ANALYTICAL REPORT

Job Number: 160-18552-1

Job Description: EA and Cabrera - Hill AFB WR111

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

Attention: Pamela J Moss

Approved for release.
Jessica H DeHerrera
Project Manager I
9/8/2016 5:44 PM

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09/08/2016

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The Lab Certification ID# is 4025.

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

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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.
¤	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: 160-18552-1

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 proceeded 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-076-SS-P-00 (160-18552-1), SU01-EXB-077-SS-P-00 (160-18552-2), SU02-EXB-078-SS-P-00 (160-18552-3), SU02-EXB-079-SS-P-00 (160-18552-4), SU03-S-080-SS-P-00 (160-18552-5), SU03-S-081-SS-P-00 (160-18552-6) and SU03-S-082-SS-P-00 (160-18552-7) 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-076-SS-P-00 (160-18552-1), SU01-EXB-077-SS-P-00 (160-18552-2), SU02-EXB-078-SS-P-00 (160-18552-3), SU02-EXB-079-SS-P-00 (160-18552-4), SU03-S-080-SS-P-00 (160-18552-5), SU03-S-081-SS-P-00 (160-18552-6) and SU03-S-082-SS-P-00 (160-18552-7) 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.

Thorium-230 was detected in method blank MB 160-266485/1-A at a level exceeding the reporting limit. However, because the result concentration was less than 1/10 the amount measured in the associated samples, no corrective action was necessary.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:
SU01-EXB-076-SS-P-00 (160-18552-1), SU01-EXB-077-SS-P-00 (160-18552-2), SU02-EXB-078-SS-P-00 (160-18552-3), SU02-EXB-079-SS-P-00 (160-18552-4), SU03-S-080-SS-P-00 (160-18552-5), SU03-S-081-SS-P-00 (160-18552-6), SU03-S-082-SS-P-00 (160-18552-7) and (160-18552-A-1-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-076-SS-P-00 (160-18552-1), SU01-EXB-077-SS-P-00 (160-18552-2), SU02-EXB-078-SS-P-00 (160-18552-3), SU02-EXB-079-SS-P-00 (160-18552-4), SU03-S-080-SS-P-00 (160-18552-5), SU03-S-081-SS-P-00 (160-18552-6), SU03-S-082-SS-P-00 (160-18552-7), (LCS 160-266485/2-A), (MB 160-266485/1-A) 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 samples is greater than the 100 keV limit (112.9 keV): SU01-EXB-076-SS-P-00 (160-18552-1). The resolution of the tracer peak in all other samples were well within the 100 keV limit indicating an anomaly isolated to this sample. 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: 160-18552-1

Client Sample ID: SU01-EXB-076-SS-P-00 — Lab Sample ID: 160-18552-1

No Detections.

Client Sample ID: SU01-EXB-077-SS-P-00 — Lab Sample ID: 160-18552-2

No Detections.

Client Sample ID: SU02-EXB-078-SS-P-00 — Lab Sample ID: 160-18552-3

No Detections.

Client Sample ID: SU02-EXB-079-SS-P-00 — Lab Sample ID: 160-18552-4

No Detections.

Client Sample ID: SU03-S-080-SS-P-00 — Lab Sample ID: 160-18552-5

No Detections.

Client Sample ID: SU03-S-081-SS-P-00 — Lab Sample ID: 160-18552-6

No Detections.

Client Sample ID: SU03-S-082-SS-P-00 — Lab Sample ID: 160-18552-7

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample ID: SU01-EXB-076-SS-P-00 — Lab Sample ID: 160-18552-1

Date Collected: 08/08/16 14:07 — **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		0.234	0.283	0.500	0.164	pCi/g	08/11/16 15:27	09/01/16 10:43	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	5.94		0.363	0.617	0.100	0.0306	pCi/g	08/25/16 09:34	09/07/16 14:28	1
Thorium-232	2.71		0.244	0.334	0.100	0.0165	pCi/g	08/25/16 09:34	09/07/16 14:28	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*78.3*		*30 - 110*	*08/25/16 09:34*	*09/07/16 14:28*	*1*

Client Sample ID: SU01-EXB-077-SS-P-00 — Lab Sample ID: 160-18552-2

Date Collected: 08/08/16 14:15 — **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	1.10		0.243	0.269	0.500	0.184	pCi/g	08/11/16 15:27	09/01/16 10:46	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	1.11		0.153	0.179	0.100	0.0289	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.87		0.197	0.252	0.100	0.0156	pCi/g	08/25/16 09:34	08/31/16 19:41	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*88.0*		*30 - 110*	*08/25/16 09:34*	*08/31/16 19:41*	*1*

Client Sample ID: SU02-EXB-078-SS-P-00 — Lab Sample ID: 160-18552-3

Date Collected: 08/08/16 13:37 — **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		0.218	0.266	0.500	0.145	pCi/g	08/11/16 15:27	09/01/16 10:47	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	1.10		0.152	0.178	0.100	0.0158	pCi/g	08/25/16 09:34	09/07/16 14:28	1
Thorium-232	1.11		0.153	0.179	0.100	0.0290	pCi/g	08/25/16 09:34	09/07/16 14:28	1

Client Sample ID: SU02-EXB-078-SS-P-00 — Lab Sample ID: 160-18552-3

Date Collected: 08/08/16 13:37 — **Matrix: Solid**
Date Received: 08/09/16 09:20

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*86.1*		*30 - 110*	*08/25/16 09:34*	*09/07/16 14:28*	*1*

Client Sample ID: SU02-EXB-079-SS-P-00 — Lab Sample ID: 160-18552-4

Date Collected: 08/08/16 14:30 — **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	1.22		0.286	0.313	0.500	0.247	pCi/g	08/11/16 15:27	09/01/16 10:49	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	1.66		0.185	0.231	0.100	0.0338	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.95		0.200	0.259	0.100	0.0283	pCi/g	08/25/16 09:34	08/31/16 19:41	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*84.3*		*30 - 110*	*08/25/16 09:34*	*08/31/16 19:41*	*1*

Client Sample ID: SU03-S-080-SS-P-00 — Lab Sample ID: 160-18552-5

Date Collected: 08/08/16 13:56 — **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	1.30		0.172	0.218	0.500	0.0983	pCi/g	08/11/16 15:27	09/01/16 11:38	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	1.62		0.184	0.229	0.100	0.0289	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.42		0.173	0.210	0.100	0.0384	pCi/g	08/25/16 09:34	08/31/16 19:41	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*87.0*		*30 - 110*	*08/25/16 09:34*	*08/31/16 19:41*	*1*

Client Sample ID: SU03-S-081-SS-P-00 — Lab Sample ID: 160-18552-6

Date Collected: 08/08/16 13:44 — **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	1.29		0.276	0.307	0.500	0.233	pCi/g	08/11/16 15:27	09/01/16 11:39	1

Client Sample ID: SU03-S-081-SS-P-00

Lab Sample ID: 160-18552-6

Date Collected: 08/08/16 13:44

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	9.09		0.437	0.880	0.100	0.0345	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	2.74		0.239	0.332	0.100	0.0289	pCi/g	08/25/16 09:34	08/31/16 19:41	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*90.2*		*30 - 110*	*08/25/16 09:34*	*08/31/16 19:41*	*1*

Client Sample ID: SU03-S-082-SS-P-00

Lab Sample ID: 160-18552-7

Date Collected: 08/08/16 13:49

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	1.55		0.256	0.302	0.500	0.156	pCi/g	08/11/16 15:27	09/01/16 11:40	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	3.67		0.277	0.414	0.100	0.0289	pCi/g	08/25/16 09:34	08/31/16 19:41	1
Thorium-232	1.69		0.188	0.236	0.100	0.0478	pCi/g	08/25/16 09:34	08/31/16 19:41	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*90.1*		*30 - 110*	*08/25/16 09:34*	*08/31/16 19:41*	*1*

Tracer/Carrier Summary

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

TestAmerica Job ID: 160-18552-1

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)**							
160-18552-1	SU01-EXB-076-SS-P-00	78.3							
160-18552-1 DU	SU01-EXB-076-SS-P-00	84.3							
160-18552-2	SU01-EXB-077-SS-P-00	88.0							
160-18552-3	SU02-EXB-078-SS-P-00	86.1							
160-18552-4	SU02-EXB-079-SS-P-00	84.3							
160-18552-5	SU03-S-080-SS-P-00	87.0							
160-18552-6	SU03-S-081-SS-P-00	90.2							
160-18552-7	SU03-S-082-SS-P-00	90.1							
LCS 160-266485/2-A	Lab Control Sample	89.1							
MB 160-266485/1-A	Method Blank	89.8							

Tracer/Carrier Legend

Th-229 = Thorium-229

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

Lab Sample ID: MB 160-264537/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267763 — **Prep Batch: 264537**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.02125	U	0.0472	0.0472	0.500	0.338	pCi/g	08/11/16 15:27	09/01/16 10:41	1

Lab Sample ID: LCS 160-264537/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267757 — **Prep Batch: 264537**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits		
Americium-241			97.1	97.82		10.3		1.20	pCi/g	101	87 - 116		
Cesium-137			29.5	29.19		3.11		0.270	pCi/g	99	87 - 120		
Cobalt-60			16.6	16.27		1.68		0.146	pCi/g	98	87 - 115		

Lab Sample ID: 160-18552-1 DU — **Client Sample ID: SU01-EXB-076-SS-P-00**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267757 — **Prep Batch: 264537**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit			RER	RER Limit
Radium-226	1.52			1.422		0.312	0.500	0.233	pCi/g			0.16	1

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

Lab Sample ID: MB 160-266485/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267479 — **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 — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267480 — **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*

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

Lab Sample ID: 160-18552-1 DU
Matrix: Solid
Analysis Batch: 268505

Client Sample ID: SU01-EXB-076-SS-P-00
Prep Type: Total/NA
Prep Batch: 266485

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit			RER	RER Limit
Thorium-230	5.94			3.855		0.433	0.100	0.0161	pCi/g			1.99	1
Thorium-232	2.71			2.264		0.291	0.100	0.0161	pCi/g			0.71	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Thorium-229	*84.3*		*30 - 110*

Rad

Leach Batch: 264089

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18552-1	SU01-EXB-076-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18552-2	SU01-EXB-077-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18552-3	SU02-EXB-078-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18552-4	SU02-EXB-079-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18552-5	SU03-S-080-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18552-6	SU03-S-081-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18552-7	SU03-S-082-SS-P-00	Total/NA	Solid	Dry and Grind	
160-18552-1 DU	SU01-EXB-076-SS-P-00	Total/NA	Solid	Dry and Grind	

Prep Batch: 264537

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18552-1	SU01-EXB-076-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18552-2	SU01-EXB-077-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18552-3	SU02-EXB-078-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18552-4	SU02-EXB-079-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18552-5	SU03-S-080-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18552-6	SU03-S-081-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
160-18552-7	SU03-S-082-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089
MB 160-264537/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-264537/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-18552-1 DU	SU01-EXB-076-SS-P-00	Total/NA	Solid	Fill_Geo-21	264089

Prep Batch: 266485

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18552-1	SU01-EXB-076-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18552-2	SU01-EXB-077-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18552-3	SU02-EXB-078-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18552-4	SU02-EXB-079-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18552-5	SU03-S-080-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18552-6	SU03-S-081-SS-P-00	Total/NA	Solid	ExtChrom	264089
160-18552-7	SU03-S-082-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	
160-18552-1 DU	SU01-EXB-076-SS-P-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: 160-18552-1

Client Sample ID: SU01-EXB-076-SS-P-00 — Lab Sample ID: 160-18552-1

Date Collected: 08/08/16 14:07
Date Received: 08/09/16 09:20
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			264537	08/11/16 15:27	R1S	TAL SL
Total/NA	Analysis	901.1		1	267758	09/01/16 10:43	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	268506	09/07/16 14:28	ALD	TAL SL

Client Sample ID: SU01-EXB-077-SS-P-00 — Lab Sample ID: 160-18552-2

Date Collected: 08/08/16 14:15
Date Received: 08/09/16 09:20
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			264537	08/11/16 15:27	R1S	TAL SL
Total/NA	Analysis	901.1		1	267756	09/01/16 10:46	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	267483	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU02-EXB-078-SS-P-00 — Lab Sample ID: 160-18552-3

Date Collected: 08/08/16 13:37
Date Received: 08/09/16 09:20
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			264537	08/11/16 15:27	R1S	TAL SL
Total/NA	Analysis	901.1		1	267755	09/01/16 10:47	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	268504	09/07/16 14:28	ALD	TAL SL

Client Sample ID: SU02-EXB-079-SS-P-00 — Lab Sample ID: 160-18552-4

Date Collected: 08/08/16 14:30
Date Received: 08/09/16 09:20
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			264537	08/11/16 15:27	R1S	TAL SL
Total/NA	Analysis	901.1		1	267754	09/01/16 10:49	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	267485	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU03-S-080-SS-P-00 — Lab Sample ID: 160-18552-5

Date Collected: 08/08/16 13:56 — **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			264537	08/11/16 15:27	R1S	TAL SL
Total/NA	Analysis	901.1		1	267758	09/01/16 11:38	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	267486	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU03-S-081-SS-P-00 — Lab Sample ID: 160-18552-6

Date Collected: 08/08/16 13:44 — **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			264537	08/11/16 15:27	R1S	TAL SL
Total/NA	Analysis	901.1		1	267760	09/01/16 11:39	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	267487	08/31/16 19:41	ALD	TAL SL

Client Sample ID: SU03-S-082-SS-P-00 — Lab Sample ID: 160-18552-7

Date Collected: 08/08/16 13:49 — **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			264537	08/11/16 15:27	R1S	TAL SL
Total/NA	Analysis	901.1		1	267761	09/01/16 11:40	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	267489	08/31/16 19:41	ALD	TAL SL

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: 160-18552-1

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.

Method Summary

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

TestAmerica Job ID: 160-18552-1

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: 160-18552-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-18552-1	SU01-EXB-076-SS-P-00	Solid	08/08/16 14:07	08/09/16 09:20
160-18552-2	SU01-EXB-077-SS-P-00	Solid	08/08/16 14:15	08/09/16 09:20
160-18552-3	SU02-EXB-078-SS-P-00	Solid	08/08/16 13:37	08/09/16 09:20
160-18552-4	SU02-EXB-079-SS-P-00	Solid	08/08/16 14:30	08/09/16 09:20
160-18552-5	SU03-S-080-SS-P-00	Solid	08/08/16 13:56	08/09/16 09:20
160-18552-6	SU03-S-081-SS-P-00	Solid	08/08/16 13:44	08/09/16 09:20
160-18552-7	SU03-S-082-SS-P-00	Solid	08/08/16 13:49	08/09/16 09:20

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18552-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
82232-334_00001	06/03/60	Eckert & Ziegler, Lot 82232-334			(Purchased Reagent)		Americium-241	7.281 Bq
							Pu-239	7.137 Bq
							Thorium-230	7.63 Bq
82233-334_00001	06/03/60	Eckert & Zigler, Lot 82233-334			(Purchased Reagent)		Americium-241	5.114 Bq
							Pu-239	6.064 Bq
							Thorium-230	4.95 Bq
82234-334_00001	06/02/60	Eckert & Zigler, Lot 82234-334			(Purchased Reagent)		Americium-241	5.652 Bq
							Pu-239	5.936 Bq
							Thorium-230	5.685 Bq
82235-334_00001	06/04/60	Eckert & Ziegler, Lot 82235-334			(Purchased Reagent)		Americium-241	7.466 Bq
							Pu-239	6.897 Bq
							Thorium-230	7.167 Bq
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
82247-334_00001	06/10/60	Eckert & Ziegler, Lot 82247-334			(Purchased Reagent)		Americium-241	6.291 Bq
							Pu-239	5.746 Bq
							Thorium-230	6.251 Bq
Marn Soil_00002	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		Americium-241	2870 Bq
							Cd-109	39231 Bq
							Ce-139	1302 Bq
							Cesium-137	1087 Bq
							Co-57	849 Bq
							Cobalt-60	1788 Bq
							Hg-203	2820 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18552-1

SDG No.:

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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18552-1

SDG No.:

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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18552-1

SDG No.:

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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18552-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
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
							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
							Y-88	1571 Bq
Tuna Can_00003	02/09/17	Eckert & Ziegler, Lot 90099			(Purchased Reagent)		Americium-241	1164 Bq
							Cd-109	16373 Bq
							Ce-139	549 Bq
							Cesium-137	467 Bq
							Co-57	362 Bq
							Cobalt-60	735 Bq
							Hg-203	1171 Bq
							Pb-210	14936 Bq
							Sn-113	967 Bq
							Y-88	1590 Bq
Tuna Can_00006	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18552-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Y-88	1568 Bq

Reagent

82232-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82232-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.630E+00	4420-4800	7.540E+04	0.7	1.1	2.6
Pu-239	7.137E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	7.281E+00	5280-5600	4.326E+02	0.7	1.1	2.6
Total Activity	2.210E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82233-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82233-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	4.950E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.064E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	5.114E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.616E+01	3000-8000		0.1	1.1	2.2

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82234-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82234-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 2-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.685E+00	4420-4800	7.540E+04	0.9	1.1	2.8
Pu-239	5.936E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	5.652E+00	5280-5600	4.326E+02	0.9	1.1	2.8
Total Activity	1.732E+01	3000-8000		0.5	1.1	2.4

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82235-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82235-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 4-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.167E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.897E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	7.466E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.161E+01	3000-8000		0.5	1.1	2.4

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06·24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82237-334_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82237-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 1-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	6.424E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	5.608E+00	5280-5600	4.326E+02	1.0	1.1	3.0
Total Activity	1.793E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82240-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82240-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.304E+00	4420-4800	7.540E+04	0.9	1.1	2.8
Pu-239	7.163E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	8.298E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.182E+01	3000-8000		0.5	1.1	2.4

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82241-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82241-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.629E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.797E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.638E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.011E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82242-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82242-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.583E+00	4420-4800	7.540E+04	0.9	1.1	2.8
Pu-239	6.414E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	7.145E+00	5280-5600	4.326E+02	0.9	1.1	2.8
Total Activity	2.018E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82243-334_00001

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
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Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82243-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	5.979E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.390E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.827E+01	3000-8000		0.3	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1966

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82244-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82244-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.352E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.717E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	6.897E+00	5280-5600	4.326E+02	0.9	1.1	2.8
Total Activity	2.101E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82245-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
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Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82245-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.727E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	5.437E+00	4950-5240	2.410E+04	1.1	1.1	3.1
Am-241	5.528E+00	5280-5600	4.326E+02	1.1	1.1	3.1
Total Activity	1.773E+01	3000-8000		0.8	1.1	2.7

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06·24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82247-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82247-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 10-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.251E+00	4420-4800	7.540E+04	0.9	1.1	2.8
Pu-239	5.746E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	6.291E+00	5280-5600	4.326E+02	0.9	1.1	2.8
Total Activity	1.832E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

Gamma Ampuole_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: [signature] for
W. Mao, Radiochemist

QA Approved: [signature] Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Gamma Ampuole_00003

Eckert & Ziegler
Analytics

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Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

83725-334
5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
5.30203 grams 4M HCl solution with approximately 30 μg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: MITaskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13/JAN/11
J. D. McCorvey, QA Manager Alternate

Reagent

Marn Soil_00002

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83814-334

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: Test America St. Louis
P.O. No.: 2395112, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.016927

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8.120E+03	———	3.021E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.090E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	2.873E+03	0.8	2.3	4.9	HPGe
Co-57	122.1	2.718E+02	8.711E+04	1.475E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	2.111E+03	0.5	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	4.660E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	2.994E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	1.877E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.224E+05	7.150E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	3.626E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	3.627E+03	0.6	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	7.570E+03	0.5	1.9	3.9	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
1550 grams of sand. Homogeneous down to 10 gram aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 2/11/11
J. D. McCorvey, QA Manager Alternate

Reagent

MarnSolid_00002

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
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Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

90099

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: TestAmerica St. Louis / Earth City, MO
P.O. No.: 2454150, Item 1
Reference Date: 01-Jan-2012 12:00 PM EST **Grams of Master Source:** 0.017180

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Additional radionuclides were added gravimetrically from solutions calibrated by gamma-ray spectrometry, ionization chamber, or liquid scintillation counting. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty*, % Type u_A	u_B	U	Calibration Method*
Pb-210	46.5	8.109E+03	———	3.094E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.037E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.677E+05	2.881E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.795E+04	1.511E+03	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.245E+05	2.139E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.707E+05	4.651E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.755E+05	3.015E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.128E+05	1.938E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.228E+05	7.264E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.084E+05	3.580E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.084E+05	3.581E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.476E+05	7.690E+03	0.7	1.9	4.0	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
1550 grams of sand. Homogenous down to 10 grams aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 30 JAN 12
J.D. McCorvey, Counting Room Manager

Reagent

Source A_00001

Eckert & Ziegler
Analytics

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www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: [signature] for
W. Mao, Radiochemist

QA Approved: [signature] Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source C_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: [signature] for
W. Mao, Radiochemist

QA Approved: [signature] Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source D_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: [signature] for
W. Mao, Radiochemist

QA Approved: [signature] Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source E_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

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Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: [signature] for
W. Mao, Radiochemist

QA Approved: [signature] Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source F_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

83725-334
5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355
Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Comments:
5.30203 grams 4M HCl solution with approximately 30 μg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: MITaskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13/JAN/11
J. D. McCorvey, QA Manager Alternate

Reagent

Source H_00002

Eckert & Ziegler
Analytics

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Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

83725-334
5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
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(Certificate continued on reverse side)

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This standard will expire one year after the reference date.

Source Prepared by: MITaskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13/JAN/11
J. D. McCorvey, QA Manager Alternate

Reagent

Source I_00001

Eckert & Ziegler
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CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

83725-334
5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

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Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
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(Certificate continued on reverse side)

Corporate Office
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Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

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This standard will expire one year after the reference date.

Source Prepared by: MITaskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13/JAN/11
J. D. McCorvey, QA Manager Alternate

Reagent

Th-229_00016

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
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Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

97790

Th-229 5 mL Liquid in Flame Sealed Vial

430569
ID: Th-229_00016
Exp:08/06/64 Prpd:SCB Opn:08/20/14
Th-229 Ampoule

Customer: TestAmerica - St. Louis
P.O. No.: 2573570, Item 1 Product Code: 8229

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-229	2.681E+06	3.761E+03	0.5	1.5	3.1	08/06/2014

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities: Th-228 2.83E-01 Bq, Th-230 2.33E+01 Bq, Th-232 1.51E0 Bq; γ-impurities (other than decay products)<0.1%.
5.08156 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved: _____ Date: 06 AUG 14
A. Chen, Spectroscopist

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

ANA Form005 Rev. —

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

Certificate of Participation

Eckert & Ziegler Analytics
Atlanta, Georgia

is a participant for the period January 1, 2014, through December 31, 2014, in a radioactivity measurements assurance program conducted by the National Institute of Standards and Technology, in cooperation with NRMAP Incorporated. Continued participation is evidenced by dated Reports of Traceability issued for particular radionuclides, which indicate the deviation of the participant's reported value from that measured by the National Institute of Standards and Technology. The significance of these Reports is addressed below.*

For the Director,

Michael P. Unterweger, Leader
Radioactivity Group
Physical Measurement Laboratory

*As guidance for the proper use of Reports of Traceability, it should be emphasized that the National Institute of Standards and Technology is concerned only with fostering good measurements capability and consistency with the national measurements system. The assurance of the proper application of that capability to the ultimate consumer products is the responsibility of each manufacturer of these products and of the Federal regulatory agencies.

A continuing traceability program in radioactivity demonstrates, to the degree established by the periodic assays of calibrated radioactivity samples, a continuing competence to maintain the methods and standards necessary for accurate measurement. Such a program cannot, however, endorse each and every measurement nor the final product, any more than a spot check can vouch for every unchecked item. Care should be taken, therefore, not to imply such endorsement. The proper use of this Report is governed by section 200.114 of Title 15 of the Code of Federal Regulations. These regulations may be met if Reports are quoted only in their entirety. Excerpts out of context may be misleading.

1380 Seaboard Industrial Boulevard
Atlanta, Georgia 30318 USA
Phone (404) 352-8677 • Fax (404) 352-2837
Email: analytics@ezag.com (Tax EIN: 58-1406082)

Eckert & Ziegler
Analytics

Recommended Procedure for Opening the Flame Sealed Vial

1) If the solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the standard.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood.

3) Shake the vial to wet the entire inside surface of the vial. Return the vial to the upright position.

4) Check that all of the liquid has drained out of the neck of the vial. If necessary, gently tap the neck to speed the process.

5) The Wheaton vials we use are pre-scored.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the vial upright and wrap with soft tissue, such as Chem Wipes, around the tip of the vial and secure with tape (see picture). Snap off the top of the vial by pressing the pre-scored part of the neck away towards you while pulling the tip of the vial away from you.

8) Transfer the solution from the vial using a pycnometer or pipet with a dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused solution in a flame sealed glass vial, if possible, to minimize the evaporation loss.

Reagent

Th-229_00021

Standard ID Number: Th-229_00021
True Value = 67.217 Dpm/mL
Date Analyzed: 8/1/2016

Radionuclide: Th-229

	Replicates	
#1	65.43	Dpm/mL
#2	62.76	Dpm/mL
#3	66.9	Dpm/mL

Mean = 65.03

1 sigma = 2.09878536

1.96 sigma = 4.113619

True Value minus 5% = 63.85615 (True Value - 5%)
True Value plus 5% = 70.57785 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: ALD 8/2/16

2nd Reviewed By/Date: RM 8·3·16

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Th - 229 _ 00021

Reagent ID: Th-229_00021

		Expiration Date:	12/01/2016
Description:	Th-229 Tracer	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Bernsen, Sarah C
Storage Location:	RAD Actinide STDs	Solvent:	0.1M HNO3
Reagent Volume:	500.000 mL	Solvent Lot:	n/a
Creation Date:	07/20/2016		
Open Date:			
Container(s):	957642		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
At-217	Th-229_00017	08/05/2016	2240.98600	dpm/mL	67.22958	dpm/mL
Th-229	Th-229_00017	08/05/2016	2240.98600	dpm/mL	67.22958	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Th-229_00017	Th-229 Parent		08/05/16				15.00000	mL

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	8/6/2014 0:00		
Decayto Date/Time (t):	8/1/16 0:00		
Initial Activity (A_0):	67.23 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	67.229 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Th-229		
Half-Life (days):	2897163	decay days	fraction
****Decay Factor:**	0.9998	726.00	0.00025
Decay Corr Activity:	6.7217E+01 dpm		
Decay Corr Conc:	6.7217E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	6.7217E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	6.7217E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:03:02AM 8/2/2016

Sample

Sample Name: Verification 1 Type: Sample
Spectrum #1 Analysis #1

Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th-229_00021
AnalysisResultsID: 172960
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

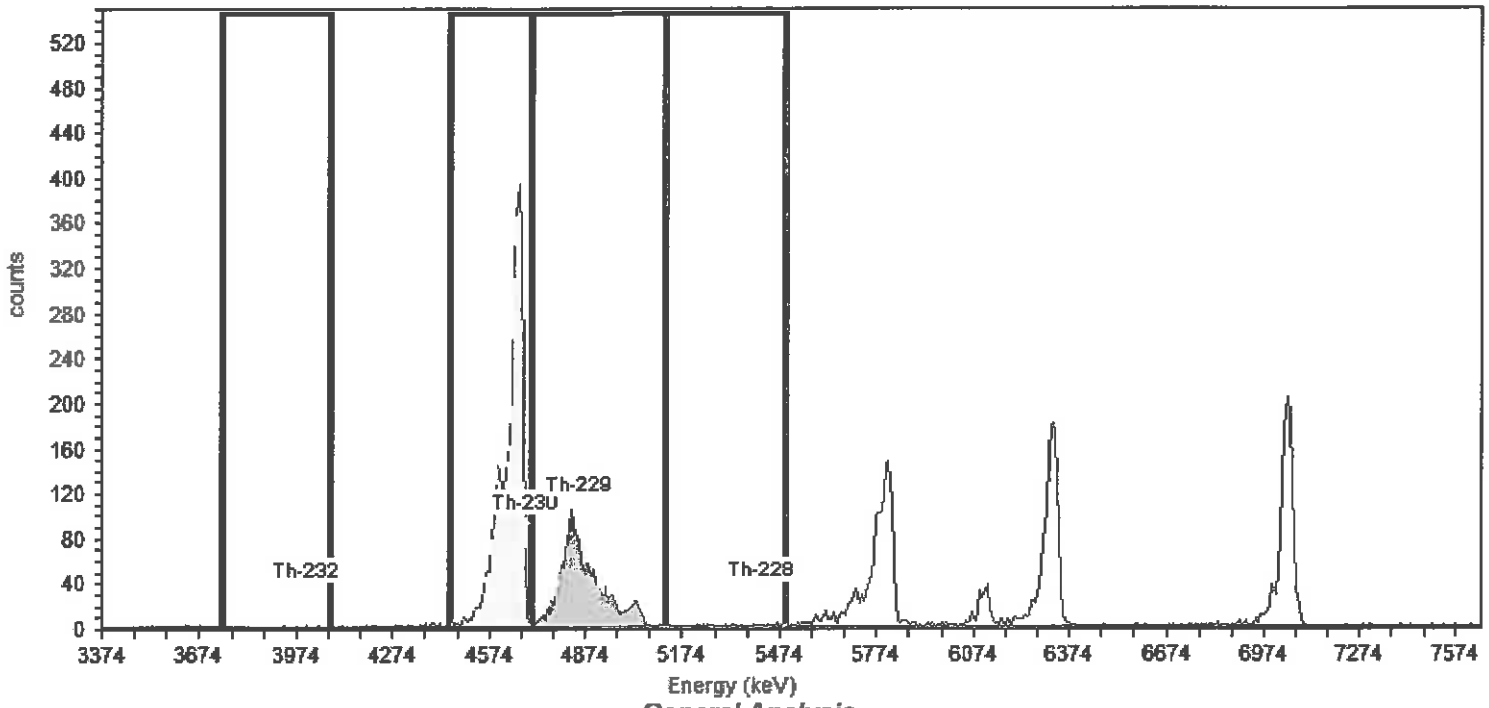
Tracer Name: Th-230_00029
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:19:32AM

Tracer Nuclide: Th-230
Tracer Recovery: 97.09%

Acquisition

Detector: AV170 SN: 50-112 G7
Acquisition Start Date: 8/1/2016 2:01:38PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 7/25/2016 1:14:05PM
Bkgd Info: Sample: ICB;AV170; Det: AV170; Spectrum #1; 7/25/2016 1:14:05 PM

Energy Calibration: IC-9795;AV170-20151016
Efficiency Calibration:IC-9795;AV170-20151016
Calibration Date: 10/17/2015 2:36:50PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.95% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Interactive ROI Analysis
Decay Correction:8/1/2016 2:00:42PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	9.9	100.2	4	0.0000	4.00	1.650E-001	DPM/mL
Th-230	4688.0	4,687.5	0.5	4448.3	4701.9	22.4	99.7	3225	1.0000	3224.00	1.298E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4701.9	5119.5	98.2	99.6	1580	3.0000	1577.00	6.543E+001	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	28.8	99.8	30	18.0000	12.00	4.973E-001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:59:33AM 8/2/2016

Sample

Sample Name: Verification 2 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th-229_00021
AnalysisResultsID: 172958
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

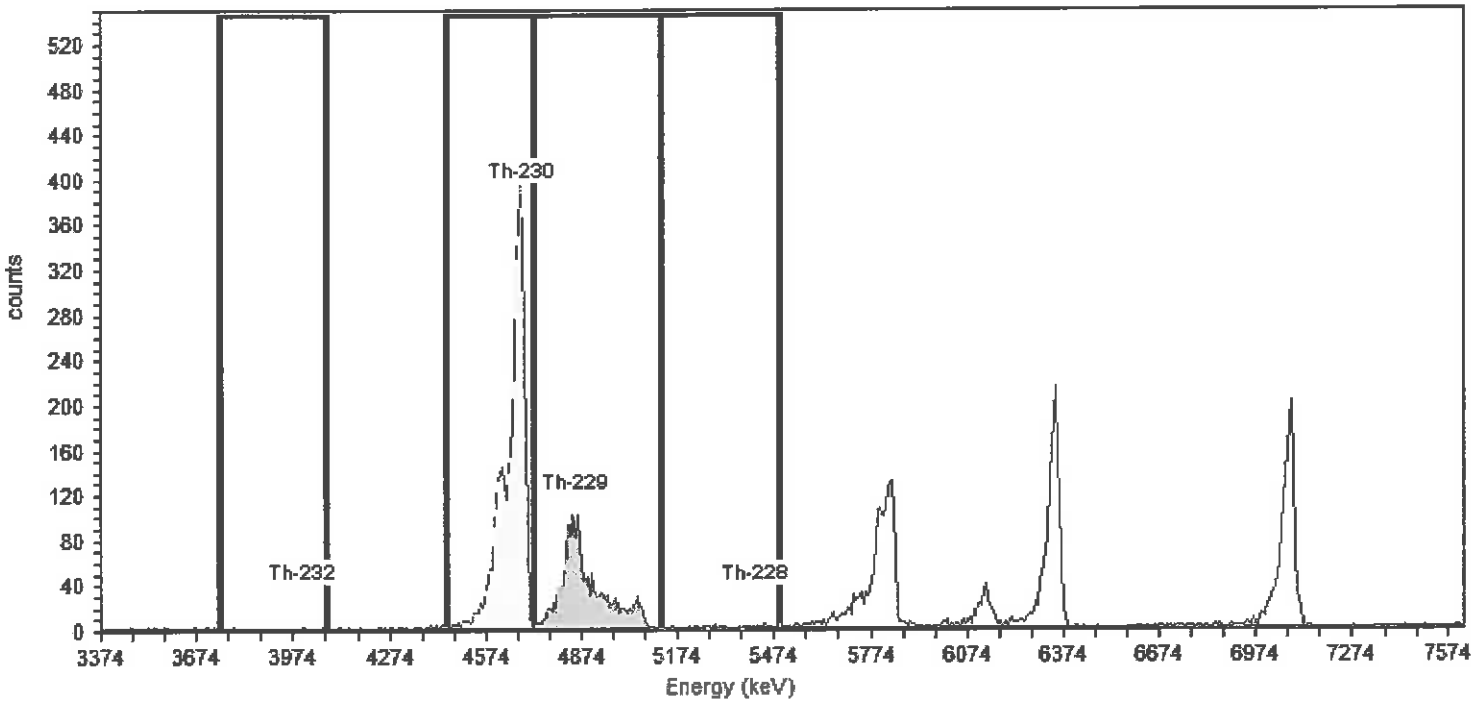
Tracer Name: Th-230_00029
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:19:32AM

Tracer Nuclide: Th-230
Tracer Recovery: 105.76%

Acquisition

Detector: AV171 SN: 50-112 Y2
Acquisition Start Date: 8/1/2016 2:01:38PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Background Date: 7/22/2016 3:43:34PM
Bkgd Info: Sample: ICB;AV171; Det: AV171; Spectrum #1; 7/22/2016 3:43:34 PM

Energy Calibration: IC-9817;AV171-20151016
Efficiency Calibration:IC-9817;AV171-20151016
Calibration Date: 10/17/2015 2:36:53PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.59% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Interactive ROI Analysis
Decay Correction:8/1/2016 2:00:42PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-229	4848.0	4,845.3	2.7	4724.2	5119.5	77.3	99.6	1565	4.0000	1561.00	6.276E+001	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	16.4	99.8	40	19.0866	20.65	8.294E-001	DPM/mL
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	322.3	100.2	4	2.0000	1.85	7.397E-002	DPM/mL
Th-230	4688.0	4,687.5	0.5	4448.3	4724.2	31.3	99.7	3327	0.0000	3327.00	1.414E+002	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:58:04AM 8/2/2016

Sample

Sample Name: Verification 3 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th-229_00021
AnalysisResultsID: 172954
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

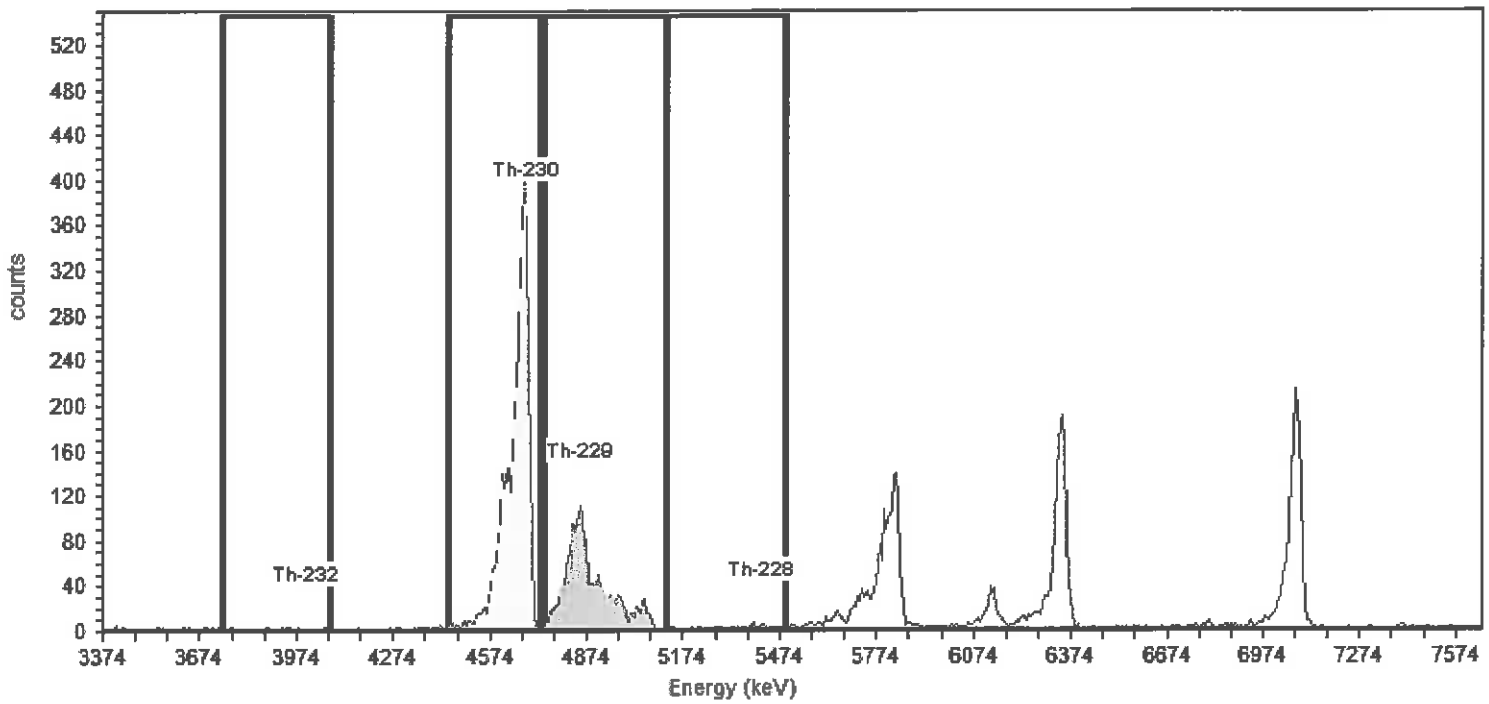
Tracer Name: Th-230_00029
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:19:32AM

Tracer Nuclide: Th-230
Tracer Recovery: 101.01%

Acquisition

Detector: AV173 SN: 50-112 Y4
Acquisition Start Date: 8/1/2016 2:01:39PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Background Date: 7/25/2016 1:14:05PM
Bkgd Info: Sample: ICB;AV173; Det: AV173; Spectrum #1; 7/25/2016 1:14:05 PM

Energy Calibration: IC-9885;AV173-20151016a
Efficiency Calibration:IC-9885;AV173-20151016a
Calibration Date: 10/17/2015 2:37:06PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.59% +/- 0.38% TPU(2 sigma)



General Analysis

Analysis Method: Interactive ROI Analysis
Decay Correction:8/1/2016 2:00:42PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	10.3	100.2	8	2.0000	5.57	2.243E-001	DPM/mL
Th-230	4688.0	4,687.5	0.5	4440.8	4731.7	47.8	99.7	3309	2.0000	3307.00	1.350E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4739.1	5119.5	76.7	99.6	1657	3.0000	1654.00	6.690E+001	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	105.5	99.8	42	12.9361	28.98	1.171E+000	DPM/mL

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Th-229 Tracer (New) by Coppt.

Aliquot Only

Batch No. : ____

Balance ID : ____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver. 1		170	
2	2		171	
3	3		173	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : Th-230

Std Sol'n No. : Th-230-

Vol (mL) : 0.3

Ref Activity (dpm/mL) :

Act Ref Date :

Samples Spiked and Traced By: SLB 7/25/16 (Initials / Date)

Verification Signature & Date: km 7-25-16 (Initials / Date)

LCS Standard ☐ N/A

Initials / Date

Isotope : Th-229

Std Sol'n ID. : Th-229-00021

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 67.229

Act Ref Date : 08-06-14

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐	ST-RC-0003 Rev.	☐	ST-RC-0040 Rev.	☐	ST-RC-0110 Rev.		
☐	ST-RC-0004 Rev.	☐	ST-RC-0041 Rev.	☐	ST-RC-0120 Rev.		
☐	ST-RC-0014 Rev.	☐	ST-RC-0050 Rev.	☐	ST-RC-0232 Rev.		
☐	ST-RC-0020 Rev.	☐	ST-RC-0090 Rev.	☐	ST-RC-0238 Rev.		
☐	ST-RC-0021 Rev.	☑	ST-RC-0100 Rev.	☐	ST-RC-0240 Rev.		
				☐	ST-RC-0241 Rev.		
				☑	ST-RC-0242 Rev.		
				☐	ST-RC-5016 Rev.		
				☐			
				☐			

Isotope(s)

αβ	☐	Iso Pu	☐	Tc-99	☐	Iso Cm	☐
Iso Am	☐	Ra	☐	Iso Th	☑	Pu-241	☐
KPA	☐	Sr	☐	Iso U	☐	Th-229	☐
Np	☐	TAR	☐	C-14	☐	Cl-36	☐

Count Time		Matrix	
Long Count	☑	Soil	☐
Short Count	☐	H_2O	☐

Prepared By : ____

Date : ____

Reviewed by: ____

Date: ____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

Reagent

TRM-2_00001

Perry, Doug E

From: Salmi, Douglas R
Sent: March 20, 2000 10:48 AM
To: Perry, Doug E; Puissant, Pamela M
Subject: FW: SRMs for radiochemistry LCSs

Pam, Doug
FYI

-----Original Message-----
From: Minteer@aol.com [mailto:Minteer@aol.com]
Sent: March 20, 2000 10:36 AM
To: drsalmi@sandia.gov
Cc: dbourne@doeal.gov; GLDechant@aol.com; crandallb@quanterra.com
Subject: SRMs for radiochemistry LCSs

Doug:

As we discussed by telephone, please send approximately 500 grams each of PEM-1, TRM-2, and NBHD to STL St. Louis. These are to be used by STL as laboratory control samples. As with our other laboratories, STL will be asked to provide summaries of the data obtained in quarterly progress reports. This is not to assess their proficiency, but rather to help us develop interlaboratory acceptance criteria. The known values (given below) for PEM and TRM are good because the samples are well characterized. The known values for NBHD result from a single analysis and hence should be taken as estimates. All the values below are in pCi/g.

PEM-1:

Parameter	Result	Std. Dev.
Pu-238	8.03	0.37
Pu-239	41.0	3.0
Am-241	32.5	1.1
Cs-137	73.5	0.9
U-234	5.99	0.2
U-235	0.27	0.04
U-238	18.1	0.5

TRM-2

Parameter	Result	Uncertainty
U-238	6.0	+/- 4.0
U-234	6.2	+/- 4.0
Th-230	24.5	+/- 0.6
Ra-226	25.4	+/- 0.9
Pb-210	22.1	+/- 1.2

NBHD

Parameter	Result	Uncertainty
Am-241	1.47	+/- 0.28
Ra-226	67.3	+/- 5.5
U-234	174	none available
U-235	8.7	"
U-238	212	"
Cs-137	52.1	+/- 4.6
Pb-210	78.3	+/- 2.4
Pu-239/40	4.7	+/- 0.63
Pu-238	0.3	+/- 0.11
Th-230	83.4	+/- 6.5

Reagent

Tuna Can LCS_00005

St. Louis Radiological Standard Reverification Form

Standard ID Number: Tuna Can LCS_00005 (776670)
True Value = 30.08 pCi/g
Date Analyzed: 10/25/2015

Radionuclide: Gamma LCS Cs-137

	Replicates	
#1	30	pCi/g
#2	29.42	pCi/g
#3	28.95	pCi/g

Mean = 29.45667

1 sigma = 0.525959

1.96 sigma = 1.030881

True Value minus 5% = 28.576 (True Value - 5%)
True Value plus 5% = 31.584 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 10/29/15

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Tuna Can LCS_00005 (776670)
True Value = 97.23 pCi/g
Date Analyzed: 10/25/2015

Radionuclide: Gamma LCS Am-241

	Replicates	
#1	96.82	pCi/g
#2	97.14	pCi/g
#3	97.26	pCi/g

Mean = 97.07333

1 sigma = 0.22745

1.96 sigma = 0.445801

True Value minus 5% = 92.3685 (True Value - 5%)
True Value plus 5% = 102.0915 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 10/29/15

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Tuna Can LCS_00005 (776670)
True Value = 18.6 pCi/g
Date Analyzed: 10/25/2015

Radionuclide: Gamma LCS Co-60

	Replicates	
#1	17.74	pCi/g
#2	18.7	pCi/g
#3	17.74	pCi/g

Mean = 18.06

1 sigma = 0.554256

1.96 sigma = 1.086342

True Value minus 5% = 17.67 (True Value - 5%)
True Value plus 5% = 19.53 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 10/29/15

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 217910 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-217910~2-	LCS	341.90g	1.00	GammaVision	GV01	10 / 25 / 15 16:00	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	11136	6.771E-001pCi/g	2.800E-001	2.778E-001	1.003E+000	4.849E-001	0.68
AG-108M	10982	-6.779E-003pCi/g	1.235E-002	1.235E-002	2.560E-001	1.249E-001	-0.03
AG-110M	10973	8.663E-003pCi/g	1.112E-001	1.112E-001	3.788E-001	1.830E-001	0.02
AM-241	10818	9.682E+001pCi/g	5.076E+000	7.243E-001	1.019E+000	5.045E-001	95.00
BA-133	10469	1.494E-002pCi/g	8.071E-002	8.071E-002	2.729E-001	1.325E-001	0.05
BA-140	10463	1.374E-001pCi/g	2.240E-001	2.238E-001	7.542E-001	3.638E-001	0.18
BE-7	10435	0.000E+000pCi/g	3.925E-001	3.925E-001	2.266E+000	1.104E+000	0.00
BI-207	10195	-2.705E-003pCi/g	5.167E-002	5.167E-002	1.770E-001	8.502E-002	-0.02
BI-210M	10173	8.461E-002pCi/g	9.172E-002	9.158E-002	3.052E-001	1.486E-001	0.28
BI-212	10160	5.691E-002pCi/g	6.570E-001	6.570E-001	2.266E+000	1.080E+000	0.03
BI-214	10154	5.973E-001pCi/g	1.858E-001	1.832E-001	3.511E-001	1.678E-001	1.70
CD-109	9254	9.357E+000pCi/g	3.288E+000	3.246E+000	3.163E+000	1.546E+000	2.96
CD-113M	17462	-1.418E+002pCi/g	7.297E+002	7.296E+002	2.462E+003	1.198E+003	-0.06
CE-139	9241	-3.471E-002pCi/g	4.795E-002	4.783E-002	1.596E-001	7.801E-002	-0.22
CE-141	9235	1.101E-001pCi/g	6.681E-002	6.657E-002	2.193E-001	1.068E-001	0.50
CE-144	9221	-1.962E-001pCi/g	3.271E-001	3.269E-001	1.092E+000	5.343E-001	-0.18
CF-249	9215	-9.471E-002pCi/g	9.312E-002	9.299E-002	3.094E-001	1.508E-001	-0.31
CF-251	13690	9.783E-002pCi/g	2.187E-001	2.185E-001	7.329E-001	3.576E-001	0.13
CO-56	8704	-4.255E-002pCi/g	7.343E-002	7.340E-002	2.477E-001	1.193E-001	-0.17
CO-57	13694	3.299E-002pCi/g	4.336E-002	4.333E-002	1.444E-001	7.069E-002	0.23
CO-58	8698	-4.234E-003pCi/g	6.516E-002	6.516E-002	2.232E-001	1.072E-001	-0.02
CO-60	8692	1.774E+001pCi/g	9.138E-001	2.049E-001	6.716E-002	2.728E-002	264.12
CR-51	8604	3.076E-001pCi/g	4.401E-001	4.398E-001	1.475E+000	7.149E-001	0.21
CS-134	8553	2.831E-002pCi/g	5.517E-002	5.515E-002	1.867E-001	8.973E-002	0.15
CS-136	8546	-1.109E-001pCi/g	7.217E-002	7.189E-002	2.373E-001	1.142E-001	-0.47
CS-137	8539	3.000E+001pCi/g	1.596E+000	3.338E-001	2.346E-001	1.129E-001	127.87
EU-152	7145	2.877E-001pCi/g	2.421E-001	2.417E-001	6.269E-001	3.045E-001	0.46
EU-154	7138	1.536E-001pCi/g	1.711E-001	1.709E-001	2.192E+000	1.058E+000	0.07
EU-155	7131	4.023E-002pCi/g	1.795E-001	1.795E-001	6.019E-001	2.949E-001	0.07
FE-59	7073	5.086E-002pCi/g	8.161E-002	8.157E-002	4.958E-001	2.382E-001	0.10
GA-68	18005	-1.209E+000pCi/g	2.759E+000	2.758E+000	9.368E+000	4.493E+000	-0.13
GD-153	6824	-3.997E-003pCi/g	1.316E-001	1.316E-001	4.420E-001	2.167E-001	-0.01
HF-181	6495	9.445E-002pCi/g	6.542E-002	6.524E-002	2.322E-001	1.124E-001	0.41
HG-203	6466	-3.305E-002pCi/g	5.989E-002	5.986E-002	2.006E-001	9.778E-002	-0.16
I-131	6380	6.854E-002pCi/g	6.647E-002	6.638E-002	2.080E-001	1.010E-001	0.33
IR-192	6303	-3.750E-002pCi/g	5.981E-002	5.977E-002	2.001E-001	9.748E-002	-0.19
K-40	6148	-1.766E-002pCi/g	3.281E-001	3.281E-001	1.273E+000	5.734E-001	-0.01
LA-140	6096	5.379E-002pCi/g	4.255E-002	4.246E-002	1.212E-001	5.304E-002	0.44
MN-54	5382	3.726E-002pCi/g	6.608E-002	6.605E-002	2.235E-001	1.073E-001	0.17
NA-22	5201	2.193E-002pCi/g	3.156E-002	3.154E-002	1.109E-001	4.933E-002	0.20
NB-94	5160	-7.036E-002pCi/g	5.947E-002	5.936E-002	1.977E-001	9.485E-002	-0.36
NB-95	5154	3.994E-002pCi/g	5.496E-002	5.493E-002	1.856E-001	8.861E-002	0.22
ND-147	5083	-4.022E-002pCi/g	4.368E-001	4.368E-001	1.486E+000	7.183E-001	-0.03
NP-237	4757	-4.170E-001pCi/g	3.829E-001	3.821E-001	1.266E+000	6.228E-001	-0.33
NP-239	4751	-3.998E-004pCi/g	1.579E-001	1.579E-001	5.314E-001	2.601E-001	0.00
PA-231	4541	1.362E+000pCi/g	8.851E-001	8.820E-001	4.992E+000	2.420E+000	0.27
PA-233	4535	1.538E-001pCi/g	1.053E-001	1.050E-001	4.596E-001	2.236E-001	0.33
PA-234	4528	-1.000E-001pCi/g	2.035E-001	2.034E-001	6.804E-001	3.330E-001	-0.15
PA-234M	19453	-4.676E-001pCi/g	9.603E+000	9.603E+000	3.283E+001	1.580E+001	-0.01
PB-210	4467	8.549E+002pCi/g	5.089E+001	8.359E+000	1.428E+001	7.079E+000	59.88

PB-212	4454	**3.866E-001**pCi/g	1.254E-001	1.229E-001	3.210E-001	1.563E-001	1.20
PB-214	4448	**3.785E-001**pCi/g	1.361E-001	1.347E-001	4.828E-001	2.350E-001	0.78
PM-144	19585	**4.119E-002**pCi/g	3.554E-002	3.548E-002	1.884E-001	9.023E-002	0.22
PM-146	2464	**3.014E-002**pCi/g	1.161E-001	1.161E-001	5.435E-001	2.596E-001	0.06
RH-106	1882	**-2.180E-001**pCi/g	1.994E-001	1.991E-001	2.012E+000	9.694E-001	-0.11
RU-103	1828	**0.000E+000**pCi/g	5.216E-002	5.216E-002	2.468E-001	1.200E-001	0.00
SB-124	1784	**4.494E-003**pCi/g	5.524E-002	5.524E-002	1.889E-001	9.084E-002	0.02
SB-125	1777	**2.356E-001**pCi/g	2.342E-001	2.338E-001	7.180E-001	3.497E-001	0.33
SC-46	1739	**9.344E-002**pCi/g	5.627E-002	5.606E-002	2.546E-001	1.226E-001	0.37
SN-113	1570	**-5.143E-002**pCi/g	9.312E-002	9.309E-002	3.121E-001	1.520E-001	-0.16
SN-126	17459	**5.835E-002**pCi/g	5.783E-001	5.783E-001	1.938E+000	9.517E-001	0.03
TA-182	1301	**1.840E-003**pCi/g	2.175E-001	2.175E-001	7.482E-001	3.582E-001	0.00
TC-99M	17412	**2.645E-002**pCi/g	4.239E-002	4.236E-002	1.415E-001	6.920E-002	0.19
TH-227	1058	**2.617E+000**pCi/g	1.856E+000	1.850E+000	6.105E+000	3.024E+000	0.43
TH-229	1046	**9.577E-002**pCi/g	1.073E-001	1.070E-001	3.470E+000	1.699E+000	0.03
TH-234	1027	**7.930E-002**pCi/g	7.788E-002	7.777E-002	5.067E+000	2.489E+000	0.02
TL-208	929	**1.848E-001**pCi/g	8.785E-002	8.733E-002	2.310E-001	1.114E-001	0.80
U-235	281	**8.439E-002**pCi/g	1.008E-001	1.007E-001	9.972E-001	4.863E-001	0.08
Y-88	74	**-2.520E-002**pCi/g	8.904E-002	8.903E-002	3.017E-001	1.458E-001	-0.08
ZN-65	31	**-9.888E-002**pCi/g	1.701E-001	1.700E-001	5.742E-001	2.762E-001	-0.17
ZR-95	7	**8.948E-002**pCi/g	8.129E-002	8.116E-002	3.492E-001	1.669E-001	0.26

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-217910~2-A	LCS 160-217910~2-A	CS-137	3.000E+001	pCi/g	3.008E+001	99.72%	-0.0379
		CO-60	1.774E+001	pCi/g	1.860E+001	95.37%	-0.6506
		AM-241	9.682E+001	pCi/g	9.723E+001	99.58%	-0.0565

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor
MB 160-217910~1-A	MB	AC-228	4.303E-002	4.671E-002	0.9214
MB 160-217910~1-A	MB	AG-108M	5.251E-003	5.684E-003	0.9238
MB 160-217910~1-A	MB	AG-110M	-1.714E-002	2.621E-002	-0.6542
MB 160-217910~1-A	MB	AM-241	-1.074E-002	2.656E-002	-0.4043
MB 160-217910~1-A	MB	BA-133	8.629E-003	1.742E-002	0.4954
MB 160-217910~1-A	MB	BA-140	1.558E-002	5.153E-002	0.3023
MB 160-217910~1-A	MB	BE-7	2.157E-003	9.785E-002	0.0220
MB 160-217910~1-A	MB	BI-207	1.116E-002	1.404E-002	0.7947
MB 160-217910~1-A	MB	BI-210M	1.161E-002	2.003E-002	0.5795
MB 160-217910~1-A	MB	BI-212	-6.519E-004	1.749E-001	-0.0037
MB 160-217910~1-A	MB	BI-214	-3.620E-002	1.629E-001	-0.2222
MB 160-217910~1-A	MB	CD-109	1.434E-001	1.674E-001	0.8566
MB 160-217910~1-A	MB	CD-113M	0.000E+000	1.045E+002	0.0000
MB 160-217910~1-A	MB	CE-139	1.578E-003	8.340E-003	0.1892
MB 160-217910~1-A	MB	CE-141	1.422E-002	1.284E-002	1.1075
MB 160-217910~1-A	MB	CE-144	4.109E-002	5.187E-002	0.7922
MB 160-217910~1-A	MB	CF-249	-5.027E-003	1.126E-002	-0.4467
MB 160-217910~1-A	MB	CF-251	4.859E-003	5.226E-002	0.0930
MB 160-217910~1-A	MB	CO-56	8.053E-003	1.466E-002	0.5492
MB 160-217910~1-A	MB	CO-57	0.000E+000	3.213E-003	0.0000
MB 160-217910~1-A	MB	CO-58	0.000E+000	1.250E-002	0.0000
MB 160-217910~1-A	MB	CO-60	-1.064E-002	2.053E-002	-0.5180
MB 160-217910~1-A	MB	CR-51	1.172E-001	6.390E-002	1.8350
MB 160-217910~1-A	MB	CS-134	9.570E-003	1.221E-002	0.7837
MB 160-217910~1-A	MB	CS-136	3.486E-003	1.564E-002	0.2228
MB 160-217910~1-A	MB	CS-137	9.350E-003	1.111E-002	0.8412
MB 160-217910~1-A	MB	EU-152	2.175E-002	4.360E-002	0.4989
MB 160-217910~1-A	MB	EU-154	4.973E-002	3.892E-002	1.2779
MB 160-217910~1-A	MB	EU-155	1.249E-002	1.540E-002	0.8106
MB 160-217910~1-A	MB	FE-59	1.620E-002	2.388E-002	0.6781
MB 160-217910~1-A	MB	GA-68	0.000E+000	1.259E-001	0.0000
MB 160-217910~1-A	MB	GD-153	-7.436E-003	2.145E-002	-0.3466
MB 160-217910~1-A	MB	HF-181	3.207E-003	4.689E-003	0.6839
MB 160-217910~1-A	MB	HG-203	-1.192E-003	1.116E-002	-0.1067
MB 160-217910~1-A	MB	I-131	2.131E-002	1.517E-002	1.4047
MB 160-217910~1-A	MB	IR-192	1.091E-003	6.973E-003	0.1565
MB 160-217910~1-A	MB	K-40	-4.508E-001	8.911E+000	-0.0506
MB 160-217910~1-A	MB	LA-140	0.000E+000	5.961E-003	0.0000
MB 160-217910~1-A	MB	MN-54	-1.135E-002	1.784E-002	-0.6362
MB 160-217910~1-A	MB	NA-22	0.000E+000	4.741E-003	0.0000
MB 160-217910~1-A	MB	NB-94	2.773E-004	1.092E-002	0.0254
MB 160-217910~1-A	MB	NB-95	7.816E-004	1.302E-002	0.0600
MB 160-217910~1-A	MB	ND-147	4.997E-002	8.625E-002	0.5794
MB 160-217910~1-A	MB	NP-237	1.411E-002	3.697E-002	0.3816
MB 160-217910~1-A	MB	NP-239	1.903E-002	2.441E-002	0.7798
MB 160-217910~1-A	MB	PA-231	5.945E-002	5.603E-002	1.0610
MB 160-217910~1-A	MB	PA-233	2.561E-002	2.422E-002	1.0574
MB 160-217910~1-A	MB	PA-234	2.390E-002	2.381E-002	1.0038
MB 160-217910~1-A	MB	PA-234M	-1.176E+000	2.117E+000	-0.5557
MB 160-217910~1-A	MB	PB-210	0.000E+000	1.332E-001	0.0000
MB 160-217910~1-A	MB	PB-212	0.000E+000	1.627E-002	0.0000
MB 160-217910~1-A	MB	PB-214	5.054E-002	1.994E-002	2.5345

MB 160-217910~1-A	MB	PM-144	7.657E-003	1.530E-002	0.5006
MB 160-217910~1-A	MB	PM-146	-3.061E-002	4.827E-002	-0.6342
MB 160-217910~1-A	MB	RA-226	-8.578E-002	2.376E-001	-0.3610
MB 160-217910~1-A	MB	RH-106	-3.627E-003	1.343E-001	-0.0270
MB 160-217910~1-A	MB	RU-103	-4.735E-003	1.118E-002	-0.4237
MB 160-217910~1-A	MB	SB-124	4.616E-003	1.522E-002	0.3032
MB 160-217910~1-A	MB	SB-125	1.047E-002	2.186E-002	0.4787
MB 160-217910~1-A	MB	SC-46	0.000E+000	7.139E-003	0.0000
MB 160-217910~1-A	MB	SN-113	6.694E-003	1.727E-002	0.3875
MB 160-217910~1-A	MB	SN-126	9.094E-003	7.322E-002	0.1242
MB 160-217910~1-A	MB	TA-182	9.043E-003	1.445E-002	0.6258
MB 160-217910~1-A	MB	TC-99M	-1.255E-003	8.033E-003	-0.1562
MB 160-217910~1-A	MB	TH-227	5.670E-003	1.499E-001	0.0378
MB 160-217910~1-A	MB	TH-229	-7.369E-002	1.885E-001	-0.3910
MB 160-217910~1-A	MB	TH-234	1.446E-002	1.018E-001	0.1420
MB 160-217910~1-A	MB	TL-208	1.346E-002	1.077E-002	1.2495
MB 160-217910~1-A	MB	U-235	7.507E-002	5.910E-002	1.2704
MB 160-217910~1-A	MB	Y-88	0.000E+000	3.838E-003	0.0000
MB 160-217910~1-A	MB	ZN-65	-1.025E-002	3.666E-002	-0.2797
MB 160-217910~1-A	MB	ZR-95	3.371E-003	1.189E-002	0.2836

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 218441 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-218441~2-	LCS	341.90g	1.00	GammaVision	GV08	10 / 27 / 15 15:25	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	11136	7.359E-002pCi/g	1.183E-001	1.183E-001	1.351E+000	6.534E-001	0.05
AG-108M	10982	-1.250E-001pCi/g	9.830E-002	9.810E-002	3.249E-001	1.586E-001	-0.38
AG-110M	10973	-2.165E-001pCi/g	1.350E-001	1.346E-001	4.435E-001	2.131E-001	-0.49
AM-241	10818	9.714E+001pCi/g	5.131E+000	9.547E-001	1.461E+000	7.246E-001	66.50
BA-133	10469	-1.434E-001pCi/g	1.166E-001	1.163E-001	3.856E-001	1.880E-001	-0.37
BA-140	10463	3.008E-001pCi/g	3.866E-001	3.863E-001	8.898E-001	4.279E-001	0.34
BE-7	10435	1.764E-001pCi/g	8.364E-001	8.364E-001	2.818E+000	1.373E+000	0.06
BI-207	10195	-3.983E-002pCi/g	7.303E-002	7.300E-002	2.465E-001	1.188E-001	-0.16
BI-210M	10173	4.829E-002pCi/g	6.207E-002	6.201E-002	3.950E-001	1.928E-001	0.12
BI-212	10160	1.191E+000pCi/g	9.269E-001	9.248E-001	3.076E+000	1.467E+000	0.39
BI-214	10154	1.600E-001pCi/g	1.464E-001	1.462E-001	4.902E-001	2.351E-001	0.33
CD-109	9254	2.361E+000pCi/g	4.441E+000	4.439E+000	4.063E+000	1.992E+000	0.58
CD-113M	17462	-3.716E+001pCi/g	9.021E+002	9.021E+002	3.049E+003	1.485E+003	-0.01
CE-139	9241	3.182E-002pCi/g	5.820E-002	5.812E-002	1.942E-001	9.506E-002	0.16
CE-141	9235	4.980E-002pCi/g	8.364E-002	8.361E-002	2.795E-001	1.366E-001	0.18
CE-144	9221	2.569E-002pCi/g	4.004E-001	4.004E-001	1.345E+000	6.591E-001	0.02
CF-249	9215	5.942E-002pCi/g	1.163E-001	1.162E-001	3.177E-001	1.540E-001	0.19
CF-251	13690	3.966E-001pCi/g	2.757E-001	2.735E-001	9.033E-001	4.415E-001	0.44
CO-56	8704	8.557E-002pCi/g	8.063E-002	8.051E-002	2.695E-001	1.287E-001	0.32
CO-57	13694	3.076E-002pCi/g	5.134E-002	5.131E-002	1.712E-001	8.393E-002	0.18
CO-58	8698	1.346E-002pCi/g	8.405E-002	8.405E-002	2.875E-001	1.379E-001	0.05
CO-60	8692	1.870E+001pCi/g	1.007E+000	3.639E-001	1.870E-001	8.459E-002	100.02
CR-51	8604	-4.740E-001pCi/g	6.167E-001	6.162E-001	2.059E+000	1.002E+000	-0.23
CS-134	8553	9.391E-002pCi/g	6.368E-002	6.349E-002	1.526E-001	7.164E-002	0.62
CS-136	8546	3.304E-002pCi/g	3.799E-002	3.794E-002	3.085E-001	1.484E-001	0.11
CS-137	8539	2.942E+001pCi/g	1.582E+000	3.998E-001	3.497E-001	1.691E-001	84.15
EU-152	7145	1.912E-001pCi/g	2.554E-001	2.552E-001	8.302E-001	4.042E-001	0.23
EU-154	7138	6.956E-002pCi/g	1.146E-001	1.146E-001	2.351E+000	1.125E+000	0.03
EU-155	7131	2.888E-002pCi/g	2.199E-001	2.199E-001	7.370E-001	3.618E-001	0.04
FE-59	7073	-1.833E-001pCi/g	1.818E-001	1.815E-001	6.083E-001	2.908E-001	-0.30
GA-68	18005	4.764E+000pCi/g	2.454E+000	2.440E+000	7.914E+000	3.694E+000	0.60
GD-153	6824	7.978E-002pCi/g	1.552E-001	1.551E-001	5.177E-001	2.540E-001	0.15
HF-181	6495	2.335E-002pCi/g	1.043E-001	1.043E-001	3.518E-001	1.712E-001	0.07
HG-203	6466	6.698E-003pCi/g	6.497E-002	6.497E-002	2.197E-001	1.068E-001	0.03
I-131	6380	-1.610E-002pCi/g	8.500E-002	8.500E-002	2.866E-001	1.396E-001	-0.06
IR-192	6303	1.018E-001pCi/g	9.042E-002	9.022E-002	2.283E-001	1.111E-001	0.45
K-40	6148	1.623E-001pCi/g	3.950E-001	3.949E-001	1.502E+000	6.607E-001	0.11
LA-140	6096	6.191E-003pCi/g	4.179E-002	4.179E-002	5.946E-002	1.880E-002	0.10
MN-54	5382	1.822E-002pCi/g	9.095E-002	9.094E-002	3.102E-001	1.491E-001	0.06
NA-22	5201	1.507E-002pCi/g	4.555E-002	4.554E-002	1.637E-001	7.329E-002	0.09
NB-94	5160	6.019E-002pCi/g	3.912E-002	3.899E-002	2.572E-001	1.233E-001	0.23
NB-95	5154	2.541E-002pCi/g	7.560E-002	7.559E-002	2.579E-001	1.234E-001	0.10
ND-147	5083	4.071E-001pCi/g	4.877E-001	4.871E-001	1.636E+000	7.863E-001	0.25
NP-237	4757	0.000E+000pCi/g	4.510E-001	4.510E-001	1.509E+000	7.430E-001	0.00
NP-239	4751	-1.622E-002pCi/g	2.061E-001	2.061E-001	6.910E-001	3.393E-001	-0.02
PA-231	4541	-2.797E-001pCi/g	6.016E-001	6.014E-001	7.388E+000	3.603E+000	-0.04
PA-233	4535	1.354E-001pCi/g	2.200E-001	2.199E-001	5.917E-001	2.884E-001	0.23
PA-234	4528	2.370E-002pCi/g	7.301E-002	7.300E-002	8.496E-001	4.166E-001	0.03
PA-234M	19453	2.685E+000pCi/g	3.731E+000	3.729E+000	3.935E+001	1.884E+001	0.07
PB-210	4467	8.385E+002pCi/g	5.067E+001	1.196E+001	2.132E+001	1.059E+001	39.34

PB-212	4454	**2.569E-001**pCi/g	1.484E-001	1.475E-001	4.865E-001	2.382E-001	0.53
PB-214	4448	**-1.187E-001**pCi/g	2.062E-001	2.061E-001	4.941E-001	2.392E-001	-0.24
PM-144	19585	**-1.104E-002**pCi/g	1.584E-002	1.583E-002	2.412E-001	1.154E-001	-0.05
PM-146	2464	**1.016E-001**pCi/g	1.134E-001	1.133E-001	6.877E-001	3.278E-001	0.15
RH-106	1882	**9.849E-001**pCi/g	7.318E-001	7.301E-001	1.785E+000	8.453E-001	0.55
RU-103	1828	**-7.826E-003**pCi/g	8.182E-002	8.182E-002	2.777E-001	1.346E-001	-0.03
SB-124	1784	**1.264E-001**pCi/g	7.595E-002	7.567E-002	1.582E-001	7.445E-002	0.80
SB-125	1777	**2.237E-001**pCi/g	1.965E-001	1.962E-001	9.608E-001	4.688E-001	0.23
SC-46	1739	**6.651E-002**pCi/g	9.525E-002	9.519E-002	3.209E-001	1.541E-001	0.21
SN-113	1570	**2.166E-002**pCi/g	1.160E-001	1.160E-001	3.912E-001	1.906E-001	0.06
SN-126	17459	**-6.991E+000**pCi/g	1.044E+000	9.772E-001	3.085E+000	1.523E+000	-2.27
TA-182	1301	**2.287E-001**pCi/g	2.419E-001	2.416E-001	9.149E-001	4.354E-001	0.25
TC-99M	17412	**-3.499E-002**pCi/g	5.302E-002	5.298E-002	1.767E-001	8.659E-002	-0.20
TH-227	1058	**-3.701E+001**pCi/g	4.063E+000	3.522E+000	1.124E+001	5.589E+000	-3.29
TH-229	1046	**-1.190E+000**pCi/g	1.295E+000	1.291E+000	4.291E+000	2.104E+000	-0.28
TH-234	1027	**-5.199E+001**pCi/g	5.252E+000	4.493E+000	1.365E+001	6.775E+000	-3.81
TL-208	929	**1.496E-001**pCi/g	8.481E-002	8.445E-002	2.772E-001	1.334E-001	0.54
U-235	281	**-6.184E-002**pCi/g	1.918E+001	1.918E+001	1.442E+000	7.072E-001	-0.04
Y-88	74	**-1.169E-001**pCi/g	1.223E-001	1.221E-001	4.080E-001	1.972E-001	-0.29
ZN-65	31	**-6.060E-002**pCi/g	2.169E-001	2.169E-001	7.398E-001	3.548E-001	-0.08
ZR-95	7	**1.074E-001**pCi/g	1.365E-001	1.364E-001	4.600E-001	2.199E-001	0.23

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-218441~2-A	LCS 160-218441~2-A	CS-137	2.942E+001	pCi/g	3.008E+001	97.82%	-0.2899
		CO-60	1.870E+001	pCi/g	1.859E+001	100.64%	0.0836
		AM-241	9.714E+001	pCi/g	9.723E+001	99.92%	-0.0112

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor
MB 160-218441~1-A	MB	AC-228	3.987E-002	4.560E-002	0.8743
MB 160-218441~1-A	MB	AG-108M	5.451E-003	8.527E-003	0.6393
MB 160-218441~1-A	MB	AG-110M	-1.473E-002	2.625E-002	-0.5612
MB 160-218441~1-A	MB	AM-241	-1.477E-002	2.928E-002	-0.5047
MB 160-218441~1-A	MB	BA-133	3.407E-003	1.959E-002	0.1740
MB 160-218441~1-A	MB	BA-140	6.525E-002	6.139E-002	1.0630
MB 160-218441~1-A	MB	BE-7	0.000E+000	6.035E-002	0.0000
MB 160-218441~1-A	MB	BI-207	8.121E-003	1.544E-002	0.5258
MB 160-218441~1-A	MB	BI-210M	1.934E-002	1.581E-002	1.2233
MB 160-218441~1-A	MB	BI-212	0.000E+000	1.856E-001	0.0000
MB 160-218441~1-A	MB	BI-214	-1.133E-002	5.880E-002	-0.1926
MB 160-218441~1-A	MB	CD-109	9.453E-002	2.288E-001	0.4132
MB 160-218441~1-A	MB	CD-113M	-1.366E+002	2.218E+002	-0.6159
MB 160-218441~1-A	MB	CE-139	-3.140E-003	9.986E-003	-0.3145
MB 160-218441~1-A	MB	CE-141	-6.169E-003	1.570E-002	-0.3929
MB 160-218441~1-A	MB	CE-144	4.904E-003	4.662E-002	0.1052
MB 160-218441~1-A	MB	CF-249	8.754E-003	1.572E-002	0.5569
MB 160-218441~1-A	MB	CF-251	-2.594E-002	5.279E-002	-0.4914
MB 160-218441~1-A	MB	CO-56	-6.736E-003	1.135E-002	-0.5936
MB 160-218441~1-A	MB	CO-57	4.406E-003	9.298E-003	0.4738
MB 160-218441~1-A	MB	CO-58	1.276E-002	1.914E-002	0.6662
MB 160-218441~1-A	MB	CO-60	-3.371E-003	2.082E-002	-0.1619
MB 160-218441~1-A	MB	CR-51	6.564E-002	1.182E-001	0.5552
MB 160-218441~1-A	MB	CS-134	-7.518E-004	1.083E-003	-0.6945
MB 160-218441~1-A	MB	CS-136	0.000E+000	5.399E-003	0.0000
MB 160-218441~1-A	MB	CS-137	1.650E-002	1.844E-002	0.8946
MB 160-218441~1-A	MB	EU-152	-8.619E-004	1.441E-003	-0.5979
MB 160-218441~1-A	MB	EU-154	1.149E-001	1.445E-001	0.7954
MB 160-218441~1-A	MB	EU-155	-2.026E-002	3.719E-002	-0.5447
MB 160-218441~1-A	MB	FE-59	9.255E-003	1.826E-002	0.5070
MB 160-218441~1-A	MB	GA-68	0.000E+000	1.430E-001	0.0000
MB 160-218441~1-A	MB	GD-153	-2.088E-002	3.165E-002	-0.6598
MB 160-218441~1-A	MB	HF-181	-1.476E-003	1.865E-003	-0.7914
MB 160-218441~1-A	MB	HG-203	1.656E-002	9.732E-003	1.7013
MB 160-218441~1-A	MB	I-131	6.142E-003	2.344E-002	0.2620
MB 160-218441~1-A	MB	IR-192	3.418E-003	1.317E-002	0.2595
MB 160-218441~1-A	MB	K-40	-6.451E-001	1.290E+001	-0.0500
MB 160-218441~1-A	MB	LA-140	2.528E-003	2.485E-002	0.1017
MB 160-218441~1-A	MB	MN-54	-2.351E-003	1.657E-002	-0.1419
MB 160-218441~1-A	MB	NA-22	0.000E+000	5.287E-003	0.0000
MB 160-218441~1-A	MB	NB-94	1.400E-003	7.442E-003	0.1881
MB 160-218441~1-A	MB	NB-95	-2.221E-003	1.672E-002	-0.1328
MB 160-218441~1-A	MB	ND-147	2.932E-002	2.819E-002	1.0401
MB 160-218441~1-A	MB	NP-237	-1.201E-002	7.433E-002	-0.1615
MB 160-218441~1-A	MB	NP-239	4.366E-002	2.736E-002	1.5962
MB 160-218441~1-A	MB	PA-231	3.079E-001	2.831E-001	1.0876
MB 160-218441~1-A	MB	PA-233	2.077E-002	3.041E-002	0.6831
MB 160-218441~1-A	MB	PA-234	5.537E-002	5.645E-002	0.9808
MB 160-218441~1-A	MB	PA-234M	-7.028E-001	1.816E+000	-0.3870
MB 160-218441~1-A	MB	PB-210	4.463E-001	4.306E-001	1.0364
MB 160-218441~1-A	MB	PB-212	4.711E-003	2.788E-002	0.1690
MB 160-218441~1-A	MB	PB-214	4.377E-002	3.189E-002	1.3727

MB 160-218441~1-A	MB	PM-144	9.554E-004	6.357E-003	0.1503
MB 160-218441~1-A	MB	PM-146	-3.544E-002	4.841E-002	-0.7319
MB 160-218441~1-A	MB	RH-106	4.655E-002	1.634E-001	0.2849
MB 160-218441~1-A	MB	RU-103	6.210E-003	1.531E-002	0.4057
MB 160-218441~1-A	MB	SB-124	-1.006E-002	1.857E-002	-0.5418
MB 160-218441~1-A	MB	SB-125	1.305E-003	4.143E-003	0.3151
MB 160-218441~1-A	MB	SC-46	-1.594E-004	1.758E-002	-0.0091
MB 160-218441~1-A	MB	SN-113	3.684E-002	1.998E-002	1.8437
MB 160-218441~1-A	MB	SN-126	2.933E-001	1.237E-001	2.3710
MB 160-218441~1-A	MB	TA-182	2.383E-002	4.528E-002	0.5262
MB 160-218441~1-A	MB	TC-99M	3.169E-003	8.389E-003	0.3778
MB 160-218441~1-A	MB	TH-227	2.179E-001	1.503E-001	1.4498
MB 160-218441~1-A	MB	TH-229	-9.602E-002	2.482E-001	-0.3868
MB 160-218441~1-A	MB	TH-234	-6.219E-001	8.472E-001	-0.7341
MB 160-218441~1-A	MB	TL-208	1.433E-002	2.289E-002	0.6260
MB 160-218441~1-A	MB	U-235	1.116E-001	8.413E-002	1.3268
MB 160-218441~1-A	MB	Y-88	0.000E+000	6.164E-003	0.0000
MB 160-218441~1-A	MB	ZN-65	0.000E+000	9.463E-003	0.0000
MB 160-218441~1-A	MB	ZR-95	-8.939E-004	1.210E-003	-0.7385

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 218442 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-218442~2-	LCS	341.90g	1.00	GammaVision	GV09	10 / 27 / 15 14:09	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	11136	5.980E-001pCi/g	2.506E-001	2.488E-001	1.014E+000	4.923E-001	0.59
AG-108M	10982	6.362E-006pCi/g	7.135E-002	7.135E-002	2.404E-001	1.175E-001	0.00
AG-110M	10973	-4.015E-003pCi/g	1.009E-001	1.009E-001	3.435E-001	1.661E-001	-0.01
AM-241	10818	9.726E+001pCi/g	5.101E+000	7.368E-001	1.053E+000	5.222E-001	92.32
BA-133	10469	8.644E-004pCi/g	8.695E-002	8.695E-002	2.932E-001	1.432E-001	0.00
BA-140	10463	2.814E-001pCi/g	2.308E-001	2.303E-001	7.647E-001	3.708E-001	0.37
BE-7	10435	5.425E-001pCi/g	6.400E-001	6.394E-001	2.131E+000	1.041E+000	0.25
BI-207	10195	-2.984E-002pCi/g	5.728E-002	5.726E-002	1.928E-001	9.338E-002	-0.15
BI-210M	10173	2.463E-002pCi/g	9.686E-002	9.684E-002	3.249E-001	1.590E-001	0.08
BI-212	10160	4.340E-001pCi/g	7.169E-001	7.165E-001	2.420E+000	1.163E+000	0.18
BI-214	10154	8.273E-001pCi/g	1.845E-001	1.794E-001	3.533E-001	1.700E-001	2.34
CD-109	9254	5.485E+000pCi/g	3.401E+000	3.387E+000	3.143E+000	1.540E+000	1.75
CD-113M	17462	8.114E+000pCi/g	7.905E+002	7.905E+002	2.661E+003	1.302E+003	0.00
CE-139	9241	-3.089E-002pCi/g	5.178E-002	5.170E-002	1.723E-001	8.460E-002	-0.18
CE-141	9235	-3.579E-003pCi/g	6.317E-002	6.317E-002	2.129E-001	1.040E-001	-0.02
CE-144	9221	1.068E-001pCi/g	3.278E-001	3.277E-001	1.096E+000	5.379E-001	0.10
CF-249	9215	1.007E-001pCi/g	1.004E-001	1.002E-001	2.876E-001	1.404E-001	0.35
CF-251	13690	-2.639E-001pCi/g	2.511E-001	2.500E-001	8.293E-001	4.069E-001	-0.32
CO-56	8704	1.134E-001pCi/g	8.881E-002	8.861E-002	2.341E-001	1.131E-001	0.48
CO-57	13694	5.717E-003pCi/g	4.406E-002	4.406E-002	1.476E-001	7.249E-002	0.04
CO-58	8698	5.129E-002pCi/g	6.155E-002	6.150E-002	2.064E-001	9.935E-002	0.25
CO-60	8692	1.774E+001pCi/g	9.122E-001	1.984E-001	9.851E-002	4.359E-002	180.05
CR-51	8604	-2.572E-002pCi/g	5.332E-001	5.332E-001	1.795E+000	8.779E-001	-0.01
CS-134	8553	5.920E-002pCi/g	4.059E-002	4.047E-002	2.764E-001	1.350E-001	0.21
CS-136	8546	4.051E-002pCi/g	4.705E-002	4.700E-002	1.989E-001	9.561E-002	0.20
CS-137	8539	2.895E+001pCi/g	1.537E+000	3.066E-001	2.184E-001	1.053E-001	132.57
EU-152	7145	1.210E-001pCi/g	1.140E-001	1.138E-001	6.662E-001	3.254E-001	0.18
EU-154	7138	1.536E-001pCi/g	2.903E-001	2.902E-001	2.035E+000	9.844E-001	0.08
EU-155	7131	-2.215E-001pCi/g	1.885E-001	1.881E-001	6.227E-001	3.061E-001	-0.36
FE-59	7073	-2.347E-001pCi/g	1.656E-001	1.651E-001	5.463E-001	2.646E-001	-0.43
GA-68	18005	-1.959E+000pCi/g	2.934E+000	2.932E+000	9.861E+000	4.761E+000	-0.20
GD-153	6824	1.074E-001pCi/g	5.604E-002	5.566E-002	4.253E-001	2.089E-001	0.25
HF-181	6495	7.655E-003pCi/g	2.864E-002	2.863E-002	2.832E-001	1.384E-001	0.03
HG-203	6466	-5.635E-002pCi/g	6.273E-002	6.264E-002	2.084E-001	1.020E-001	-0.27
I-131	6380	7.130E-002pCi/g	8.246E-002	8.238E-002	2.211E-001	1.079E-001	0.32
IR-192	6303	6.154E-002pCi/g	5.067E-002	5.054E-002	2.010E-001	9.829E-002	0.31
K-40	6148	-1.447E-001pCi/g	7.481E-001	7.481E-001	1.284E+000	5.849E-001	-0.11
LA-140	6096	1.563E-002pCi/g	2.812E-002	2.811E-002	1.016E-001	4.393E-002	0.15
MN-54	5382	-2.832E-002pCi/g	6.926E-002	6.925E-002	2.341E-001	1.131E-001	-0.12
NA-22	5201	-2.471E-002pCi/g	3.987E-002	3.985E-002	1.381E-001	6.356E-002	-0.18
NB-94	5160	4.992E-002pCi/g	4.304E-002	4.296E-002	1.435E-001	6.826E-002	0.35
NB-95	5154	-8.541E-002pCi/g	6.319E-002	6.303E-002	2.089E-001	1.008E-001	-0.41
ND-147	5083	-5.970E-002pCi/g	4.393E-001	4.392E-001	1.487E+000	7.219E-001	-0.04
NP-237	4757	-4.152E-001pCi/g	3.778E-001	3.771E-001	1.248E+000	6.152E-001	-0.33
NP-239	4751	1.422E-001pCi/g	1.425E-001	1.422E-001	4.725E-001	2.313E-001	0.30
PA-231	4541	7.897E-001pCi/g	5.588E-001	5.571E-001	6.014E+000	2.942E+000	0.13
PA-233	4535	1.659E-001pCi/g	1.174E-001	1.170E-001	4.817E-001	2.355E-001	0.34
PA-234	4528	7.379E-003pCi/g	1.848E-001	1.848E-001	6.212E-001	3.043E-001	0.01
PA-234M	19453	-3.849E+000pCi/g	1.050E+001	1.050E+001	3.544E+001	1.718E+001	-0.11
PB-210	4467	8.556E+002pCi/g	5.093E+001	8.354E+000	1.399E+001	6.939E+000	61.17

PB-212	4454	**4.747E-001**pCi/g	1.198E-001	1.158E-001	2.884E-001	1.405E-001	1.65
PB-214	4448	**2.527E-001**pCi/g	1.397E-001	1.390E-001	4.865E-001	2.377E-001	0.52
PM-144	19585	**5.467E-002**pCi/g	5.088E-002	5.080E-002	1.697E-001	8.140E-002	0.32
PM-146	2464	**-1.121E-001**pCi/g	1.694E-001	1.693E-001	5.705E-001	2.747E-001	-0.20
RH-106	1882	**2.453E-001**pCi/g	5.500E-001	5.499E-001	1.858E+000	8.973E-001	0.13
RU-103	1828	**3.179E-003**pCi/g	6.795E-002	6.795E-002	2.296E-001	1.119E-001	0.01
SB-124	1784	**6.871E-002**pCi/g	5.491E-002	5.479E-002	1.820E-001	8.786E-002	0.38
SB-125	1777	**7.725E-002**pCi/g	1.204E-001	1.203E-001	7.192E-001	3.515E-001	0.11
SC-46	1739	**6.865E-002**pCi/g	3.773E-002	3.756E-002	2.744E-001	1.331E-001	0.25
SN-113	1570	**-5.988E-002**pCi/g	9.283E-002	9.278E-002	3.100E-001	1.515E-001	-0.19
SN-126	17459	**4.728E-001**pCi/g	6.187E-001	6.182E-001	2.053E+000	1.011E+000	0.23
TA-182	1301	**2.190E-001**pCi/g	1.744E-001	1.740E-001	6.078E-001	2.897E-001	0.36
TC-99M	17412	**4.814E-002**pCi/g	4.538E-002	4.530E-002	1.502E-001	7.375E-002	0.32
TH-227	1058	**5.812E-001**pCi/g	8.496E-001	8.490E-001	7.338E+000	3.643E+000	0.08
TH-229	1046	**3.346E-001**pCi/g	9.867E-001	9.864E-001	3.300E+000	1.619E+000	0.10
TH-234	1027	**-3.012E+001**pCi/g	2.825E+000	2.346E+000	7.161E+000	3.541E+000	-4.21
TL-208	929	**1.402E-001**pCi/g	7.085E-002	7.047E-002	2.180E-001	1.055E-001	0.64
U-235	281	**1.225E-001**pCi/g	2.509E-001	2.508E-001	1.165E+000	5.718E-001	0.11
Y-88	74	**-5.977E-002**pCi/g	8.913E-002	8.908E-002	2.987E-001	1.449E-001	-0.20
ZN-65	31	**1.053E-001**pCi/g	9.011E-002	8.995E-002	3.017E-001	1.411E-001	0.35
ZR-95	7	**3.603E-002**pCi/g	1.120E-001	1.120E-001	3.799E-001	1.833E-001	0.09

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-218442~2-A	LCS 160-218442~2-A	CS-137	2.895E+001	pCi/g	3.008E+001	96.24%	-0.5100
		CO-60	1.774E+001	pCi/g	1.859E+001	95.42%	-0.6439
		AM-241	9.726E+001	pCi/g	9.723E+001	100.04%	0.0052

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SamplD	WRKNO	Analyte	Activity	UncTotal	ZFactor
MB 160-218442~1-A	MB	AC-228	4.629E-002	5.406E-002	0.8562
MB 160-218442~1-A	MB	AG-108M	5.830E-003	1.413E-002	0.4125
MB 160-218442~1-A	MB	AG-110M	1.867E-002	2.797E-002	0.6674
MB 160-218442~1-A	MB	AM-241	4.337E-002	3.562E-002	1.2178
MB 160-218442~1-A	MB	BA-133	3.213E-003	1.707E-002	0.1882
MB 160-218442~1-A	MB	BA-140	7.074E-002	6.022E-002	1.1747
MB 160-218442~1-A	MB	BE-7	2.063E-003	1.089E-001	0.0189
MB 160-218442~1-A	MB	BI-207	-8.550E-003	1.554E-002	-0.5500
MB 160-218442~1-A	MB	BI-210M	-5.240E-005	2.134E-002	-0.0025
MB 160-218442~1-A	MB	BI-212	1.891E-001	2.106E-001	0.8980
MB 160-218442~1-A	MB	BI-214	5.878E-002	4.257E-002	1.3807
MB 160-218442~1-A	MB	CD-109	-3.780E-002	2.773E-001	-0.1363
MB 160-218442~1-A	MB	CD-113M	-1.209E+002	2.006E+002	-0.6023
MB 160-218442~1-A	MB	CE-139	-2.638E-003	1.098E-002	-0.2403
MB 160-218442~1-A	MB	CE-141	0.000E+000	1.549E-002	0.0000
MB 160-218442~1-A	MB	CE-144	2.685E-004	7.314E-002	0.0037
MB 160-218442~1-A	MB	CF-249	1.313E-003	1.950E-002	0.0673
MB 160-218442~1-A	MB	CF-251	-3.857E-003	5.706E-002	-0.0676
MB 160-218442~1-A	MB	CO-56	1.232E-004	1.804E-004	0.6833
MB 160-218442~1-A	MB	CO-57	2.443E-003	8.085E-003	0.3022
MB 160-218442~1-A	MB	CO-58	-1.180E-003	2.037E-002	-0.0579
MB 160-218442~1-A	MB	CO-60	6.900E-003	9.579E-003	0.7203
MB 160-218442~1-A	MB	CR-51	1.599E-003	1.074E-001	0.0149
MB 160-218442~1-A	MB	CS-134	3.207E-002	2.395E-002	1.3391
MB 160-218442~1-A	MB	CS-136	5.803E-003	1.781E-002	0.3257
MB 160-218442~1-A	MB	CS-137	0.000E+000	1.138E-002	0.0000
MB 160-218442~1-A	MB	EU-152	-3.093E-005	4.932E-002	-0.0006
MB 160-218442~1-A	MB	EU-154	-1.070E-001	1.707E-001	-0.6272
MB 160-218442~1-A	MB	EU-155	2.380E-002	1.887E-002	1.2612
MB 160-218442~1-A	MB	FE-59	0.000E+000	8.903E-003	0.0000
MB 160-218442~1-A	MB	GA-68	0.000E+000	1.515E-001	0.0000
MB 160-218442~1-A	MB	GD-153	0.000E+000	1.067E-002	0.0000
MB 160-218442~1-A	MB	HF-181	1.261E-002	1.480E-002	0.8522
MB 160-218442~1-A	MB	HG-203	3.510E-003	1.144E-002	0.3067
MB 160-218442~1-A	MB	I-131	0.000E+000	6.680E-003	0.0000
MB 160-218442~1-A	MB	IR-192	1.578E-003	1.452E-002	0.1086
MB 160-218442~1-A	MB	K-40	-2.137E-001	7.006E-001	-0.3050
MB 160-218442~1-A	MB	LA-140	0.000E+000	7.055E-003	0.0000
MB 160-218442~1-A	MB	MN-54	0.000E+000	5.770E-003	0.0000
MB 160-218442~1-A	MB	NA-22	-2.879E-004	1.602E-002	-0.0180
MB 160-218442~1-A	MB	NB-94	1.568E-003	1.741E-002	0.0901
MB 160-218442~1-A	MB	NB-95	2.922E-003	1.554E-002	0.1880
MB 160-218442~1-A	MB	ND-147	7.112E-002	1.032E-001	0.6894
MB 160-218442~1-A	MB	NP-237	5.092E-003	7.332E-002	0.0695
MB 160-218442~1-A	MB	NP-239	1.565E-002	3.200E-002	0.4890
MB 160-218442~1-A	MB	PA-231	-1.854E-001	3.961E-001	-0.4681
MB 160-218442~1-A	MB	PA-233	7.432E-003	1.916E-002	0.3879
MB 160-218442~1-A	MB	PA-234	1.231E-002	3.411E-002	0.3608
MB 160-218442~1-A	MB	PA-234M	0.000E+000	7.911E-001	0.0000
MB 160-218442~1-A	MB	PB-210	3.880E-001	4.487E-001	0.8648
MB 160-218442~1-A	MB	PB-212	-2.440E-002	9.674E-002	-0.2522
MB 160-218442~1-A	MB	PB-214	-2.424E-002	8.010E-002	-0.3026

MB 160-218442~1-A	MB	PM-144	2.715E-003	1.733E-002	0.1567
MB 160-218442~1-A	MB	PM-146	1.519E-002	1.570E-002	0.9676
MB 160-218442~1-A	MB	RH-106	-2.995E-002	1.833E-001	-0.1634
MB 160-218442~1-A	MB	RU-103	-5.540E-003	1.385E-002	-0.4000
MB 160-218442~1-A	MB	SB-124	3.566E-003	1.681E-002	0.2121
MB 160-218442~1-A	MB	SB-125	-3.271E-002	4.871E-002	-0.6716
MB 160-218442~1-A	MB	SC-46	1.794E-002	1.459E-002	1.2302
MB 160-218442~1-A	MB	SN-113	5.033E-004	1.899E-002	0.0265
MB 160-218442~1-A	MB	SN-126	2.542E-002	1.062E-001	0.2393
MB 160-218442~1-A	MB	TA-182	5.091E-002	6.392E-002	0.7965
MB 160-218442~1-A	MB	TC-99M	4.412E-003	8.994E-003	0.4906
MB 160-218442~1-A	MB	TH-227	0.000E+000	6.308E-002	0.0000
MB 160-218442~1-A	MB	TH-229	1.425E-001	1.928E-001	0.7391
MB 160-218442~1-A	MB	TH-234	-5.703E-002	3.530E-001	-0.1616
MB 160-218442~1-A	MB	TL-208	-2.982E-003	2.496E-002	-0.1195
MB 160-218442~1-A	MB	U-235	-6.134E-003	8.135E-003	-0.7541
MB 160-218442~1-A	MB	Y-88	1.099E-002	2.017E-002	0.5449
MB 160-218442~1-A	MB	ZN-65	0.000E+000	1.005E-002	0.0000
MB 160-218442~1-A	MB	ZR-95	-1.630E-002	3.169E-002	-0.5142

Rec'd : 12-26-06

ANALYTICS
An Isotope Products Laboratories Company

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

74139-334

1.0 Liter Sand in 1 Liter Wide Mouth HDPE "S" Bottle

Customer: Severn Trent Laboratories/Earth City, MO
P.O. No.: 2169577, Item 1
Calibration Date: 01-Oct-2006 12:00 EST **Grams of Master Source:** 0.01552

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8145.9	———	3079.8	0.33	1.46	2.99	4π LS
Am-241	59.5	157860	———	2034.3	0.33	1.46	2.99	4π LS
Cd-109	88.0	462.60	189000	2933.5	0.57	1.70	3.59	HPGe
Co-57	122.1	271.79	94570	1467.8	0.34	1.30	2.69	HPGe
Ce-139	165.9	137.6	133800	2076.7	0.35	1.10	2.31	HPGe
Hg-203	279.2	46.61	295300	4583	0.40	1.10	2.34	HPGe
Sn-113	391.7	115.1	185600	2880.7	0.42	1.10	2.35	HPGe
Cs-137	661.7	10983	116700	1811.3	0.70	1.20	2.78	HPGe
Y-88	898.0	106.60	455400	7068	0.50	1.10	2.42	HPGe
Co-60	1173.2	1925.4	226900	3522	0.60	1.10	2.51	HPGe
Co-60	1332.5	1925.4	227000	3523	0.90	1.10	2.84	HPGe
Y-88	1836.1	106.6	481200	7469	0.90	1.10	2.84	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
1550 grams of sand. NOTE: Homogeneity was checked by the addition of Tc-99 tracer to the solution used to spike the sand. Ten 10-gram aliquots were removed after mixing and counted to measure the Tc-99. The standard deviation for the 10 measurements was 1.3% with a range of 4.8%. This demonstrates reasonable homogeneity for this source material down to a 10-gram aliquot.
This standard will expire one year after the calibration date.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: for D. M. Montgomery, QA Manager Date: 12-21-06

End of Certificate

Reagent

Tuna Can_00002

Rc'd 2/3/10

Eckert & Ziegler
Analytics

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Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

81427-334

1.0 Liter Sand in 1 Liter HDPE Silgan Jar

Customer: TestAmerica/St. Louis, MO
P.O. No.: 2339090, Item 1
Reference Date: 01-Jan-2010 12:00 PM EST **Grams of Master Source:** 0.017570

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8.120E+03	———	3.141E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.034E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.606E+05	2.822E+03	0.4	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.471E+04	1.488E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.209E+05	2.124E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.726E+05	4.790E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.672E+05	2.938E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.096E+05	1.926E+03	0.6	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.077E+05	7.163E+03	0.4	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.055E+05	3.611E+03	0.5	1.9	3.9	HPGe
Co-60	1332.5	1.925E+03	2.056E+05	3.612E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.308E+05	7.569E+03	0.5	1.9	3.9	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318

Comments:
1550 grams of sand.
This standard will expire one year after the reference date.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 2/1/10
J. D. McCorvey, QA Manager Alternate

Reagent

Tuna Can_00003

Eckert & Ziegler
Analytics

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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

90099

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: TestAmerica St. Louis / Earth City, MO
P.O. No.: 2454150, Item 1
Reference Date: 01-Jan-2012 12:00 PM EST **Grams of Master Source:** 0.017180

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Additional radionuclides were added gravimetrically from solutions calibrated by gamma-ray spectrometry, ionization chamber, or liquid scintillation counting. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty*, % Type u_A	u_B	U	Calibration Method*
Pb-210	46.5	8.109E+03	———	3.094E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.037E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.677E+05	2.881E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.795E+04	1.511E+03	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.245E+05	2.139E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.707E+05	4.651E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.755E+05	3.015E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.128E+05	1.938E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.228E+05	7.264E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.084E+05	3.580E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.084E+05	3.581E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.476E+05	7.690E+03	0.7	1.9	4.0	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
1550 grams of sand. Homogenous down to 10 grams aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 30 JAN 12
J.D. McCorvey, Counting Room Manager

Reagent

Tuna Can_00006

Eckert & Ziegler
Analytics

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www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83814-334

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: Test America St. Louis
P.O. No.: 2395112, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.016927

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8.120E+03	———	3.021E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.090E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	2.873E+03	0.8	2.3	4.9	HPGe
Co-57	122.1	2.718E+02	8.711E+04	1.475E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	2.111E+03	0.5	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	4.660E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	2.994E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	1.877E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.224E+05	7.150E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	3.626E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	3.627E+03	0.6	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	7.570E+03	0.5	1.9	3.9	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
1550 grams of sand. Homogeneous down to 10 gram aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 2/11/11
J. D. McCorvey, QA Manager Alternate

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: 160-18552-1
Client ID: SU01-EXB-076-SS-P-00
Sigma: 2

Analyzed: 09/07/16 14:28
Detector: AV217
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	5.94	0.363	0.617		pCi/g	0.100	0.0306	268506
Thorium-232	2.71	0.244	0.334		pCi/g	0.100	0.0165	268506

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.37	0.203	0.284		pCi/g	0.0240	3.03	78.3	30 - 110

Lab ID: 160-18552-1 DU
Client ID: SU01-EXB-076-SS-P-00
Sigma: 2

Analyzed: 09/07/16 14:28
Detector: AV216
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	3.855	0.288	0.433		pCi/g	0.100	0.0161	268505
Thorium-232	2.264	0.220	0.291		pCi/g	0.100	0.0161	268505

Tracer	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.553	0.215	0.304		pCi/g	0.0251	3.03	84.3	30 - 110

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 266485

Lab ID: 160-18552-2 | Analyzed: 08/31/16 19:41 | Decay Corrected: No
Client ID: SU01-EXB-077-SS-P-00 | Detector: AV152 | Yield Truncated: No
Sigma: 2 | Dil Fac: 1 | Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Thorium-230	1.11	0.153	0.179		pCi/g	0.100	0.0289	267483
Thorium-232	1.87	0.197	0.252		pCi/g	0.100	0.0156	267483

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.67	0.222	0.315		pCi/g	0.0340	3.03	88.0	30 - 110

Lab ID: 160-18552-3 | Analyzed: 09/07/16 14:28 | Decay Corrected: No
Client ID: SU02-EXB-078-SS-P-00 | Detector: AV213 | Yield Truncated: No
Sigma: 2 | Dil Fac: 1 | Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Thorium-230	1.10	0.152	0.178		pCi/g	0.100	0.0158	268504
Thorium-232	1.11	0.153	0.179		pCi/g	0.100	0.0290	268504

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.61	0.218	0.309		pCi/g	0.0299	3.03	86.1	30 - 110

Lab ID: 160-18552-4 | Analyzed: 08/31/16 19:41 | Decay Corrected: No
Client ID: SU02-EXB-079-SS-P-00 | Detector: AV156 | Yield Truncated: No
Sigma: 2 | Dil Fac: 1 | Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Thorium-230	1.66	0.185	0.231		pCi/g	0.100	0.0338	267485
Thorium-232	1.95	0.200	0.259		pCi/g	0.100	0.0283	267485

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.55	0.211	0.301		pCi/g	0.0320	3.03	84.3	30 - 110

Lab ID: 160-18552-5 | Analyzed: 08/31/16 19:41 | Decay Corrected: No
Client ID: SU03-S-080-SS-P-00 | Detector: AV157 | Yield Truncated: No
Sigma: 2 | Dil Fac: 1 | Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Thorium-230	1.62	0.184	0.229		pCi/g	0.100	0.0289	267486
Thorium-232	1.42	0.173	0.210		pCi/g	0.100	0.0384	267486

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.63	0.219	0.311		pCi/g	0.0336	3.03	87.0	30 - 110

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 266485

Lab ID: 160-18552-6
Client ID: SU03-S-081-SS-P-00
Sigma: 2

Analyzed: 08/31/16 19:41
Detector: AV158
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	9.09	0.437	0.880		pCi/g	0.100	0.0345	267487
Thorium-232	2.74	0.239	0.332		pCi/g	0.100	0.0289	267487

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.73	0.228	0.323		pCi/g	0.0350	3.03	90.2	30 - 110

Lab ID: 160-18552-7
Client ID: SU03-S-082-SS-P-00
Sigma: 2

Analyzed: 08/31/16 19:41
Detector: AV160
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	3.67	0.277	0.414		pCi/g	0.100	0.0289	267489
Thorium-232	1.69	0.188	0.236		pCi/g	0.100	0.0478	267489

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.73	0.227	0.323		pCi/g	0.0348	3.03	90.1	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							4.60196909
MB 160-266485/1-A	Thorium-232			0.008202	U	pCi/g							.93192806

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					1.8419972777

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-18552-1	Thorium-230	5.94		3.855		pCi/g			43	1.99	5.53	1	
160-18552-1	Thorium-232	2.71		2.264		pCi/g			18	0.71	2.00	1	

Glossary:

Ts = Count Duration, Sample

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-18552-1

SDG No.:

Batch Number: 266485 Batch Start Date: 08/25/16 09:34 Batch Analyst: Sherman, Austin T

Batch 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			
160-18552-A-1-A	SU01-EXB-076-SS-P-00	ExtChrom, A-01-R	T	1.0000 g	0.1 mL				
160-18552-A-1-A DU	SU01-EXB-076-SS-P-00	ExtChrom, A-01-R	T	1.0001 g	0.1 mL				
160-18552-A-2-A	SU01-EXB-077-SS-P-00	ExtChrom, A-01-R	T	0.9997 g	0.1 mL				
160-18552-A-3-A	SU02-EXB-078-SS-P-00	ExtChrom, A-01-R	T	1.0001 g	0.1 mL				
160-18552-A-4-A	SU02-EXB-079-SS-P-00	ExtChrom, A-01-R	T	0.9995 g	0.1 mL				
160-18552-A-5-A	SU03-S-080-SS-P-00	ExtChrom, A-01-R	T	1.0007 g	0.1 mL				
160-18552-A-6-A	SU03-S-081-SS-P-00	ExtChrom, A-01-R	T	1.0002 g	0.1 mL				
160-18552-A-7-A	SU03-S-082-SS-P-00	ExtChrom, A-01-R	T	1.0001 g	0.1 mL				

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.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:24:15AM 9/1/2016

Sample

Sample Name: MB 160-266485/1-A Type: Blank
Spectrum #1 Analysis #1
: MB 160-266485/1-A
Sample Collection Date: 8/31/2016 11:26:00AM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 175965
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

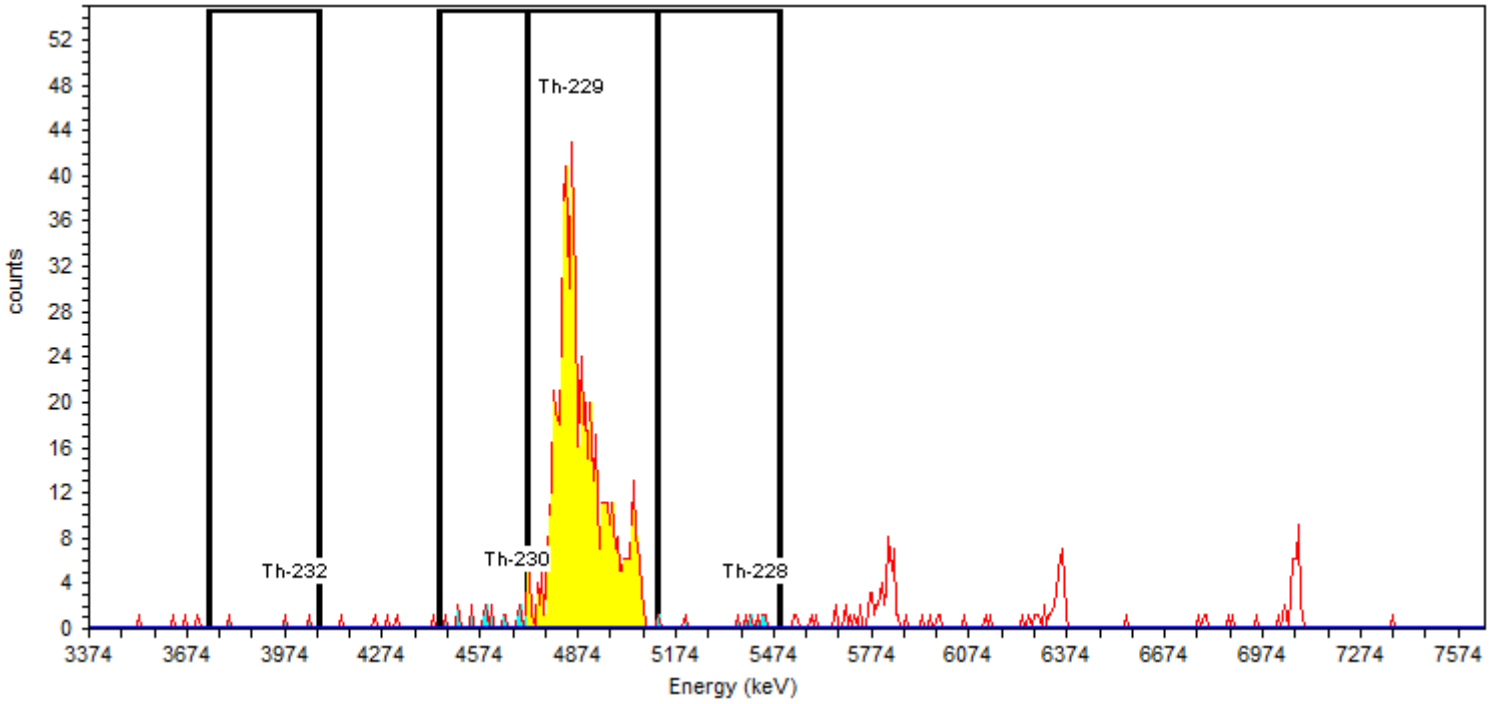
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 89.75%

Acquisition

Detector: AV148 SN: 50-05/R2
Acquisition Start Date: 8/31/2016 7:41:17PM
Live Time: 400.00 min.
Real Time: 400.21 min.
Background Date: 7/25/2016 1:14:03PM
Bkgd Info: Sample: ICB;AV148; Det: AV148; Spectrum #1; 7/25/2016 1:14:03 PM

Energy Calibration: IC-8874;AV148-20151016a
Efficiency Calibration:IC-8874;AV148-20151016a
Calibration Date: 10/16/2015 6:47:19PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.72% +/- 0.38% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:40PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	10.2	100.2	3	1.2500	1.75	8.202E-003	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	14.2	99.7	22	0.0000	22.00	1.036E-001	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	84.6	99.6	645	2.5000	642.44	2.718E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	10.7	99.8	8	5.8333	2.10	9.899E-003	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:22:52AM 9/1/2016

Sample

Sample Name: LCS 160-266485/2-A Type: Control
Spectrum #1 Analysis #1
: LCS 160-266485/2-A
Sample Collection Date: 8/31/2016 11:26:00AM
Comment:

Sample Weight : 0.50 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 175955
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

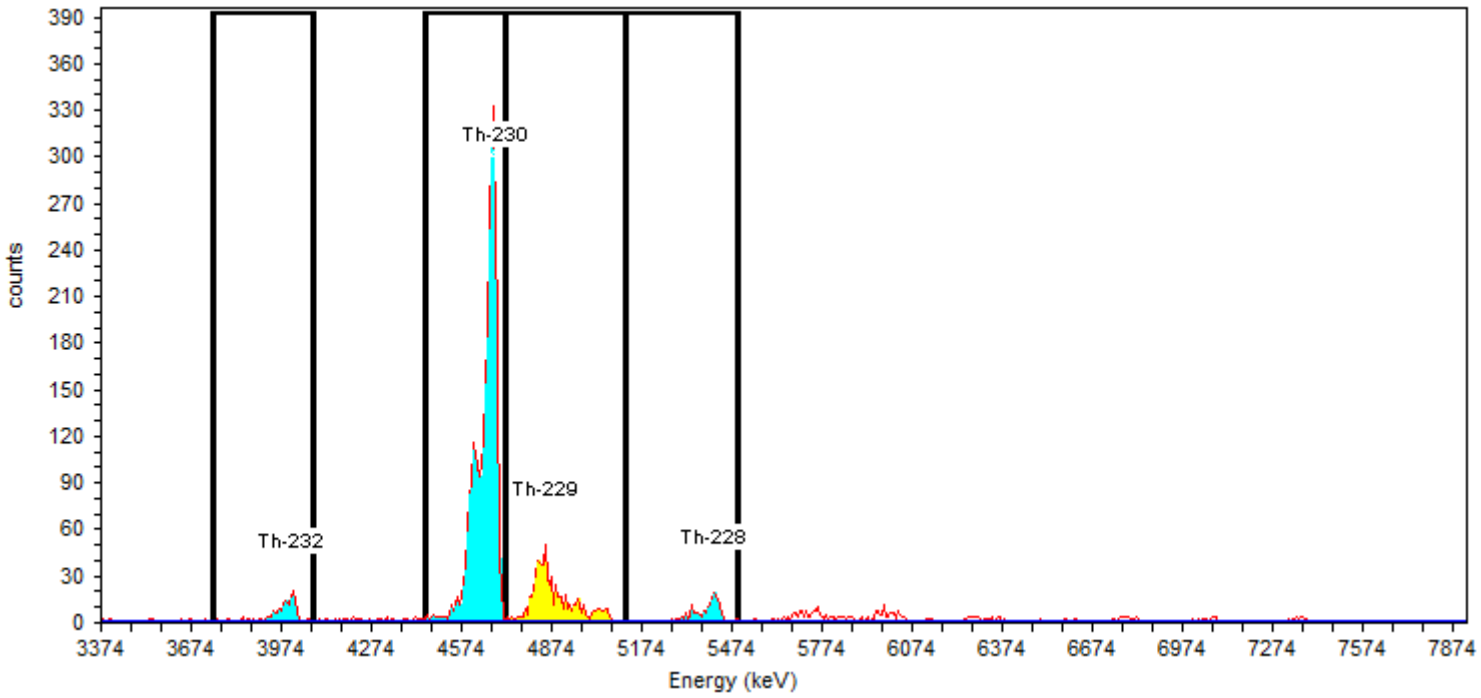
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 89.13%

Acquisition

Detector: AV149 SN: 50-05/R3
Acquisition Start Date: 8/31/2016 7:41:18PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/22/2016 3:43:52PM
Bkgd Info: Sample: ICB;AV149; Det: AV149; Spectrum #1; 7/22/2016 3:43:52 PM

Energy Calibration: IC-8875;AV149-20151016
Efficiency Calibration:IC-8875;AV149-20151016
Calibration Date: 10/16/2015 6:46:43PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.03% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:39PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	64.3	100.2	139	0.0000	139.00	1.459E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	28.7	99.7	2621	0.8333	2620.23	2.765E+001	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	72.1	99.6	575	1.2500	573.81	5.400E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	53.1	99.8	139	6.6667	132.25	1.395E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:08:56PM 9/7/2016

Sample

Sample Name: 160-18552-A-1-D Type: Sample
Spectrum #2 Analysis #1
: 160-18552-A-1-D
Sample Collection Date: 8/8/2016 2:07:00PM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 176239
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

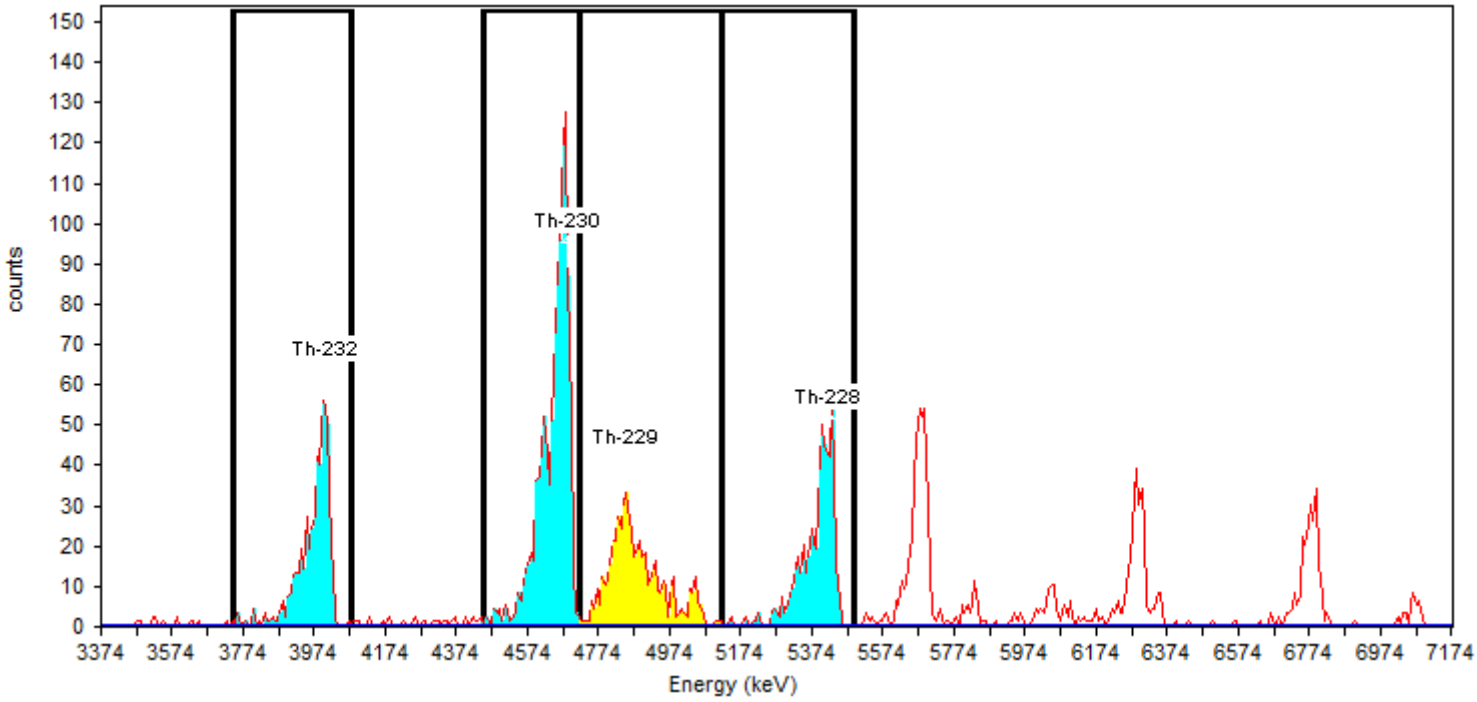
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 78.33%

Acquisition

Detector: AV217 SN: 50-117I2
Acquisition Start Date: 9/7/2016 2:28:41PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 9/2/2016 10:55:30AM
Bkgd Info: Sample: ICB;AV217; Det: AV217; Spectrum #1; 9/2/2016 10:55:30 AM

Energy Calibration: IC-7107;AV217-20151018
Efficiency Calibration:IC-7107;AV217-20151018
Calibration Date: 10/18/2015 9:19:45PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.04% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:38PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	58.5	100.2	491	0.0000	491.03	2.705E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	26.9	99.7	1074	0.4167	1073.17	5.942E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	112.9	99.6	547	0.4167	546.55	2.372E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	72.1	99.8	522	5.7972	516.20	2.876E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:09:02PM 9/7/2016

Sample

Sample Name: 160-18552-A-1-E DU Type: Sample
Spectrum #2 Analysis #1
: 160-18552-A-1-E DU
Sample Collection Date: 8/8/2016 2:07:00PM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 176242
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

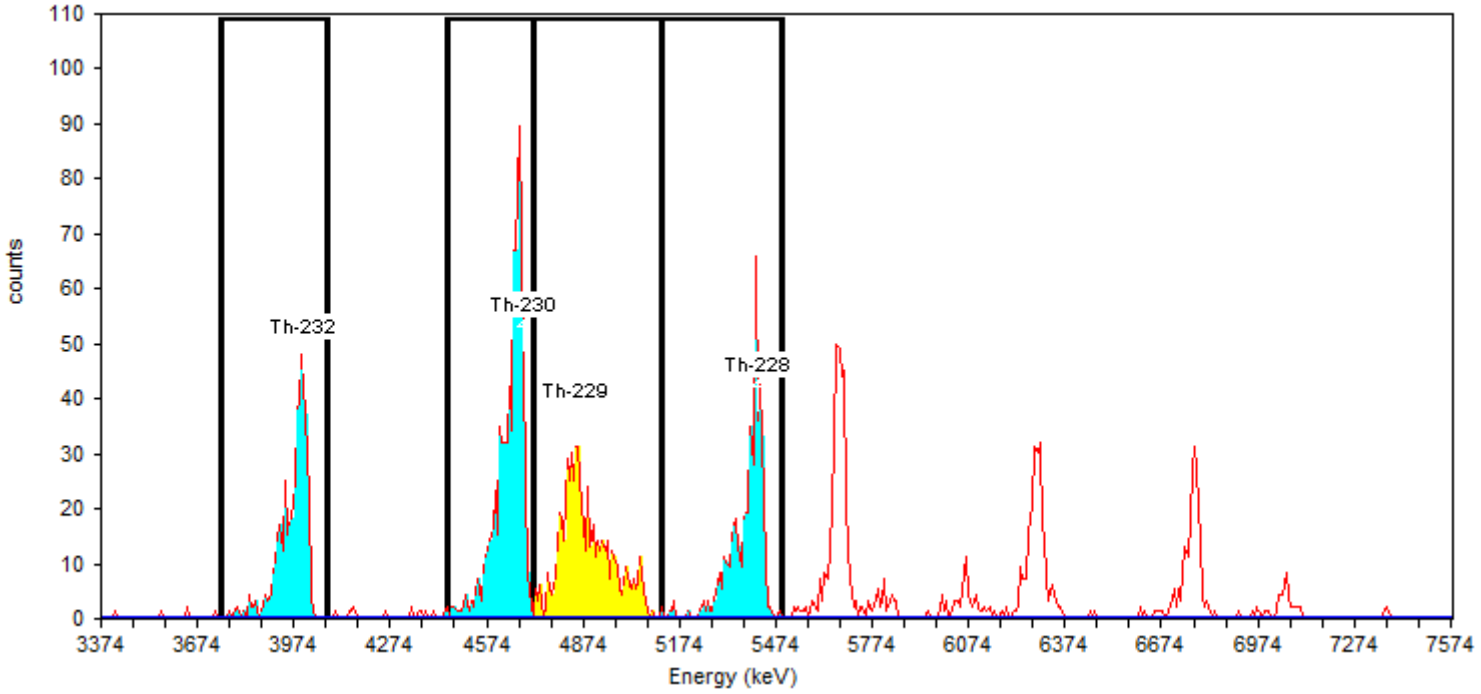
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 84.32%

Acquisition

Detector: AV216 SN: 50-117J5
Acquisition Start Date: 9/7/2016 2:28:41PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 9/1/2016 3:17:18PM
Bkgd Info: Sample: ICB;AV216; Det: AV216; Spectrum #1; 9/1/2016 3:17:18 PM

Energy Calibration: IC-9886;AV216-20151018
Efficiency Calibration:IC-9886;AV216-20151018
Calibration Date: 10/18/2015 6:42:28PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.90% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:38PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	56.4	100.2	423	0.0000	423.00	2.264E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	23.7	99.7	717	0.0000	716.85	3.855E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	93.8	99.6	563	0.4167	562.61	2.553E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	55.5	99.8	454	2.9167	450.96	2.440E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:21:16AM 9/1/2016

Sample

Sample Name: 160-18552-A-2-C Type: Sample
Spectrum #1 Analysis #1
: 160-18552-A-2-C
Sample Collection Date: 8/8/2016 2:15:00PM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 175944
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

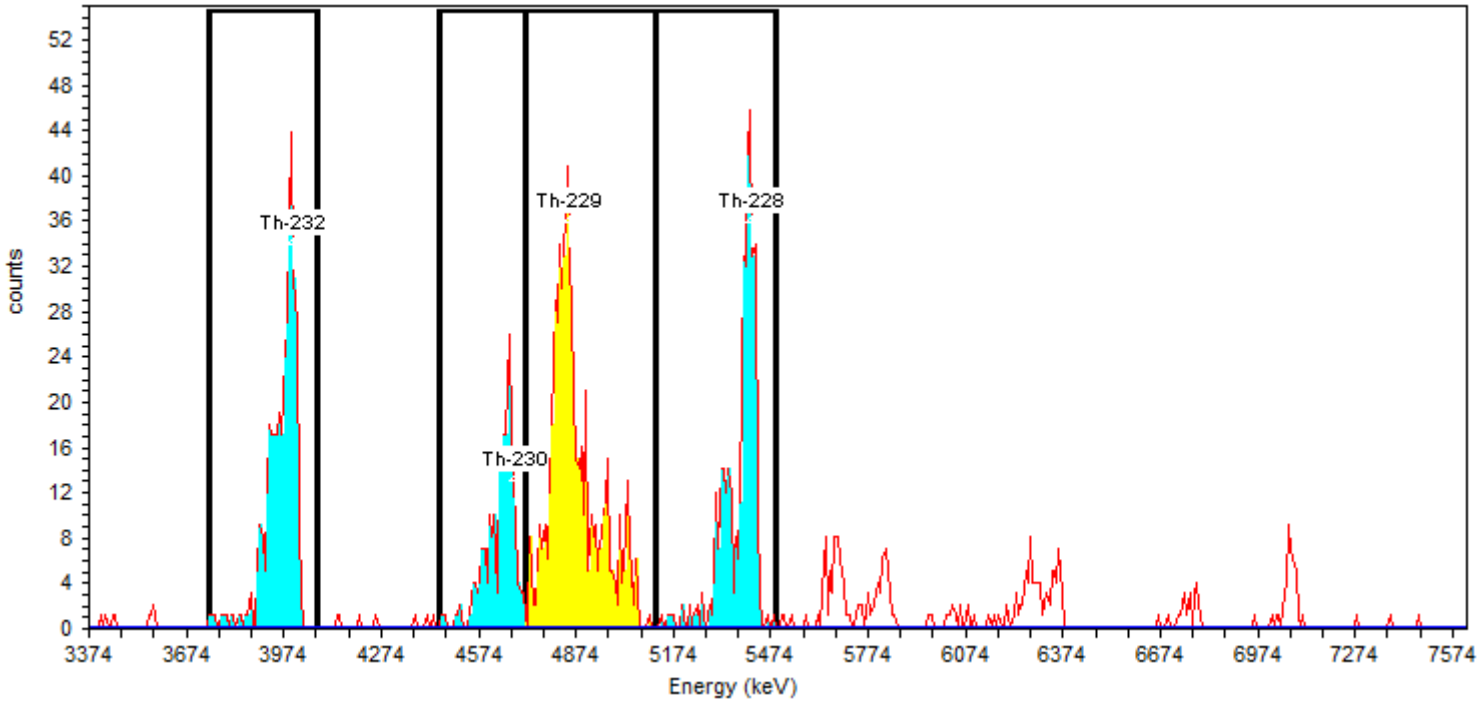
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 88.01%

Acquisition

Detector: AV152 SN: 50-05/R6
Acquisition Start Date: 8/31/2016 7:41:13PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/22/2016 3:43:31PM
Bkgd Info: Sample: ICB;AV152; Det: AV152; Spectrum #1; 7/22/2016 3:43:31 PM

Energy Calibration: IC-9520;AV152-20151016
Efficiency Calibration:IC-9520;AV152-20151016
Calibration Date: 10/16/2015 6:46:53PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.54% +/- 0.35% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:38PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	72.9	100.2	359	0.0000	359.00	1.868E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	40.3	99.7	213	0.4167	212.55	1.112E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	79.6	99.6	580	1.2500	578.72	2.666E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	48.6	99.8	370	7.8806	362.12	1.893E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:09:00PM 9/7/2016

Sample

Sample Name: 160-18552-A-3-C Type: Sample
Spectrum #2 Analysis #1
: 160-18552-A-3-C
Sample Collection Date: 8/8/2016 1:37:00PM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 176241
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

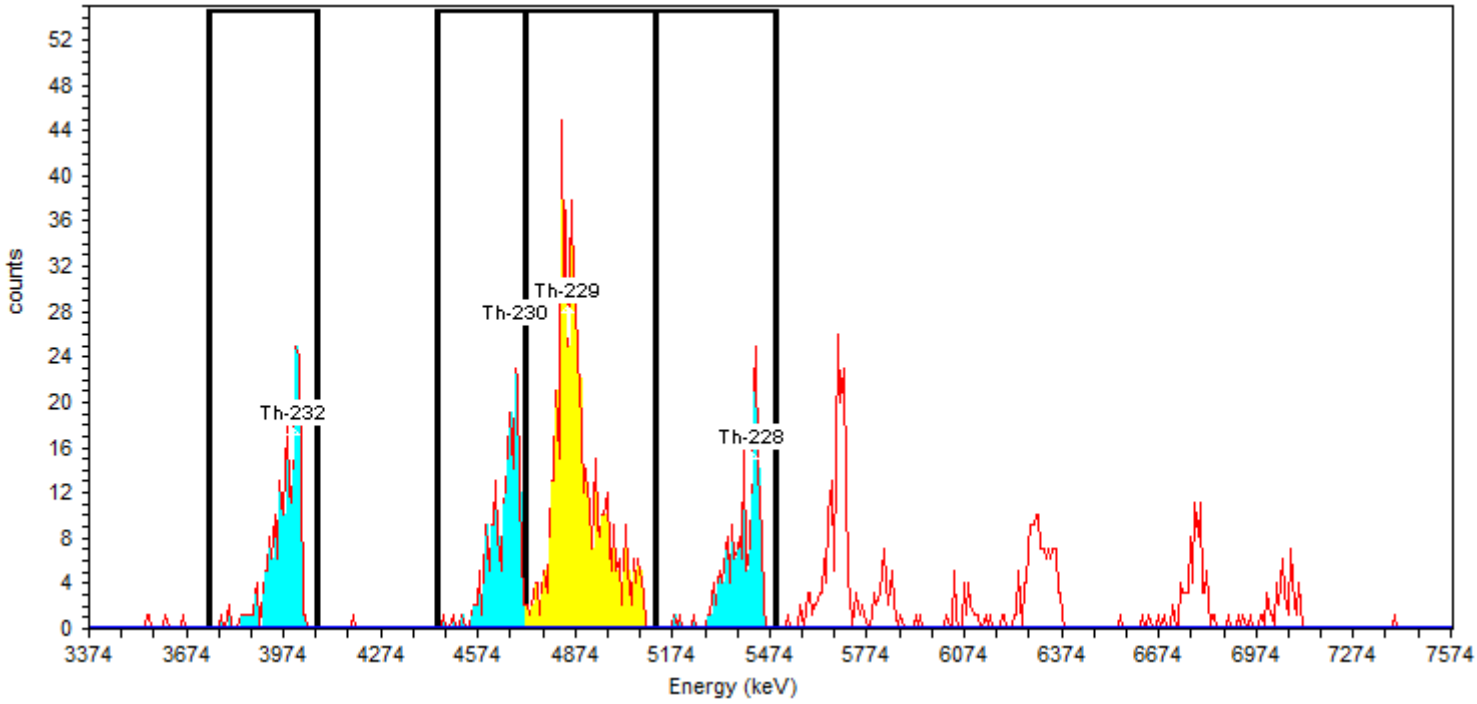
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 86.11%

Acquisition

Detector: AV213 SN: 54-011 Y1
Acquisition Start Date: 9/7/2016 2:28:45PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 9/1/2016 3:17:17PM
Bkgd Info: Sample: ICB;AV213; Det: AV213; Spectrum #1; 9/1/2016 3:17:17 PM

Energy Calibration: IC-9817;AV213-20151018
Efficiency Calibration:IC-9817;AV213-20151018
Calibration Date: 10/18/2015 6:42:09PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.89% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:38PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	84.4	100.2	213	0.4167	212.58	1.115E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	36.0	99.7	208	0.0000	208.00	1.096E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	84.5	99.6	575	0.8333	574.17	2.608E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	53.4	99.8	189	1.6667	187.33	9.933E-001	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:21:30AM 9/1/2016

Sample

Sample Name: 160-18552-A-4-C Type: Sample
Spectrum #1 Analysis #1
: 160-18552-A-4-C
Sample Collection Date: 8/8/2016 2:30:00PM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 175945
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

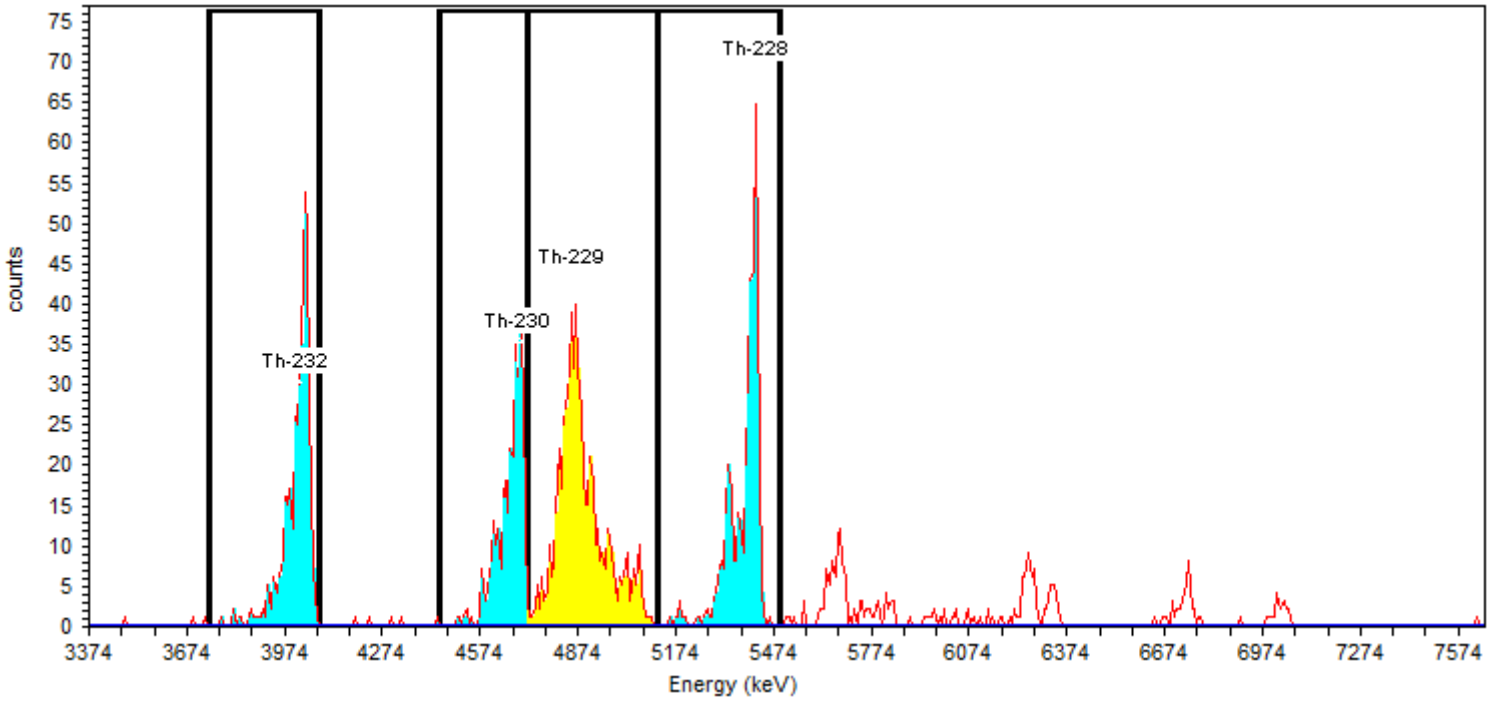
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 84.82%

Acquisition

Detector: AV156 SN: 49-155n4
Acquisition Start Date: 8/31/2016 7:41:13PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/22/2016 3:43:31PM
Bkgd Info: Sample: ICB;AV156; Det: AV156; Spectrum #1; 7/22/2016 3:43:31 PM

Energy Calibration: IC-9795;AV156-20151016a
Efficiency Calibration:IC-9795;AV156-20151016a
Calibration Date: 10/16/2015 6:47:28PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.08% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:38PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	23.9	100.2	382	0.4167	382.04	1.942E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	37.6	99.7	319	0.8333	318.41	1.627E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	83.4	99.6	594	1.2500	592.69	2.570E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	48.4	99.8	416	7.5000	408.50	2.086E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:02:58AM 9/1/2016

Sample

Sample Name: 160-18552-A-4-C Type: Sample
Spectrum #1 Analysis #1
: 160-18552-A-4-C
Sample Collection Date: 8/8/2016 2:30:00PM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 175989
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

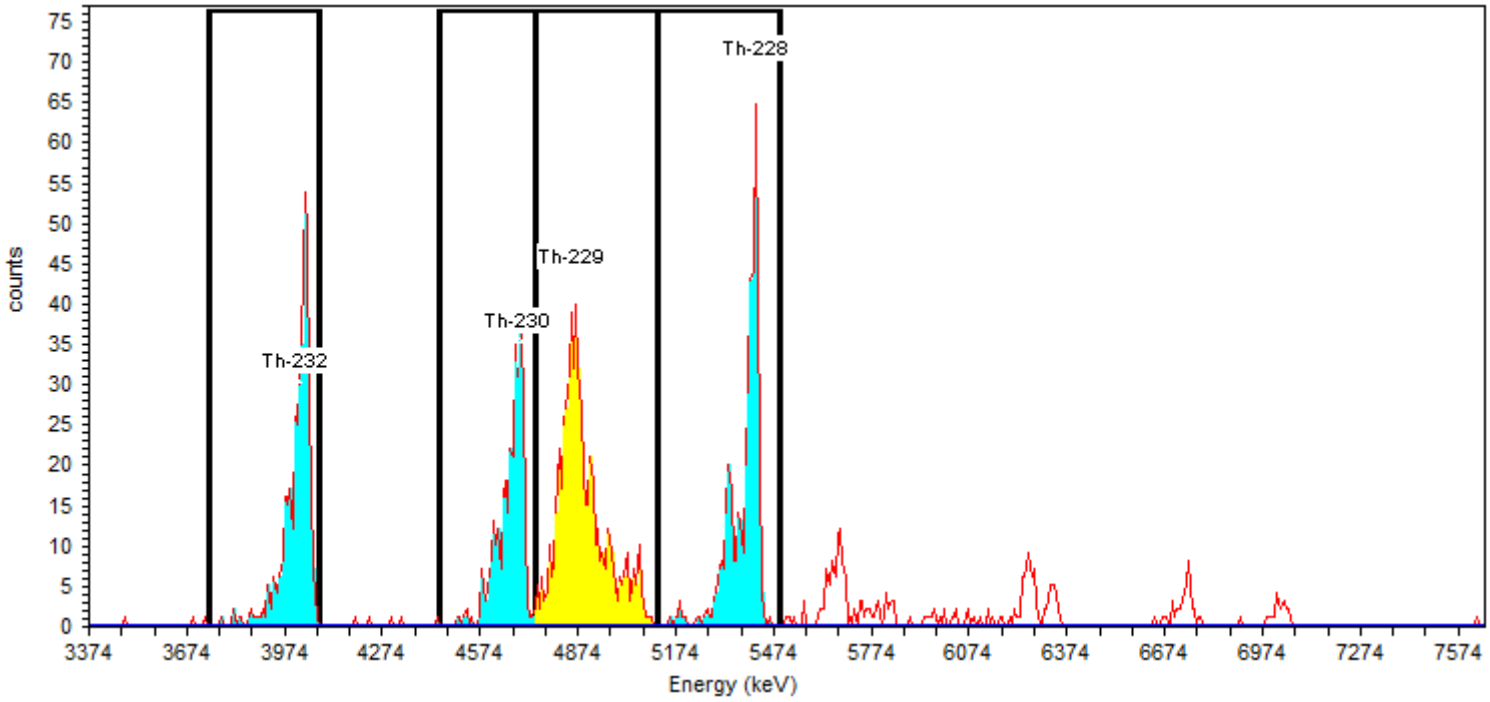
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 84.26%

Acquisition

Detector: AV156 SN: 49-155n4
Acquisition Start Date: 8/31/2016 7:41:13PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/22/2016 3:43:31PM
Bkgd Info: Sample: ICB;AV156; Det: AV156; Spectrum #1; 7/22/2016 3:43:31 PM

Energy Calibration: IC-9795;AV156-20151016a
Efficiency Calibration:IC-9795;AV156-20151016a
Calibration Date: 10/16/2015 6:47:28PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.08% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:8/31/2016 7:36:38PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Manual Integration for tailing. 09/01/2016 ALD

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	23.9	100.2	382	0.4167	382.04	1.955E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4448.3	4739.1	39.2	99.7	323	0.8333	322.17	1.657E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4739.1	5119.5	83.4	99.6	590	1.2500	588.75	2.553E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	48.4	99.8	416	7.5000	408.50	2.099E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:21:53AM 9/1/2016

Sample

Sample Name: 160-18552-A-5-C Type: Sample
Spectrum #1 Analysis #1
: 160-18552-A-5-C
Sample Collection Date: 8/8/2016 1:56:00PM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 175947
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

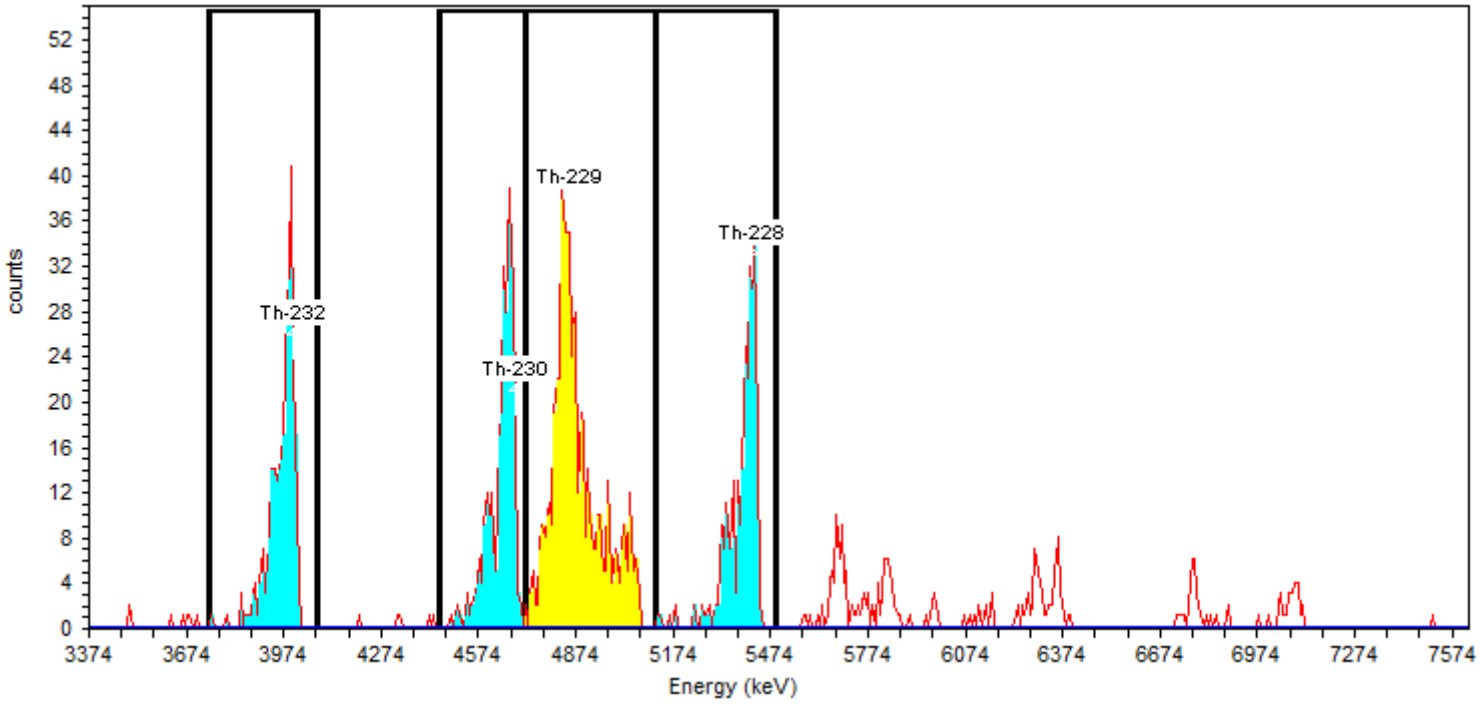
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 87.00%

Acquisition

Detector: AV157 SN: 50-05/II3
Acquisition Start Date: 8/31/2016 7:41:13PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/22/2016 3:43:31PM
Bkgd Info: Sample: ICB;AV157; Det: AV157; Spectrum #1; 7/22/2016 3:43:31 PM

Energy Calibration: IC-9817;AV157-20151016
Efficiency Calibration:IC-9817;AV157-20151016
Calibration Date: 10/16/2015 6:47:07PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.78% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:38PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	56.0	100.2	274	1.2500	273.18	1.423E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	23.6	99.7	309	0.4167	308.52	1.615E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	80.5	99.6	579	1.2500	577.69	2.633E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	52.3	99.8	277	5.4888	271.51	1.420E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:21:45AM 9/1/2016

Sample

Sample Name: 160-18552-A-6-C Type: Sample
Spectrum #1 Analysis #1
: 160-18552-A-6-C
Sample Collection Date: 8/8/2016 1:44:00PM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 175946
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

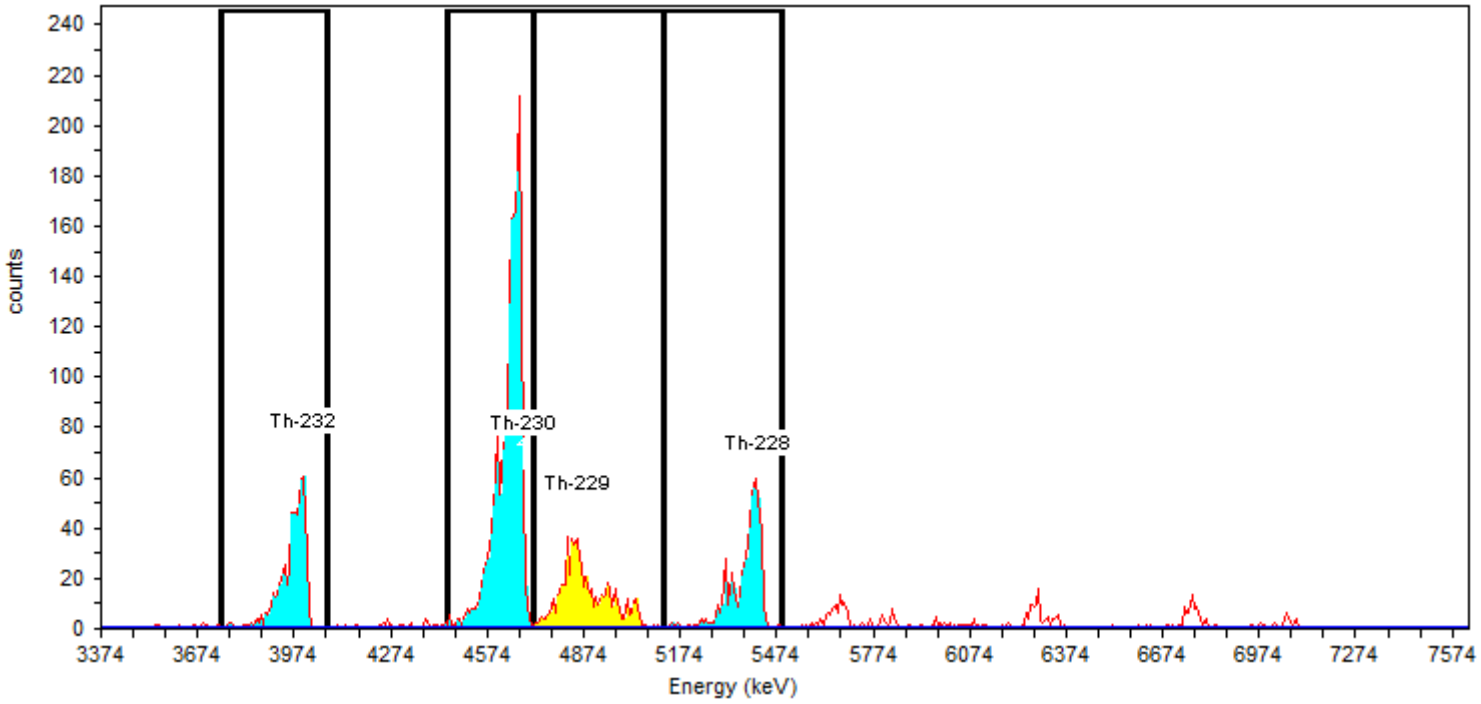
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 90.24%

Acquisition

Detector: AV158 SN: 50-05/II4
Acquisition Start Date: 8/31/2016 7:41:14PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/22/2016 3:43:32PM
Bkgd Info: Sample: ICB;AV158; Det: AV158; Spectrum #1; 7/22/2016 3:43:32 PM

Energy Calibration: IC-9884;AV158-20151016
Efficiency Calibration:IC-9884;AV158-20151016
Calibration Date: 10/16/2015 6:47:11PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.82% +/- 0.35% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:38PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	60.2	100.2	524	0.4167	523.58	2.737E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	18.5	99.7	1730	0.8333	1729.54	9.088E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	81.0	99.6	577	1.2500	575.81	2.732E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	53.5	99.8	542	3.7500	538.25	2.827E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:22:07AM 9/1/2016

Sample

Sample Name: 160-18552-A-7-C Type: Sample
Spectrum #1 Analysis #1
: 160-18552-A-7-C
Sample Collection Date: 8/8/2016 1:49:00PM
Comment:

Sample Weight : 1.00 Sample Units: g
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 266485
AnalysisResultsID: 175949
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

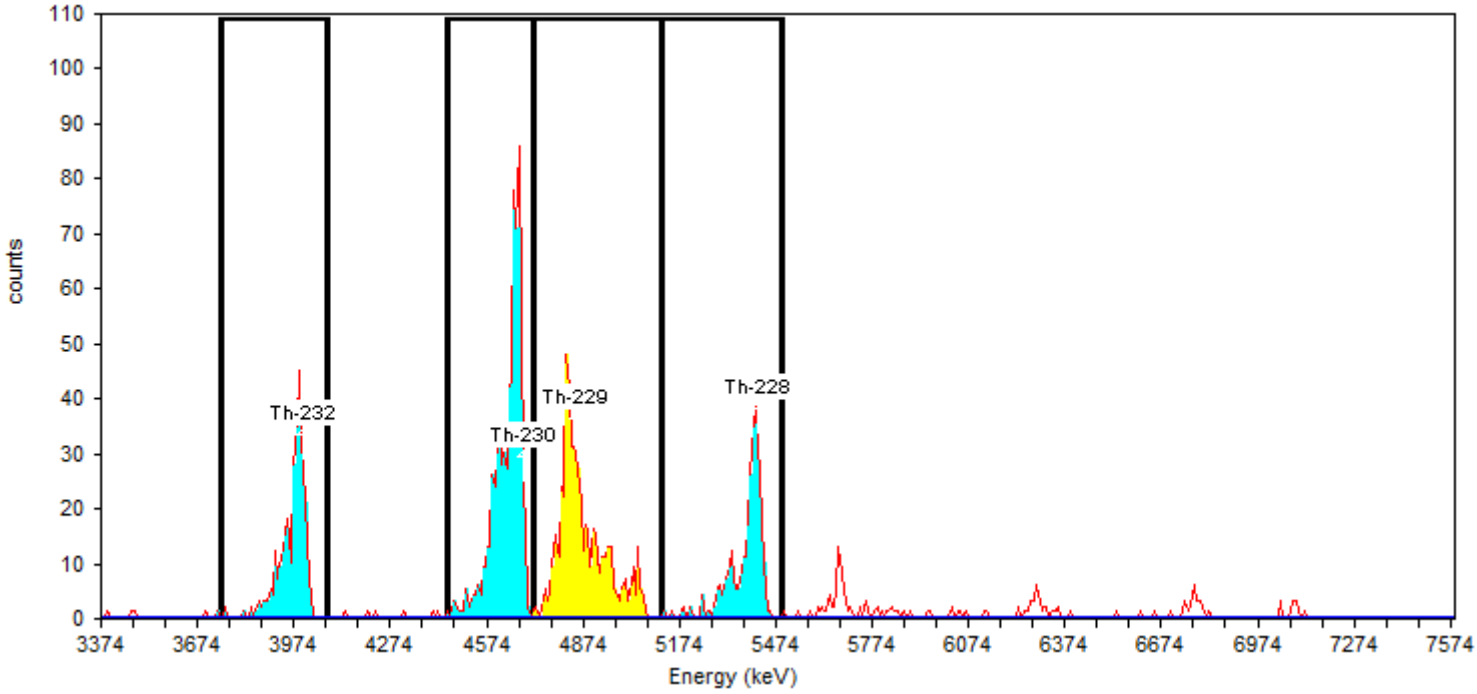
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 90.11%

Acquisition

Detector: AV160 SN: 50-05/II6
Acquisition Start Date: 8/31/2016 7:41:14PM
Live Time: 400.00 min.
Real Time: 400.01 min.
Background Date: 7/22/2016 3:43:32PM
Bkgd Info: Sample: ICB;AV160; Det: AV160; Spectrum #1; 7/22/2016 3:43:32 PM

Energy Calibration: IC-9886;AV160-20151016a
Efficiency Calibration:IC-9886;AV160-20151016a
Calibration Date: 10/16/2015 6:47:48PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.97% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/31/2016 7:36:38PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	57.1	100.2	327	2.5000	324.50	1.688E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	18.3	99.7	702	0.4167	701.31	3.666E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	72.7	99.6	580	1.2500	578.78	2.729E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	53.0	99.8	315	3.3333	311.75	1.629E+000	pCi/g

Daily Checks

Alpha Spectroscopy Daily Pulser Check

Analysis Date: 08/31/16

		Gross Counts			FWHM (keV)			Pulser Center			Energy (keV)		
Detector	Analysis Date	Result	Criteria	P/F	Result	Criteria	P/F	Result	Criteria	P/F	Result	Criteria	P/F
AV148	08/31/16 09:06	6015	5686.2 - 6284.7	Pass	14.8	10 - 20	Pass	222.0	218.0 - 228.0	Pass	5022	4990.0 - 5070.0	Pass
AV149	08/31/16 09:06	5874	5704.3 - 6304.8	Pass	12.2	10 - 20	Pass	222.9	217.9 - 227.9	Pass	5030	4989.4 - 5069.4	Pass
AV152	08/31/16 09:06	6010	5683.1 - 6281.3	Pass	14.3	10 - 20	Pass	224.2	218.9 - 228.9	Pass	5039	4996.9 - 5076.9	Pass
AV156	08/31/16 09:06	6011	5679.3 - 6277.1	Pass	15.2	10 - 20	Pass	224.0	219.0 - 229.0	Pass	5038	4997.2 - 5077.2	Pass
AV157	08/31/16 09:06	5873	5565.7 - 6151.5	Pass	12.8	10 - 20	Pass	222.0	218.1 - 228.1	Pass	5023	4990.4 - 5070.4	Pass
AV158	08/31/16 09:06	5854	5603.2 - 6193.1	Pass	13.0	10 - 20	Pass	226.0	222.0 - 232.0	Pass	5052	5020.0 - 5100.0	Pass
AV160	08/31/16 09:06	5924	5658.3 - 6253.9	Pass	17.9	10 - 20	Pass	221.9	216.9 - 226.9	Pass	5022	4981.7 - 5061.7	Pass

Analysis Date: 09/07/16

		Gross Counts			FWHM (keV)			Pulser Center			Energy (keV)		
Detector	Analysis Date	Result	Criteria	P/F	Result	Criteria	P/F	Result	Criteria	P/F	Result	Criteria	P/F
AV213	09/07/16 12:28	5974	5676.6 - 6274.2	Pass	16.6	10 - 20	Pass	223.1	218.0 - 228.0	Pass	5031	4990.3 - 5070.3	Pass
AV216	09/07/16 12:28	6011	5666.3 - 6262.8	Pass	14.6	10 - 20	Pass	224.0	219.1 - 229.1	Pass	5037	4997.8 - 5077.8	Pass
AV217	09/07/16 12:28	5834	5714.3 - 6315.8	Pass	13.0	10 - 20	Pass	217.0	212.0 - 222.0	Pass	4985	4945.0 - 5025.0	Pass

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:12:22AM 8/31/2016

Sample

Sample Name: Pulser;AV148
Comment:

Spectrum #28 Analysis #1

Batch

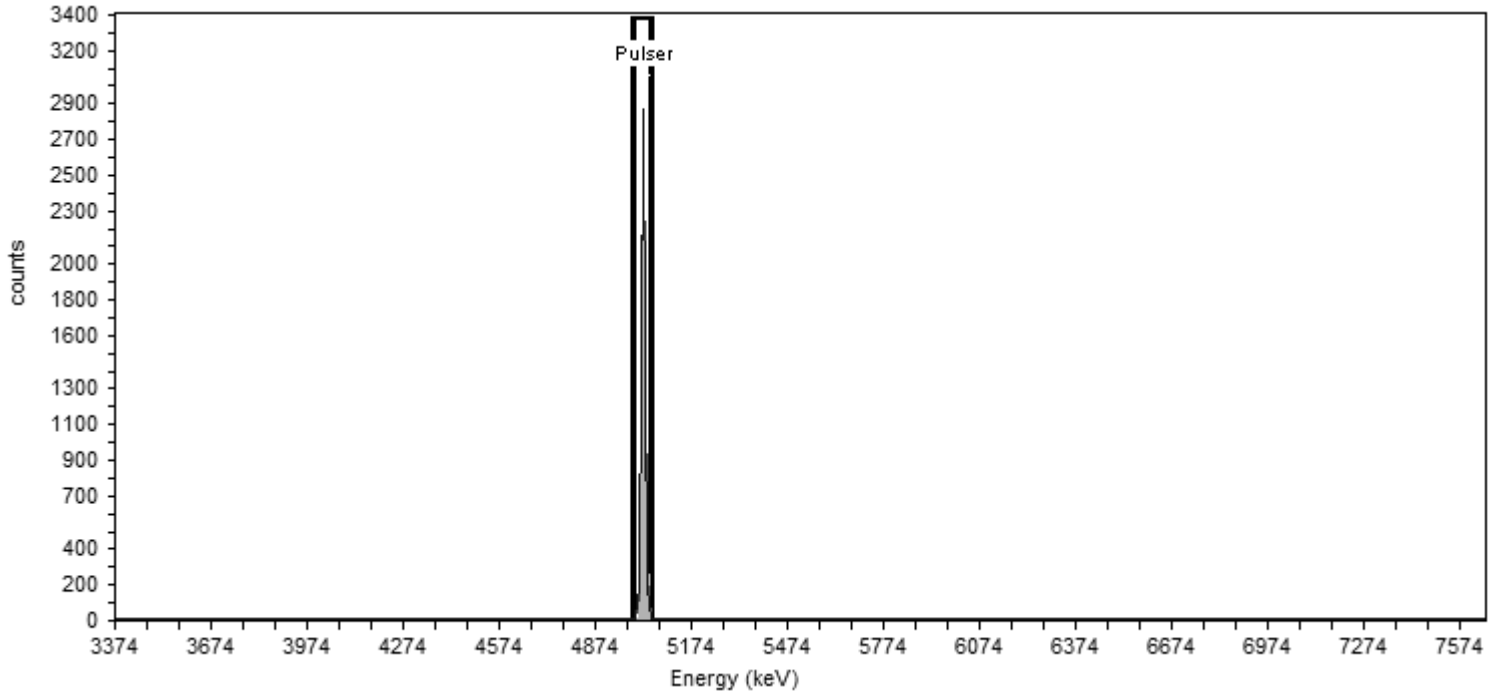
Batch Name: July2016a
Description:

Acquisition

Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 8/31/2016 9:06:51AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-8874;AV148-20151016a
Calibration Date: 10/16/2015 6:47:19PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5022.425	4997.258	5047.593	14.79	6,085.49	6,014.78

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:12:20AM 8/31/2016

Sample

Sample Name: Pulser;AV149
Comment:

Spectrum #28 Analysis #1

Batch

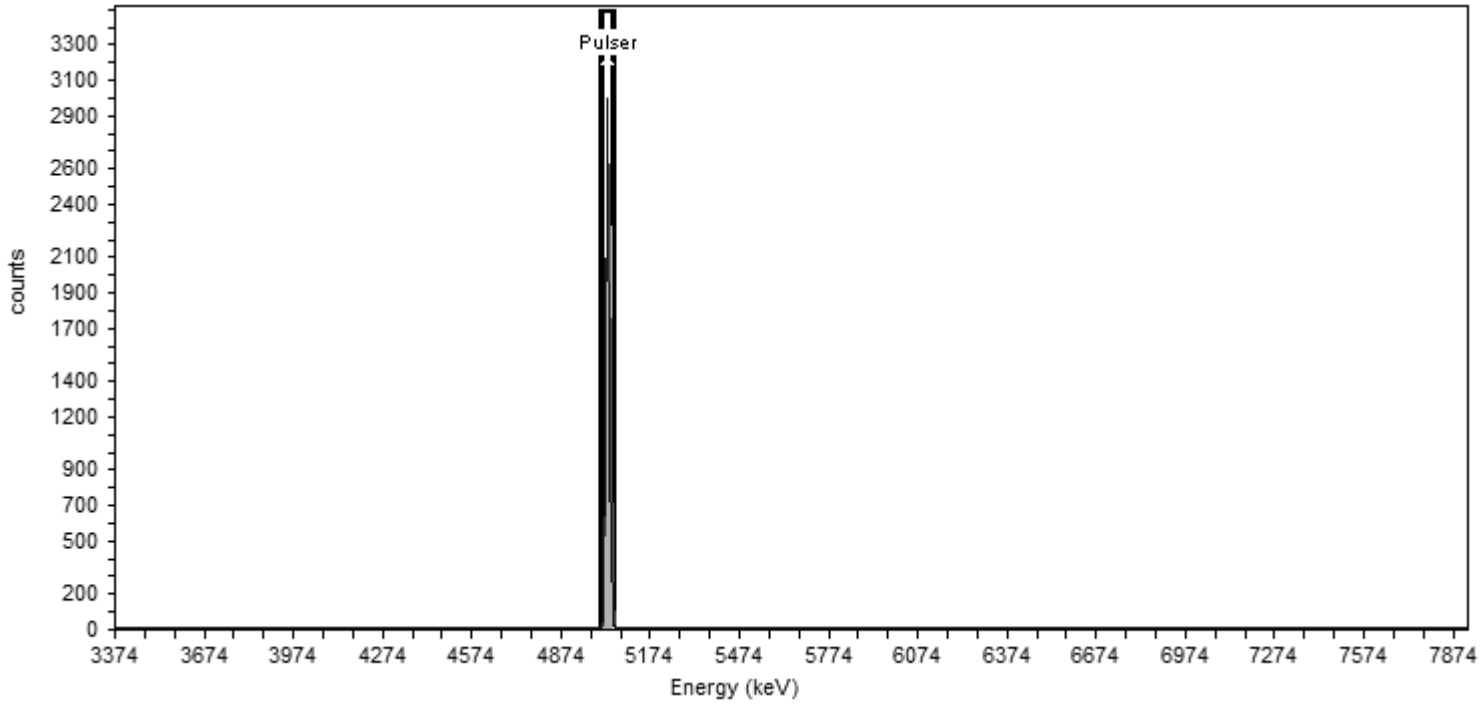
Batch Name: July2016a
Description:

Acquisition

Detector: AV149 , SN: 50-05/R3
Acquisition Start Date: 8/31/2016 9:06:45AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-8875;AV149-20151016
Calibration Date: 10/16/2015 6:46:43PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5029.537	5008.750	5050.323	12.21	5,253.19	5,873.76

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:12:23AM 8/31/2016

Sample

Sample Name: Pulser;AV152
Comment:

Spectrum #29 Analysis #1

Batch

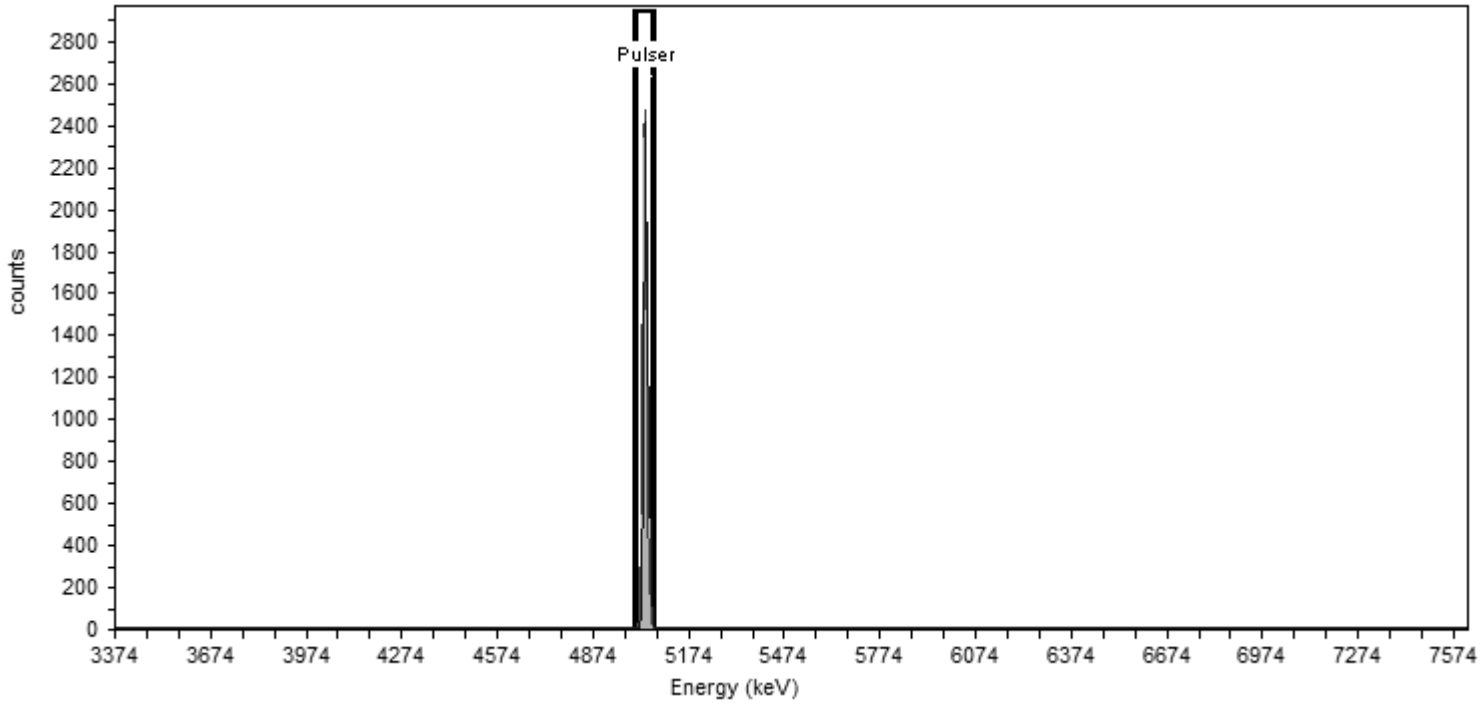
Batch Name: July2016a
Description:

Acquisition

Detector: AV152 , SN: 50-05/R6
Acquisition Start Date: 8/31/2016 9:06:46AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9520;AV152-20151016
Calibration Date: 10/16/2015 6:46:53PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5038.726	5014.380	5063.071	14.30	5,070.56	6,009.59

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:12:24AM 8/31/2016

Sample

Sample Name: Pulser;AV156
Comment:

Spectrum #28 Analysis #1

Batch

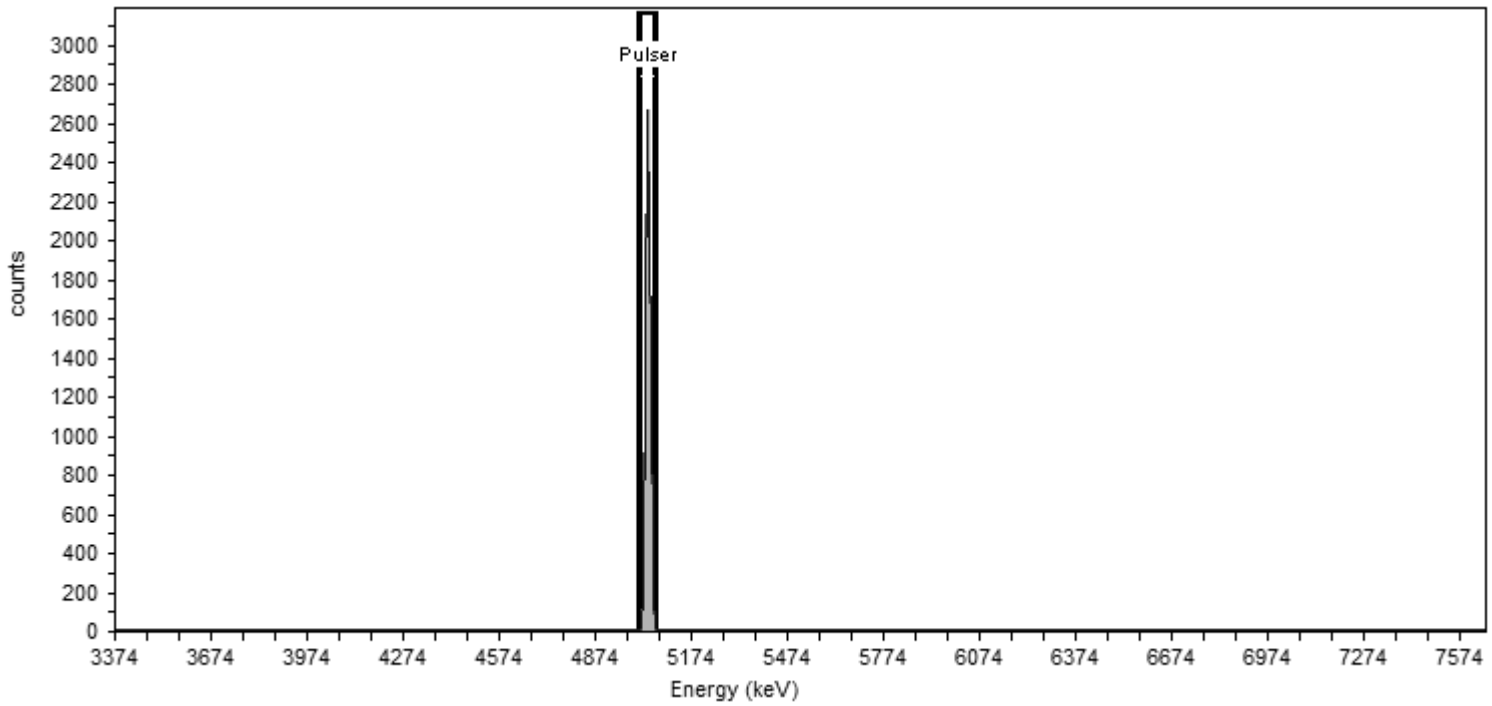
Batch Name: July2016a
Description:

Acquisition

Detector: AV156 , SN: 49-155n4
Acquisition Start Date: 8/31/2016 9:06:48AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9795;AV156-20151016a
Calibration Date: 10/16/2015 6:47:28PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5037.555	5011.665	5063.445	15.21	5,823.00	6,011.14

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:12:25AM 8/31/2016

Sample

Sample Name: Pulser;AV157
Comment:

Spectrum #28 Analysis #1

Batch

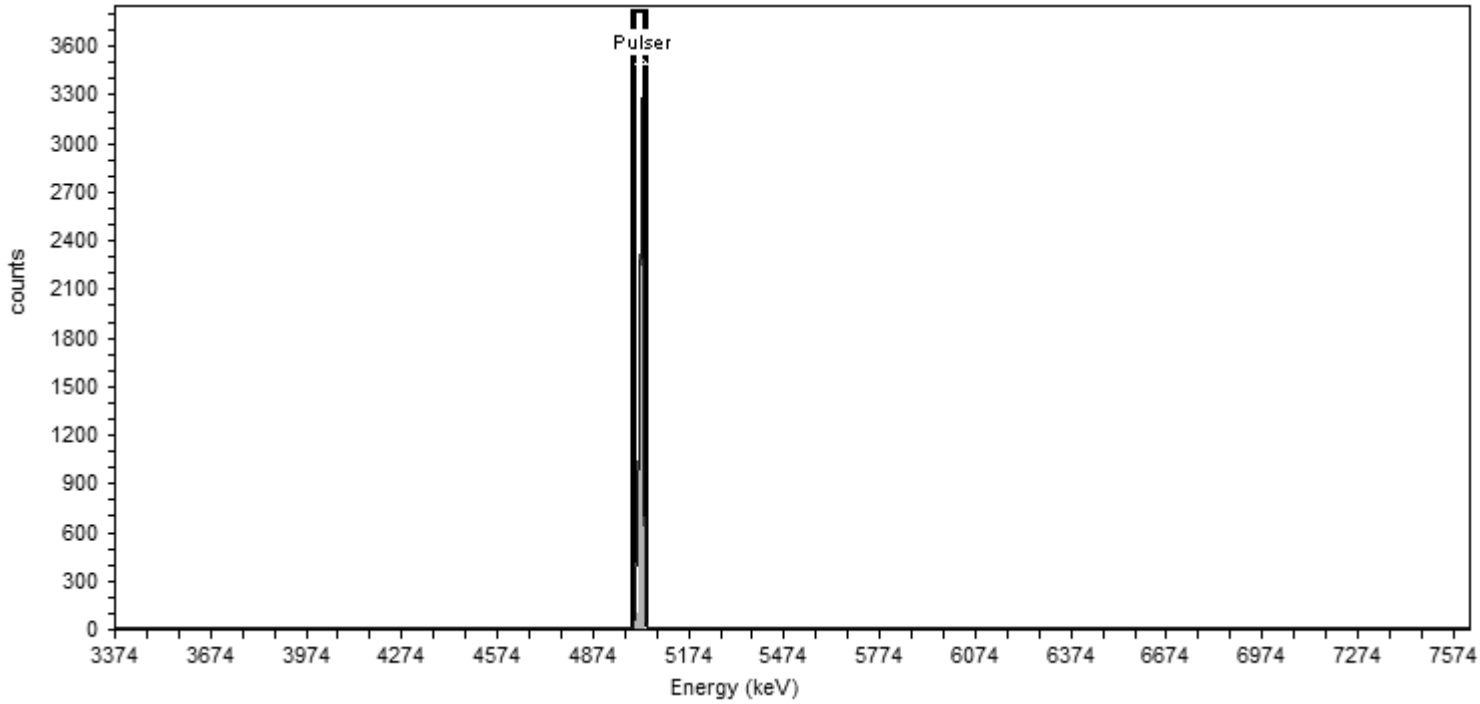
Batch Name: July2016a
Description:

Acquisition

Detector: AV157 , SN: 50-05/II3
Acquisition Start Date: 8/31/2016 9:06:47AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9817;AV157-20151016
Calibration Date: 10/16/2015 6:47:07PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5022.555	5000.705	5044.405	12.84	6,037.77	5,873.09

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:12:28AM 8/31/2016

Sample

Sample Name: Pulser;AV158
Comment:

Spectrum #28 Analysis #1

Batch

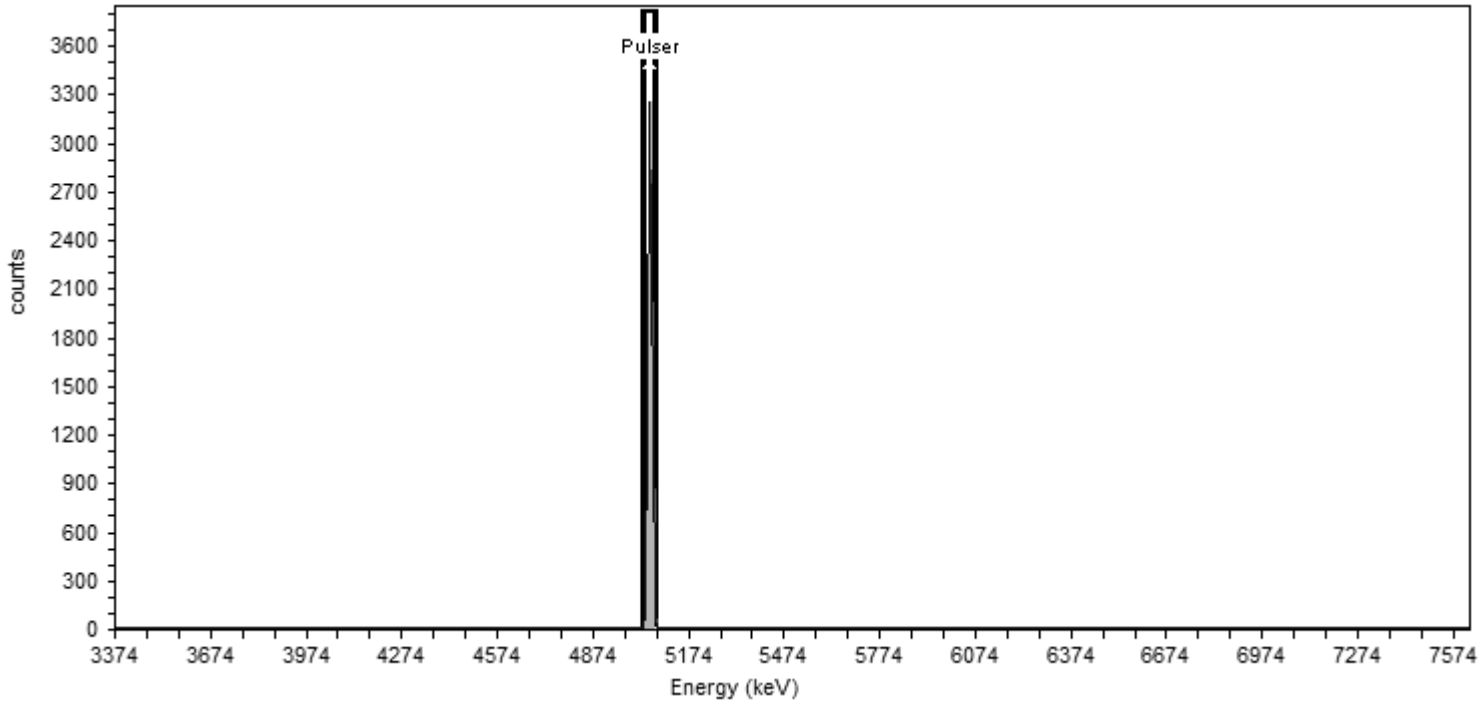
Batch Name: July2016a
Description:

Acquisition

Detector: AV158 , SN: 50-05/II4
Acquisition Start Date: 8/31/2016 9:06:47AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9884;AV158-20151016
Calibration Date: 10/16/2015 6:47:11PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5052.157	5030.114	5074.201	12.95	6,046.74	5,853.65

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:12:30AM 8/31/2016

Sample

Sample Name: Pulser;AV160
Comment:

Spectrum #40 Analysis #1

Batch

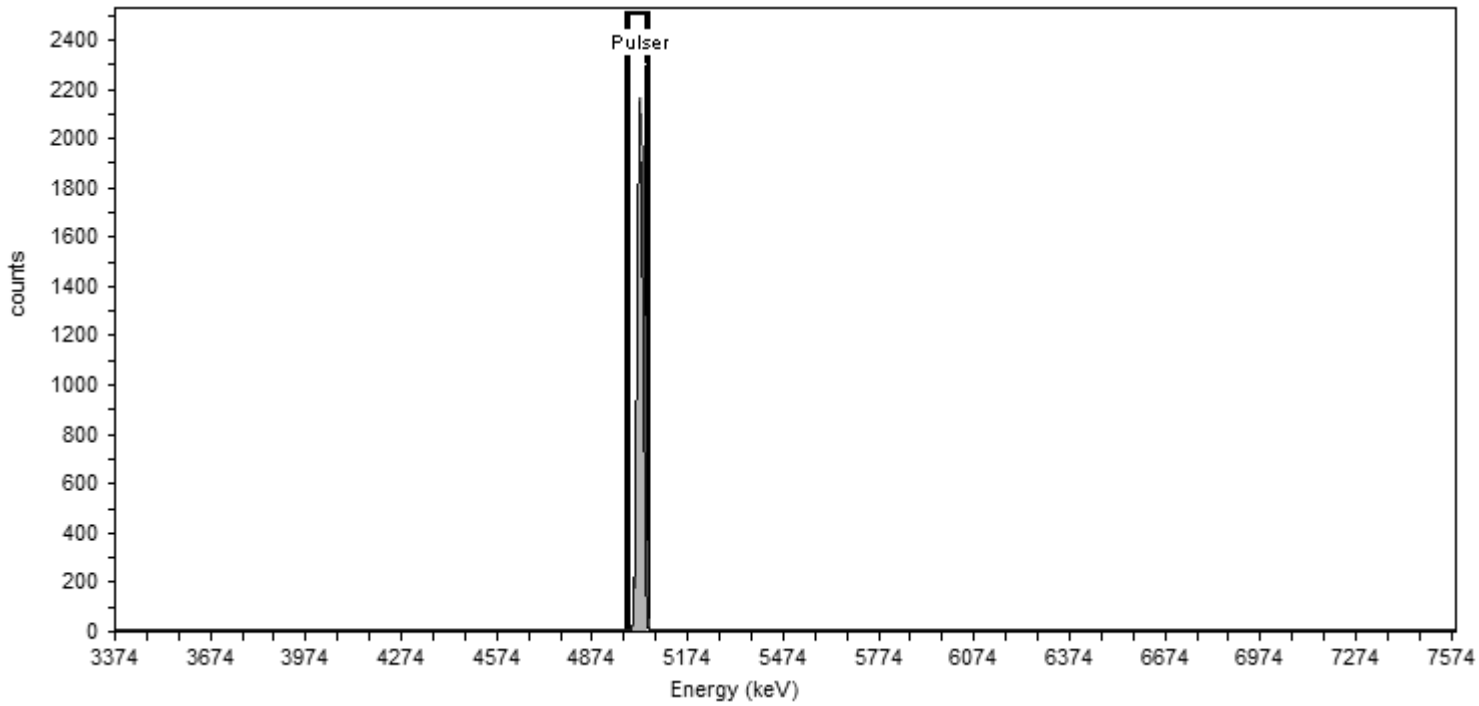
Batch Name: July2016a
Description:

Acquisition

Detector: AV160 , SN: 50-05/II6
Acquisition Start Date: 8/31/2016 9:06:48AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9886;AV160-20151016a
Calibration Date: 10/16/2015 6:47:48PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5021.706	4991.300	5052.111	17.86	5,540.83	5,924.36

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:31:02PM 9/7/2016

Sample

Sample Name: Pulser;AV213
Comment:

Spectrum #1 Analysis #1

Batch

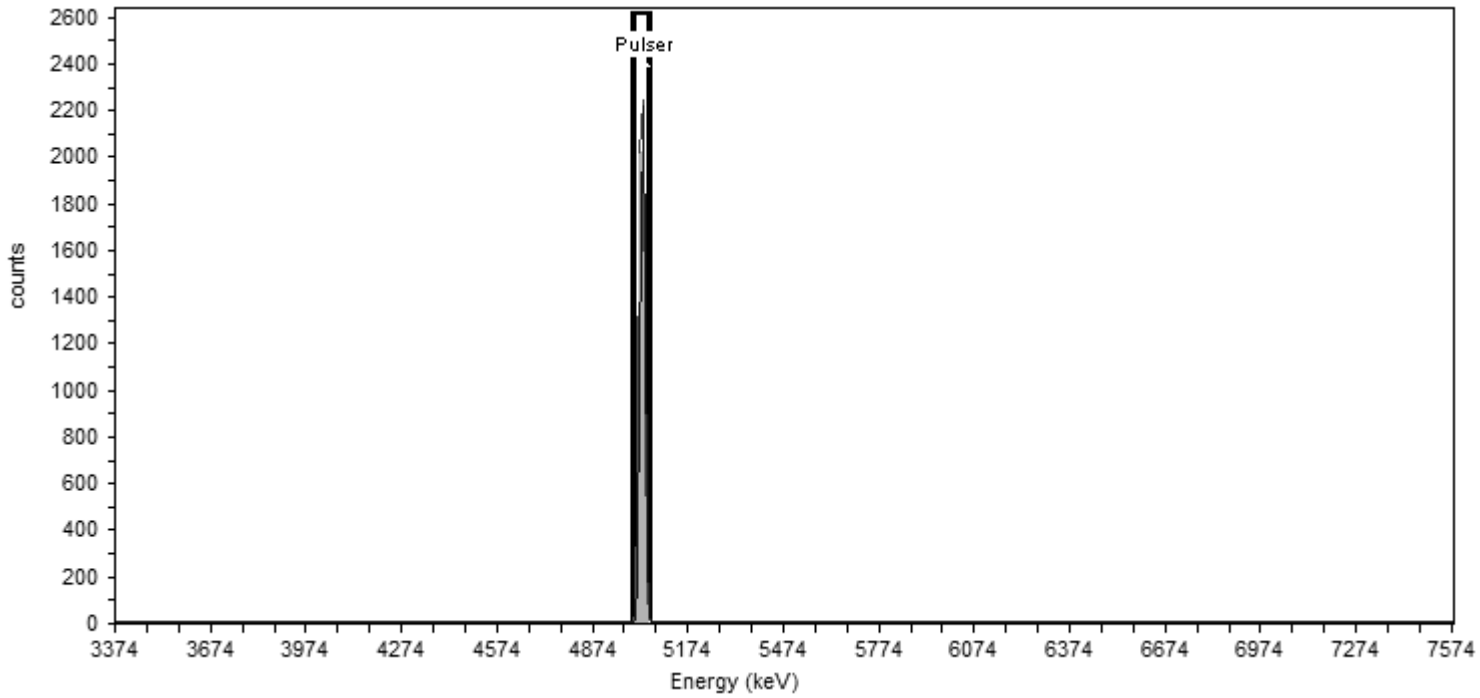
Batch Name: August2016c
Description:

Acquisition

Detector: AV213 , SN: 54-011 Y1
Acquisition Start Date: 9/7/2016 12:28:58PM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9817;AV213-20151018
Calibration Date: 10/18/2015 6:42:09PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5030.961	5002.740	5059.182	16.58	5,327.75	5,973.75

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:31:03PM 9/7/2016

Sample

Sample Name: Pulser;AV216
Comment:

Spectrum #1 Analysis #1

Batch

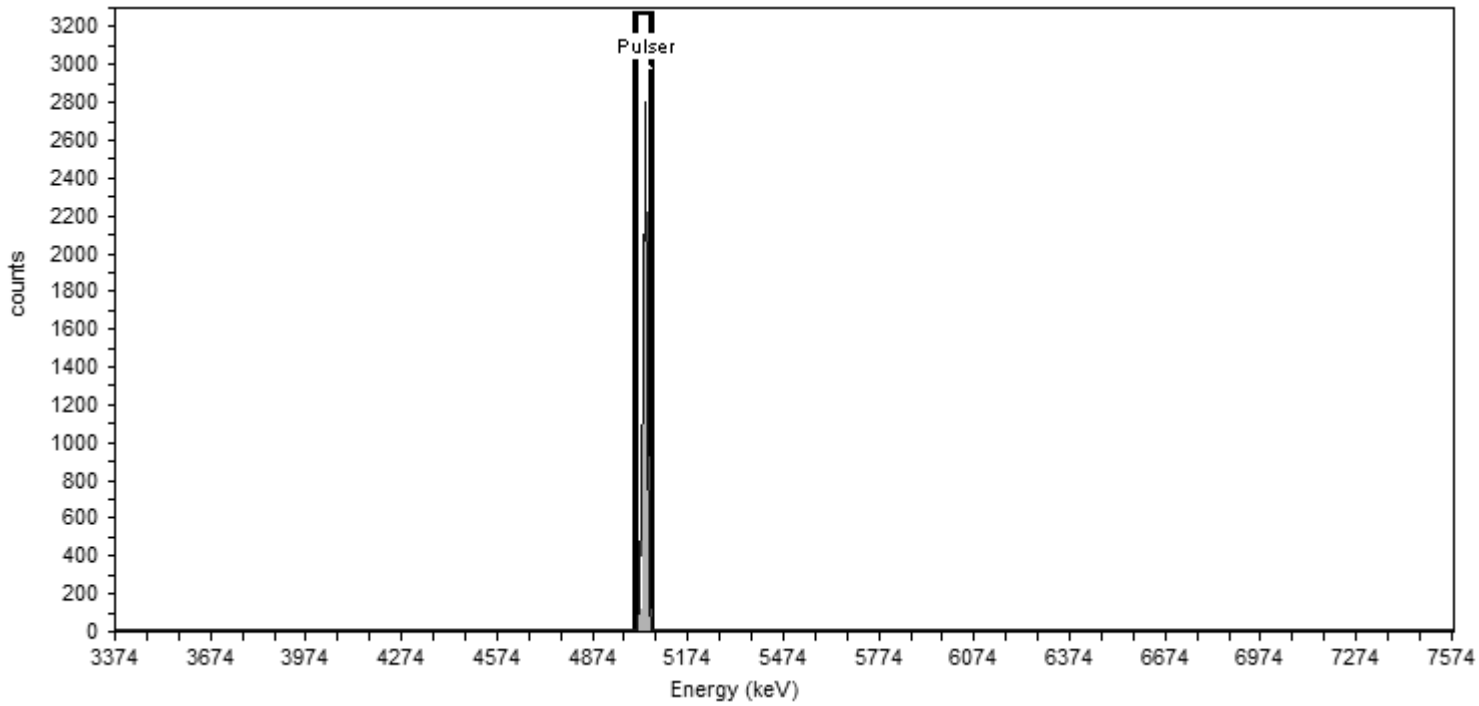
Batch Name: August2016c
Description:

Acquisition

Detector: AV216 , SN: 50-117J5
Acquisition Start Date: 9/7/2016 12:28:59PM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9886;AV216-20151018
Calibration Date: 10/18/2015 6:42:28PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5037.318	5012.501	5062.135	14.58	5,861.00	6,010.89

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:31:05PM 9/7/2016

Sample

Sample Name: Pulser;AV217
Comment:

Spectrum #1 Analysis #1

Batch

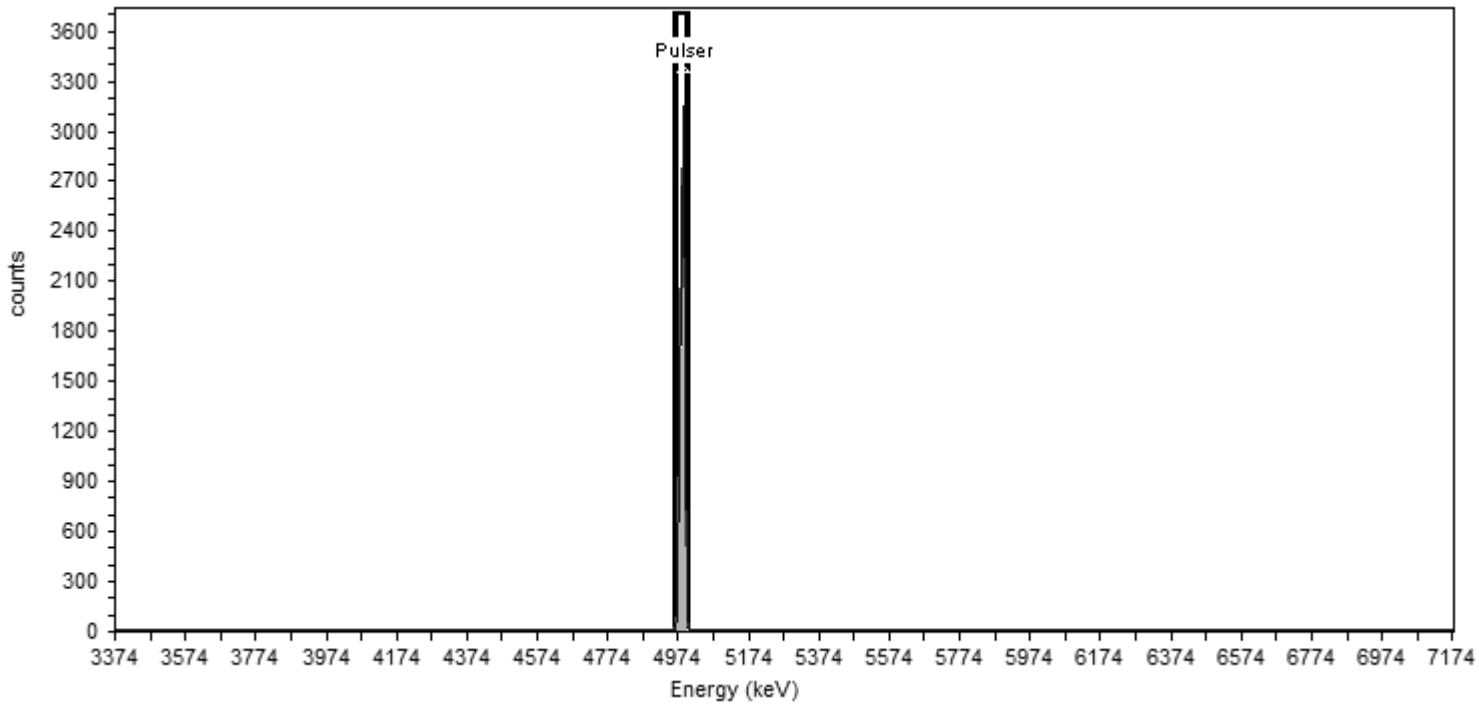
Batch Name: August2016c
Description:

Acquisition

Detector: AV217 , SN: 50-117I2
Acquisition Start Date: 9/7/2016 12:28:59PM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-7107;AV217-20151018
Calibration Date: 10/18/2015 9:19:45PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	4985.421	4963.230	5007.612	13.04	5,897.06	5,833.81

Initial Calibrations

TestAmerica
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Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:26:49PM 11/23/2015

Calibration

Sample Name: IC-8874;AV148-20151016a
Description:
Detector: AV148

Analyst: 60040
Analysis Date: 10/16/2015 6:47:19PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82233-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

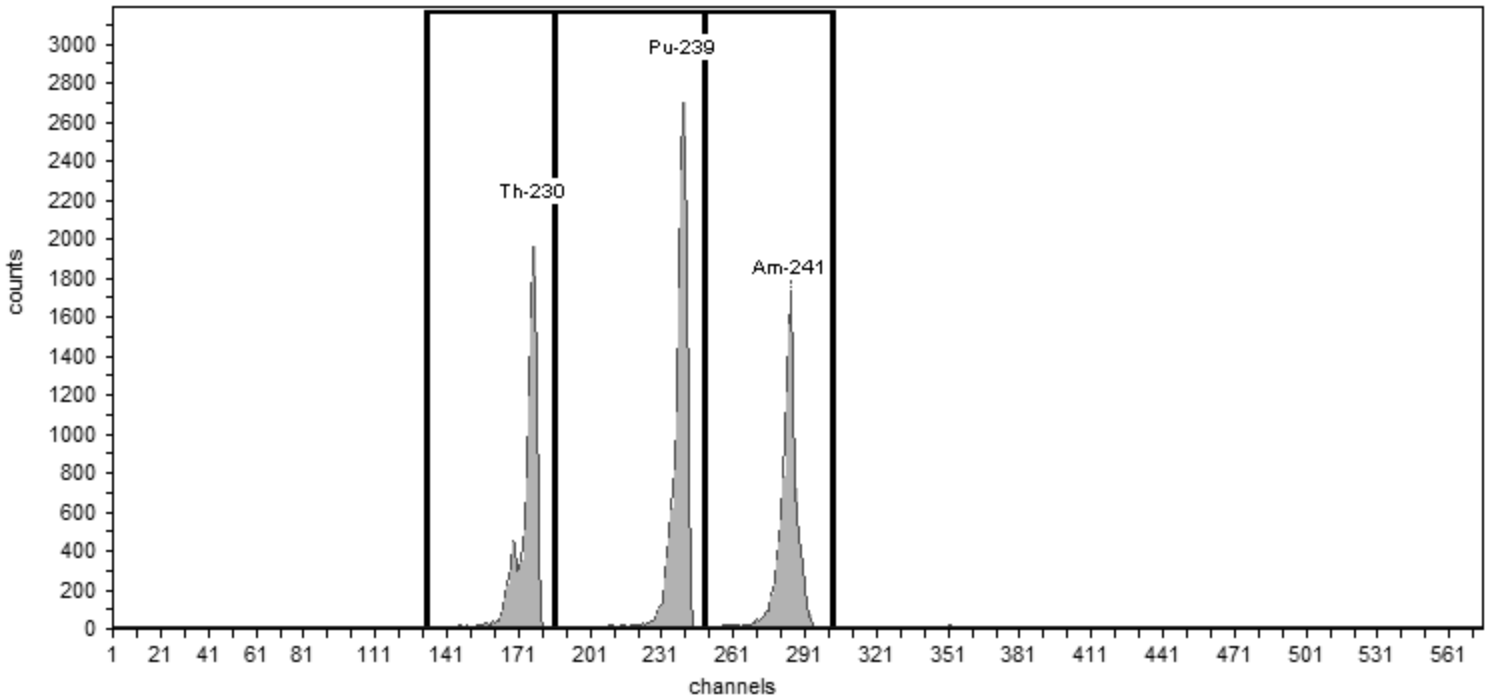
Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 10/16/2015 4:27:06PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-8874;AV148-20151016a

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.72% +/- 0.38% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	29.28	10,746.00	76.76
Pu-239	240	5,155.40	186	249	31.36	14,143.00	101.02
Am-241	284	5,485.70	249	303	32.16	11,206.00	80.04

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:26:56PM 11/23/2015

Calibration

Sample Name: IC-8875;AV149-20151016
Description:
Detector: AV149

Analyst: 60040
Analysis Date: 10/16/2015 6:46:43PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82234-334
Prepared by: Analytics
Description:

Certification Date: 6/2/2010 12:00:00PM

Acquisition

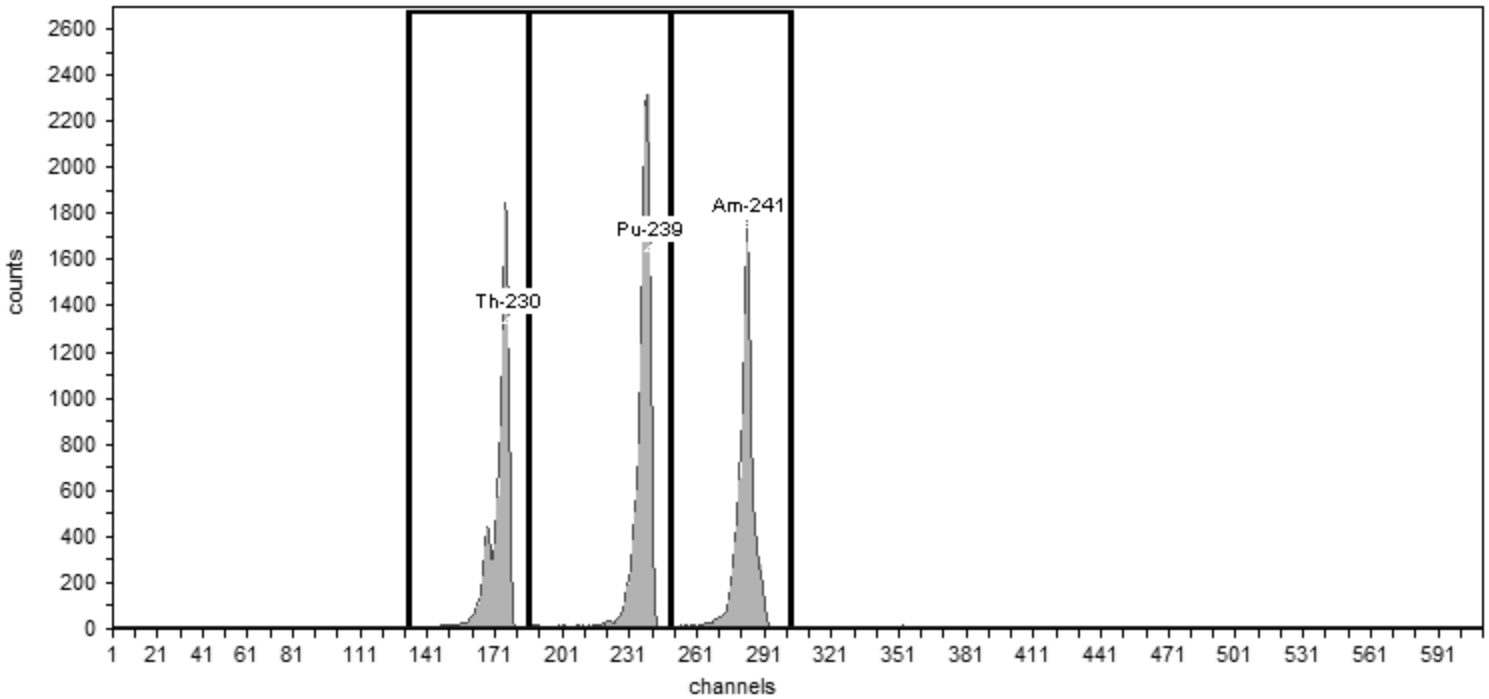
Detector: AV149 , SN: 50-05/R3
Acquisition Start Date: 10/16/2015 3:51:18PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-8875;AV149-20151016

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.03% +/- 0.34% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	31.48	10,971.00	78.36
Pu-239	240	5,155.40	186	249	33.62	12,896.00	92.11
Am-241	284	5,485.70	249	303	31.58	11,033.00	78.81

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:27:05PM 11/23/2015

Calibration

Sample Name: IC-9520;AV152-20151016
Description:
Detector: AV152

Analyst: 60040
Analysis Date: 10/16/2015 6:46:53PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82237-334
Prepared by: Analytics
Description:

Certification Date: 6/1/2010 12:00:00PM

Acquisition

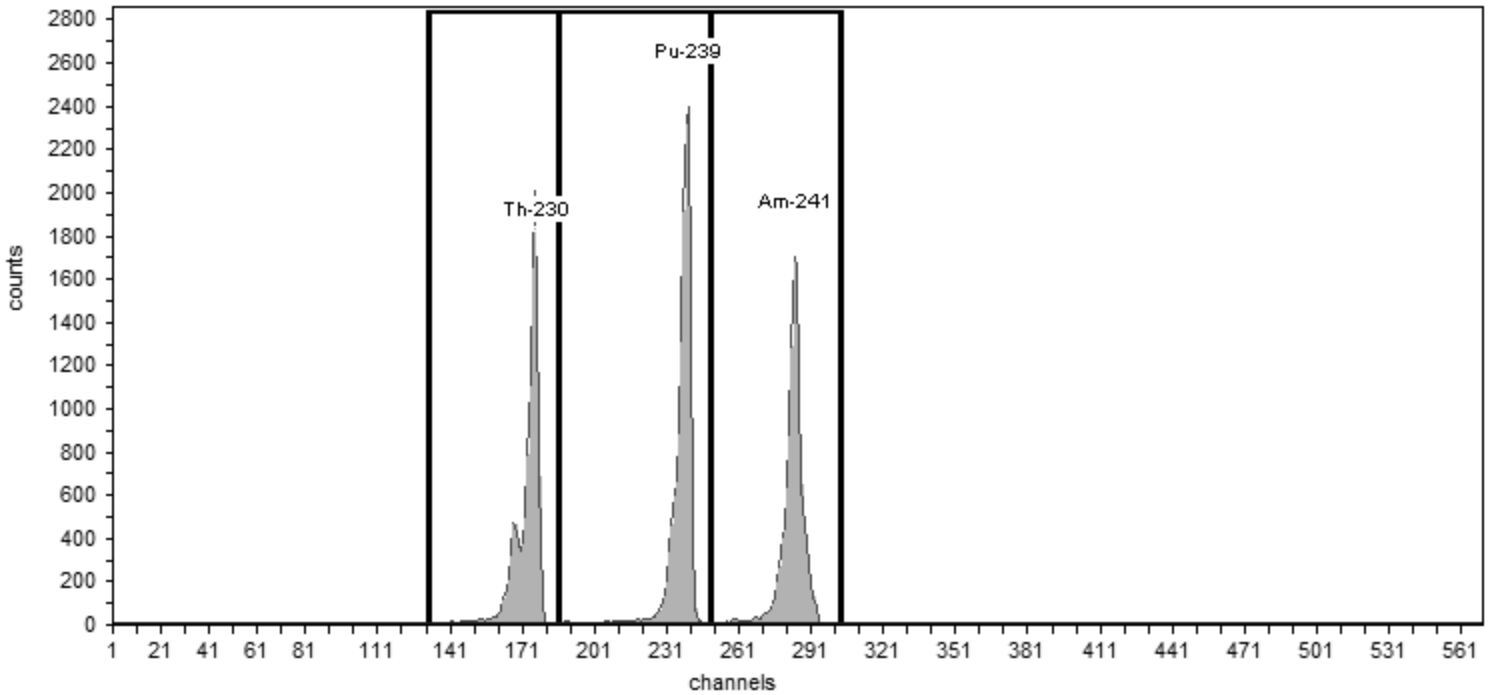
Detector: AV152 , SN: 50-05/R6
Acquisition Start Date: 10/16/2015 3:52:05PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-9520;AV152-20151016

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.54% +/- 0.35% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	29.71	11,699.00	83.56
Pu-239	240	5,155.40	186	249	33.73	13,727.00	98.05
Am-241	284	5,485.70	249	303	34.89	11,357.00	81.12

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:47:30PM 10/16/2015

Calibration

Sample Name: IC-9795;AV156-20151016a
Description:
Detector: AV156

Analyst: 60040
Analysis Date: 10/16/2015 6:47:28PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82243-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

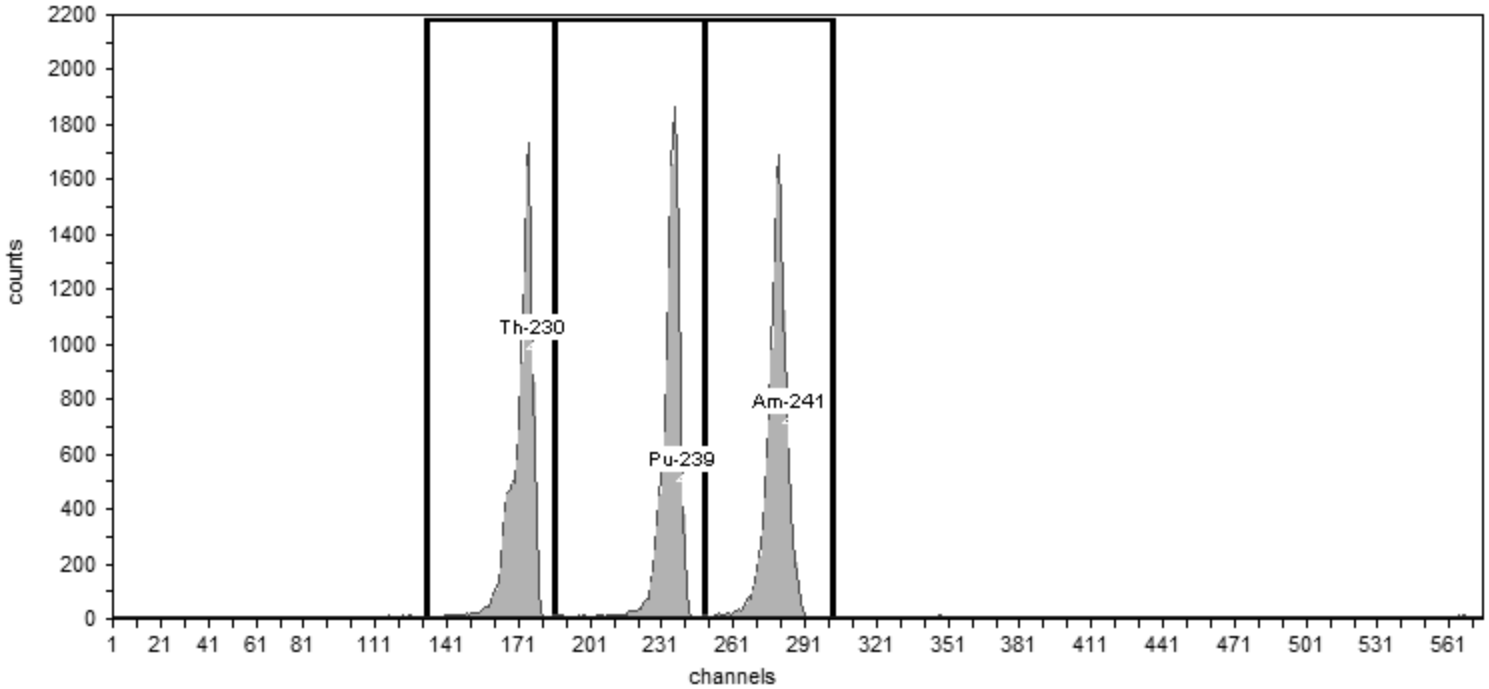
Detector: AV156 , SN: 49-155n4
Acquisition Start Date: 10/16/2015 4:27:27PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-9795;AV156-20151016a

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.08% +/- 0.34% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	38.92	12,938.00	92.41
Pu-239	240	5,155.40	186	249	42.72	13,072.00	93.37
Am-241	284	5,485.70	249	303	48.22	13,814.00	98.67

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:47:08PM 10/16/2015

Calibration

Sample Name: IC-9817;AV157-20151016
Description:
Detector: AV157

Analyst: 60040
Analysis Date: 10/16/2015 6:47:07PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82244-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

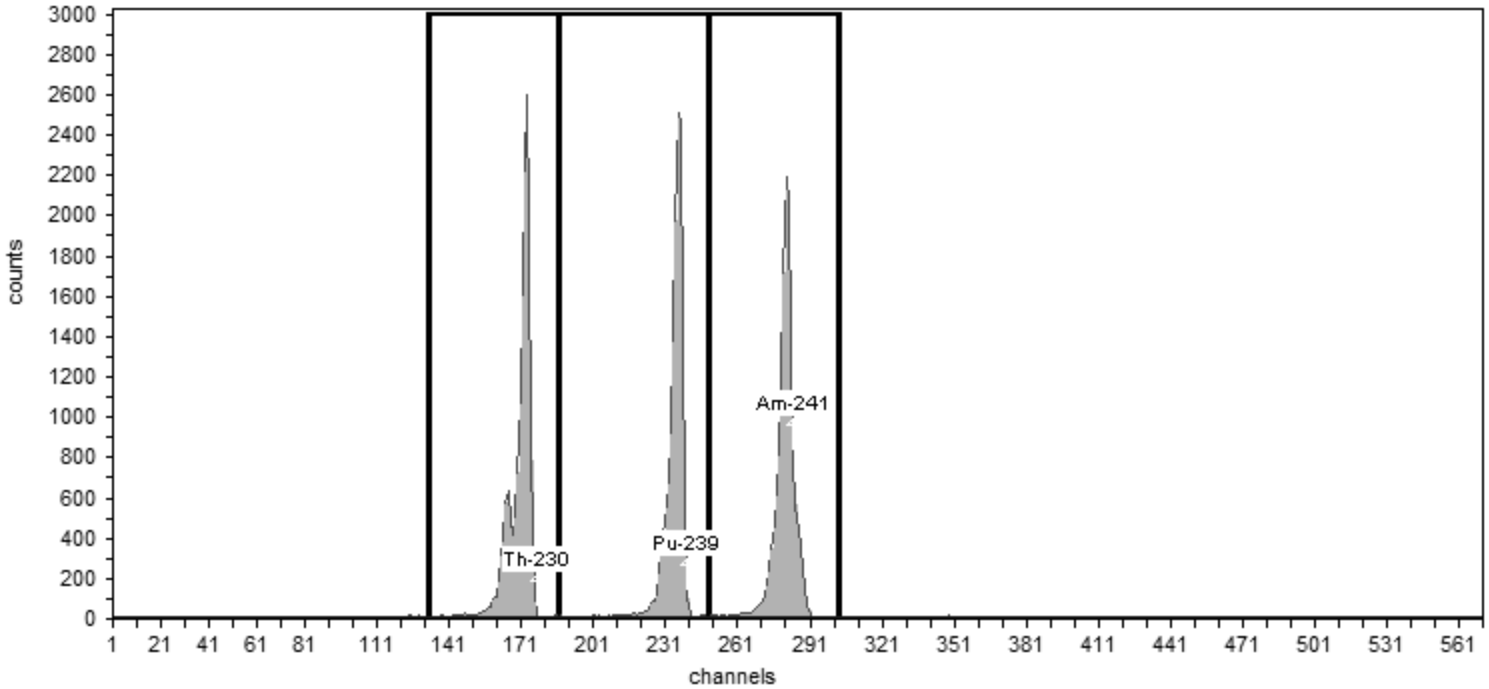
Detector: AV157 , SN: 50-05/II3
Acquisition Start Date: 10/16/2015 3:53:14PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-9817;AV157-20151016

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.78% +/- 0.30% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	30.82	15,163.00	108.31
Pu-239	240	5,155.40	186	249	33.33	14,109.00	100.78
Am-241	284	5,485.70	249	303	34.11	14,283.00	102.02

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:47:12PM 10/16/2015

Calibration

Sample Name: IC-9884;AV158-20151016
Description:
Detector: AV158

Analyst: 60040
Analysis Date: 10/16/2015 6:47:11PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82245-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

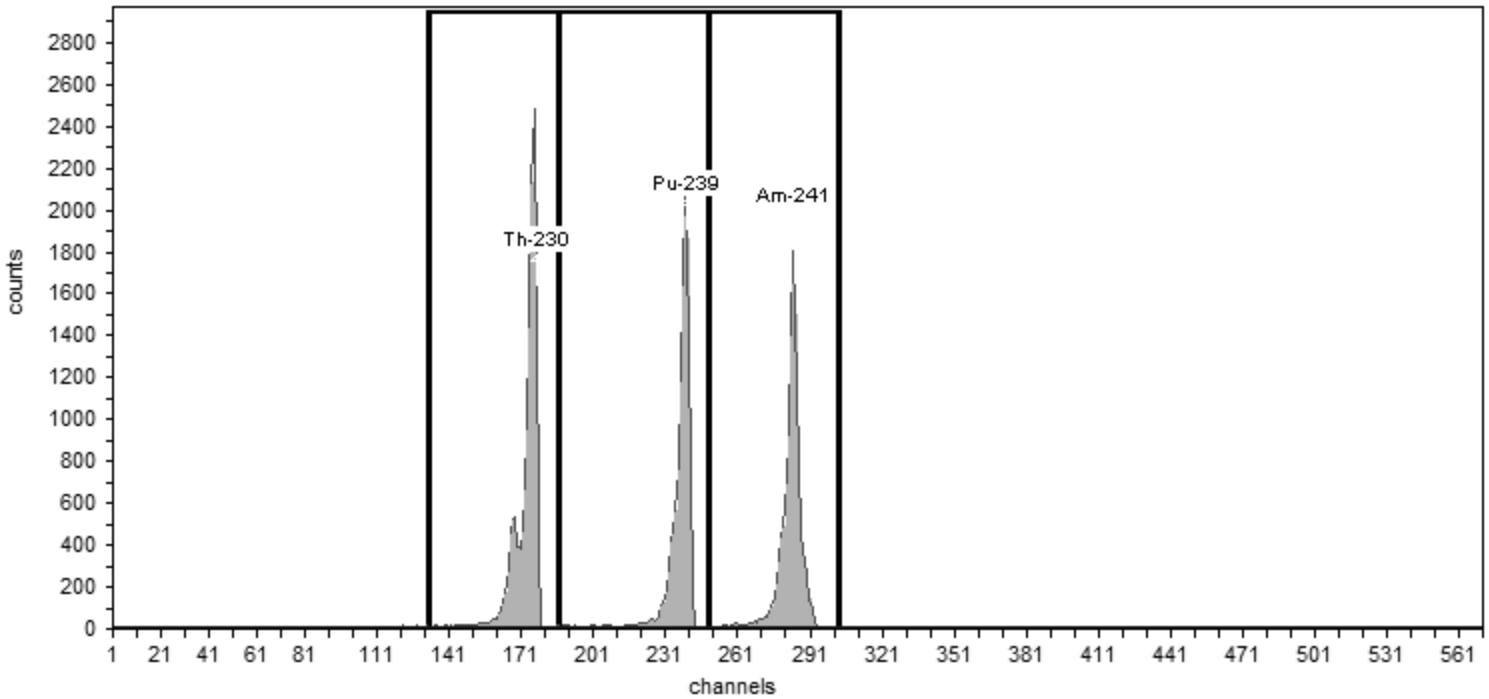
Detector: AV158 , SN: 50-05/II4
Acquisition Start Date: 10/16/2015 3:53:27PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-9884;AV158-20151016

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.82% +/- 0.35% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	27.57	13,439.00	95.99
Pu-239	240	5,155.40	186	249	30.43	11,009.00	78.64
Am-241	284	5,485.70	249	303	29.29	10,876.00	77.69

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:47:49PM 10/16/2015

Calibration

Sample Name: IC-9886;AV160-20151016a
Description:
Detector: AV160

Analyst: 60040
Analysis Date: 10/16/2015 6:47:48PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82247-334
Prepared by: Analytics
Description:

Certification Date: 6/10/2010 12:00:00PM

Acquisition

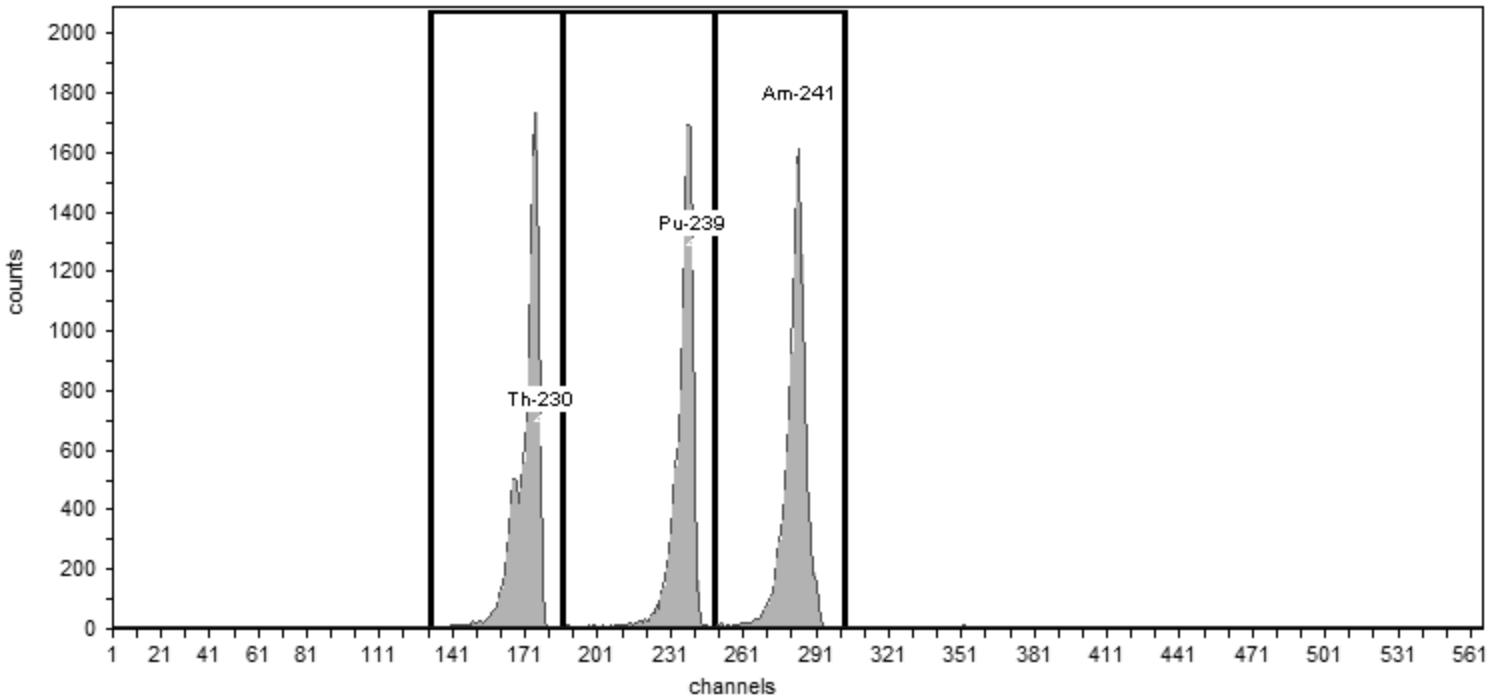
Detector: AV160 , SN: 50-05/II6
Acquisition Start Date: 10/16/2015 4:27:46PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-9886;AV160-20151016a

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.97% +/- 0.33% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	35.56	12,479.00	89.14
Pu-239	240	5,155.40	186	249	39.99	11,607.00	82.91
Am-241	284	5,485.70	249	303	42.43	12,651.00	90.36

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:42:10PM 10/18/2015

Calibration

Sample Name: IC-9817;AV213-20151018
Description:
Detector: AV213

Analyst: 60040
Analysis Date: 10/18/2015 6:42:09PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82244-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

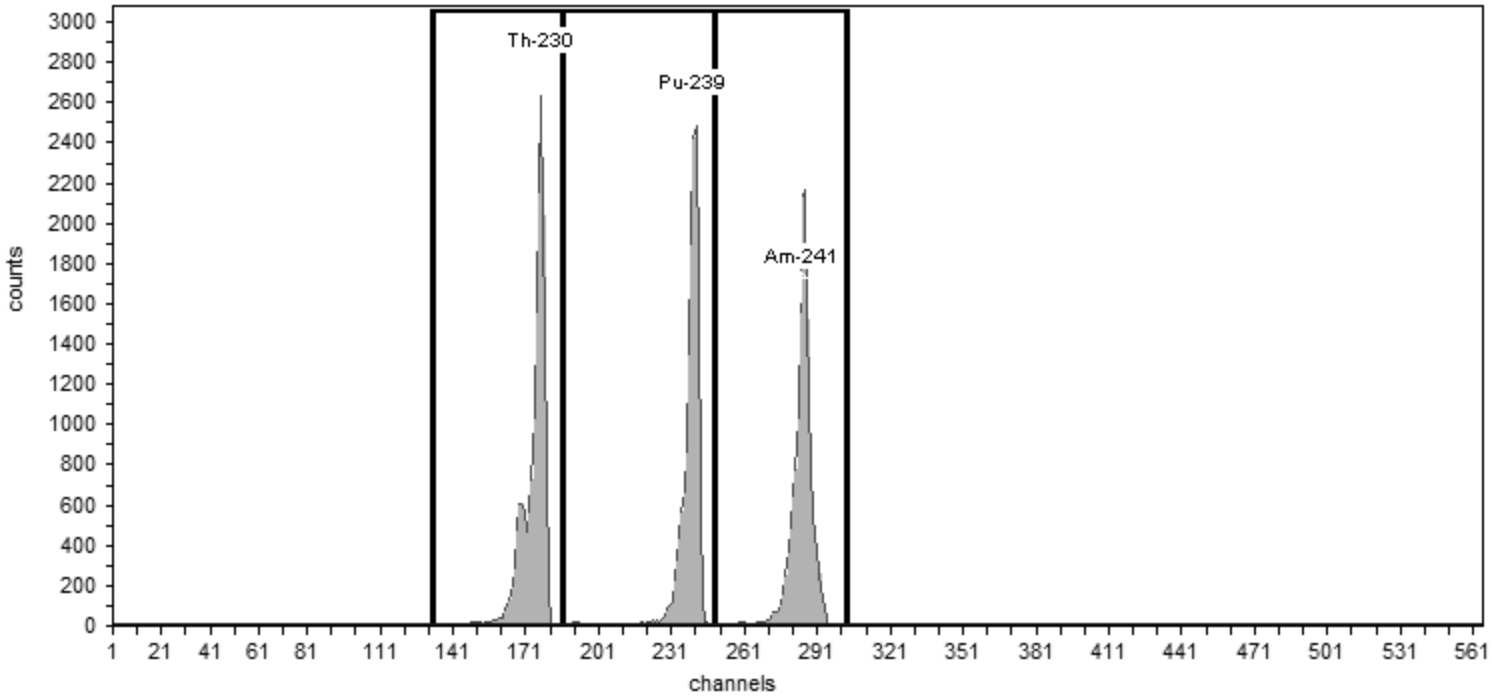
Detector: AV213 , SN: 54-011 Y1
Acquisition Start Date: 10/18/2015 4:12:30PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-9817;AV213-20151018

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.89% +/- 0.30% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	30.14	15,375.00	109.82
Pu-239	240	5,155.40	186	249	34.34	14,147.00	101.05
Am-241	284	5,485.70	249	303	33.46	14,203.00	101.45

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:42:29PM 10/18/2015

Calibration

Sample Name: IC-9886;AV216-20151018
Description:
Detector: AV216

Analyst: 60040
Analysis Date: 10/18/2015 6:42:28PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82247-334
Prepared by: Analytics
Description:

Certification Date: 6/10/2010 12:00:00PM

Acquisition

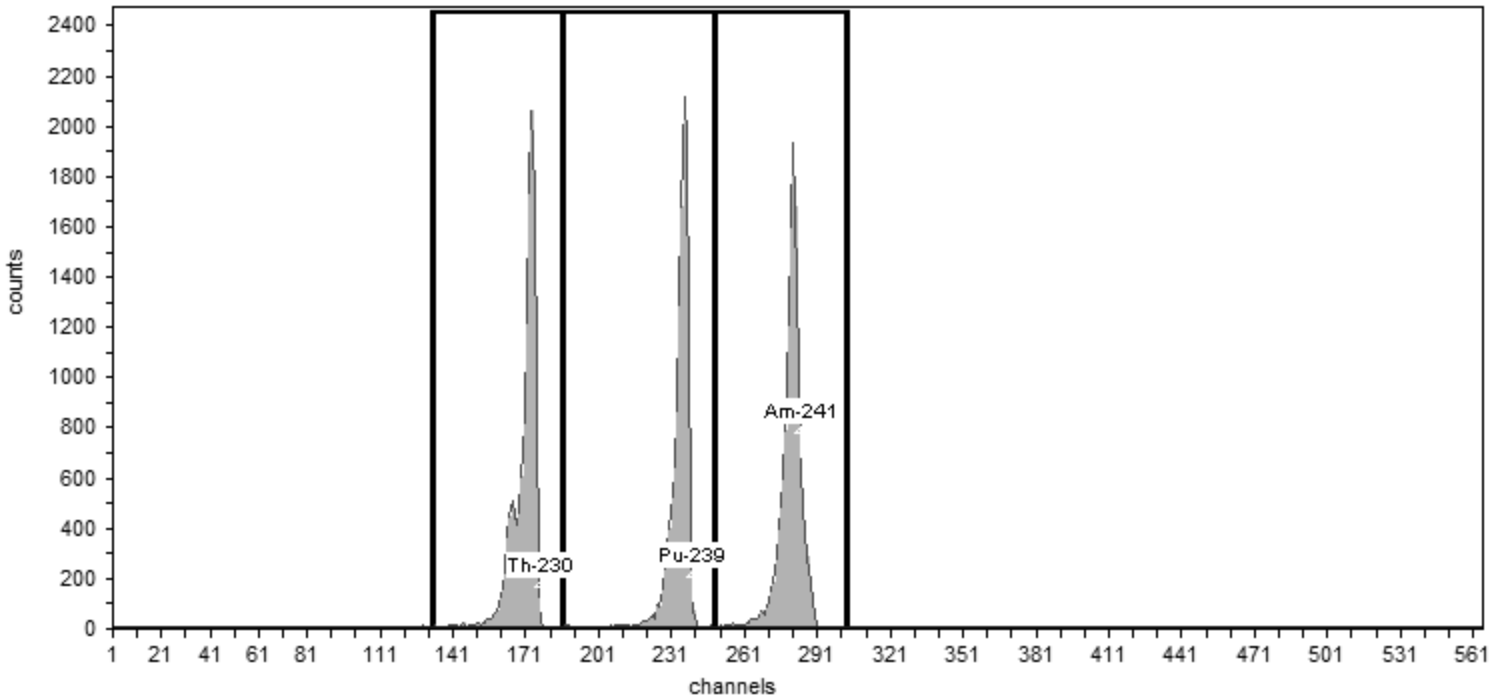
Detector: AV216 , SN: 50-117J5
Acquisition Start Date: 10/18/2015 4:13:07PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-9886;AV216-20151018

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.90% +/- 0.34% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	32.06	12,860.00	91.86
Pu-239	240	5,155.40	186	249	35.07	12,348.00	88.20
Am-241	284	5,485.70	249	303	35.23	12,981.00	92.72

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:19:46PM 10/18/2015

Calibration

Sample Name: IC-7107;AV217-20151018
Description:
Detector: AV217

Analyst: 60040
Analysis Date: 10/18/2015 9:19:45PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82232-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

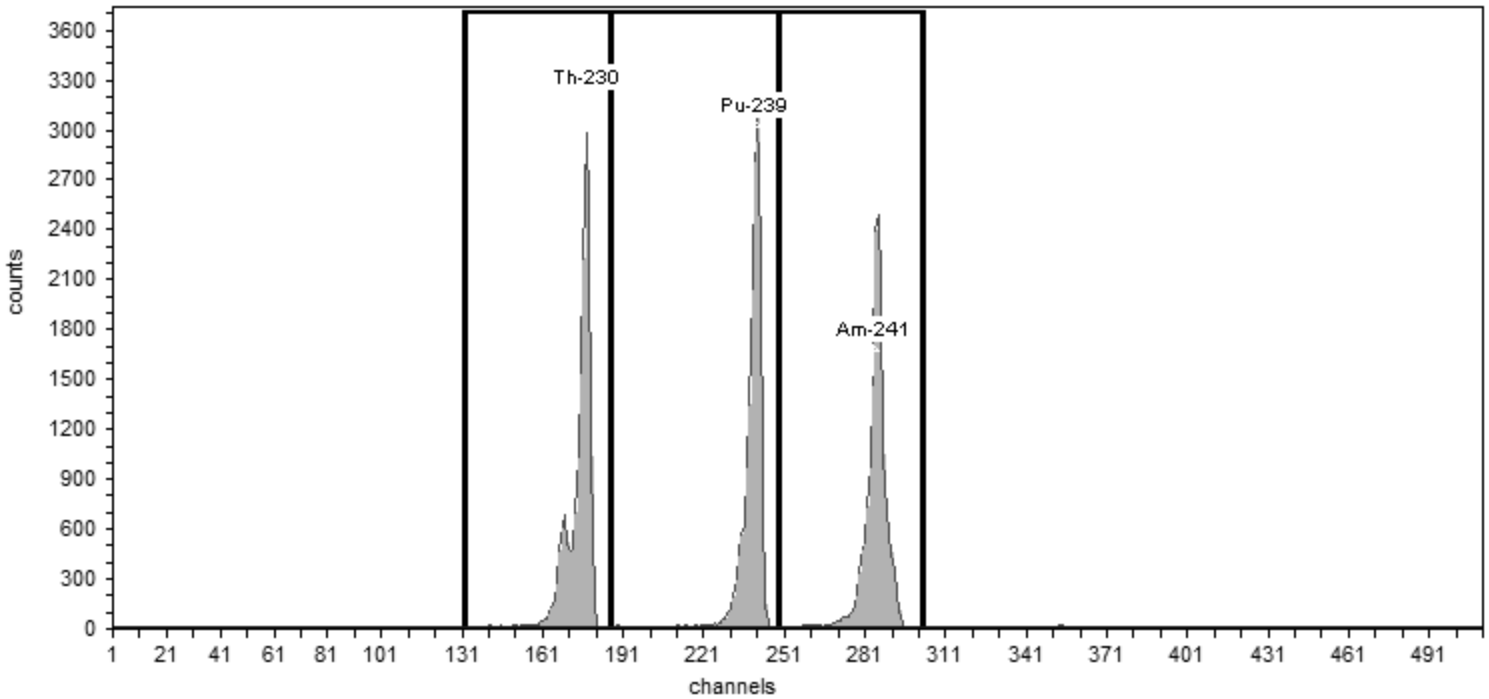
Detector: AV217 , SN: 50-117I2
Acquisition Start Date: 10/18/2015 6:57:34PM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-7107;AV217-20151018

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.04% +/- 0.30% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	28.15	16,300.00	116.43
Pu-239	240	5,155.40	186	249	30.74	16,137.00	115.26
Am-241	284	5,485.70	249	303	31.60	15,722.00	112.30

Initial Calibration Verifications

Alpha Spectroscopy Calibration Summary

Detector: AV148

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223445/1	10/16/15 16:27	82233-334_00001	0.2672	0.20-0.32		
ICV 160-223563/1	10/26/15 19:10	82232-334_00001	0.2586	0.20-0.32	96.8	95-105
CCV 160-262320/1	07/26/16 09:12	82233-334_00001	0.2643	0.20-0.32	98.9	95-105

Detector: AV149

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223446/1	10/16/15 15:51	82234-334_00001	0.2403	0.20-0.32		
ICV 160-223564/1	10/26/15 19:10	82245-334_00001	0.2396	0.20-0.32	99.7	95-105
CCV 160-262220/1	07/27/16 07:26	82234-334_00001	0.2292	0.20-0.32	95.4	95-105

Detector: AV152

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223449/1	10/16/15 15:52	82237-334_00003	0.2454	0.20-0.32		
ICV 160-223567/1	10/26/15 19:11	82242-334_00001	0.2417	0.20-0.32	98.5	95-105
CCV 160-262324/1	07/26/16 09:35	82237-334_00003	0.2394	0.20-0.32	97.5	95-105

Detector: AV156

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223453/1	10/16/15 16:27	82243-334_00001	0.2608	0.20-0.32		
ICV 160-223571/1	10/26/15 19:12	82240-334_00001	0.2531	0.20-0.32	97.0	95-105
CCV 160-262326/1	07/26/16 09:14	82243-334_00001	0.2590	0.20-0.32	99.3	95-105

Detector: AV157

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223454/1	10/16/15 15:53	82244-334_00001	0.2478	0.20-0.32		
ICV 160-223572/1	10/26/15 19:12	82241-334_00001	0.2553	0.20-0.32	103.0	95-105
CCV 160-262327/1	07/26/16 09:15	82244-334_00001	0.2421	0.20-0.32	97.7	95-105

Detector: AV158

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223455/1	10/16/15 15:53	82245-334_00001	0.2382	0.20-0.32		
ICV 160-223573/1	10/26/15 19:13	82234-334_00001	0.2384	0.20-0.32	100.1	95-105
CCV 160-262328/1	07/26/16 09:15	82245-334_00001	0.2352	0.20-0.32	98.7	95-105

Detector: AV160

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223457/1	10/16/15 16:27	82247-334_00001	0.2397	0.20-0.32		
ICV 160-223575/1	10/26/15 19:13	82235-334_00001	0.2420	0.20-0.32	100.9	95-105
CCV 160-262330/1	07/26/16 09:34	82247-334_00001	0.2297	0.20-0.32	95.8	95-105

Detector: AV213

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223878/1	10/18/15 16:12	82244-334_00001	0.2489	0.20-0.32		
ICV 160-223628/1	11/01/15 16:04	82241-334_00001	0.2572	0.20-0.32	103.3	95-105
CCV 160-268355/1	09/06/16 11:24	82244-334_00001	0.2449	0.20-0.32	98.4	95-105

Alpha Spectroscopy Calibration Summary

Detector: AV216

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223512/1	10/18/15 16:13	82247-334_00001	0.2490	0.20-0.32		
ICV 160-223631/1	11/01/15 16:12	82235-334_00001	0.2535	0.20-0.32	101.8	95-105
CCV 160-268387/1	09/07/16 08:38	82247-334_00001	0.2411	0.20-0.32	96.8	95-105

Detector: AV217

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223513/1	10/18/15 18:57	82232-334_00001	0.2604	0.20-0.32		
ICV 160-223632/1	11/01/15 19:16	82233-334_00001	0.2629	0.20-0.32	101.0	95-105
CCV 160-268357/1	09/06/16 11:25	82232-334_00001	0.2582	0.20-0.32	99.1	95-105

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:20:51PM 10/26/2015

Calibration

Sample Name: ICV-7107;AV148-20151026
Description:
Detector: AV148

Analyst: 60040
Analysis Date: 10/26/2015 8:20:51PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82232-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

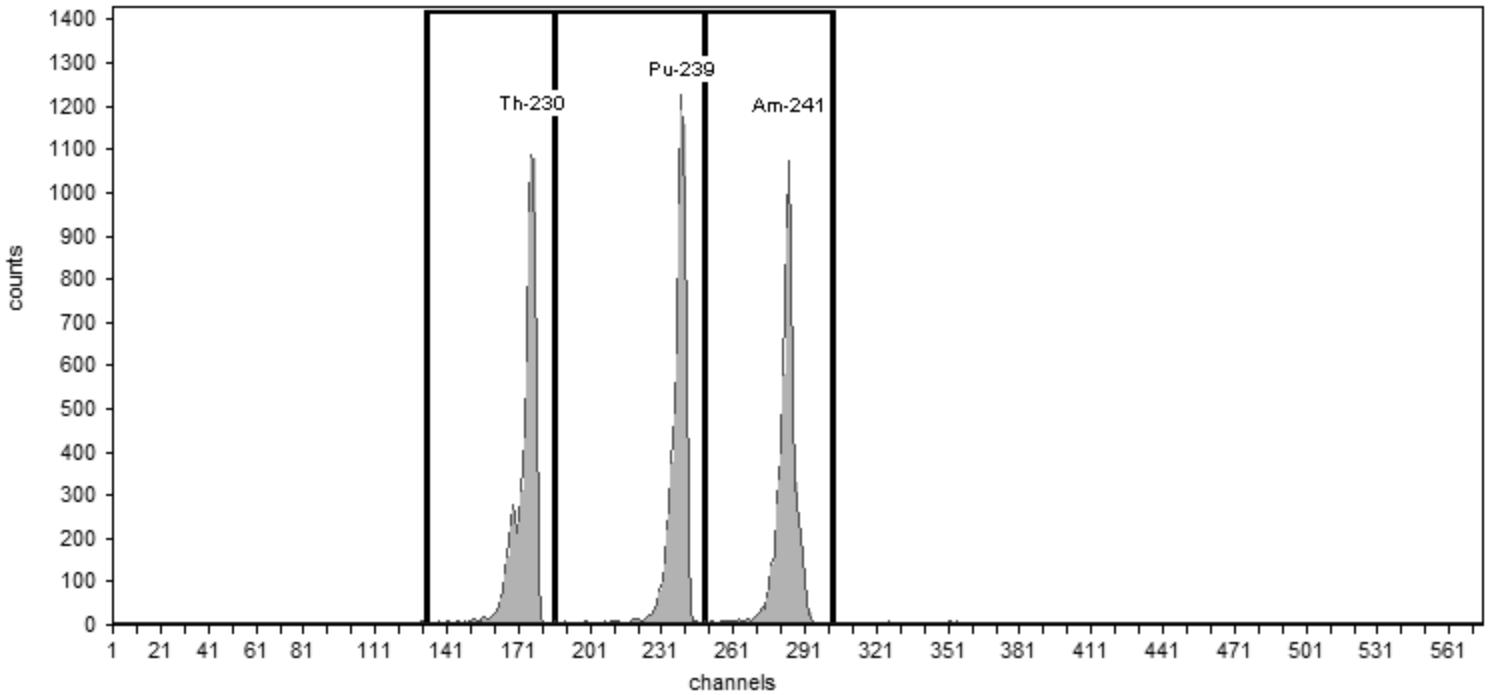
Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 10/26/2015 7:10:27PM

Live Time: 60.00 min.
Real Time: 60.01 min.

Efficiency Calibration Name: ICV-7107;AV148-2015102

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 25.86% +/- 0.40% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	33.29	7,000.00	116.67
Pu-239	240	5,155.40	186	249	31.50	6,783.00	113.05
Am-241	284	5,485.70	249	303	30.75	6,700.00	111.67

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:20:54PM 10/26/2015

Calibration

Sample Name: ICV-9884;AV149-20151026
Description:
Detector: AV149

Analyst: 60040
Analysis Date: 10/26/2015 8:20:53PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82245-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

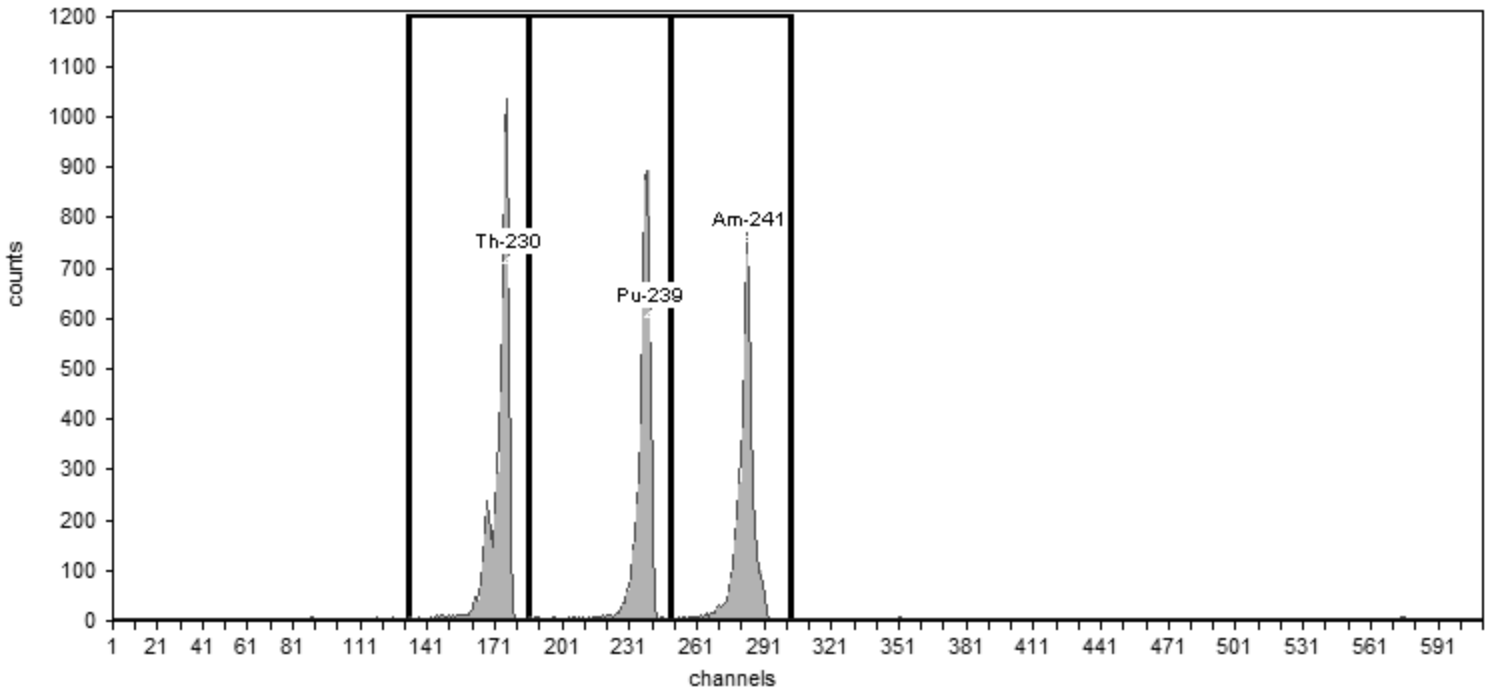
Detector: AV149 , SN: 50-05/R3
Acquisition Start Date: 10/26/2015 7:10:42PM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: ICV-9884;AV149-2015102

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.96% +/- 0.46% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	29.24	5,784.00	96.40
Pu-239	240	5,155.40	186	249	30.13	4,711.00	78.52
Am-241	284	5,485.70	249	303	31.22	4,732.00	78.87

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:30:25PM 11/23/2015

Calibration

Sample Name: ICV-9794;AV152-20151026
Description:
Detector: AV152

Analyst: 60040
Analysis Date: 10/26/2015 8:21:03PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82242-334
Prepared by: Analytics
Description:

Certification Date: 6/8/2010 12:00:00PM

Acquisition

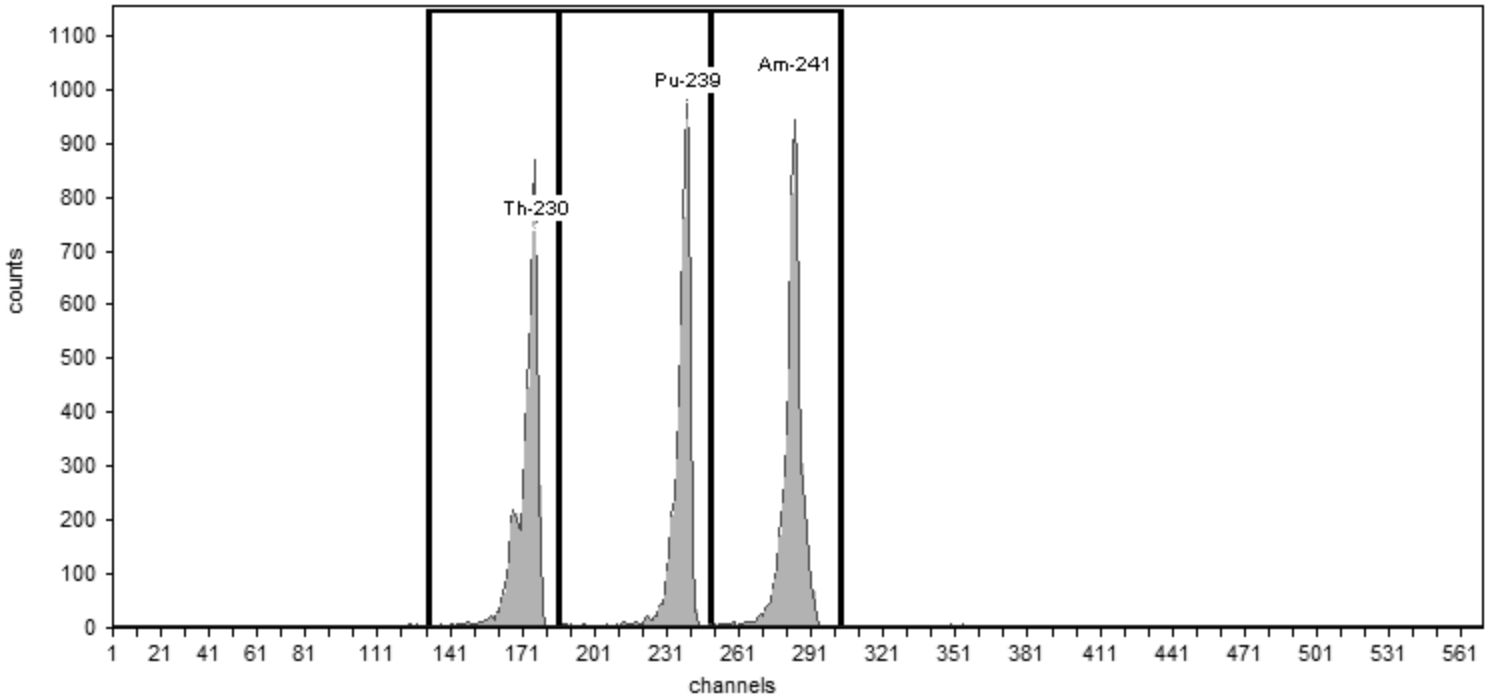
Detector: AV152 , SN: 50-05/R6
Acquisition Start Date: 10/26/2015 7:11:27PM

Live Time: 60.00 min.
Real Time: 60.01 min.

Efficiency Calibration Name: ICV-9794;AV152-2015102

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.17% +/- 0.41% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	34.77	5,721.00	95.35
Pu-239	240	5,155.40	186	249	33.01	5,586.00	93.10
Am-241	284	5,485.70	249	303	31.64	6,169.00	102.82

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:21:17PM 10/26/2015

Calibration

Sample Name: ICV-9792;AV156-20151026
Description:
Detector: AV156

Analyst: 60040
Analysis Date: 10/26/2015 8:21:16PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82240-334
Prepared by: Analytics
Description:

Certification Date: 6/8/2010 12:00:00PM

Acquisition

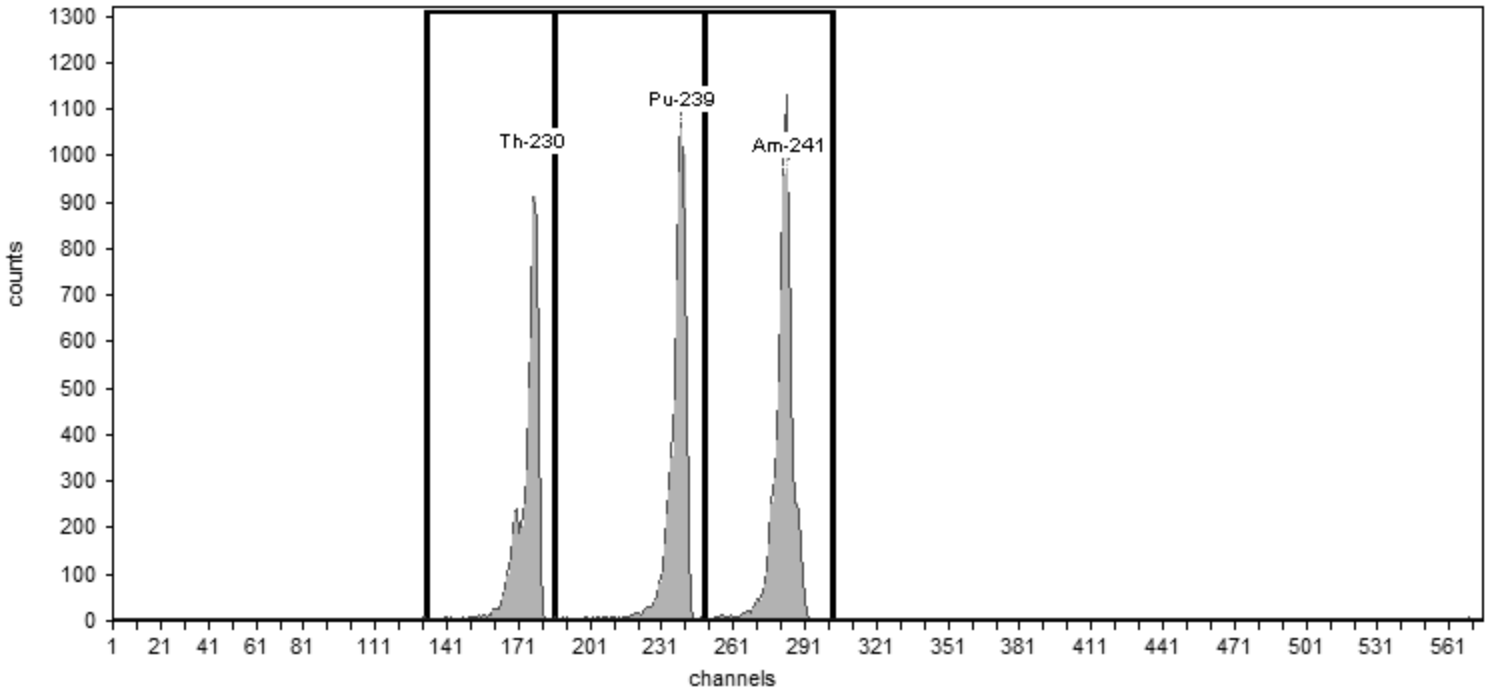
Detector: AV156 , SN: 49-155n4
Acquisition Start Date: 10/26/2015 7:12:28PM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: ICV-9792;AV156-2015102

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 25.31% +/- 0.40% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	32.33	5,665.00	94.42
Pu-239	240	5,155.40	186	249	34.53	6,598.00	109.97
Am-241	284	5,485.70	249	303	34.62	7,507.00	125.12

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:21:20PM 10/26/2015

Calibration

Sample Name: ICV-9793;AV157-20151026
Description:
Detector: AV157

Analyst: 60040
Analysis Date: 10/26/2015 8:21:20PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82241-334
Prepared by: Analytics
Description:

Certification Date: 6/8/2010 12:00:00PM

Acquisition

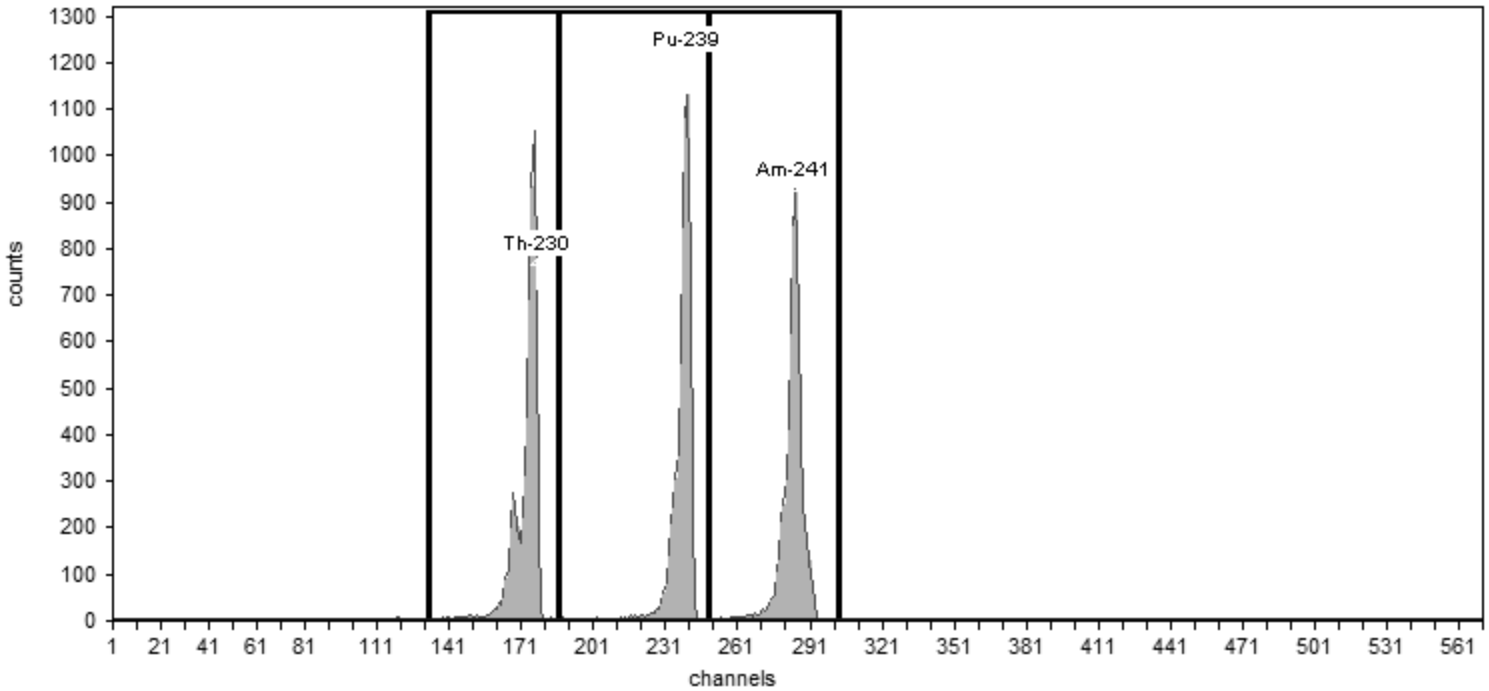
Detector: AV157 , SN: 50-05/II3
Acquisition Start Date: 10/26/2015 7:12:43PM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: ICV-9793;AV157-2015102

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 25.53% +/- 0.43% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	29.74	6,101.00	101.68
Pu-239	240	5,155.40	186	249	32.30	6,260.00	104.33
Am-241	284	5,485.70	249	303	33.51	6,031.00	100.52

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:30:44PM 11/23/2015

Calibration

Sample Name: ICV-8875;AV158-20151026
Description:
Detector: AV158

Analyst: 60040
Analysis Date: 10/26/2015 8:21:23PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82234-334
Prepared by: Analytics
Description:

Certification Date: 6/2/2010 12:00:00PM

Acquisition

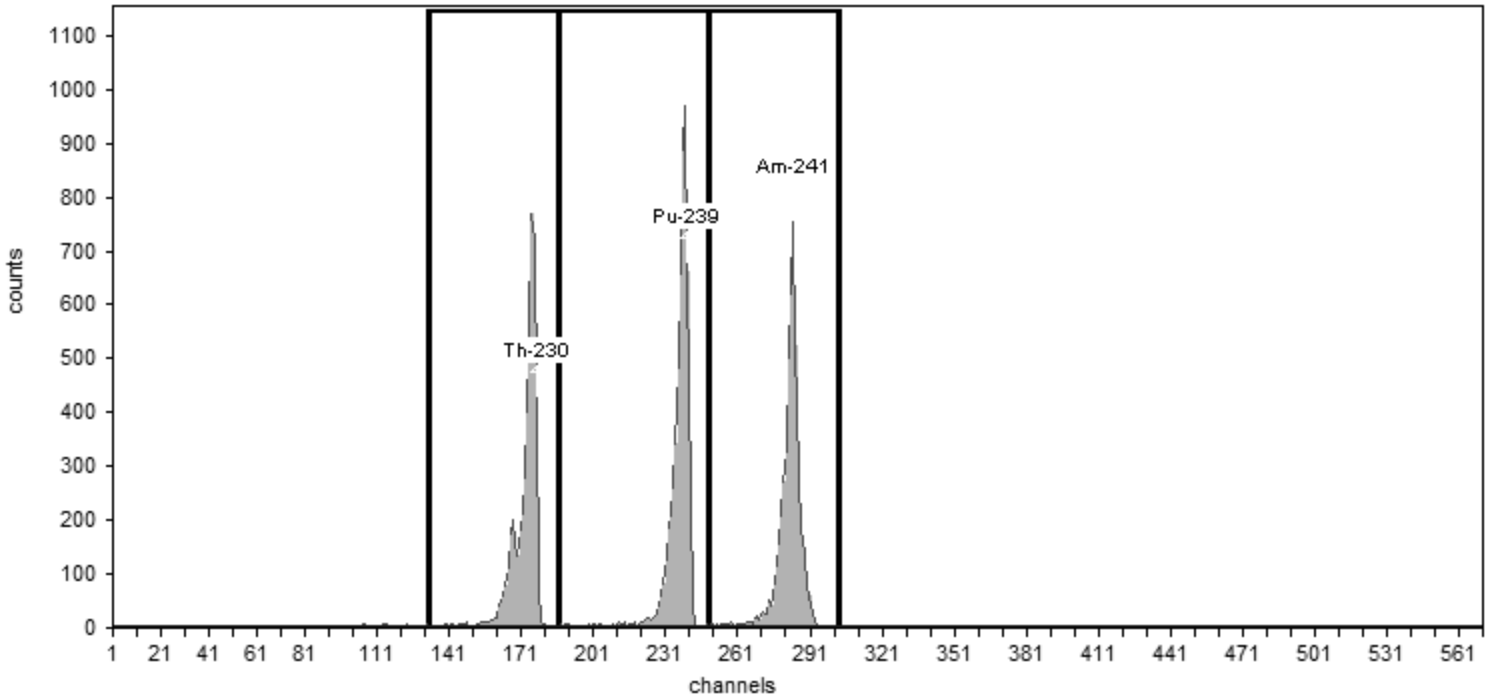
Detector: AV158 , SN: 50-05/II4
Acquisition Start Date: 10/26/2015 7:13:00PM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: ICV-8875;AV158-2015102

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 23.84% +/- 0.45% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	31.31	4,668.00	77.80
Pu-239	240	5,155.40	186	249	32.94	5,406.00	90.10
Am-241	284	5,485.70	249	303	32.15	4,748.00	79.13

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:21:30PM 10/26/2015

Calibration

Sample Name: ICV-8876;AV160-20151026
Description:
Detector: AV160

Analyst: 60040
Analysis Date: 10/26/2015 8:21:29PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82235-334
Prepared by: Analytics
Description:

Certification Date: 6/4/2010 12:00:00PM

Acquisition

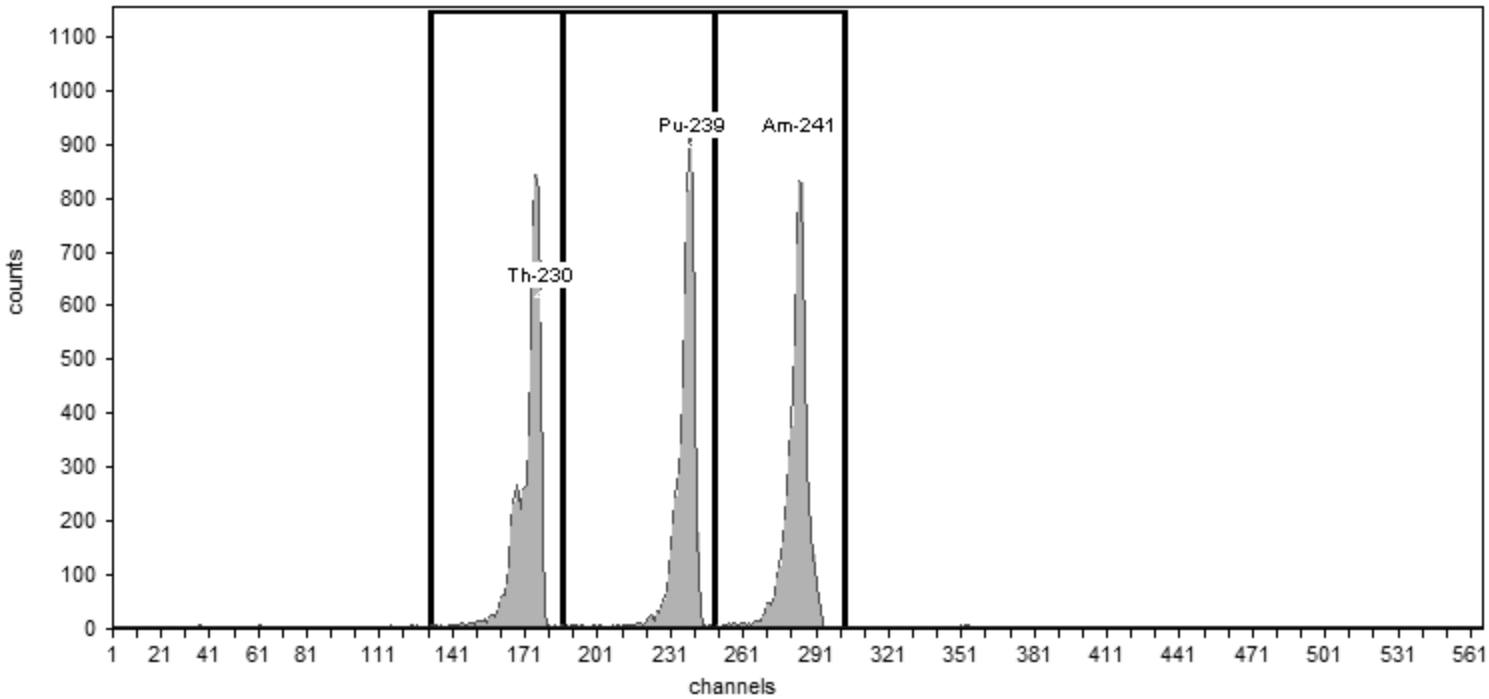
Detector: AV160 , SN: 50-05/II6
Acquisition Start Date: 10/26/2015 7:13:36PM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: ICV-8876;AV160-2015102

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.20% +/- 0.39% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	36.92	6,309.00	105.15
Pu-239	240	5,155.40	186	249	36.44	6,073.00	101.22
Am-241	284	5,485.70	249	303	38.86	6,332.00	105.53

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:06:59PM 11/1/2015

Calibration

Sample Name: ICV-9793;AV213-20151101
Description:
Detector: AV213

Analyst: 60040
Analysis Date: 11/1/2015 6:06:58PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82241-334
Prepared by: Analytics
Description:

Certification Date: 6/8/2010 12:00:00PM

Acquisition

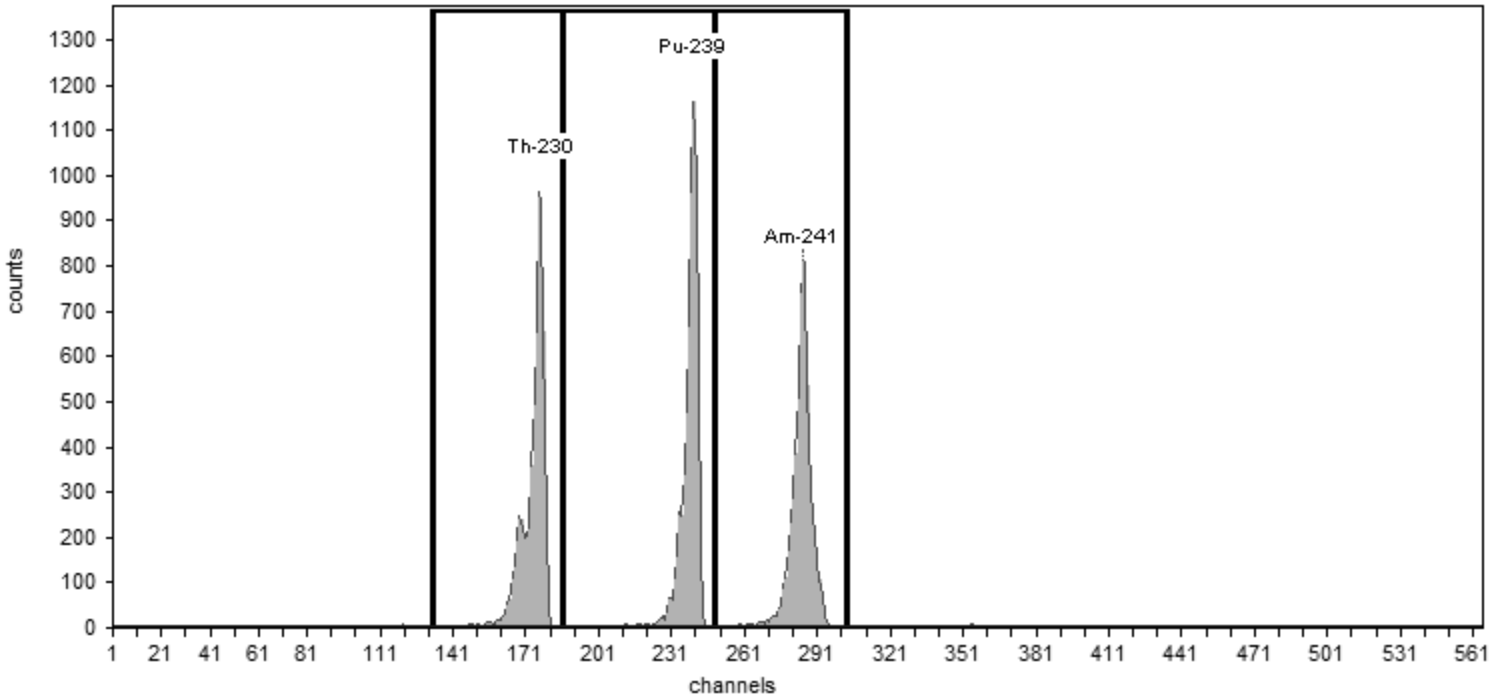
Detector: AV213 , SN: 54-011 Y1
Acquisition Start Date: 11/1/2015 4:04:09PM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: ICV-9793;AV213-2015110

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 25.72% +/- 0.43% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	33.58	6,116.00	101.93
Pu-239	240	5,155.40	186	249	32.86	6,409.00	106.82
Am-241	284	5,485.70	249	303	38.21	6,006.00	100.10

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:07:23PM 11/1/2015

Calibration

Sample Name: ICV-8876;AV216-20151101a
Description:
Detector: AV216

Analyst: 60040
Analysis Date: 11/1/2015 6:07:22PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82235-334
Prepared by: Analytics
Description:

Certification Date: 6/4/2010 12:00:00PM

Acquisition

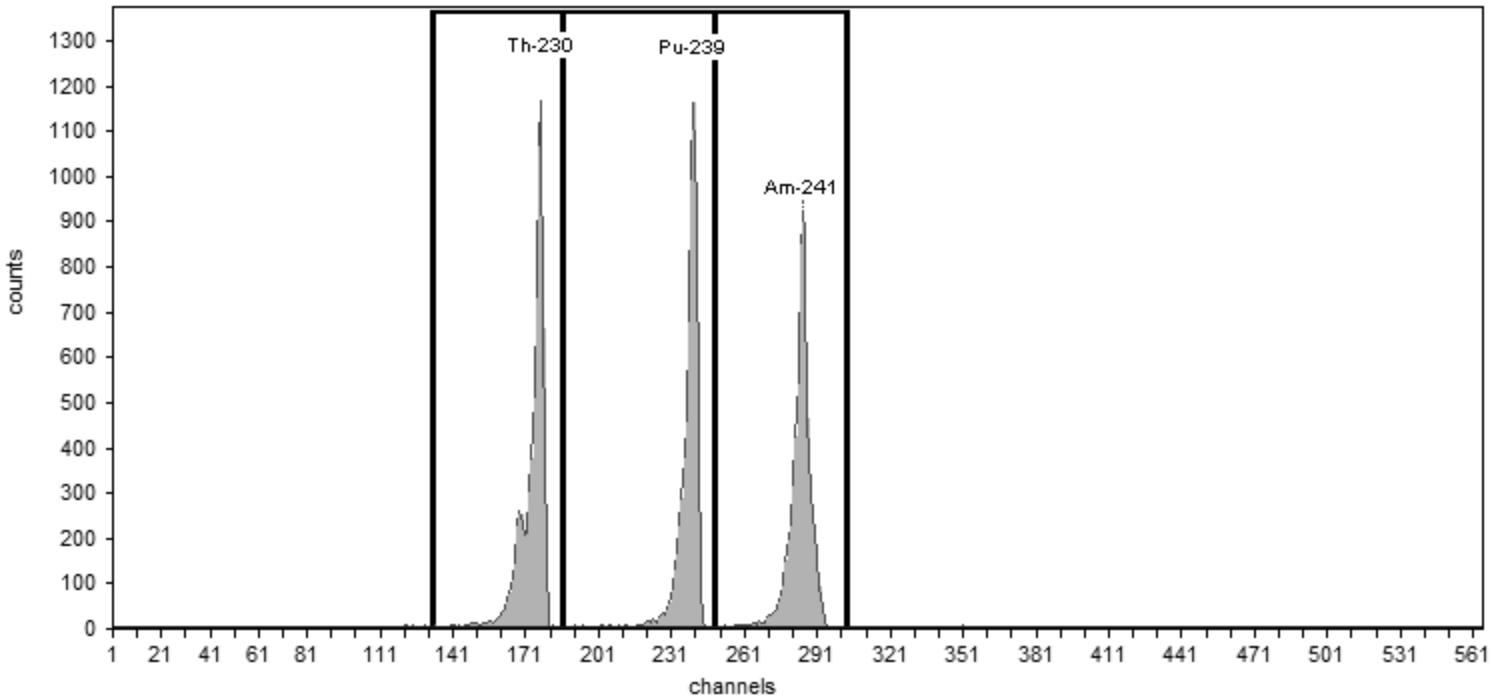
Detector: AV216 , SN: 50-117J5
Acquisition Start Date: 11/1/2015 4:12:04PM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: ICV-8876;AV216-2015110

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 25.35% +/- 0.41% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	28.44	6,769.00	112.82
Pu-239	240	5,155.40	186	249	30.74	6,339.00	105.65
Am-241	284	5,485.70	249	303	31.90	6,508.00	108.47

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:23:31PM 11/1/2015

Calibration

Sample Name: ICV-8874;AV217-20151101
Description:
Detector: AV217

Analyst: 60040
Analysis Date: 11/1/2015 8:23:30PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82233-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

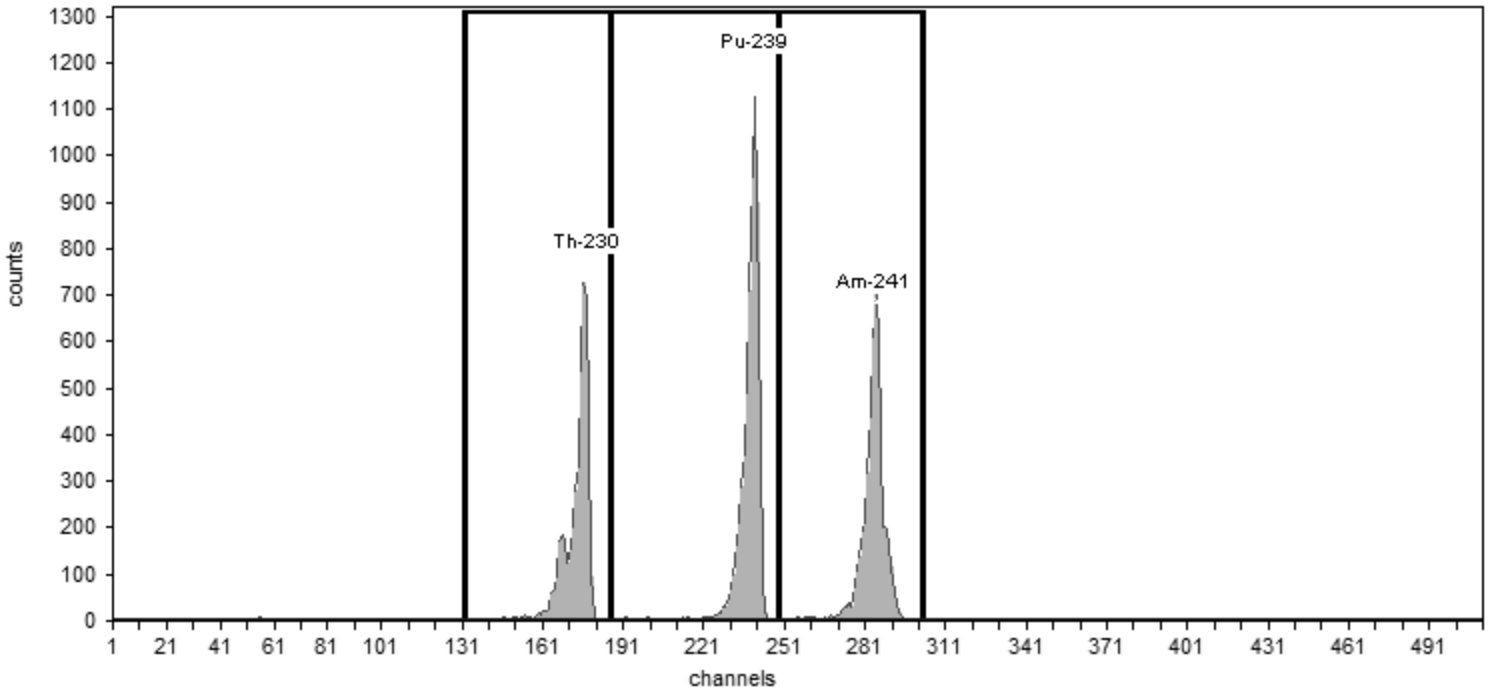
Detector: AV217 , SN: 50-117I2
Acquisition Start Date: 11/1/2015 7:16:52PM

Live Time: 60.00 min.
Real Time: 60.01 min.

Efficiency Calibration Name: ICV-8874;AV217-2015110

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.29% +/- 0.49% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 0

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	29.96	4,431.00	73.85
Pu-239	240	5,155.40	186	249	32.16	6,033.00	100.55
Am-241	284	5,485.70	249	303	34.28	4,782.00	79.70

Monthly Calibration Verifications

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:00:44PM 7/27/2016

Calibration

Sample Name: CCV-8874;AV148-20160726
Description:
Detector: AV148

Analyst: 60040
Analysis Date: 7/26/2016 10:30:18AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82233-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

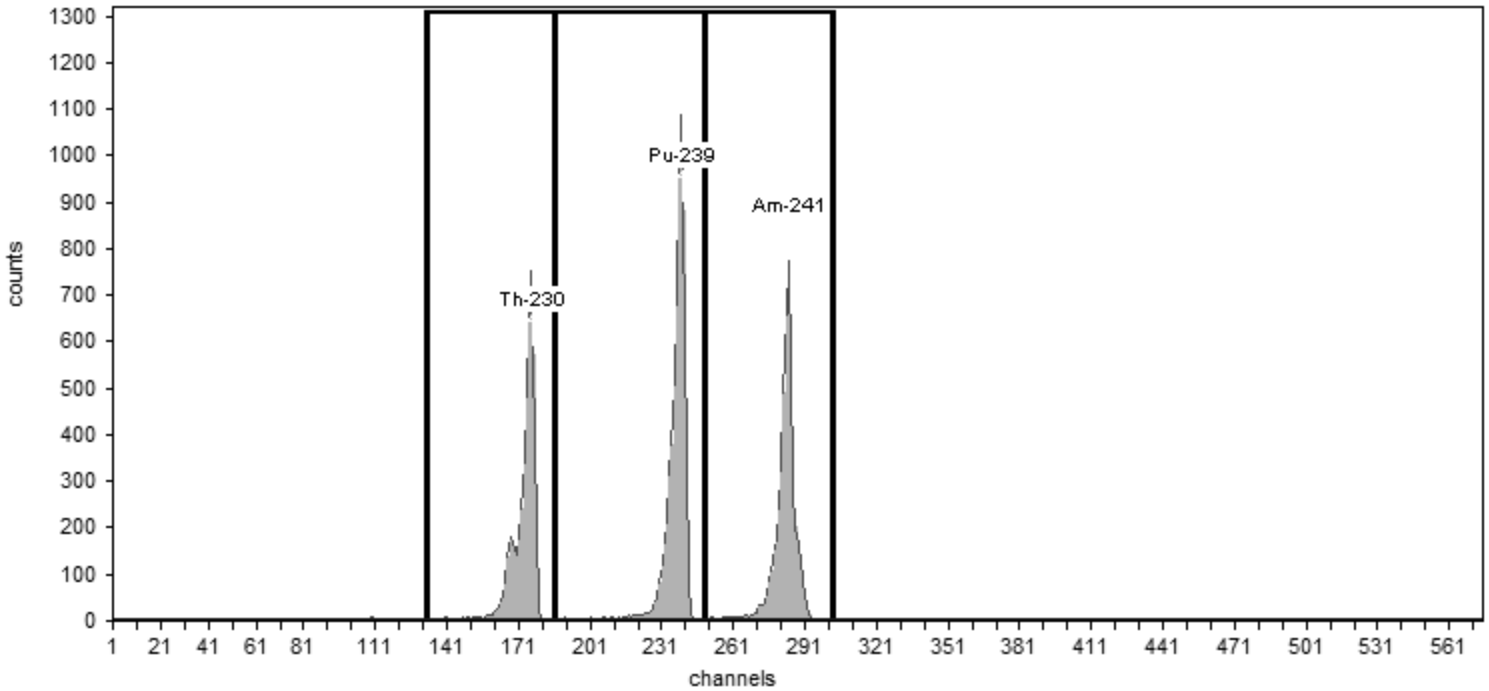
Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 7/26/2016 9:12:53AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-8874;AV148-201607

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 26.43% +/- 0.50% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	31.70	4,498.00	74.97
Pu-239	240	5,155.40	186	249	32.83	6,081.00	101.35
Am-241	284	5,485.70	249	303	31.58	4,737.00	78.95

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:27:00AM 7/27/2016

Calibration

Sample Name: CCV-8875;AV149-20160727a
Description:
Detector: AV149

Analyst: 60040
Analysis Date: 7/27/2016 8:26:59AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82234-334
Prepared by: Analytics
Description:

Certification Date: 6/2/2010 12:00:00PM

Acquisition

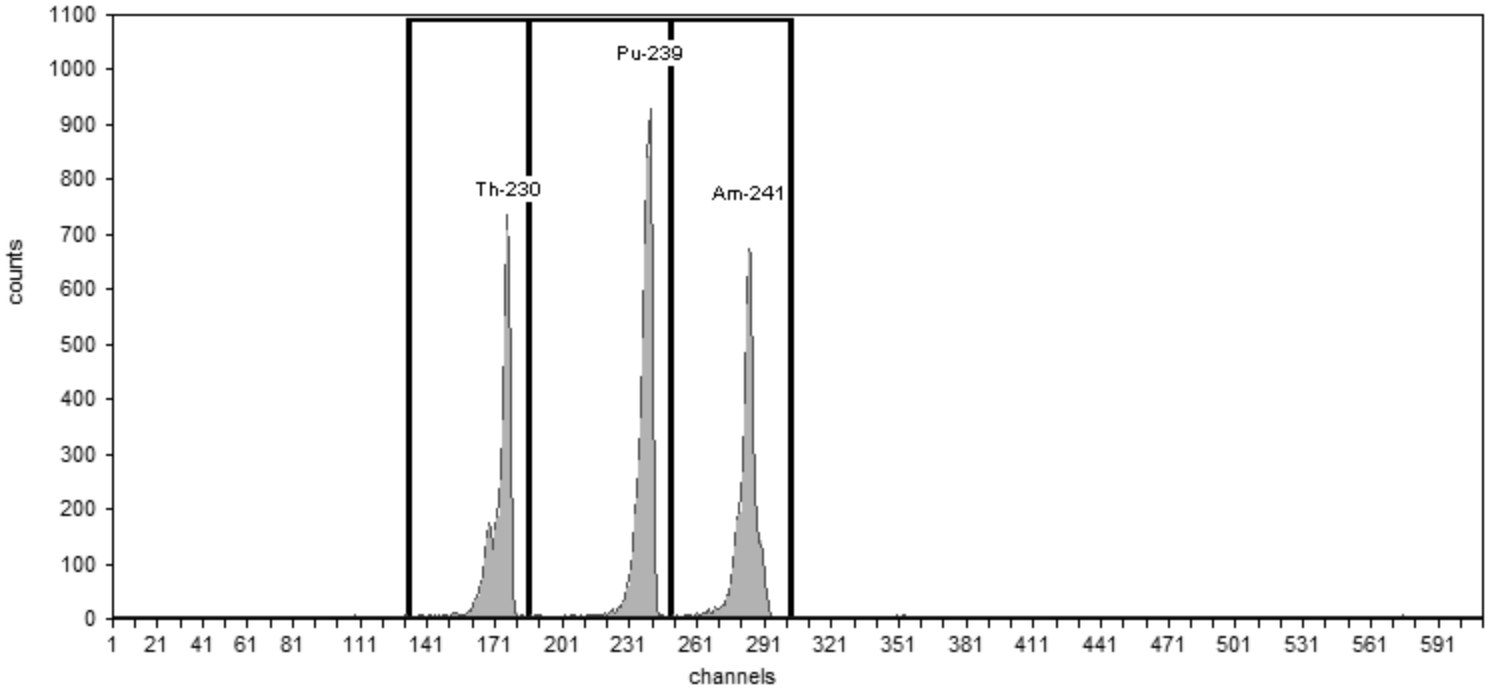
Detector: AV149 , SN: 50-05/R3
Acquisition Start Date: 7/27/2016 7:26:53AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-8875;AV149-201607

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.92% +/- 0.44% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	29.75	4,412.00	73.53
Pu-239	240	5,155.40	186	249	33.33	5,193.00	86.55
Am-241	284	5,485.70	249	303	34.80	4,648.00	77.47

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:36:03AM 7/26/2016

Calibration

Sample Name: CCV-9520;AV152-20160726a
Description:
Detector: AV152

Analyst: 60040
Analysis Date: 7/26/2016 10:36:02AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82237-334
Prepared by: Analytics
Description:

Certification Date: 6/1/2010 12:00:00PM

Acquisition

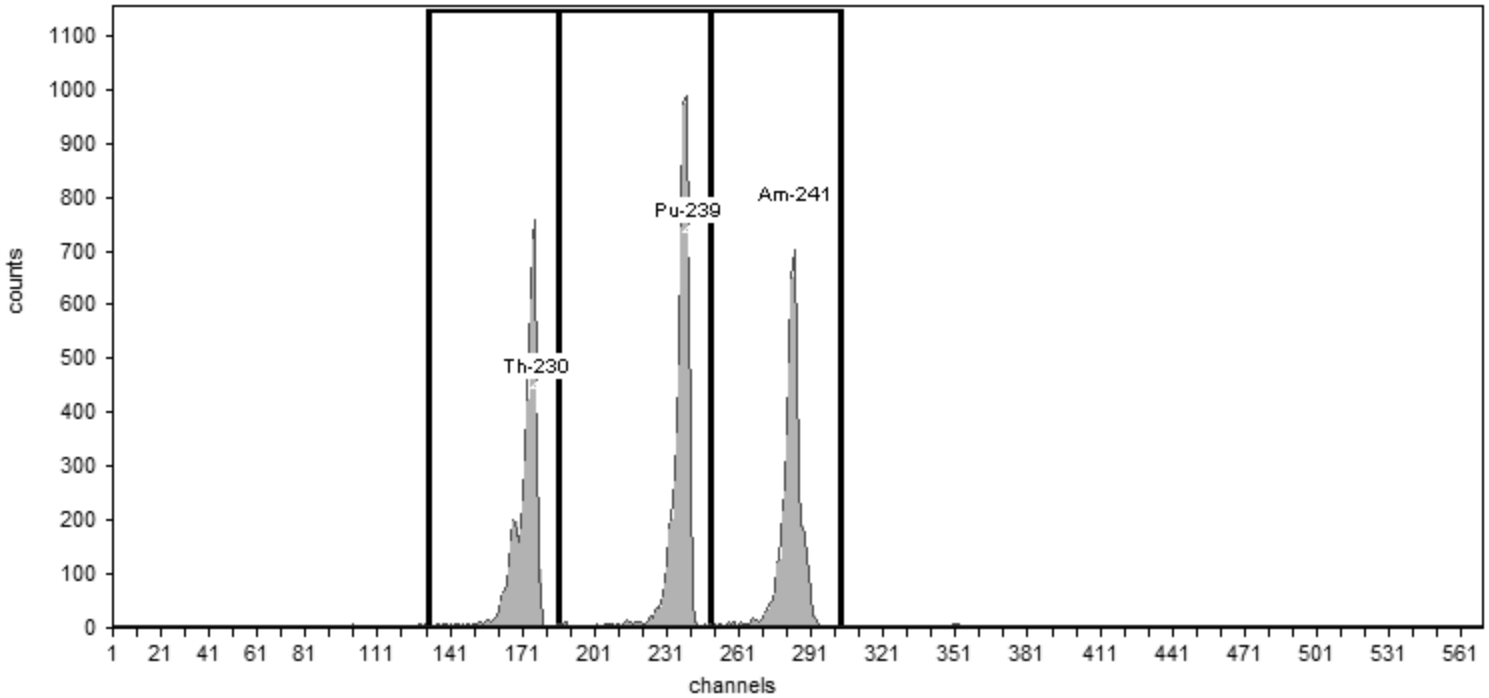
Detector: AV152 , SN: 50-05/R6
Acquisition Start Date: 7/26/2016 9:35:59AM

Live Time: 60.00 min.
Real Time: 60.01 min.

Efficiency Calibration Name: CCV-9520;AV152-201607

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 23.94% +/- 0.45% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	32.76	4,909.00	81.82
Pu-239	240	5,155.40	186	249	33.12	5,750.00	95.83
Am-241	284	5,485.70	249	303	35.36	4,718.00	78.63

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:30:42AM 7/26/2016

Calibration

Sample Name: CCV-9795;AV156-20160726
Description:
Detector: AV156

Analyst: 60040
Analysis Date: 7/26/2016 10:30:41AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82243-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

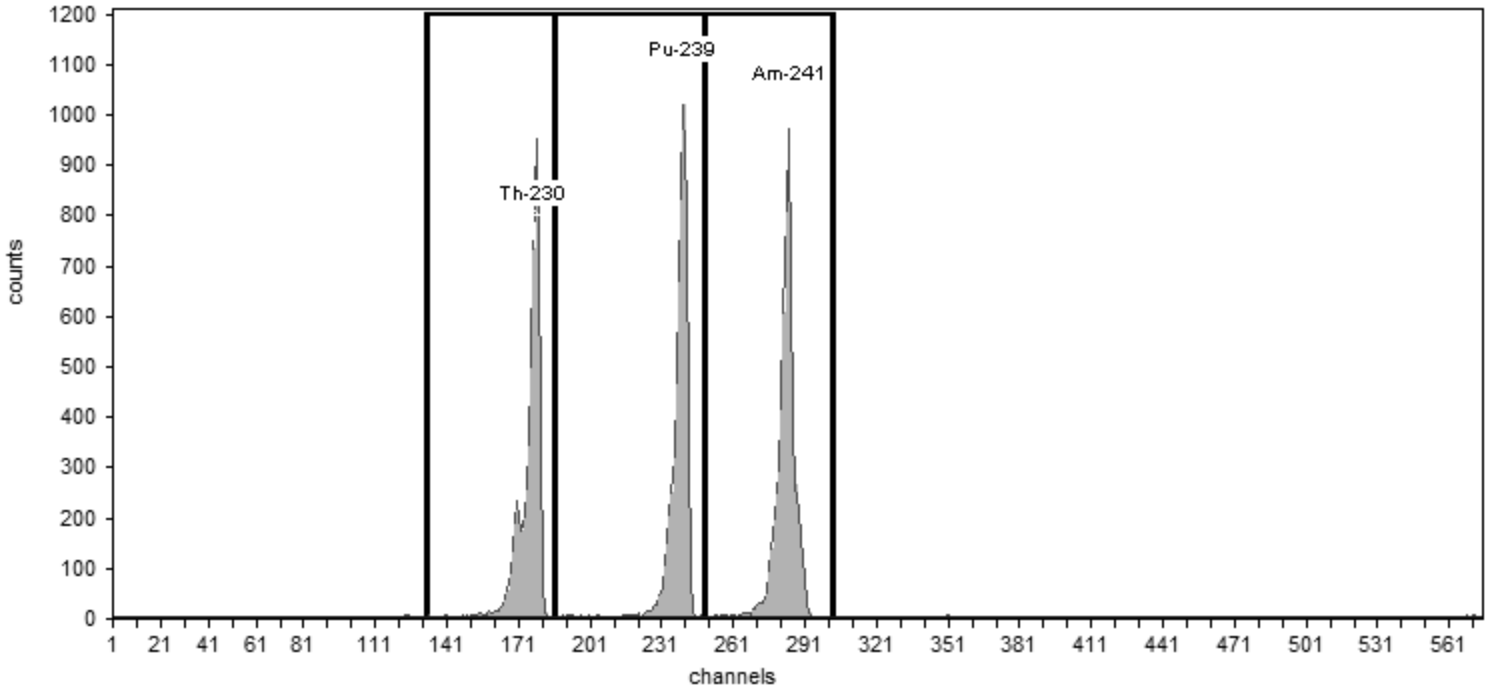
Detector: AV156 , SN: 49-155n4
Acquisition Start Date: 7/26/2016 9:14:52AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-9795;AV156-201607

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 25.90% +/- 0.46% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	28.67	5,433.00	90.55
Pu-239	240	5,155.40	186	249	33.25	5,549.00	92.48
Am-241	284	5,485.70	249	303	31.81	5,959.00	99.32

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:00:52PM 7/27/2016

Calibration

Sample Name: CCV-9817;AV157-20160726
Description:
Detector: AV157

Analyst: 60040
Analysis Date: 7/26/2016 10:30:47AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82244-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

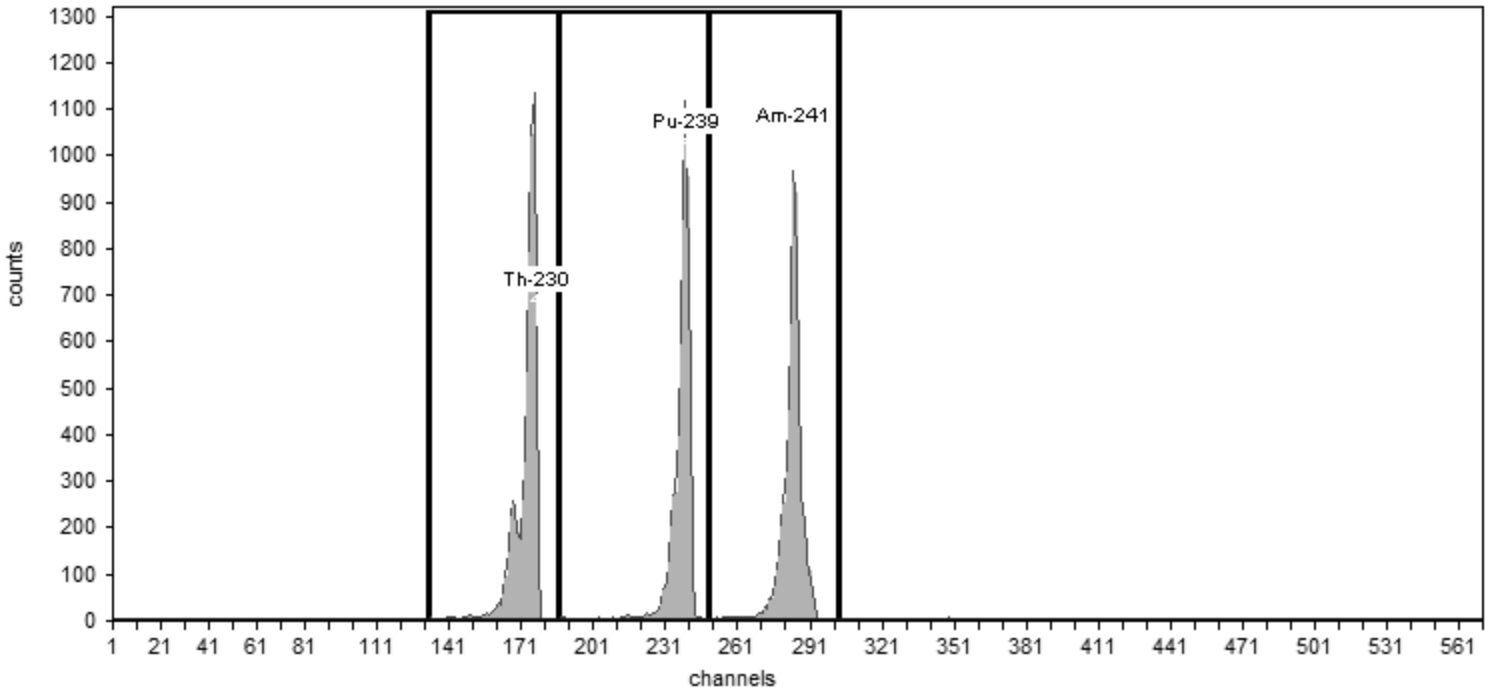
Detector: AV157 , SN: 50-05/II3
Acquisition Start Date: 7/26/2016 9:15:12AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-9817;AV157-201607

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 24.21% +/- 0.40% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	29.54	6,466.00	107.77
Pu-239	240	5,155.40	186	249	30.34	5,804.00	96.73
Am-241	284	5,485.70	249	303	30.52	5,949.00	99.15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:30:54AM 7/26/2016

Calibration

Sample Name: CCV-9884;AV158-20160726
Description:
Detector: AV158

Analyst: 60040
Analysis Date: 7/26/2016 10:30:53AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82245-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

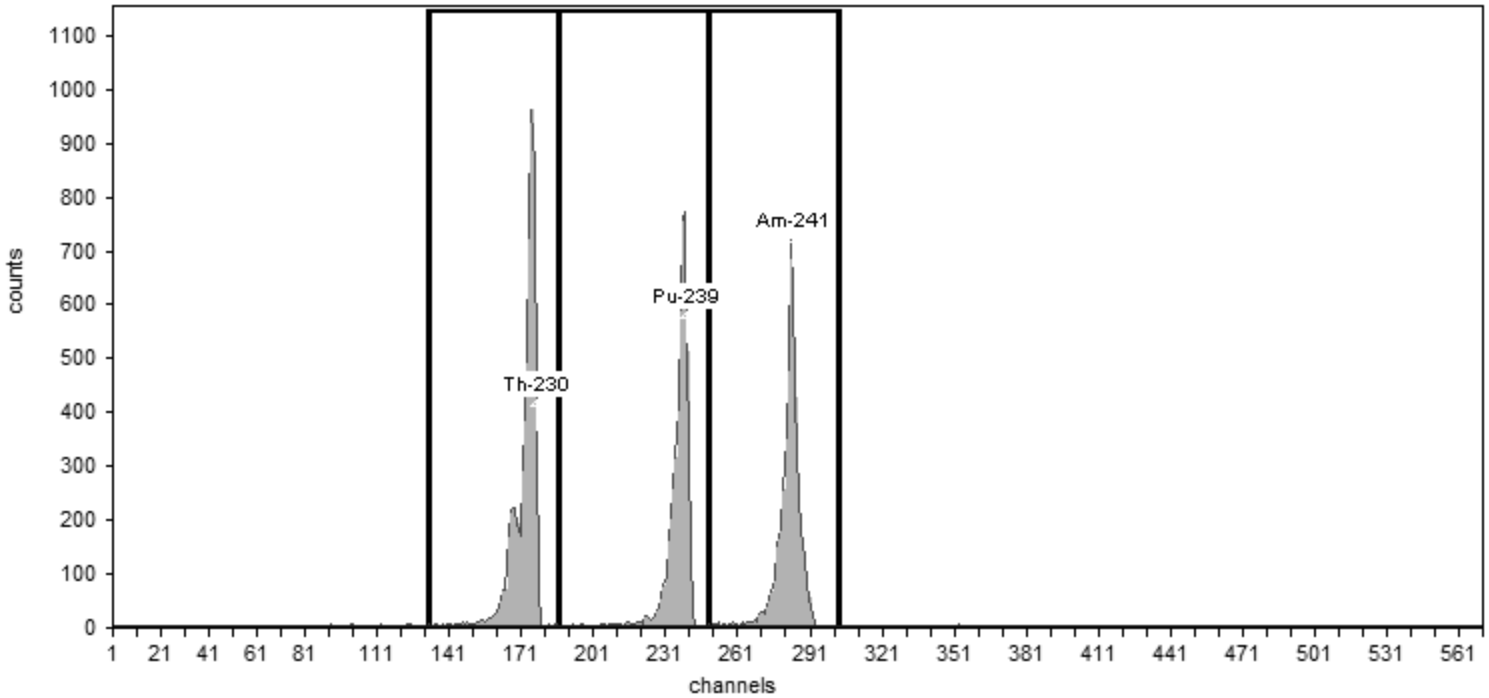
Detector: AV158 , SN: 50-05/II4
Acquisition Start Date: 7/26/2016 9:15:30AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-9884;AV158-201607

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 23.52% +/- 0.45% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	28.63	5,734.00	95.57
Pu-239	240	5,155.40	186	249	33.80	4,573.00	76.22
Am-241	284	5,485.70	249	303	31.86	4,628.00	77.13

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:34:55AM 7/26/2016

Calibration

Sample Name: CCV-9886;AV160-20160726a
Description:
Detector: AV160

Analyst: 60040
Analysis Date: 7/26/2016 10:34:54AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82247-334
Prepared by: Analytics
Description:

Certification Date: 6/10/2010 12:00:00PM

Acquisition

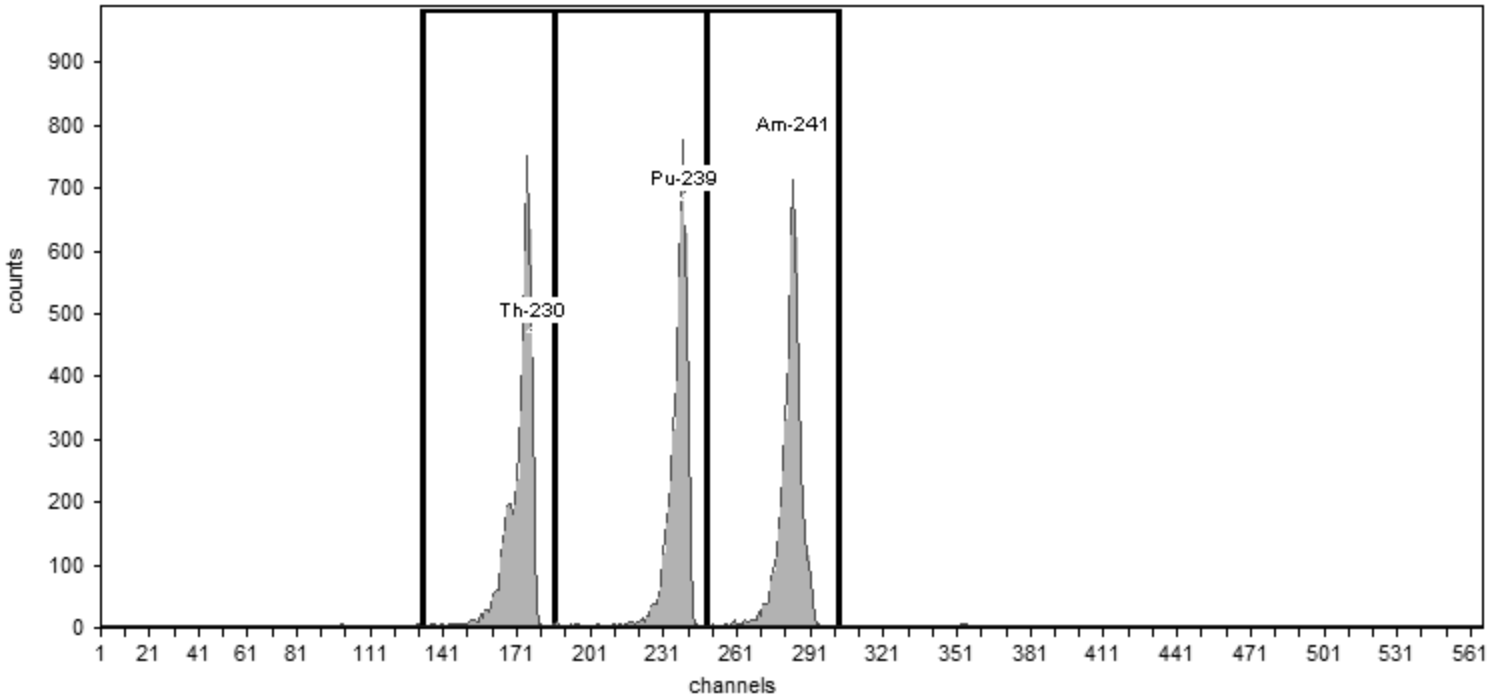
Detector: AV160 , SN: 50-05/II6
Acquisition Start Date: 7/26/2016 9:34:46AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-9886;AV160-201607

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 22.97% +/- 0.43% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	36.29	5,107.00	85.12
Pu-239	240	5,155.40	186	249	36.75	4,902.00	81.70
Am-241	284	5,485.70	249	303	37.34	5,078.00	84.63

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:30:13PM 9/6/2016

Calibration

Sample Name: CCV-9817;AV213-20160906
Description:
Detector: AV213

Analyst: 60040
Analysis Date: 9/6/2016 12:30:12PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82244-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

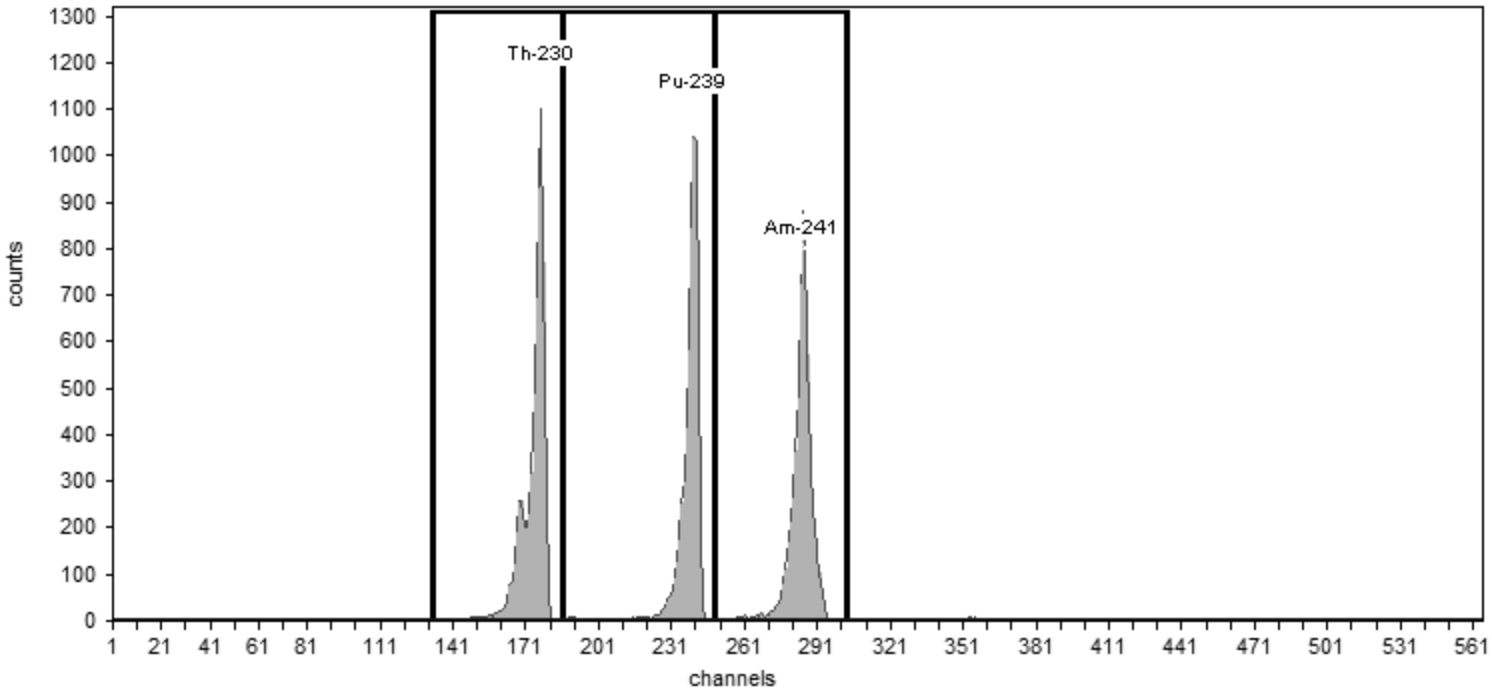
Detector: AV213 , SN: 54-011 Y1
Acquisition Start Date: 9/6/2016 11:24:28AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-9817;AV213-201609(

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 24.49% +/- 0.41% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	30.78	6,416.00	106.93
Pu-239	240	5,155.40	186	249	34.12	5,970.00	99.50
Am-241	284	5,485.70	249	303	36.58	6,047.00	100.78

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:05:39PM 9/7/2016

Calibration

Sample Name: CCV-9886;AV216-20160907
Description:
Detector: AV216

Analyst: 60040
Analysis Date: 9/7/2016 9:53:44AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82247-334
Prepared by: Analytics
Description:

Certification Date: 6/10/2010 12:00:00PM

Acquisition

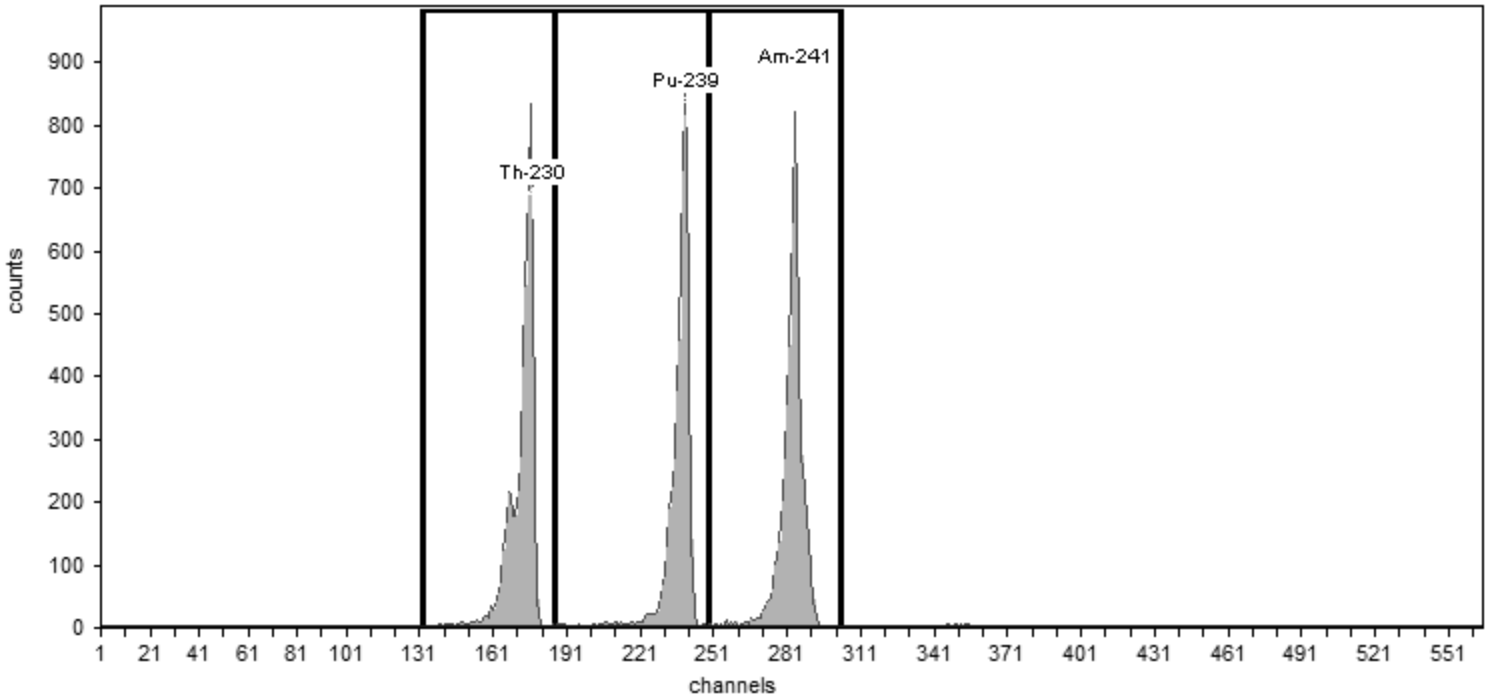
Detector: AV216 , SN: 50-117J5
Acquisition Start Date: 9/7/2016 8:38:15AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-9886;AV216-201609(

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.11% +/- 0.44% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	33.71	5,305.00	88.42
Pu-239	240	5,155.40	186	249	33.71	5,048.00	84.13
Am-241	284	5,485.70	249	303	34.56	5,477.00	91.28

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:30:26PM 9/6/2016

Calibration

Sample Name: CCV-7107;AV217-20160906
Description:
Detector: AV217

Analyst: 60040
Analysis Date: 9/6/2016 12:30:25PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82232-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

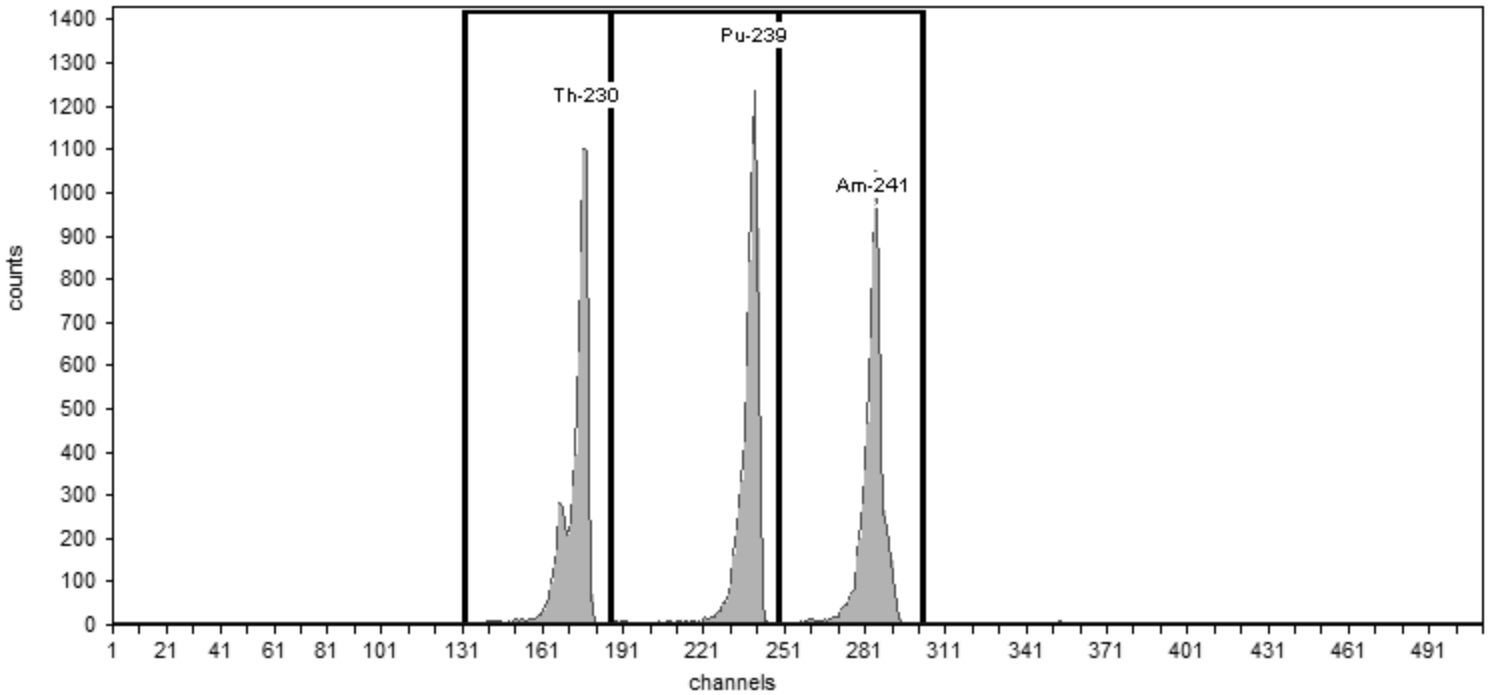
Detector: AV217 , SN: 50-117I2
Acquisition Start Date: 9/6/2016 11:25:22AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-7107;AV217-201609(

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency: 25.82% +/- 0.40% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	30.89	6,810.00	113.50
Pu-239	240	5,155.40	186	249	33.11	6,960.00	116.00
Am-241	284	5,485.70	249	303	33.33	6,698.00	111.63

Monthly Backgrounds

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:14:28AM 7/26/2016

Sample

Sample Name: ICB;AV148
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

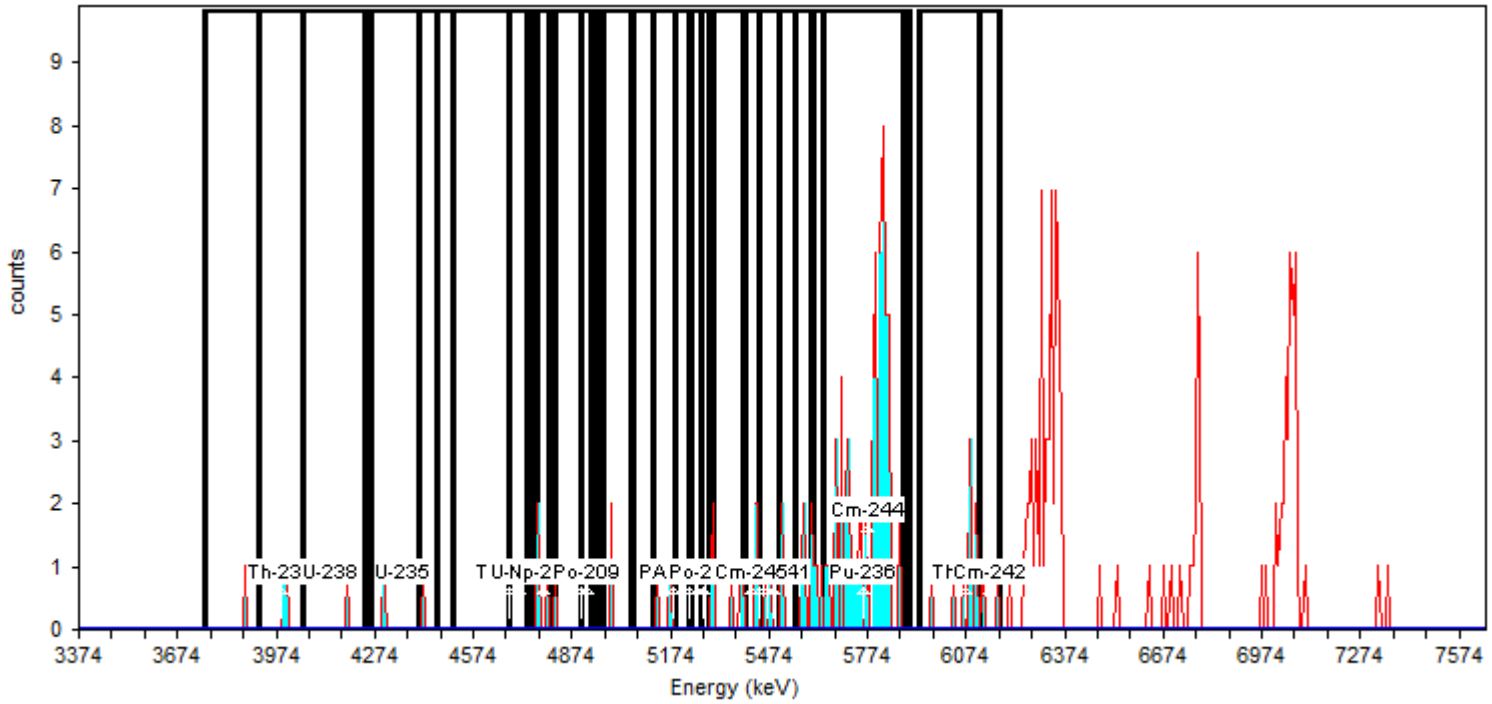
Batch Name: July2016a
Description:

Acquisition

Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 7/25/2016 1:14:03PM
Live Time: 960.00 min.
Real Time: 960.03 min.
Calibration Name: IC-8874;AV148-20151016a
Calibration Date: 10/16/2015 6:47:19PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 223.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	3.00	3.125E-003	2.083E-003
U-238	4,135.08	3,918.81	4,239.49	3.00	3.125E-003	2.083E-003
U-235	4,358.81	4,261.86	4,463.21	2.00	2.083E-003	1.804E-003
Th-230	4,679.48	4,403.55	4,746.60	1.00	1.042E-003	1.473E-003
U-234	4,709.31	4,507.96	4,821.17	4.00	4.167E-003	2.329E-003
Pu-242	4,903.21	4,679.48	4,947.95	4.00	4.167E-003	2.329E-003
Th-229	4,858.46	4,739.14	5,119.48	6.00	6.250E-003	2.756E-003
Np-237	4,783.89	4,768.97	4,806.26	3.00	3.125E-003	2.083E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	4.00	4.167E-003	2.329E-003
Am-243	5,231.34	5,052.36	5,305.92	5.00	5.208E-003	2.552E-003
U-232	5,253.71	5,059.82	5,402.86	8.00	8.333E-003	3.125E-003
Th-228	5,447.61	5,186.59	5,507.27	12.00	1.250E-002	3.756E-003
Po-210	5,276.09	5,231.34	5,291.00	0.00	0.000E+000	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	14.00	1.458E-002	4.034E-003
Am-241	5,484.90	5,298.46	5,604.22	19.00	1.979E-002	4.658E-003
Cm-245	5,417.78	5,395.41	5,447.61	5.00	5.208E-003	2.552E-003
Pu-236	5,760.83	5,611.67	5,887.60	69.00	7.188E-002	8.715E-003
Cm-244	5,775.74	5,641.51	5,902.52	66.00	6.875E-002	8.526E-003
Th-227	6,074.04	5,932.35	6,178.45	11.00	1.146E-002	3.608E-003
Cm-242	6,148.62	6,118.79	6,178.45	2.00	2.083E-003	1.804E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:46:37AM 7/23/2016

Sample

Sample Name: ICB;AV149
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

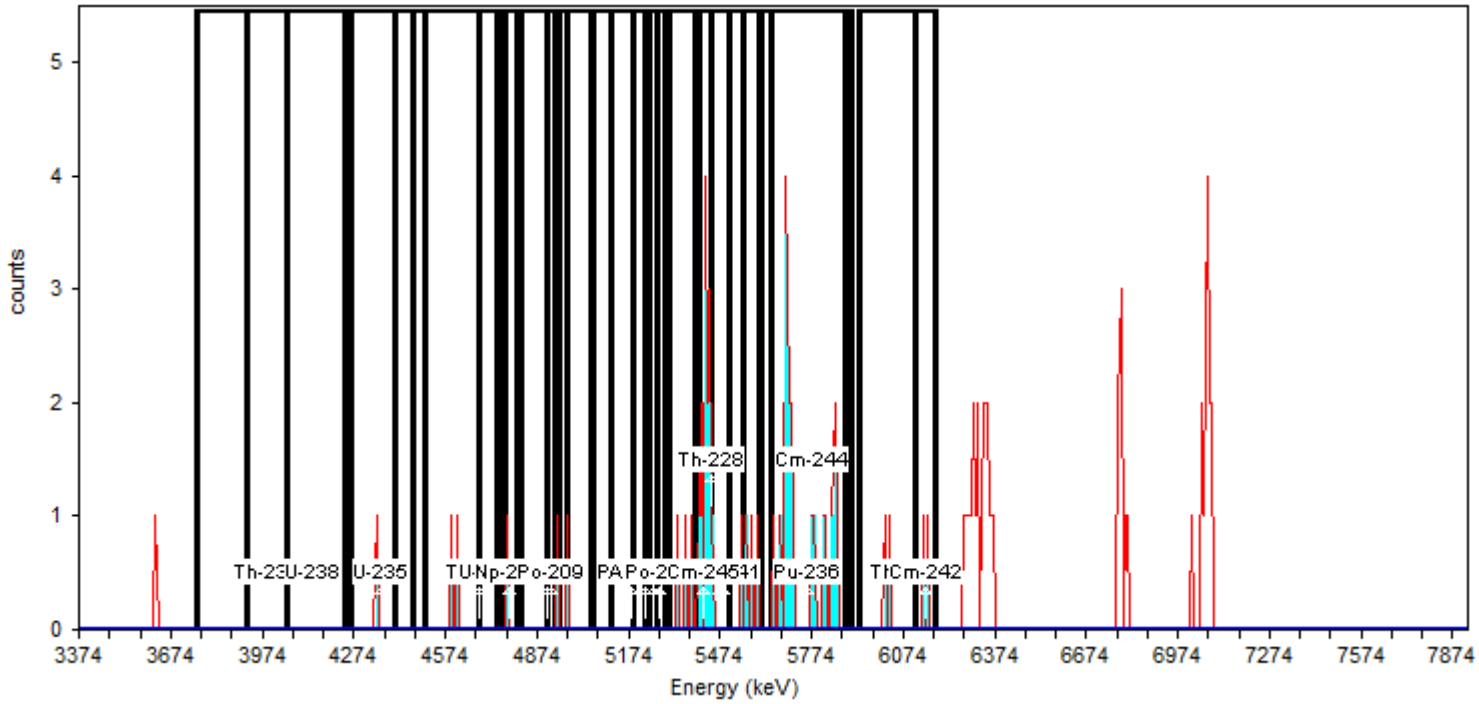
Batch Name: July2016
Description:

Acquisition

Detector: AV149 , SN: 50-05/R3
Acquisition Start Date: 7/22/2016 3:43:52PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-8875;AV149-20151016
Calibration Date: 10/16/2015 6:46:43PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 89.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	0.00	0.000E+000	1.473E-003
U-238	4,135.08	3,918.81	4,239.49	0.00	0.000E+000	1.473E-003
U-235	4,358.81	4,261.86	4,463.21	1.00	1.042E-003	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	2.00	2.083E-003	1.804E-003
U-234	4,709.31	4,507.96	4,821.17	3.00	3.125E-003	2.083E-003
Pu-242	4,903.21	4,679.48	4,947.95	2.00	2.083E-003	1.804E-003
Th-229	4,858.46	4,739.14	5,119.48	3.00	3.125E-003	2.083E-003
Np-237	4,783.89	4,768.97	4,806.26	1.00	1.042E-003	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	1.00	1.042E-003	1.473E-003
Am-243	5,231.34	5,052.36	5,305.92	0.00	0.000E+000	1.473E-003
U-232	5,253.71	5,059.82	5,402.86	4.00	4.167E-003	2.329E-003
Th-228	5,447.61	5,186.59	5,507.27	16.00	1.667E-002	4.295E-003
Po-210	5,276.09	5,231.34	5,291.00	0.00	0.000E+000	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	17.00	1.771E-002	4.419E-003
Am-241	5,484.90	5,298.46	5,604.22	20.00	2.083E-002	4.774E-003
Cm-245	5,417.78	5,395.41	5,447.61	13.00	1.354E-002	3.898E-003
Pu-236	5,760.83	5,611.67	5,887.60	22.00	2.292E-002	4.996E-003
Cm-244	5,775.74	5,641.51	5,902.52	22.00	2.292E-002	4.996E-003
Th-227	6,074.04	5,932.35	6,178.45	4.00	4.167E-003	2.329E-003
Cm-242	6,148.62	6,118.79	6,178.45	2.00	2.083E-003	1.804E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:43:57AM 7/23/2016

Sample

Sample Name: ICB;AV152
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

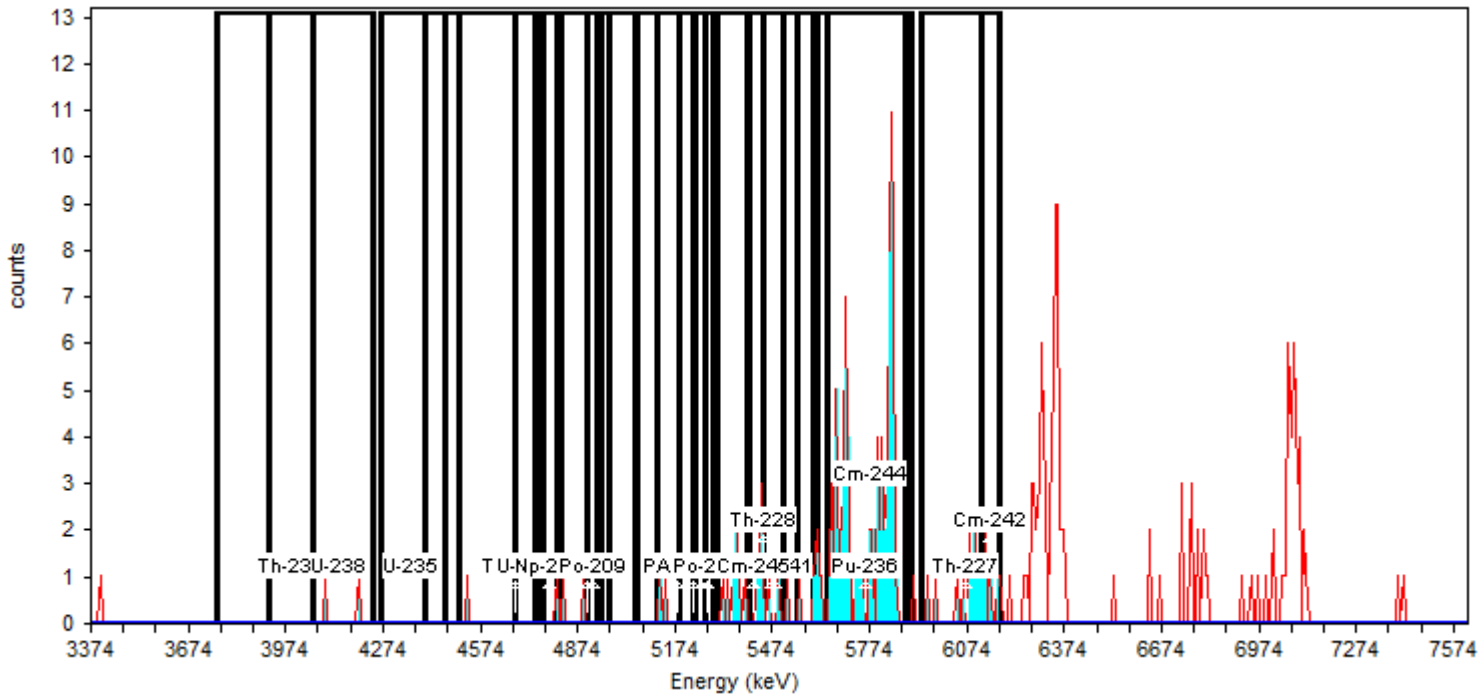
Batch Name: July2016
Description:

Acquisition

Detector: AV152 , SN: 50-05/R6
Acquisition Start Date: 7/22/2016 3:43:31PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9520;AV152-20151016
Calibration Date: 10/16/2015 6:46:53PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 247.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	0.00	0.000E+000	1.473E-003
U-238	4,135.08	3,918.81	4,239.49	2.00	2.083E-003	1.804E-003
U-235	4,358.81	4,261.86	4,463.21	0.00	0.000E+000	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	1.00	1.042E-003	1.473E-003
U-234	4,709.31	4,507.96	4,821.17	2.00	2.083E-003	1.804E-003
Pu-242	4,903.21	4,679.48	4,947.95	3.00	3.125E-003	2.083E-003
Th-229	4,858.46	4,739.14	5,119.48	3.00	3.125E-003	2.083E-003
Np-237	4,783.89	4,768.97	4,806.26	1.00	1.042E-003	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	2.00	2.083E-003	1.804E-003
Am-243	5,231.34	5,052.36	5,305.92	2.00	2.083E-003	1.804E-003
U-232	5,253.71	5,059.82	5,402.86	11.00	1.146E-002	3.608E-003
Th-228	5,447.61	5,186.59	5,507.27	17.00	1.771E-002	4.419E-003
Po-210	5,276.09	5,231.34	5,291.00	0.00	0.000E+000	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	18.00	1.875E-002	4.541E-003
Am-241	5,484.90	5,298.46	5,604.22	20.00	2.083E-002	4.774E-003
Cm-245	5,417.78	5,395.41	5,447.61	6.00	6.250E-003	2.756E-003
Pu-236	5,760.83	5,611.67	5,887.60	82.00	8.542E-002	9.490E-003
Cm-244	5,775.74	5,641.51	5,902.52	78.00	8.125E-002	9.259E-003
Th-227	6,074.04	5,932.35	6,178.45	19.00	1.979E-002	4.658E-003
Cm-242	6,148.62	6,118.79	6,178.45	7.00	7.292E-003	2.946E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:44:40AM 7/23/2016

Sample

Sample Name: ICB;AV156
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

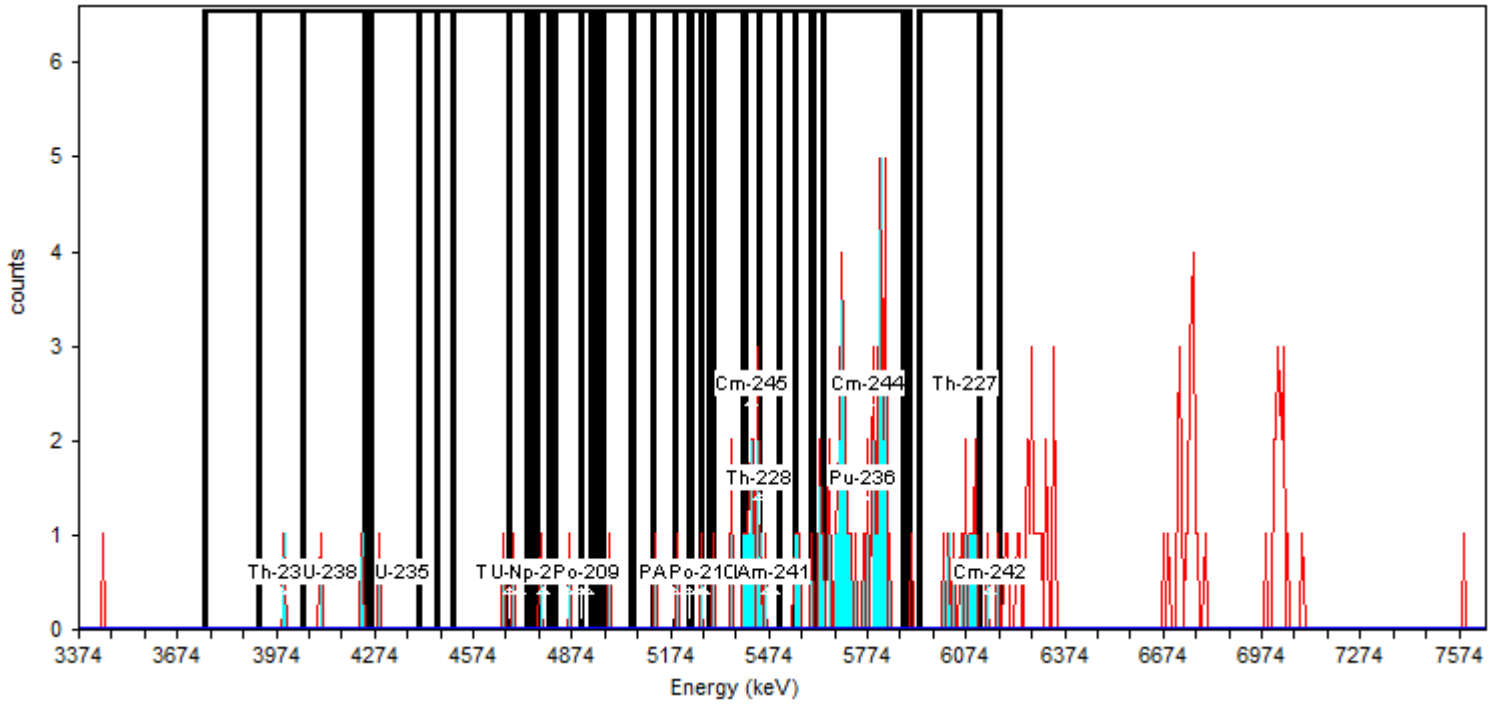
Batch Name: July2016
Description:

Acquisition

Detector: AV156 , SN: 49-155n4
Acquisition Start Date: 7/22/2016 3:43:31PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-9795;AV156-20151016a
Calibration Date: 10/16/2015 6:47:28PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 142.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	1.00	1.042E-003	1.473E-003
U-238	4,135.08	3,918.81	4,239.49	3.00	3.125E-003	2.083E-003
U-235	4,358.81	4,261.86	4,463.21	1.00	1.042E-003	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	2.00	2.083E-003	1.804E-003
U-234	4,709.31	4,507.96	4,821.17	3.00	3.125E-003	2.083E-003
Pu-242	4,903.21	4,679.48	4,947.95	3.00	3.125E-003	2.083E-003
Th-229	4,858.46	4,739.14	5,119.48	3.00	3.125E-003	2.083E-003
Np-237	4,783.89	4,768.97	4,806.26	1.00	1.042E-003	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	3.00	3.125E-003	2.083E-003
Am-243	5,231.34	5,052.36	5,305.92	4.00	4.167E-003	2.329E-003
U-232	5,253.71	5,059.82	5,402.86	8.00	8.333E-003	3.125E-003
Th-228	5,447.61	5,186.59	5,507.27	17.00	1.771E-002	4.419E-003
Po-210	5,276.09	5,231.34	5,291.00	1.00	1.042E-003	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	17.00	1.771E-002	4.419E-003
Am-241	5,484.90	5,298.46	5,604.22	19.00	1.979E-002	4.658E-003
Cm-245	5,417.78	5,395.41	5,447.61	11.00	1.146E-002	3.608E-003
Pu-236	5,760.83	5,611.67	5,887.60	42.00	4.375E-002	6.831E-003
Cm-244	5,775.74	5,641.51	5,902.52	39.00	4.062E-002	6.588E-003
Th-227	6,074.04	5,932.35	6,178.45	12.00	1.250E-002	3.756E-003
Cm-242	6,148.62	6,118.79	6,178.45	2.00	2.083E-003	1.804E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:44:44AM 7/23/2016

Sample

Sample Name: ICB;AV157
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

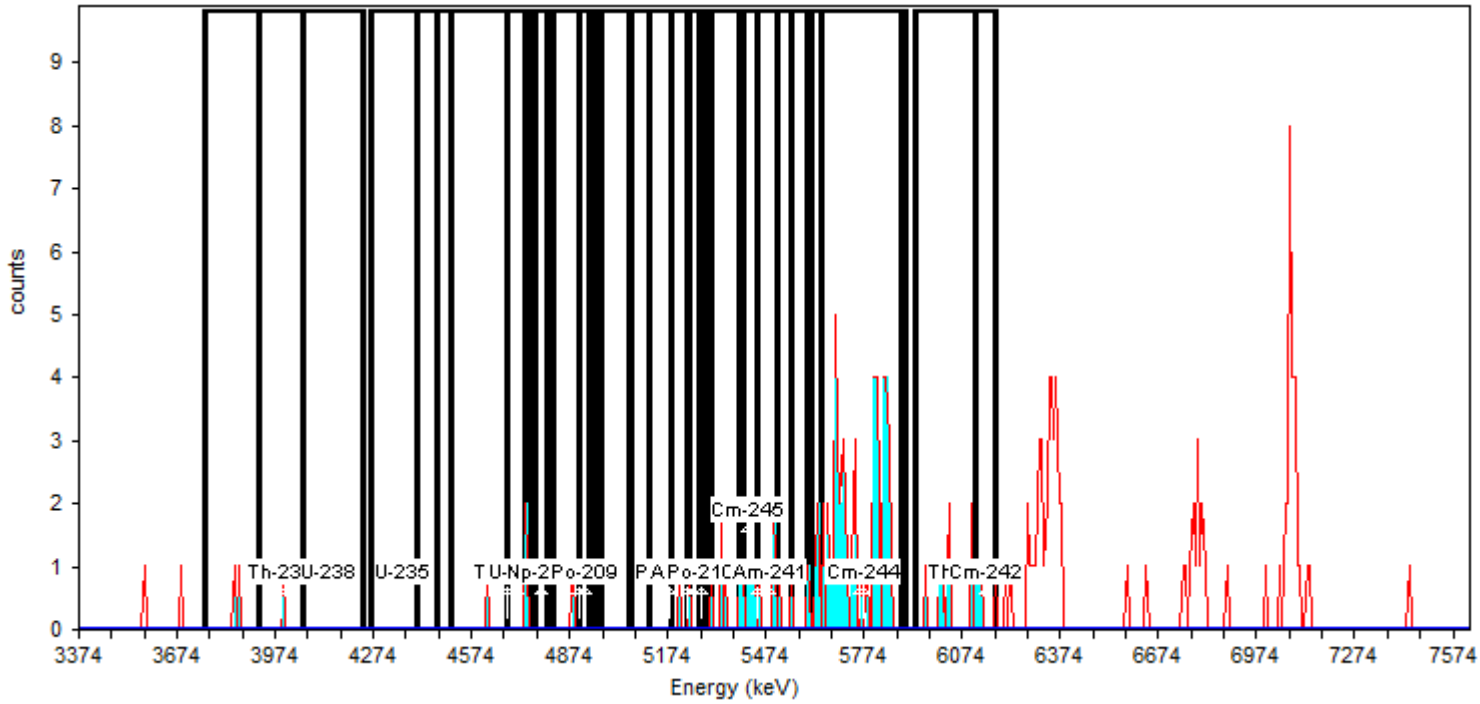
Batch Name: July2016
Description:

Acquisition

Detector: AV157 , SN: 50-05/II3
Acquisition Start Date: 7/22/2016 3:43:31PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-9817;AV157-20151016
Calibration Date: 10/16/2015 6:47:07PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 172.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	3.00	3.125E-003	2.083E-003
U-238	4,135.08	3,918.81	4,239.49	1.00	1.042E-003	1.473E-003
U-235	4,358.81	4,261.86	4,463.21	0.00	0.000E+000	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	3.00	3.125E-003	2.083E-003
U-234	4,709.31	4,507.96	4,821.17	3.00	3.125E-003	2.083E-003
Pu-242	4,903.21	4,679.48	4,947.95	3.00	3.125E-003	2.083E-003
Th-229	4,858.46	4,739.14	5,119.48	3.00	3.125E-003	2.083E-003
Np-237	4,783.89	4,768.97	4,806.26	0.00	0.000E+000	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	2.00	2.083E-003	1.804E-003
Am-243	5,231.34	5,052.36	5,305.92	3.00	3.125E-003	2.083E-003
U-232	5,253.71	5,059.82	5,402.86	8.00	8.333E-003	3.125E-003
Th-228	5,447.61	5,186.59	5,507.27	15.00	1.563E-002	4.167E-003
Po-210	5,276.09	5,231.34	5,291.00	1.00	1.042E-003	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	15.00	1.563E-002	4.167E-003
Am-241	5,484.90	5,298.46	5,604.22	16.00	1.667E-002	4.295E-003
Cm-245	5,417.78	5,395.41	5,447.61	6.00	6.250E-003	2.756E-003
Pu-236	5,760.83	5,611.67	5,887.60	53.00	5.521E-002	7.655E-003
Cm-244	5,775.74	5,641.51	5,902.52	50.00	5.208E-002	7.439E-003
Th-227	6,074.04	5,932.35	6,178.45	12.00	1.250E-002	3.756E-003
Cm-242	6,148.62	6,118.79	6,178.45	4.00	4.167E-003	2.329E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:44:50AM 7/23/2016

Sample

Sample Name: ICB;AV158
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

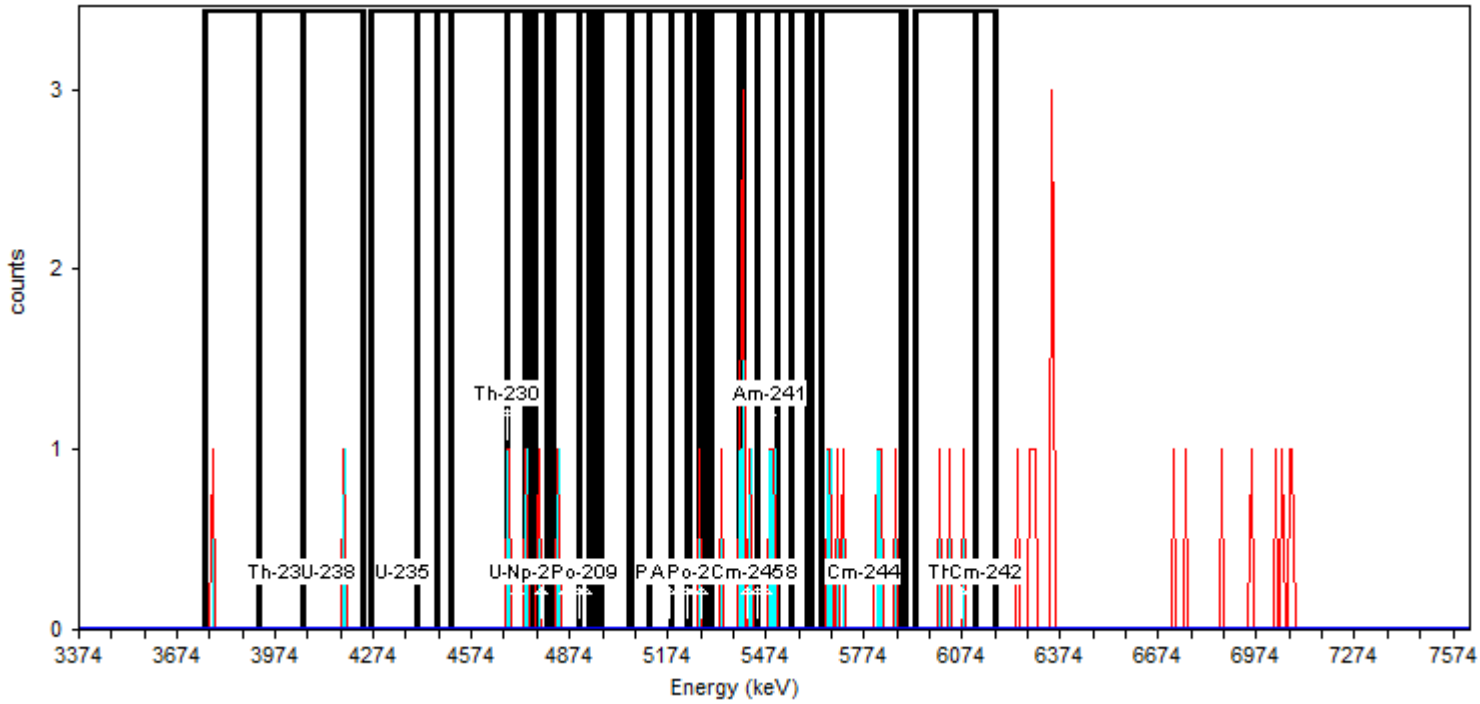
Batch Name: July2016
Description:

Acquisition

Detector: AV158 , SN: 50-05/II4
Acquisition Start Date: 7/22/2016 3:43:32PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-9884;AV158-20151016
Calibration Date: 10/16/2015 6:47:11PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 45.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	1.00	1.042E-003	1.473E-003
U-238	4,135.08	3,918.81	4,239.49	1.00	1.042E-003	1.473E-003
U-235	4,358.81	4,261.86	4,463.21	0.00	0.000E+000	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	3.00	3.125E-003	2.083E-003
U-234	4,709.31	4,507.96	4,821.17	4.00	4.167E-003	2.329E-003
Pu-242	4,903.21	4,679.48	4,947.95	5.00	5.208E-003	2.552E-003
Th-229	4,858.46	4,739.14	5,119.48	3.00	3.125E-003	2.083E-003
Np-237	4,783.89	4,768.97	4,806.26	1.00	1.042E-003	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	0.00	0.000E+000	1.473E-003
Am-243	5,231.34	5,052.36	5,305.92	1.00	1.042E-003	1.473E-003
U-232	5,253.71	5,059.82	5,402.86	6.00	6.250E-003	2.756E-003
Th-228	5,447.61	5,186.59	5,507.27	10.00	1.042E-002	3.455E-003
Po-210	5,276.09	5,231.34	5,291.00	1.00	1.042E-003	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	10.00	1.042E-002	3.455E-003
Am-241	5,484.90	5,298.46	5,604.22	9.00	9.375E-003	3.294E-003
Cm-245	5,417.78	5,395.41	5,447.61	5.00	5.208E-003	2.552E-003
Pu-236	5,760.83	5,611.67	5,887.60	8.00	8.333E-003	3.125E-003
Cm-244	5,775.74	5,641.51	5,902.52	8.00	8.333E-003	3.125E-003
Th-227	6,074.04	5,932.35	6,178.45	3.00	3.125E-003	2.083E-003
Cm-242	6,148.62	6,118.79	6,178.45	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:44:49AM 7/23/2016

Sample

Sample Name: ICB;AV160
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

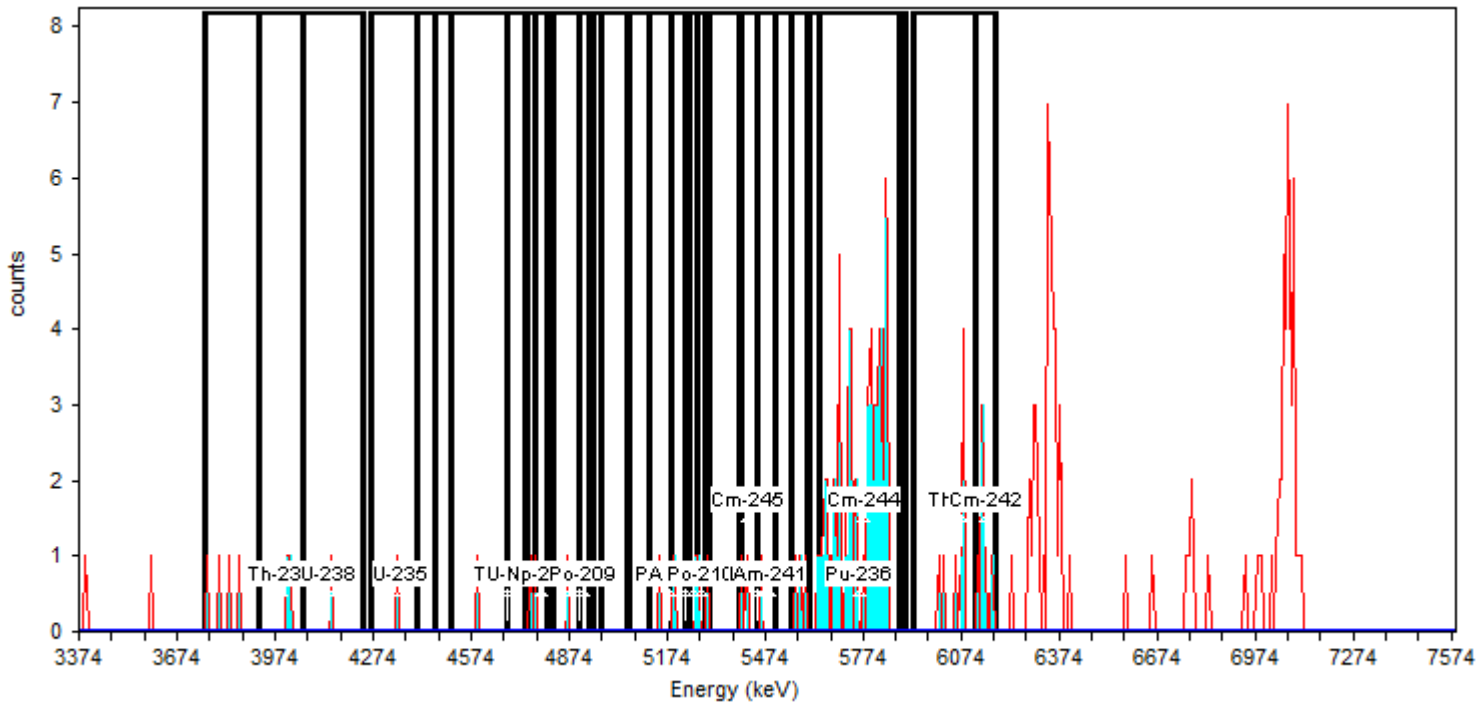
Batch Name: July2016
Description:

Acquisition

Detector: AV160 , SN: 50-05/II6
Acquisition Start Date: 7/22/2016 3:43:32PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9886;AV160-20151016a
Calibration Date: 10/16/2015 6:47:48PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 183.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	6.00	6.250E-003	2.756E-003
U-238	4,135.08	3,918.81	4,239.49	3.00	3.125E-003	2.083E-003
U-235	4,358.81	4,261.86	4,463.21	1.00	1.042E-003	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	1.00	1.042E-003	1.473E-003
U-234	4,709.31	4,507.96	4,821.17	3.00	3.125E-003	2.083E-003
Pu-242	4,903.21	4,679.48	4,947.95	3.00	3.125E-003	2.083E-003
Th-229	4,858.46	4,739.14	5,119.48	3.00	3.125E-003	2.083E-003
Np-237	4,783.89	4,768.97	4,806.26	1.00	1.042E-003	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	2.00	2.083E-003	1.804E-003
Am-243	5,231.34	5,052.36	5,305.92	5.00	5.208E-003	2.552E-003
U-232	5,253.71	5,059.82	5,402.86	6.00	6.250E-003	2.756E-003
Th-228	5,447.61	5,186.59	5,507.27	7.00	7.292E-003	2.946E-003
Po-210	5,276.09	5,231.34	5,291.00	2.00	2.083E-003	1.804E-003
Pu-238	5,469.98	5,268.63	5,552.01	5.00	5.208E-003	2.552E-003
Am-241	5,484.90	5,298.46	5,604.22	7.00	7.292E-003	2.946E-003
Cm-245	5,417.78	5,395.41	5,447.61	2.00	2.083E-003	1.804E-003
Pu-236	5,760.83	5,611.67	5,887.60	59.00	6.146E-002	8.069E-003
Cm-244	5,775.74	5,641.51	5,902.52	58.00	6.042E-002	8.001E-003
Th-227	6,074.04	5,932.35	6,178.45	14.00	1.458E-002	4.034E-003
Cm-242	6,148.62	6,118.79	6,178.45	6.00	6.250E-003	2.756E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:19:46AM 9/2/2016

Sample

Sample Name: ICB;AV213
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

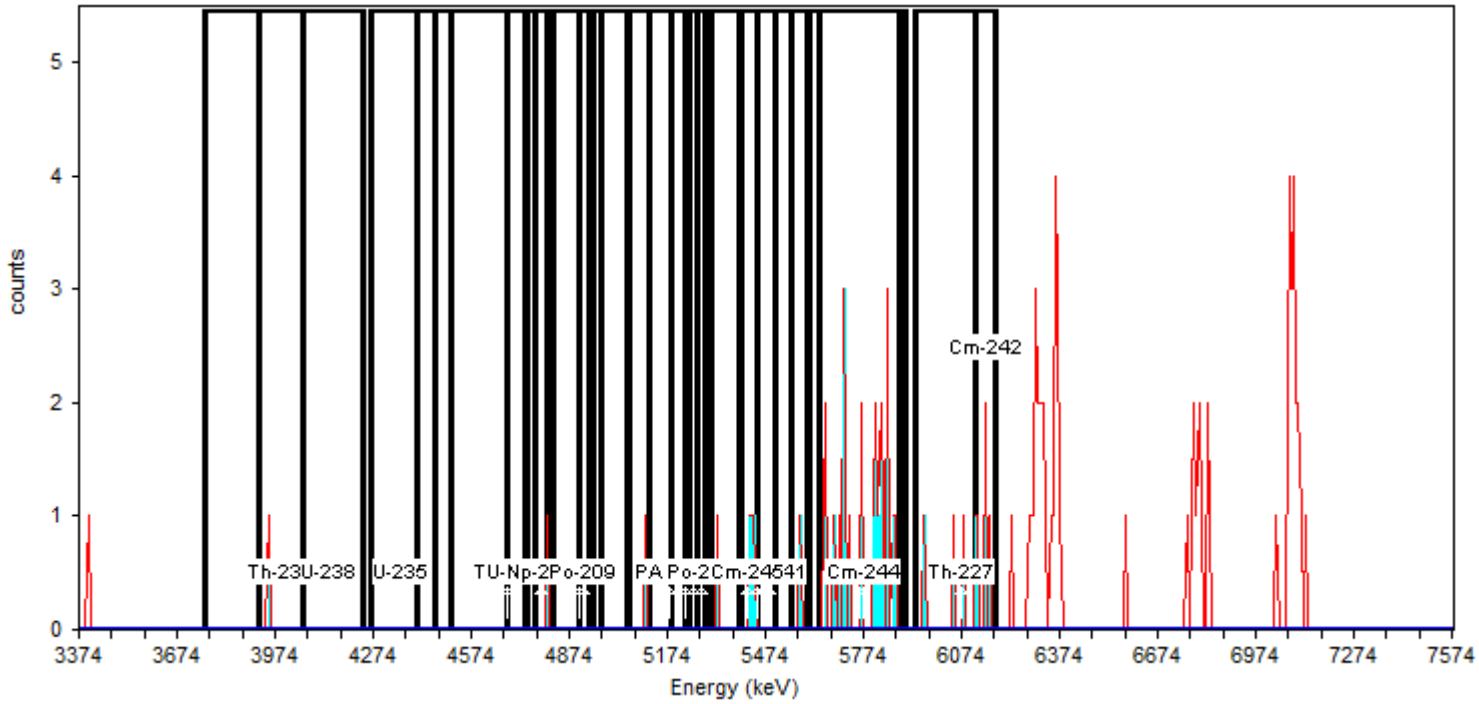
Batch Name: August2016
Description:

Acquisition

Detector: AV213 , SN: 54-011 Y1
Acquisition Start Date: 9/1/2016 3:17:17PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-9817;AV213-20151018
Calibration Date: 10/18/2015 6:42:09PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 92.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	1.00	1.042E-003	1.473E-003
U-238	4,135.08	3,918.81	4,239.49	1.00	1.042E-003	1.473E-003
U-235	4,358.81	4,261.86	4,463.21	0.00	0.000E+000	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	0.00	0.000E+000	1.473E-003
U-234	4,709.31	4,507.96	4,821.17	1.00	1.042E-003	1.473E-003
Pu-242	4,903.21	4,679.48	4,947.95	1.00	1.042E-003	1.473E-003
Th-229	4,858.46	4,739.14	5,119.48	2.00	2.083E-003	1.804E-003
Np-237	4,783.89	4,768.97	4,806.26	1.00	1.042E-003	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	1.00	1.042E-003	1.473E-003
Am-243	5,231.34	5,052.36	5,305.92	1.00	1.042E-003	1.473E-003
U-232	5,253.71	5,059.82	5,402.86	2.00	2.083E-003	1.804E-003
Th-228	5,447.61	5,186.59	5,507.27	4.00	4.167E-003	2.329E-003
Po-210	5,276.09	5,231.34	5,291.00	0.00	0.000E+000	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	4.00	4.167E-003	2.329E-003
Am-241	5,484.90	5,298.46	5,604.22	5.00	5.208E-003	2.552E-003
Cm-245	5,417.78	5,395.41	5,447.61	3.00	3.125E-003	2.083E-003
Pu-236	5,760.83	5,611.67	5,887.60	22.00	2.292E-002	4.996E-003
Cm-244	5,775.74	5,641.51	5,902.52	22.00	2.292E-002	4.996E-003
Th-227	6,074.04	5,932.35	6,178.45	8.00	8.333E-003	3.125E-003
Cm-242	6,148.62	6,118.79	6,178.45	5.00	5.208E-003	2.552E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:19:54AM 9/2/2016

Sample

Sample Name: ICB;AV216
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

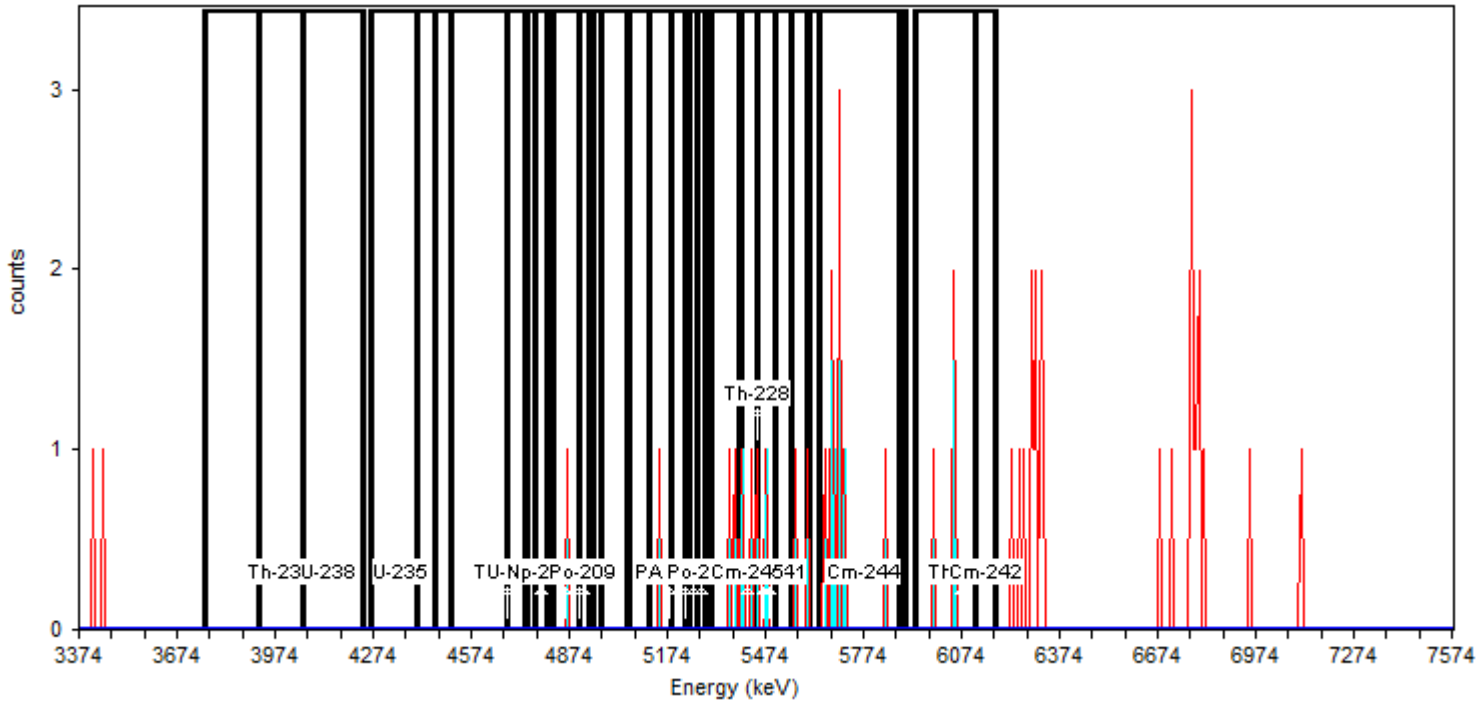
Batch Name: August2016
Description:

Acquisition

Detector: AV216 , SN: 50-117J5
Acquisition Start Date: 9/1/2016 3:17:18PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-9886;AV216-20151018
Calibration Date: 10/18/2015 6:42:28PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 49.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	0.00	0.000E+000	1.473E-003
U-238	4,135.08	3,918.81	4,239.49	0.00	0.000E+000	1.473E-003
U-235	4,358.81	4,261.86	4,463.21	0.00	0.000E+000	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	0.00	0.000E+000	1.473E-003
U-234	4,709.31	4,507.96	4,821.17	0.00	0.000E+000	1.473E-003
Pu-242	4,903.21	4,679.48	4,947.95	1.00	1.042E-003	1.473E-003
Th-229	4,858.46	4,739.14	5,119.48	1.00	1.042E-003	1.473E-003
Np-237	4,783.89	4,768.97	4,806.26	0.00	0.000E+000	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	1.00	1.042E-003	1.473E-003
Am-243	5,231.34	5,052.36	5,305.92	1.00	1.042E-003	1.473E-003
U-232	5,253.71	5,059.82	5,402.86	4.00	4.167E-003	2.329E-003
Th-228	5,447.61	5,186.59	5,507.27	6.00	6.250E-003	2.756E-003
Po-210	5,276.09	5,231.34	5,291.00	0.00	0.000E+000	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	6.00	6.250E-003	2.756E-003
Am-241	5,484.90	5,298.46	5,604.22	8.00	8.333E-003	3.125E-003
Cm-245	5,417.78	5,395.41	5,447.61	3.00	3.125E-003	2.083E-003
Pu-236	5,760.83	5,611.67	5,887.60	9.00	9.375E-003	3.294E-003
Cm-244	5,775.74	5,641.51	5,902.52	9.00	9.375E-003	3.294E-003
Th-227	6,074.04	5,932.35	6,178.45	4.00	4.167E-003	2.329E-003
Cm-242	6,148.62	6,118.79	6,178.45	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:57:54AM 9/3/2016

Sample

Sample Name: ICB;AV217
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

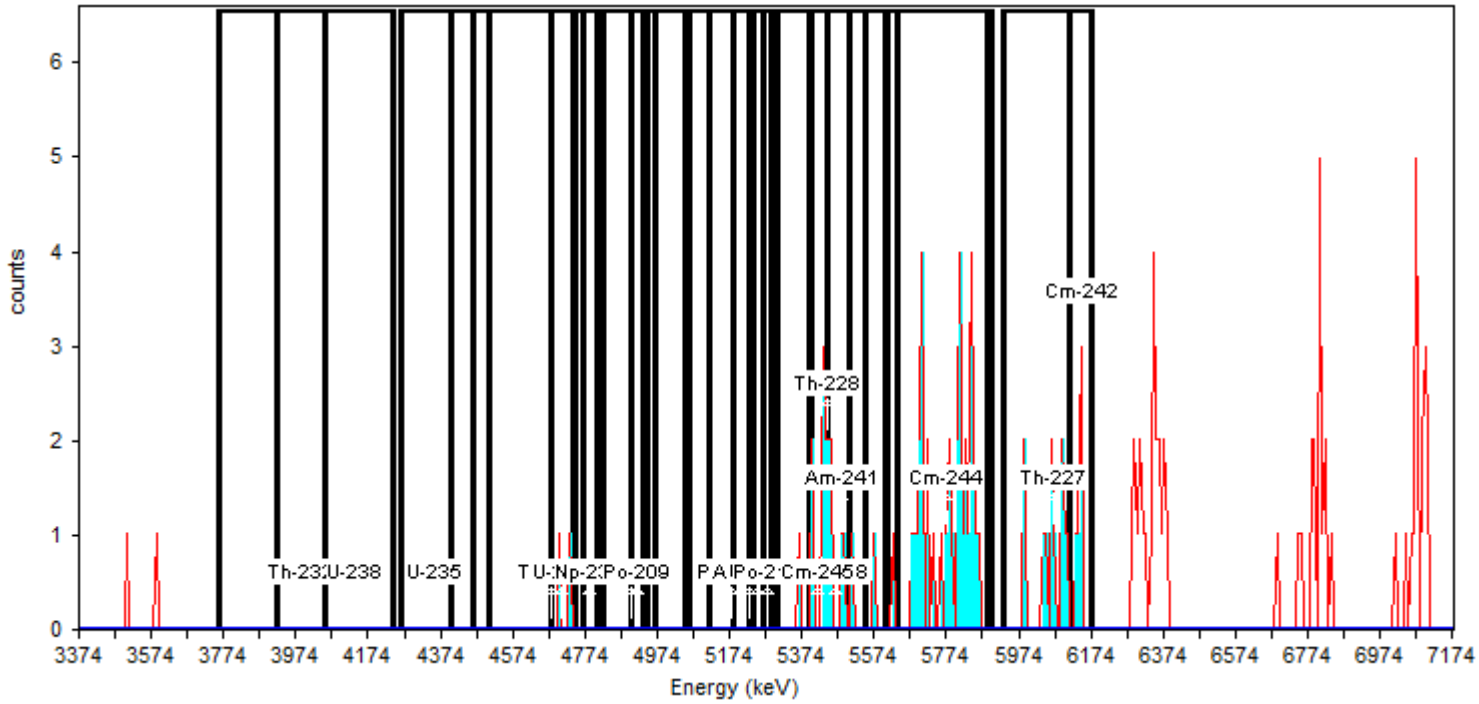
Batch Name: August2016a
Description:

Acquisition

Detector: AV217 , SN: 50-117I2
Acquisition Start Date: 9/2/2016 10:55:30AM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-7107;AV217-20151018
Calibration Date: 10/18/2015 9:19:45PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 125.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	0.00	0.000E+000	1.473E-003
U-238	4,135.08	3,918.81	4,239.49	0.00	0.000E+000	1.473E-003
U-235	4,358.81	4,261.86	4,463.21	0.00	0.000E+000	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	2.00	2.083E-003	1.804E-003
U-234	4,709.31	4,507.96	4,821.17	2.00	2.083E-003	1.804E-003
Pu-242	4,903.21	4,679.48	4,947.95	2.00	2.083E-003	1.804E-003
Th-229	4,858.46	4,739.14	5,119.48	0.00	0.000E+000	1.473E-003
Np-237	4,783.89	4,768.97	4,806.26	0.00	0.000E+000	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	0.00	0.000E+000	1.473E-003
Am-243	5,231.34	5,052.36	5,305.92	0.00	0.000E+000	1.473E-003
U-232	5,253.71	5,059.82	5,402.86	3.00	3.125E-003	2.083E-003
Th-228	5,447.61	5,186.59	5,507.27	14.00	1.458E-002	4.034E-003
Po-210	5,276.09	5,231.34	5,291.00	0.00	0.000E+000	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	15.00	1.563E-002	4.167E-003
Am-241	5,484.90	5,298.46	5,604.22	16.00	1.667E-002	4.295E-003
Cm-245	5,417.78	5,395.41	5,447.61	9.00	9.375E-003	3.294E-003
Pu-236	5,760.83	5,611.67	5,887.60	36.00	3.750E-002	6.336E-003
Cm-244	5,775.74	5,641.51	5,902.52	35.00	3.646E-002	6.250E-003
Th-227	6,074.04	5,932.35	6,178.45	16.00	1.667E-002	4.295E-003
Cm-242	6,148.62	6,118.79	6,178.45	5.00	5.208E-003	2.552E-003

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: AV152

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 15:52	140	IC 160-223449/1		223449			PS
10/26/15 19:11	60	ICV 160-223567/1		223567			PS
07/22/16 15:43	960	ICB 160-261906/1		261906			PS
07/26/16 09:35	60	CCV 160-262324/1		262324			PS
08/31/16 09:06	1	PULSER 160-267483/1		267483			ALD
08/31/16 14:07	180	ZZZZZ		267483			
08/31/16 19:41	400	160-18552-2	SU01-EXB-077-SS-P-00	267483	266485	A-01-R	ALD

Detector: AV156

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 16:27	140	IC 160-223453/1		223453			PS
10/26/15 19:12	60	ICV 160-223571/1		223571			PS
07/22/16 15:43	960	ICB 160-261910/1		261910			PS
07/26/16 09:14	60	CCV 160-262326/1		262326			PS
08/31/16 09:06	1	PULSER 160-267485/1		267485			ALD
08/31/16 14:07	180	ZZZZZ		267485			
08/31/16 19:41	400	160-18552-4	SU02-EXB-079-SS-P-00	267485	266485	A-01-R	ALD

Detector: AV157

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 15:53	140	IC 160-223454/1		223454			PS
10/26/15 19:12	60	ICV 160-223572/1		223572			PS
07/22/16 15:43	960	ICB 160-261911/1		261911			PS
07/26/16 09:15	60	CCV 160-262327/1		262327			PS
08/31/16 09:06	1	PULSER 160-267486/1		267486			ALD
08/31/16 14:07	180	ZZZZZ		267486			
08/31/16 19:41	400	160-18552-5	SU03-S-080-SS-P-00	267486	266485	A-01-R	ALD

Alpha Spectroscopy Run Log

Detector: AV158

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 15:53	140	IC 160-223455/1		223455			PS
10/26/15 19:13	60	ICV 160-223573/1		223573			PS
07/22/16 15:43	960	ICB 160-261912/1		261912			PS
07/26/16 09:15	60	CCV 160-262328/1		262328			PS
08/31/16 09:06	1	PULSER 160-267487/1		267487			ALD
08/31/16 14:07	180	ZZZZZ		267487			
08/31/16 19:41	400	160-18552-6	SU03-S-081-SS-P-00	267487	266485	A-01-R	ALD

Detector: AV160

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/16/15 16:27	140	IC 160-223457/1		223457			PS
10/26/15 19:13	60	ICV 160-223575/1		223575			PS
07/22/16 15:43	960	ICB 160-261914/1		261914			PS
07/26/16 09:34	60	CCV 160-262330/1		262330			PS
08/31/16 09:06	1	PULSER 160-267489/1		267489			ALD
08/31/16 14:07	180	ZZZZZ		267489			
08/31/16 19:41	400	160-18552-7	SU03-S-082-SS-P-00	267489	266485	A-01-R	ALD

Detector: AV213

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:12	140	IC 160-223878/1		223878			PS
11/01/15 16:04	60	ICV 160-223628/1		223628			PS
09/01/16 15:17	960	ICB 160-268076/1		268076			PS
09/06/16 11:24	60	CCV 160-268355/1		268355			PS
09/07/16 12:28	1	PULSER 160-268504/1		268504			ALD
09/07/16 14:28	400	160-18552-3	SU02-EXB-078-SS-P-00	268504	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
09/07/16 14:28	400	160-18552-1 DU	SU01-EXB-076-SS-P-00 DU	268505	266485	A-01-R	ALD

Detector: AV217

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 18:57	140	IC 160-223513/1		223513			PS
11/01/15 19:16	60	ICV 160-223632/1		223632			PS
09/02/16 10:55	960	ICB 160-268140/1		268140			PS
09/06/16 11:25	60	CCV 160-268357/1		268357			PS
09/07/16 12:28	1	PULSER 160-268506/1		268506			ALD
09/07/16 14:28	400	160-18552-1	SU01-EXB-076-SS-P-00	268506	266485	A-01-R	ALD

GAMMA SPECTROSCOPY

Method 901.1
Ra-226

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

Prep Batch: 264537

Fill Geometry, 21-Day In-Growth

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 264537

Lab ID: MB 160-264537/1-A Analyzed: 09/01/16 10:41 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	-0.02125	0.0472	0.0472	U	pCi/g	0.500	0.338	267763

Lab ID: LCS 160-264537/2-A Analyzed: 09/01/16 10:42 Ts: 30 Sigma: 2
Client ID: Detector: GV12 Decay Corrected: No

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Americium-241	97.82	1.62	10.3		pCi/g		1.20	267757
Cesium-137	29.19	0.682	3.11		pCi/g		0.270	267757
Cobalt-60	16.27	0.410	1.68		pCi/g		0.146	267757

Lab ID: 160-18552-1 Analyzed: 09/01/16 10:43 Ts: 30 Sigma: 2
Client ID: SU01-EXB-076-SS-P-00 Detector: GV13 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.52	0.234	0.283		pCi/g	0.500	0.164	267758

Lab ID: 160-18552-1 DU Analyzed: 09/01/16 11:37 Ts: 30 Sigma: 2
Client ID: SU01-EXB-076-SS-P-00 Detector: GV12 Decay Corrected: No

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.422	0.275	0.312		pCi/g	0.500	0.233	267757

Lab ID: 160-18552-2 Analyzed: 09/01/16 10:46 Ts: 30 Sigma: 2
Client ID: SU01-EXB-077-SS-P-00 Detector: GV8 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.10	0.243	0.269		pCi/g	0.500	0.184	267756

Lab ID: 160-18552-3 Analyzed: 09/01/16 10:47 Ts: 30 Sigma: 2
Client ID: SU02-EXB-078-SS-P-00 Detector: GV7 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.46	0.218	0.266		pCi/g	0.500	0.145	267755

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 264537

Lab ID: 160-18552-4 Analyzed: 09/01/16 10:49 Ts: 30 Sigma: 2
Client ID: SU02-EXB-079-SS-P-00 Detector: GV5 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.22	0.286	0.313		pCi/g	0.500	0.247	267754

Lab ID: 160-18552-5 Analyzed: 09/01/16 11:38 Ts: 30 Sigma: 2
Client ID: SU03-S-080-SS-P-00 Detector: GV13 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.30	0.172	0.218		pCi/g	0.500	0.0983	267758

Lab ID: 160-18552-6 Analyzed: 09/01/16 11:39 Ts: 30 Sigma: 2
Client ID: SU03-S-081-SS-P-00 Detector: GV14 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.29	0.276	0.307		pCi/g	0.500	0.233	267760

Lab ID: 160-18552-7 Analyzed: 09/01/16 11:40 Ts: 30 Sigma: 2
Client ID: SU03-S-082-SS-P-00 Detector: GV15 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.55	0.256	0.302		pCi/g	0.500	0.156	267761

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 160-264537/1-A	Radium-226			-0.02125	U	pCi/g							-.9001289 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 160-264537/2-A	Americium-241		97.1	97.82		pCi/g	101	87 - 116					.1004875 708
LCS 160-264537/2-A	Cesium-137		29.5	29.19		pCi/g	99	87 - 120					-.1377630 488
LCS 160-264537/2-A	Cobalt-60		16.6	16.27		pCi/g	98	87 - 115					-.2945392 261

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-18552-1	Radium-226	1.52		1.422		pCi/g			6	0.16	0.45	1	

Glossary:

Ts = Count Duration, Sample

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-18552-1

SDG No.:

Batch Number: 264537 Batch Start Date: 08/11/16 15:27 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
MB 160-264537/1		Fill_Geo-21, 901.1				291.18 g	8/11/2016	9/1/2016	Tuna Can
LCS 160-264537/2		Fill_Geo-21, 901.1				341.9 g	8/11/2016	9/1/2016	Tuna Can
160-18552-A-1-A	SU01-EXB-076-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	312.9 g	266.3 g	8/11/2016	9/1/2016	Tuna Can
160-18552-A-1-A DU	SU01-EXB-076-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	312.9 g	266.3 g	8/11/2016	9/1/2016	Tuna Can
160-18552-A-2-A	SU01-EXB-077-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	344.4 g	297.8 g	8/11/2016	9/1/2016	Tuna Can
160-18552-A-3-A	SU02-EXB-078-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	388.4 g	341.8 g	8/11/2016	9/1/2016	Tuna Can
160-18552-A-4-A	SU02-EXB-079-SS-P-00	Fill_Geo-21, 901.1	T	46.4 g	395.2 g	348.8 g	8/11/2016	9/1/2016	Tuna Can
160-18552-A-5-A	SU03-S-080-SS-P-00	Fill_Geo-21, 901.1	T	46.8 g	399.4 g	352.6 g	8/11/2016	9/1/2016	Tuna Can
160-18552-A-6-A	SU03-S-081-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	356.7 g	310.1 g	8/11/2016	9/1/2016	Tuna Can
160-18552-A-7-A	SU03-S-082-SS-P-00	Fill_Geo-21, 901.1	T	46.6 g	357.9 g	311.3 g	8/11/2016	9/1/2016	Tuna Can

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00005					
MB 160-264537/1		Fill_Geo-21, 901.1							
LCS 160-264537/2		Fill_Geo-21, 901.1		# g					
160-18552-A-1-A	SU01-EXB-076-SS-P-00	Fill_Geo-21, 901.1	T						
160-18552-A-1-A DU	SU01-EXB-076-SS-P-00	Fill_Geo-21, 901.1	T						
160-18552-A-2-A	SU01-EXB-077-SS-P-00	Fill_Geo-21, 901.1	T						
160-18552-A-3-A	SU02-EXB-078-SS-P-00	Fill_Geo-21, 901.1	T						
160-18552-A-4-A	SU02-EXB-079-SS-P-00	Fill_Geo-21, 901.1	T						
160-18552-A-5-A	SU03-S-080-SS-P-00	Fill_Geo-21, 901.1	T						
160-18552-A-6-A	SU03-S-081-SS-P-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.

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-18552-1

SDG No.:

Batch Number: 264537 Batch Start Date: 08/11/16 15:27 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	Tuna Can LCS 00005					
160-18552-A-7-A	SU03-S-082-SS-P-00	Fill_Geo-21, 901.1	T						

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

Basis	Basis Description
T	Total/NA

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

Test America St. Louis Spectrum ID: 17_Gamma_20161128

Sample Description: 264537_Gamma_MB 160-264537~1-A
Detector: Detector #17
Batch ID: 264537
Work Order Number: Gamma
Lot Number: MB 160-264537~1-A

Decay to Time: 9/1/2016 10:40 Live Time: 1800 sec
Acquisition Time: 9/1/2016 10:41:45 Real Time: 1841 sec
Analysis Time: 9/1/2016 11:12 Dead Time: 2.24 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 17_Soil_TunaCan.Clb
Efficiency Cal Desc: 17_TunaCan_90099_032612
Efficiency Cal Date: 4/12/2012 09:28
Energy Cal Date: 2/29/2012 10:33
Library: Client_Long_Rev11.lib
Bkgd Correction File: 17_2016-08-18_0548.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	1.198E+00	102.6	1.228E+00	1.230E+00	4.336E+00
NA-22	-1.478E-01	154.5	2.283E-01	2.284E-01	8.531E-01
K-40	-7.391E-01	610.5	4.512E+00	4.512E+00	1.316E+01
Sc-46	-1.602E-02	2056.7	3.294E-01	3.294E-01	1.212E+00
CR-51	-1.537E+00	160.6	2.469E+00	2.470E+00	7.185E+00
MN-54	-6.109E-02	493.7	3.016E-01	3.016E-01	7.764E-01
FE-59	5.526E-01	37.8	2.088E-01	2.107E-01	1.330E+00
Co-56	5.936E-01	46.8	2.779E-01	2.796E-01	5.920E-01
CO-57	1.480E-01	109.8	1.625E-01	1.627E-01	5.534E-01
CO-58	-1.652E-01	174.6	2.885E-01	2.886E-01	1.029E+00
CO-60	3.931E-01	40.8	1.605E-01	1.617E-01	4.829E-01
ZN-65	6.724E-01	88.7	5.967E-01	5.977E-01	2.050E+00
NB-94	2.716E-01	99.5	2.702E-01	2.705E-01	6.797E-01
ZR-95	2.564E-01	143.6	3.683E-01	3.686E-01	1.003E+00
NB-95	-2.151E-01	131.1	2.821E-01	2.824E-01	9.905E-01
RU-103	-1.041E-01	146.5	1.526E-01	1.527E-01	7.339E-01
RH-106	2.470E-01	1917.0	4.734E+00	4.734E+00	1.657E+01
AG-108M	-2.753E-01	97.1	2.672E-01	2.676E-01	7.089E-01
AG-110M	3.756E-01	35.4	1.328E-01	1.342E-01	1.650E+00
SN-113	1.717E-01	158.7	2.726E-01	2.727E-01	9.640E-01
SB-124	2.281E-01	86.6	1.975E-01	1.979E-01	1.651E+00
SB-125	2.087E-01	74.5	1.554E-01	1.558E-01	2.326E+00
I-131	1.547E-01	110.2	1.705E-01	1.707E-01	7.721E-01
Gd-153	-4.868E-01	116.4	5.665E-01	5.673E-01	1.923E+00
Ga-68	1.199E+01	40.8	4.895E+00	4.941E+00	1.473E+01
Tc-99m	1.821E-02	1146.2	2.087E-01	2.087E-01	7.277E-01
BA-133	-1.196E-01	116.2	1.389E-01	1.391E-01	1.107E+00
CS-134	3.282E-01	78.2	2.566E-01	2.571E-01	1.658E+00
CS-137	-5.541E-01	92.5	5.125E-01	5.133E-01	1.729E+00
CE-139	-1.818E-01	120.8	2.196E-01	2.203E-01	7.478E-01
Ba-140	-1.027E+00	60.6	6.226E-01	6.249E-01	3.497E+00
La-140	-1.181E+00	46.3	5.467E-01	5.503E-01	1.985E+00
CE-141	9.378E-02	335.4	3.146E-01	3.146E-01	1.099E+00

CE-144	0.000E+00	1.#INF	4.471E-01	4.471E-01	6.039E+00
PM-144	-1.347E-01	260.8	3.512E-01	3.513E-01	8.935E-01
EU-152	9.755E-01	44.7	4.363E-01	4.392E-01	3.925E+00
EU-154	1.719E+00	86.9	1.494E+00	1.497E+00	5.975E+00
EU-155	4.169E-01	144.5	6.025E-01	6.030E-01	2.077E+00
HF-181	3.236E-01	102.8	3.328E-01	3.332E-01	6.931E-01
Ta-182	0.000E+00	1.#INF	1.643E-01	1.643E-01	2.906E+00
Hg-203	1.145E-01	212.6	2.433E-01	2.434E-01	8.507E-01
TL-208	2.491E-01	100.9	2.514E-01	2.517E-01	6.596E-01
pm-146	2.558E-01	127.5	3.261E-01	3.264E-01	1.551E+00
y-88	-6.887E-02	493.7	3.400E-01	3.401E-01	8.754E-01
Cd-113m	1.770E+03	143.6	2.542E+03	2.545E+03	8.887E+03
Cd-109	0.000E+00	1.#INF	3.270E+00	3.270E+00	2.477E+01
Cf-251	-8.020E-01	129.4	1.038E+00	1.040E+00	2.868E+00
Cf-249	0.000E+00	1.#INF	5.597E-02	5.598E-02	1.244E+00
Sn-126	-1.960E+00	134.4	2.633E+00	2.636E+00	8.939E+00
PB-210	5.555E+00	125.4	6.967E+00	6.975E+00	2.200E+01
PB-212	-9.890E-01	45.8	4.528E-01	4.573E-01	2.310E+00
PB-214	3.441E-02	1421.1	4.891E-01	4.891E-01	1.760E+00
BI-207	0.000E+00	1.#INF	4.990E-02	4.990E-02	6.112E-01
BI-212	3.738E+00	94.2	3.523E+00	3.528E+00	1.209E+01
BI-214	-2.289E-01	111.0	2.540E-01	2.543E-01	3.642E+00
BI-210M	-9.106E-02	105.2	9.576E-02	9.591E-02	1.294E+00
AC-228	6.818E-01	125.8	8.579E-01	8.586E-01	2.859E+00
TH-227	1.571E+00	80.2	1.261E+00	1.264E+00	4.918E+00
TH-229	-2.480E+00	148.5	3.682E+00	3.687E+00	1.228E+01
TH-234	1.594E+00	152.4	2.429E+00	2.430E+00	1.715E+01
PA-231	4.072E+00	122.7	4.998E+00	5.003E+00	2.443E+01
PA-233	-1.647E-01	125.7	2.070E-01	2.072E-01	3.067E+00
PA-234	-3.456E-02	91.7	3.169E-02	3.174E-02	3.494E+00
PA-234M	9.152E+00	97.6	8.930E+00	8.942E+00	1.347E+02
U-235	3.823E-01	344.5	1.317E+00	1.317E+00	4.577E+00
AM-241	4.187E-01	114.9	4.811E-01	4.816E-01	1.409E+00
Np-237	-1.053E+00	207.4	2.184E+00	2.185E+00	7.399E+00
Ir-192	1.054E-01	240.6	2.535E-01	2.536E-01	6.759E-01
Cs-136	-8.650E-04	37.8	3.269E-04	3.307E-04	1.656E+00
Np-239	4.369E-01	141.9	6.200E-01	6.206E-01	2.130E+00
Nd-147	0.000E+00	1.#INF	3.564E-01	3.564E-01	4.004E+00
Total	1.820E+03				

Analyst: kody Saulters

Sample description
264537_Gamma_MB 160-264537~1-A

Spectrum Filename: C:\User\SPC\Det17\17_Gamma_20161128.An1

Acquisition information
Start time: 9/1/2016 10:41:45 AM
Live time: 1800
Real time: 1841
Dead time: 2.24 %
Detector ID: 17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_Soil_TunaCan.Clb
17_TunaCan_90099_032612

Energy Calibration
Created: 2/29/2012 10:33:23 AM
Zero offset: 0.108 keV
Gain: 0.250 keV/channel
Quadratic: -2.584E-08 keV/channel^2

Efficiency Calibration
Created: 4/12/2012 9:28:42 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.91 %
Log(Eff): -5.264190E-01 + (-4.024164E-01*Log(E)) + (-2.604461E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.00 %
Log(Eff): -2.343889E+01 + (8.582715E+00*Log(E)) + (-9.075430E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev11.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.63keV)
Stop channel: 8000 (1999.54keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 10:40:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	17_2016-08-18_0548.PBC 8/18/2016 5:48:59 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 3 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1127

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.54	9.	125.43	0.87	2.100E-02	46.54	4.250	PBC<MDA	PB210
50.14	5.	117.29	0.78	2.357E-02	50.14	8.000	PBC<MDA	TH227
59.54	8.	114.90	0.79	2.957E-02	59.54	35.900	PBC<MDA	AM241
63.34	2.	569.30	0.92	3.164E-02	63.29	3.810	PBC<MDA	TH234
80.99	2.	555.07	0.81	3.884E-02	80.99	34.060	PBC<MDA	BA133
92.77	8.	152.37	1.06	4.144E-02	92.59	5.584	PBC<MDA	TH234
99.50	9.	123.14	0.82	4.234E-02	99.50	15.000	PBC<MDA	Np239
103.20	4.	239.91	0.83	4.265E-02	103.20	21.800	PBC<MDA	Gd153
103.70	7.	128.45	0.83	4.269E-02	103.70	24.000	PBC<MDA	Np239
105.31	7.	144.54	0.83	4.278E-02	105.31	21.200	PBC<MDA	EU155
106.13	8.	141.92	0.83	4.282E-02	106.13	22.700	PBC<MDA	Np239
122.06	10.	109.80	0.85	4.276E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.480E-01	CO57
143.79	3.	344.55	0.87	4.080E-02	143.79	10.960	PBC<MDA	U235
145.44	3.	335.44	0.87	4.059E-02	145.44	48.200	PBC<MDA	CE141
162.66	2.	552.27	0.88	3.813E-02	162.66	6.220	PBC<MDA	Ba140
185.60	12.	82.82	0.66	3.547E-02				
205.33	-1.	652.50	0.92	3.312E-02	205.33	5.010	PBC<MDA	U235
244.69	11.	131.49	0.96	2.938E-02	244.69	7.580	PBC<MDA	EU152
256.24	6.	109.55	0.97	2.846E-02	256.24	7.000	PBC<MDA	TH227
263.70	5.	143.61	0.98	2.790E-02	263.70	0.006	PBC<MDA	Cd113m
279.20	4.	212.57	0.99	2.681E-02	279.20	81.460	PBC<MDA	Hg203

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
284.30	7.	110.21	1.00	2.648E-02	284.30	6.140	PBC<MDA	I131
300.03	6.	126.81	1.01	2.550E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	PBC<MDA	PA231
					300.18	6.200	PBC<MDA	PA233
300.07	5.	161.83	1.01	2.550E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	4.401E+00	PA231
					300.18	6.200	1.746E+00	PA233
300.18	5.	173.79	1.01	2.549E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	4.402E+00	PA231
					300.18	6.200	1.747E+00	PA233
302.65	5.	184.60	1.01	2.534E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	5.959E-01	BA133
302.85	5.	195.17	1.01	2.533E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	5.959E-01	BA133
304.85	5.	225.36	1.02	2.522E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	PBC<MDA	BI210M
304.90	5.	215.25	1.02	2.521E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	PBC<MDA	BI210M
308.44	5.	240.61	1.02	2.501E-02	308.44	31.750	PBC<MDA	Ir192
316.49	1.	714.14	1.03	2.456E-02	316.49	87.040	PBC<MDA	Ir192
328.76	15.	54.66	1.04	2.391E-02	328.76	20.300	PBC<MDA	La140
344.29	1.	928.71	1.05	2.315E-02	344.29	26.500	PBC<MDA	EU152
345.83	8.	162.74	1.05	2.308E-02	345.83	15.070	PBC<MDA	HF181
391.69	4.	158.72	1.09	2.112E-02	391.69	64.000	PBC<MDA	SN113
453.88	4.	147.20	1.15	1.900E-02	453.88	65.000	PBC<MDA	pm146
463.37	3.	127.03	1.16	1.872E-02	463.37	10.470	PBC<MDA	SB125
477.60	4.	102.55	1.17	1.832E-02	477.60	10.520	PBC<MDA	BE7
482.00	4.	125.77	1.18	1.820E-02	482.00	80.500	PBC<MDA	HF181
511.86	46.	35.47	2.45	1.742E-02	511.86	20.000	7.282E+00	RH106
569.32	6.	78.17	1.25	1.612E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.523E+00	PA234
					569.70	97.740	2.117E-01	BI207
569.47	4.	128.24	1.25	1.611E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	1.612E+00	PA234
					569.70	97.740	1.353E-01	BI207
583.02	6.	100.92	1.26	1.584E-02	583.02	84.500	PBC<MDA	TL208
600.50	8.	156.12	1.28	1.550E-02	600.50	17.860	PBC<MDA	SB125
602.73	-1.	567.09	1.28	1.546E-02	602.73	98.260	PBC<MDA	SB124
609.31	-6.	110.97	1.29	1.533E-02	609.31	46.090	PBC<MDA	BI214
702.63	7.	99.48	1.37	1.380E-02	702.63	97.900	PBC<MDA	NB94
722.79	7.	86.59	1.39	1.351E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	3.085E-01	AG108M
					723.36	20.220	1.386E+00	EU154
727.17	7.	94.23	1.39	1.345E-02	727.17	7.550	PBC<MDA	BI212
735.72	2.	305.25	1.40	1.333E-02	735.72	22.500	PBC<MDA	pm146
747.16	3.	177.44	1.41	1.318E-02	747.16	34.000	PBC<MDA	pm146
756.73	3.	143.65	1.41	1.306E-02	756.73	54.460	PBC<MDA	ZR95
763.94	2.	244.95	1.42	1.296E-02	763.94	22.280	PBC<MDA	AG110M

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
766.41	6.	97.57	1.42	1.293E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
778.92	5.	44.72	1.43	1.278E-02	778.92	12.940	PBC<MDA	EU152
801.95	4.	146.76	1.45	1.250E-02	801.95	8.690	PBC<MDA	CS134
846.77	12.	46.81	1.49	1.200E-02	846.77	99.935	PBC<MDA	Co56
873.23	5.	86.92	1.51	1.172E-02	873.23	12.270	PBC<MDA	EU154
880.53	2.	283.20	1.52	1.165E-02	880.53	6.000	PBC<MDA	PA234
911.07	1.	979.80	1.55	1.135E-02	911.07	29.000	PBC<MDA	AC228
937.49	8.	35.36	1.57	1.111E-02	937.49	34.360	1.164E+00	AG110M
968.97	6.	125.83	1.59	1.083E-02	968.97	17.460	PBC<MDA	AC228
996.33	3.	169.88	1.62	1.061E-02	996.33	10.600	PBC<MDA	EU154
1001.00	-3.	216.05	1.62	1.057E-02	1001.00	0.837	PBC<MDA	PA234M
1037.84	2.	361.82	1.65	1.028E-02	1037.84	14.130	PBC<MDA	Co56
1048.07	7.	37.80	1.66	1.021E-02	1048.07	80.000	PBC<MDA	Cs136
1077.40	6.	40.82	1.68	9.992E-03	1077.40	3.300	PBC<MDA	Ga68
1099.25	2.	281.08	1.70	9.840E-03	1099.25	56.500	PBC<MDA	FE59
1115.55	6.	88.74	1.71	9.729E-03	1115.55	50.600	PBC<MDA	ZN65
1120.29	1.	590.56	1.72	9.697E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
1238.28	2.	270.90	1.81	8.977E-03	1238.28	66.070	PBC<MDA	Co56
1291.60	7.	37.80	1.85	8.689E-03	1291.60	43.200	PBC<MDA	FE59
1332.50	6.	40.82	1.89	8.481E-03	1332.50	99.980	PBC<MDA	CO60
1460.83	-1.	610.49	1.98	7.894E-03	1460.83	10.670	PBC<MDA	K40

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
741.61	185.60	36.	12.	3.396E+02	82.82	0.661	- c

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.62	46.54	49.	9.	0.005	125.43	0.870
TH-227	200.03	50.14	9.	5.	0.003	117.29	0.778s
AM-241	237.59	59.54	27.	8.	0.004	114.90	0.787s
TH-234	252.79	63.34	55.	2.	0.001	569.30	0.921s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Sn-126	256.56	64.28	104.	-11.	-0.006	134.37	0.792
BA-133	323.36	80.99	39.	2.	0.001	555.07	0.807s
Np-237	345.35	86.49	210.	-10.	-0.006	207.36	0.813s
EU-155	345.56	86.54	200.	0.	0.000	1000.00	0.813s
Sn-126	347.15	86.94	200.	0.	0.000	1000.00	0.813s
Sn-126	349.67	87.57	200.	0.	0.000	1000.00	0.814s
Cd-109	351.55	88.04	200.	0.	0.000	1000.00	0.814s
Nd-147	363.79	91.10	234.	-14.	-0.008	157.73	0.817
TH-234	370.47	92.77	67.	8.	0.005	152.37	1.063s
AC-228	372.78	93.35	220.	-14.	-0.008	152.71	0.819s
Gd-153	389.37	97.50	78.	-11.	-0.006	116.36	0.823s
Np-239	397.37	99.50	58.	9.	0.005	123.14	0.825s
Gd-153	412.16	103.20	34.	4.	0.002	239.91	0.828s
Np-239	414.16	103.70	38.	7.	0.004	128.45	0.829
EU-155	420.61	105.31	45.	7.	0.004	144.54	0.830s
Np-239	423.88	106.13	55.	8.	0.004	141.92	0.831s
EU-152	486.43	121.78	79.	-12.	-0.007	107.86	0.846s
CO-57	487.57	122.06	52.	10.	0.005	109.80	0.846s
EU-154	491.73	123.10	67.	-11.	-0.006	106.03	0.847s
PA-234	524.49	131.29	93.	-11.	-0.006	131.10	0.855s
HF-181	531.41	133.02	104.	-1.	-0.001	991.14	0.856
CE-144	533.46	133.54	105.	0.	0.000	1000.00	0.857s
HF-181	544.50	136.30	105.	0.	0.000	1000.00	0.859s
CO-57	545.20	136.47	108.	-6.	-0.003	270.39	0.859s
U-235	574.43	143.79	54.	3.	0.002	344.55	0.866s
CE-141	581.05	145.44	60.	3.	0.002	335.44	0.868s
Ba-140	649.90	162.66	60.	2.	0.001	552.27	0.884s
U-235	652.78	163.38	66.	-4.	-0.002	260.59	0.885s
CE-139	662.67	165.85	68.	-10.	-0.006	120.83	0.887s
Cf-251	705.64	176.60	40.	-9.	-0.005	129.42	0.897s
TH-229	773.25	193.51	44.	-7.	-0.004	148.48	0.913s
U-235	820.52	205.33	28.	-1.	-0.001	652.50	0.924s
TH-229	842.58	210.85	33.	-3.	-0.002	313.05	0.929s
Cf-251	907.16	227.00	37.	-9.	-0.005	128.89	0.944s
PB-212	953.67	238.63	120.	-23.	-0.013	45.79	0.955s
PB-214	967.13	242.00	122.	-7.	-0.004	218.57	0.958s
EU-152	977.91	244.69	100.	11.	0.006	131.49	0.960s
TH-227	1024.08	256.24	14.	6.	0.004	109.55	0.971s
Cd-113m	1053.91	263.70	27.	5.	0.003	143.61	0.978s
BI-210M	1062.44	265.83	40.	-9.	-0.005	105.15	0.979s
TL-208	1108.23	277.28	35.	-9.	-0.005	80.37	0.990s
Hg-203	1115.89	279.20	44.	4.	0.002	212.57	0.992s
I-131	1136.28	284.30	15.	7.	0.004	110.21	0.996s
PB-212	1199.19	300.03	24.	6.	0.003	126.81	1.011s
PA-231	1199.35	300.07	30.	5.	0.003	161.83	1.011s
PA-233	1199.79	300.18	35.	5.	0.003	173.79	1.011s
PA-231	1209.66	302.65	40.	5.	0.003	184.60	1.013s
BA-133	1210.47	302.85	45.	5.	0.003	195.17	1.013s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ba-140	1218.46	304.85	50.	5.	0.003	225.36	1.015
BI-210M	1218.64	304.90	54.	5.	0.003	215.25	1.015
Ir-192	1232.82	308.44	59.	5.	0.003	240.61	1.019s
PA-233	1247.10	312.01	100.	-8.	-0.004	181.60	1.022s
Ir-192	1265.01	316.49	25.	1.	0.001	714.14	1.026
CR-51	1279.38	320.08	38.	-7.	-0.004	160.58	1.029s
La-140	1314.07	328.76	15.	15.	0.008	54.66	1.037s
Cf-249	1332.79	333.44	26.	-2.	-0.001	573.93	1.041
AC-228	1352.30	338.32	71.	-10.	-0.006	119.78	1.046s
Cs-136	1361.30	340.57	81.	-4.	-0.002	293.94	1.048s
EU-152	1376.16	344.29	76.	1.	0.001	928.71	1.051
HF-181	1382.33	345.83	74.	8.	0.004	162.74	1.053s
BA-133	1423.00	356.00	29.	-8.	-0.005	126.14	1.062s
Cf-249	1550.77	387.95	38.	0.	0.000	1000.00	1.091s
SN-113	1565.73	391.69	20.	4.	0.002	158.72	1.094
SB-125	1710.44	427.88	22.	-10.	-0.005	97.01	1.127s
AG-108M	1734.69	433.94	18.	-9.	-0.005	97.07	1.132s
pm-146	1814.44	453.88	8.	4.	0.002	147.20	1.150
SB-125	1852.38	463.37	8.	3.	0.002	127.03	1.158s
Ir-192	1871.15	468.06	4.	0.	0.000	1000.00	1.163s
BE-7	1909.29	477.59	7.	4.	0.002	102.55	1.171s
HF-181	1926.89	482.00	11.	4.	0.002	125.77	1.175s
La-140	1946.98	487.02	12.	-2.	-0.001	346.41	1.180s
RU-103	1987.11	497.05	16.	-3.	-0.002	146.52	1.188s
RH-106	2046.35	511.86	33.	46.	0.025	35.47	2.452s
Nd-147	2122.88	531.00	8.	0.	0.000	1000.00	1.219s
Ba-140	2147.92	537.26	25.	-8.	-0.004	60.65	1.224
CS-134	2251.82	563.24	16.	-5.	-0.003	86.86	1.247s
CS-134	2276.15	569.32	8.	6.	0.003	78.17	1.252s
PA-234	2276.75	569.47	10.	4.	0.002	128.24	1.253s
BI-207	2277.67	569.70	10.	0.	0.000	1000.00	1.253s
TL-208	2330.95	583.02	8.	6.	0.003	100.92	1.264s
SB-125	2400.86	600.50	74.	8.	0.004	156.12	1.280s
SB-124	2409.78	602.73	83.	-1.	0.000	567.09	1.282s
CS-134	2417.70	604.71	82.	0.	0.000	1000.00	1.284s
BI-214	2436.10	609.31	88.	-6.	-0.003	110.97	1.287s
RU-103	2440.05	610.30	82.	0.	0.000	1000.00	1.288s
AG-108M	2455.98	614.28	82.	0.	0.000	1000.00	1.292s
PM-144	2471.11	618.06	82.	0.	0.000	1000.00	1.295s
SB-125	2542.41	635.89	19.	-1.	-0.001	474.34	1.311s
I-131	2546.75	636.97	22.	-1.	0.000	857.77	1.312s
AG-110M	2629.90	657.76	34.	-10.	-0.006	85.81	1.330s
CS-137	2645.49	661.66	58.	-12.	-0.007	92.49	1.333s
PM-144	2785.03	696.54	17.	-3.	-0.002	260.77	1.363s
NB-94	2809.38	702.63	9.	7.	0.004	99.48	1.368s
SB-124	2890.01	722.79	14.	7.	0.004	86.59	1.386s
EU-154	2892.29	723.36	21.	0.	0.000	1000.00	1.386s
ZR-95	2895.66	724.20	30.	-10.	-0.005	86.94	1.387s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-212	2907.54	727.17	17.	7.	0.004	94.23	1.390s
pm-146	2941.74	735.72	9.	2.	0.001	305.25	1.397s
pm-146	2987.51	747.16	4.	3.	0.001	177.44	1.407
ZR-95	3025.79	756.73	5.	3.	0.002	143.65	1.415s
AG-110M	3054.64	763.94	11.	2.	0.001	244.95	1.421s
NB-95	3062.03	765.79	19.	-5.	-0.003	131.15	1.423s
PA-234M	3064.52	766.41	16.	6.	0.004	97.57	1.423
EU-152	3114.56	778.92	0.	5.	0.003	44.72	1.434s
BI-212	3140.56	785.42	17.	-8.	-0.005	107.70	1.440s
CS-134	3182.35	795.87	9.	-5.	-0.003	136.84	1.448s
CS-134	3206.69	801.95	9.	4.	0.002	146.76	1.454s
CO-58	3241.99	810.78	19.	-4.	-0.002	174.63	1.461s
La-140	3261.97	815.77	36.	-10.	-0.006	89.34	1.465s
Cs-136	3272.90	818.50	53.	-8.	-0.005	126.41	1.467s
MN-54	3338.30	834.85	9.	-1.	-0.001	493.71	1.481s
Co-56	3385.99	846.77	5.	12.	0.007	46.81	1.491s
TL-208	3441.18	860.56	24.	-11.	-0.006	56.15	1.503s
NB-94	3483.32	871.10	11.	-1.	-0.001	367.42	1.512s
EU-154	3491.85	873.23	8.	5.	0.003	86.92	1.514s
PA-234	3521.06	880.53	21.	2.	0.001	283.20	1.520s
PA-234	3531.90	883.24	23.	0.	0.000	1000.00	1.522s
AG-110M	3537.67	884.68	23.	0.	0.000	1000.00	1.523s
y-88	3591.11	898.04	9.	-1.	-0.001	493.71	1.534s
AC-228	3643.24	911.07	9.	1.	0.000	979.80	1.545s
AG-110M	3748.95	937.49	0.	8.	0.004	35.36	1.567s
PA-234	3783.07	946.02	0.	0.	0.000	1000.00	1.574s
EU-152	3855.45	964.11	38.	-14.	-0.008	69.90	1.589s
AC-228	3874.90	968.97	22.	6.	0.003	125.83	1.593s
EU-154	3984.36	996.33	10.	3.	0.002	169.88	1.616s
PA-234M	4003.04	1001.00	16.	-3.	-0.002	216.05	1.620s
EU-154	4018.15	1004.77	24.	-8.	-0.004	93.46	1.623s
Co-56	4150.45	1037.84	10.	2.	0.001	361.82	1.650s
Cs-136	4191.39	1048.07	0.	7.	0.004	37.80	1.658s
RH-106	4200.55	1050.36	14.	-6.	-0.003	101.37	1.661s
BI-207	4253.77	1063.66	10.	-5.	-0.003	146.06	1.671s
Ga-68	4308.74	1077.40	0.	6.	0.003	40.82	1.683s
FE-59	4396.18	1099.25	5.	2.	0.001	281.08	1.700s
ZN-65	4461.38	1115.55	11.	6.	0.003	88.74	1.713s
BI-214	4480.35	1120.29	20.	1.	0.001	590.56	1.717s
Sc-46	4481.41	1120.55	21.	0.	0.000	1000.00	1.717s
Ta-182	4484.41	1121.30	10.	0.	0.000	1000.00	1.718s
CO-60	4692.24	1173.24	10.	0.	0.000	1000.00	1.760s
Co-56	4952.53	1238.28	6.	2.	0.001	270.90	1.812s
NA-22	5097.60	1274.53	5.	-2.	-0.001	154.52	1.840s
EU-154	5097.66	1274.54	8.	0.	0.000	1000.00	1.840s
FE-59	5165.90	1291.60	0.	7.	0.004	37.80	1.854s
CO-60	5329.61	1332.50	0.	6.	0.003	40.82	1.886s
EU-152	5631.79	1408.00	0.	0.	0.000	1000.00	1.944s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
K-40	5843.25	1460.83	14.	-1.	-0.001	610.49	1.985s
La-140	6385.15	1596.21	23.	-15.	-0.008	46.28	2.087s
BI-214	7058.84	1764.49	19.	-13.	-0.007	54.75	2.211s
Co-56	7086.31	1771.35	11.	0.	0.000	1000.00	2.216s
y-88	7345.39	1836.06	0.	0.	0.000	1000.00	2.262s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	1.1979E+00				5.31E+01	
			477.60	1.198E+00	?(	4.336E+00 1.03E+02	1.05E+01 G
NA-22	C	-1.4775E-01				9.50E+02	
			1274.53	-1.478E-01	?(	8.531E-01 1.55E+02	9.99E+01 G
K-40	N	-7.3905E-01				4.66E+11	
			1460.83	-7.391E-01	?(P	1.316E+01 6.10E+02	1.07E+01 G
Sc-46	F	-1.6017E-02				8.38E+01	
			889.28	-1.602E-02	%(	1.212E+00 2.06E+03	1.00E+02 G
			1120.55	0.000E+00	+	1.379E+00 1.00E+03	1.00E+02 G
CR-51	F	-1.5375E+00				2.77E+01	
			320.08	-1.537E+00	&(P	7.185E+00 1.61E+02	9.94E+00 G
MN-54	C	-6.1090E-02				3.12E+02	
			834.85	-6.109E-02	?(	7.764E-01 4.94E+02	1.00E+02 G
FE-59	F	5.5255E-01				4.45E+01	
			1099.25	1.828E-01	?(P	1.330E+00 2.81E+02	5.65E+01 G
			1291.60	1.036E+00	?(	1.091E+00 3.78E+01	4.32E+01 G
Co-56	C	5.9361E-01				7.73E+01	
			846.77	5.714E-01	?(	5.920E-01 4.68E+01	9.99E+01 G
			1238.28	1.923E-01	- P	1.318E+00 2.71E+02	6.61E+01 G
			1037.84	7.506E-01	?(P	6.682E+00 3.62E+02	1.41E+01 G
			1771.35	0.000E+00	-	9.566E+00 1.00E+03	1.55E+01 A
CO-57	C	1.4803E-01				2.72E+02	
			122.06	1.480E-01	(	5.534E-01 1.10E+02	8.56E+01 G
			136.47	-6.873E-01	+	6.385E+00 2.70E+02	1.07E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-58	C	-1.6520E-01					7.09E+01	
			810.78	-1.652E-01	?(	1.029E+00	1.75E+02	9.95E+01 G
CO-60	F	3.9312E-01					1.93E+03	
			1332.50	3.931E-01	?(	4.829E-01	4.08E+01	1.00E+02 G
			1173.24	0.000E+00	-	1.037E+00	1.00E+03	9.99E+01 G
ZN-65	F	6.7244E-01					2.44E+02	
			1115.55	6.724E-01	&(	2.050E+00	8.87E+01	5.06E+01 G
NB-94	I	2.7157E-01					7.41E+06	
			702.63	2.716E-01	?(P	6.797E-01	9.95E+01	9.79E+01 G
			871.10	-6.314E-02	-	8.712E-01	3.67E+02	9.99E+01 G
ZR-95	I	2.5641E-01					6.40E+01	
			756.73	2.564E-01	&(P	1.003E+00	1.44E+02	5.45E+01 G
			724.20	-8.996E-01	+	2.647E+00	8.69E+01	4.42E+01 G
NB-95	I	-2.1512E-01					6.40E+01	
			765.79	-2.151E-01	?(	9.905E-01	1.31E+02	9.98E+01 G
RU-103	I	-1.0414E-01					3.93E+01	
			497.05	-1.041E-01	?(P	7.339E-01	1.47E+02	9.09E+01 G
			610.30	0.000E+00	+	2.833E+01	1.00E+03	5.75E+00 GA
RH-106	I	2.4695E-01					3.74E+02	
			621.92	2.470E-01	%(	1.657E+01	1.92E+03	9.93E+00 G
			1050.36	-1.981E+01	+	6.969E+01	1.01E+02	1.56E+00 G
			511.86	7.282E+00	?	4.723E+00	3.55E+01	2.00E+01 GA
AG-108M	C	-2.7528E-01					1.53E+05	
			433.94	-2.753E-01	?(	7.089E-01	9.71E+01	9.05E+01 G
			722.94	8.427E-03	%	1.085E+00	3.47E+03	9.08E+01 G
			614.28	0.000E+00	+	1.822E+00	1.00E+03	8.98E+01 G
AG-110M	F	3.7562E-01					2.50E+02	
			884.68	0.000E+00	&(	1.650E+00	1.00E+03	7.27E+01 G
			657.76	-4.187E-01	+	1.213E+00	8.58E+01	9.46E+01 G
			937.49	1.164E+00	?(	1.073E+00	3.54E+01	3.44E+01 G
			1384.30	-5.852E-02	% P	2.047E+00	2.66E+03	2.43E+01 G
			763.94	3.847E-01	?(	3.494E+00	2.45E+02	2.23E+01 G
SN-113	F	1.7175E-01					1.15E+02	
			391.69	1.717E-01	?(P	9.640E-01	1.59E+02	6.40E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SB-124	F	2.2810E-01					6.02E+01	
			602.73	-3.195E-02	?(P	1.651E+00	5.67E+02	9.83E+01 G
			1690.98	-6.197E-02	% P	1.218E+00	1.86E+03	4.78E+01 G
			722.79	2.592E+00	?(	7.663E+00	8.66E+01	1.08E+01 G
SB-125	I	2.0866E-01					1.01E+03	
			427.88	-9.080E-01	?(	2.326E+00	9.70E+01	2.96E+01 G
			600.50	1.606E+00	?(	8.590E+00	1.56E+02	1.79E+01 G
			635.89	-4.408E-01	+	7.670E+00	4.74E+02	1.13E+01 G
			463.37	9.825E-01	?(P	4.479E+00	1.27E+02	1.05E+01 G
I-131	I	1.5469E-01					8.02E+00	
			364.48	-1.157E-02	&(P	7.721E-01	2.36E+03	8.17E+01 G
			284.30	2.367E+00	?(	7.026E+00	1.10E+02	6.14E+00 G
			636.97	-3.833E-01	+ P	1.293E+01	8.58E+02	7.17E+00 G
Gd-153	F	-4.8684E-01					2.42E+02	
			97.50	-4.868E-01	&(	1.923E+00	1.16E+02	3.00E+01 G
			103.20	2.106E-01	+	1.785E+00	2.40E+02	2.18E+01 G
Ga-68	C	1.1990E+01					4.71E-02	
			1077.40	1.199E+01	?(	1.473E+01	4.08E+01	3.30E+00 G
Tc-99m	I	1.8207E-02					2.51E-01	
			140.51	1.821E-02	%(	7.277E-01	1.15E+03	8.93E+01 G
BA-133	F	-1.1958E-01					3.85E+03	
			356.00	-3.309E-01	&(	1.107E+00	1.26E+02	6.20E+01 G
			302.85	5.959E-01	&(	4.054E+00	1.95E+02	1.83E+01 G
			383.84	1.933E-01	%	9.043E+00	1.30E+03	8.94E+00 GA
			80.99	8.038E-02	? P	1.337E+00	5.55E+02	3.41E+01 GA
CS-134	I	3.2822E-01					7.54E+02	
			604.71	0.000E+00	?(	1.658E+00	1.00E+03	9.76E+01 G
			795.87	-2.411E-01	+	8.488E-01	1.37E+02	8.55E+01 G
			569.32	1.345E+00	?(	3.561E+00	7.82E+01	1.54E+01 G
			801.95	2.216E+00	?(	8.402E+00	1.47E+02	8.69E+00 G
			563.24	-2.223E+00	+ P	8.846E+00	8.69E+01	8.35E+00 G
CS-137	I	-5.5406E-01					1.10E+04	
			661.66	-5.541E-01	?(	1.729E+00	9.25E+01	8.52E+01 G
CE-139	F	-1.8178E-01					1.38E+02	
			165.85	-1.818E-01	*(	7.478E-01	1.21E+02	7.99E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ba-140	I	-1.0267E+00					1.28E+01	
			537.26	-1.027E+00	?(P	3.497E+00	6.06E+01	2.44E+01 G
			162.66	4.685E-01	+	9.090E+00	5.52E+02	6.22E+00 G
			304.85	2.337E+00	+ P	1.834E+01	2.25E+02	4.29E+00 G
La-140	I	-1.1814E+00					1.28E+01	
			1596.21	-1.181E+00	?(P	1.985E+00	4.63E+01	9.54E+01 G
			487.02	-1.352E-01	+	1.275E+00	3.46E+02	4.55E+01 G
			328.76	1.717E+00	+ P	2.376E+00	5.47E+01	2.03E+01 G
			815.77	-1.970E+00	+	5.956E+00	8.93E+01	2.33E+01 G
CE-141	I	9.3778E-02					3.25E+01	
			145.44	9.378E-02	?(	1.099E+00	3.35E+02	4.82E+01 G
PM-144	C	-1.3469E-01					3.63E+02	
			696.54	-1.347E-01	?(	8.935E-01	2.61E+02	9.90E+01 G
			618.06	0.000E+00	+	1.659E+00	1.00E+03	9.91E+01 G
EU-152	F	9.7553E-01					4.94E+03	
			344.29	1.208E-01	?(	3.925E+00	9.29E+02	2.65E+01 G
			1112.07	1.392E-01	&	1.019E+01	1.98E+03	1.36E+01 G
			121.78	-5.507E-01	+	2.010E+00	1.08E+02	2.86E+01 G
			778.92	1.680E+00	?(	2.477E+00	4.47E+01	1.29E+01 G
			964.11	-4.735E+00	+	1.099E+01	6.99E+01	1.46E+01 G
			244.69	2.761E+00	&(	1.232E+01	1.31E+02	7.58E+00 G
			1408.00	0.000E+00	-	2.399E+00	1.00E+03	2.10E+01 GA
EU-154	I	1.7194E+00					3.14E+03	
			873.23	1.995E+00	?(	5.975E+00	8.69E+01	1.23E+01 G
			123.10	-3.636E-01	-	1.306E+00	1.06E+02	4.08E+01 G
			1274.54	0.000E+00	-	2.808E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	-	4.897E+00	1.00E+03	2.02E+01 G
			1004.77	-2.336E+00	-	7.452E+00	9.35E+01	1.80E+01 G
			996.33	1.400E+00	?(	8.680E+00	1.70E+02	1.06E+01 G
EU-155	I	4.1686E-01					1.81E+03	
			105.31	4.169E-01	?(P	2.077E+00	1.45E+02	2.12E+01 G
			86.54	0.000E+00	-	3.083E+00	1.00E+03	3.07E+01 G
HF-181	F	3.2364E-01					4.24E+01	
			482.00	1.549E-01	?(	6.931E-01	1.26E+02	8.05E+01 G
			133.02	-4.461E-02	-	1.535E+00	9.91E+02	4.33E+01 G
			345.83	1.225E+00	&(	6.837E+00	1.63E+02	1.51E+01 G
			136.30	0.000E+00	-	1.152E+01	1.00E+03	5.85E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Hg-203	F	1.1446E-01					4.66E+01	
			279.20	1.145E-01	?(	8.507E-01	2.13E+02	8.15E+01 G
TL-208	N	2.4906E-01					6.98E+02	
			583.02	2.491E-01	?(	6.596E-01	1.01E+02	8.45E+01 G
			277.28	-2.895E+00	+ P	9.877E+00	8.04E+01	6.31E+00 G
			860.56	-4.246E+00	+ P	9.683E+00	5.61E+01	1.24E+01 G
pm-146	C	2.5577E-01					2.02E+03	
			747.16	3.197E-01	?(P	1.551E+00	1.77E+02	3.40E+01 G
			735.72	3.783E-01	&(P	3.085E+00	3.05E+02	2.25E+01 G
			453.88	1.799E-01	?(	7.147E-01	1.47E+02	6.50E+01 G
y-88	F	-6.8875E-02					1.07E+02	
			898.04	-6.887E-02	?(	8.754E-01	4.94E+02	9.37E+01 G
			1836.06	0.000E+00	+	6.260E-01	1.00E+03	9.92E+01 G
Cd-113m		1.7702E+03					5.33E+03	
			263.70	1.770E+03	?(	8.887E+03	1.44E+02	6.00E-03 K
Cf-251	T	-8.0196E-01					3.28E+05	
			176.60	-8.020E-01	(	2.868E+00	1.29E+02	1.70E+01 G
			227.00	-2.471E+00	+	8.817E+00	1.29E+02	6.30E+00 GA
Sn-126		-1.9598E+00					3.65E+07	
			87.57	0.000E+00	+	2.510E+00	1.00E+03	3.75E+01 GA
			64.28	-1.960E+00	?(	8.939E+00	1.34E+02	9.70E+00 G
			86.94	0.000E+00	+	1.045E+01	1.00E+03	9.04E+00 GA
PB-210	N	5.5546E+00					8.14E+03	
			46.54	5.555E+00	(P	2.200E+01	1.25E+02	4.25E+00 G
PB-212	N	-9.8895E-01					6.98E+02	
			238.63	-9.890E-01	?(P	2.310E+00	4.58E+01	4.33E+01 G
			300.03	3.853E+00	+ P	1.698E+01	1.27E+02	3.28E+00 GA
PB-214	N	3.4415E-02					5.84E+05	
			351.93	3.441E-02	%(P	1.760E+00	1.42E+03	3.76E+01 G
			295.09	2.976E-02	% P	2.836E+00	3.28E+03	1.93E+01 G
			242.00	-1.832E+00	+	1.369E+01	2.19E+02	7.43E+00 GA
BI-212	N	3.7382E+00					6.98E+02	
			727.17	3.738E+00	?(	1.209E+01	9.42E+01	7.55E+00 G
			785.42	-2.849E+01	+	7.558E+01	1.08E+02	1.28E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-214	N	-2.2892E-01					5.84E+05	
			609.31	-4.396E-01	(P	3.642E+00	1.11E+02	4.61E+01 G
			1120.29	4.141E-01	?(P	8.917E+00	5.91E+02	1.51E+01 G
			1764.49	-7.133E+00	+ P	1.218E+01	5.47E+01	1.54E+01 G
BI-210M	T	-9.1064E-02					1.10E+09	
			265.83	-3.607E-01	&(	1.294E+00	1.05E+02	5.00E+01 G
			304.90	3.904E-01	?(P	2.918E+00	2.15E+02	2.80E+01 G
AC-228	N	6.8177E-01					2.10E+03	
			911.07	1.125E-01	?(	2.859E+00	9.80E+02	2.90E+01 G
			968.97	1.627E+00	?(	7.147E+00	1.26E+02	1.75E+01 G
			338.32	-2.029E+00	+	8.267E+00	1.20E+02	1.20E+01 G
			93.35	-3.352E+00	+	1.726E+01	1.53E+02	5.56E+00 XA
TH-227	N	1.5714E+00					7.95E+03	
			50.14	1.380E+00	(	4.918E+00	1.17E+02	8.00E+00 G
			256.24	1.790E+00	?(P	5.546E+00	1.10E+02	7.00E+00 G
TH-229	N	-2.4796E+00					2.68E+06	
			193.51	-2.480E+00	?(P	1.228E+01	1.48E+02	4.40E+00 G
			210.85	-1.904E+00	+	1.692E+01	3.13E+02	2.99E+00 G
TH-234	N	1.5941E+00					1.63E+12	
			63.29	9.984E-01	(P	1.715E+01	5.69E+02	3.81E+00 G
			92.59	2.001E+00	(P	9.785E+00	1.52E+02	5.58E+00 G
PA-231	N	4.0717E+00					1.20E+07	
			302.65	3.791E+00	(	2.443E+01	1.85E+02	2.88E+00 G
			300.07	4.401E+00	?(	2.495E+01	1.62E+02	2.46E+00 G
PA-233	C	-1.6472E-01					7.82E+08	
			312.01	-4.939E-01	(	3.067E+00	1.82E+02	3.60E+01 G
			300.18	1.747E+00	?(	1.062E+01	1.74E+02	6.20E+00 G
PA-234	N	-3.4556E-02					1.63E+12	
			131.29	-7.845E-01	(	3.494E+00	1.31E+02	1.80E+01 G
			946.02	0.000E+00	+	2.769E+00	1.00E+03	1.34E+01 G
			569.47	1.612E+00	?(	7.387E+00	1.28E+02	8.20E+00 G
			883.24	0.000E+00	+	1.248E+01	1.00E+03	9.60E+00 G
			880.53	1.854E+00	?	1.899E+01	2.83E+02	6.00E+00 GA
PA-234M	N	9.1519E+00					1.63E+12	
			1001.00	-1.999E+01	?(P	1.347E+02	2.16E+02	8.37E-01 G
			766.41	9.212E+01	?(P	3.094E+02	9.76E+01	2.94E-01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

U-235    N   3.8232E-01                                      2.57E+11
                          143.79 3.823E-01  (P 4.577E+00 3.45E+02 1.10E+01 G
                          205.33-4.784E-01 + P 9.226E+00 6.53E+02 5.01E+00 G
                          163.38-1.230E+00 + P 1.169E+01 2.61E+02 5.08E+00 G

AM-241   T   4.1868E-01                                      1.58E+05
                           59.54 4.187E-01  (  1.409E+00 1.15E+02 3.59E+01 G

Np-237   F  -1.0534E+00                                      2.14E+06
                           86.49-1.053E+00 ?(  7.399E+00 2.07E+02 1.31E+01 G

Ir-192   F   1.0537E-01                                      7.40E+01
                          316.49 2.599E-02 ?(  6.759E-01 7.14E+02 8.70E+01 G
                          468.06 0.000E+00 -   6.966E-01 1.00E+03 5.18E+01 G
                          308.44 3.230E-01 ?(  2.702E+00 2.41E+02 3.18E+01 G

Cs-136   F  -8.6500E-04                                      1.30E+01
                          818.50-3.826E-01 ?(  1.656E+00 1.26E+02 1.00E+02 G
                         1048.07 4.764E-01 ?(  5.015E-01 3.78E+01 8.00E+01 G
                          340.57-2.228E-01 +   2.267E+00 2.94E+02 4.69E+01 G

Np-239   T   4.3687E-01                                      2.36E+00
                          103.70 3.827E-01 ?   1.696E+00 1.28E+02 2.40E+01 X
                          106.13 4.369E-01 ?(  2.130E+00 1.42E+02 2.27E+01 G
                           99.50 7.930E-01 ?   3.336E+00 1.23E+02 1.50E+01 X
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
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I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	9.	5.	0.003	117.29	1.380E+00	
AM-241	59.54	27.	8.	0.004	114.90	4.187E-01	
Sn-126	64.28	104.	-11.	-0.006	134.37	-1.960E+00	
BA-133	80.99	39.	2.	0.001	555.07	8.038E-02	P
Np-237	86.49	210.	-10.	-0.006	207.36	-1.053E+00	
Nd-147	91.10	234.	-14.	-0.008	157.73	-6.629E-01	
AC-228	93.35	220.	-14.	-0.008	152.71	-3.352E+00	
Gd-153	97.50	78.	-11.	-0.006	116.36	-4.868E-01	
Np-239	99.50	58.	9.	0.005	123.14	7.930E-01	
Gd-153	103.20	34.	4.	0.002	239.91	2.106E-01	
Np-239	103.70	38.	7.	0.004	128.45	3.827E-01	
EU-155	105.31	45.	7.	0.004	144.54	4.169E-01	P
Np-239	106.13	55.	8.	0.004	141.92	4.369E-01	
EU-152	121.78	79.	-12.	-0.007	107.86	-5.507E-01	
CO-57	122.06	52.	10.	0.005	109.80	1.480E-01	
EU-154	123.10	67.	-11.	-0.006	106.03	-3.636E-01	
PA-234	131.29	93.	-11.	-0.006	131.10	-7.845E-01	
HF-181	133.02	104.	-1.	-0.001	991.14	-4.461E-02	
CO-57	136.47	108.	-6.	-0.003	270.39	-6.873E-01	
U-235	143.79	54.	3.	0.002	344.55	3.823E-01	P
CE-141	145.44	60.	3.	0.002	335.44	9.378E-02	
Ba-140	162.66	60.	2.	0.001	552.27	4.685E-01	
U-235	163.38	66.	-4.	-0.002	260.59	-1.230E+00	P
CE-139	165.85	68.	-10.	-0.006	120.83	-1.818E-01	
Cf-251	176.60	40.	-9.	-0.005	129.42	-8.020E-01	
TH-229	193.51	44.	-7.	-0.004	148.48	-2.480E+00	P
U-235	205.33	28.	-1.	-0.001	652.50	-4.784E-01	P
TH-229	210.85	33.	-3.	-0.002	313.05	-1.904E+00	
Cf-251	227.00	37.	-9.	-0.005	128.89	-2.471E+00	
PB-212	238.63	120.	-23.	-0.013	45.79	-9.890E-01	P
PB-214	242.00	122.	-7.	-0.004	218.57	-1.832E+00	
EU-152	244.69	100.	11.	0.006	131.49	2.761E+00	
TH-227	256.24	14.	6.	0.004	109.55	1.790E+00	P
Cd-113m	263.70	27.	5.	0.003	143.61	1.770E+03	
BI-210M	265.83	40.	-9.	-0.005	105.15	-3.607E-01	
TL-208	277.28	35.	-9.	-0.005	80.37	-2.895E+00	P
Hg-203	279.20	44.	4.	0.002	212.57	1.145E-01	
I-131	284.30	15.	7.	0.004	110.21	2.367E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-212	300.03	24.	6.	0.003	126.81	3.853E+00	P
PA-231	300.07	30.	5.	0.003	161.83	4.401E+00	
PA-233	300.18	35.	5.	0.003	173.79	1.747E+00	
PA-231	302.65	40.	5.	0.003	184.60	3.791E+00	
BA-133	302.85	45.	5.	0.003	195.17	5.959E-01	
Ba-140	304.85	50.	5.	0.003	225.36	2.337E+00	P
BI-210M	304.90	54.	5.	0.003	215.25	3.904E-01	P
Ir-192	308.44	59.	5.	0.003	240.61	3.230E-01	
PA-233	312.01	100.	-8.	-0.004	181.60	-4.939E-01	
Ir-192	316.49	25.	1.	0.001	714.14	2.599E-02	
CR-51	320.08	38.	-7.	-0.004	160.58	-1.537E+00	P
La-140	328.76	15.	15.	0.008	54.66	1.717E+00	P
Cf-249	333.44	26.	-2.	-0.001	573.93	-2.521E-01	
AC-228	338.32	71.	-10.	-0.006	119.78	-2.029E+00	
Cs-136	340.57	81.	-4.	-0.002	293.94	-2.228E-01	
EU-152	344.29	76.	1.	0.001	928.71	1.208E-01	
HF-181	345.83	74.	8.	0.004	162.74	1.225E+00	
BA-133	356.00	29.	-8.	-0.005	126.14	-3.309E-01	
SN-113	391.69	20.	4.	0.002	158.72	1.717E-01	P
SB-125	427.88	22.	-10.	-0.005	97.01	-9.080E-01	
AG-108M	433.94	18.	-9.	-0.005	97.07	-2.753E-01	
pm-146	453.88	8.	4.	0.002	147.20	1.799E-01	
SB-125	463.37	8.	3.	0.002	127.03	9.825E-01	P
BE-7	477.59	7.	4.	0.002	102.55	1.198E+00	
HF-181	482.00	11.	4.	0.002	125.77	1.549E-01	
La-140	487.02	12.	-2.	-0.001	346.41	-1.352E-01	
RU-103	497.05	16.	-3.	-0.002	146.52	-1.041E-01	P
RH-106	511.86	33.	46.	0.025	35.47	7.282E+00	
Ba-140	537.26	25.	-8.	-0.004	60.65	-1.027E+00	P
CS-134	563.24	16.	-5.	-0.003	86.86	-2.223E+00	P
CS-134	569.32	8.	6.	0.003	78.17	1.345E+00	
PA-234	569.47	10.	4.	0.002	128.24	1.612E+00	
TL-208	583.02	8.	6.	0.003	100.92	2.491E-01	
SB-125	600.50	74.	8.	0.004	156.12	1.606E+00	
SB-124	602.73	83.	-1.	0.000	567.09	-3.195E-02	P
BI-214	609.31	88.	-6.	-0.003	110.97	-4.396E-01	P
SB-125	635.89	19.	-1.	-0.001	474.34	-4.408E-01	
I-131	636.97	22.	-1.	0.000	857.77	-3.833E-01	P
AG-110M	657.76	34.	-10.	-0.006	85.81	-4.187E-01	
CS-137	661.66	58.	-12.	-0.007	92.49	-5.541E-01	
PM-144	696.54	17.	-3.	-0.002	260.77	-1.347E-01	
NB-94	702.63	9.	7.	0.004	99.48	2.716E-01	P
SB-124	722.79	14.	7.	0.004	86.59	2.592E+00	
ZR-95	724.20	30.	-10.	-0.005	86.94	-8.996E-01	
BI-212	727.17	17.	7.	0.004	94.23	3.738E+00	
pm-146	735.72	9.	2.	0.001	305.25	3.783E-01	P
pm-146	747.16	4.	3.	0.001	177.44	3.197E-01	P
ZR-95	756.73	5.	3.	0.002	143.65	2.564E-01	P

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
AG-110M	763.94	11.	2.	0.001	244.95	3.847E-01		
NB-95	765.79	19.	-5.	-0.003	131.15	-2.151E-01		
PA-234M	766.41	16.	6.	0.004	97.57	9.212E+01		P
EU-152	778.92	0.	5.	0.003	44.72	1.680E+00		
BI-212	785.42	17.	-8.	-0.005	107.70	-2.849E+01		
CS-134	795.87	9.	-5.	-0.003	136.84	-2.411E-01		
CS-134	801.95	9.	4.	0.002	146.76	2.216E+00		
CO-58	810.78	19.	-4.	-0.002	174.63	-1.652E-01		
La-140	815.77	36.	-10.	-0.006	89.34	-1.970E+00		
Cs-136	818.50	53.	-8.	-0.005	126.41	-3.826E-01		
MN-54	834.85	9.	-1.	-0.001	493.71	-6.109E-02		
TL-208	860.56	24.	-11.	-0.006	56.15	-4.246E+00		P
NB-94	871.10	11.	-1.	-0.001	367.42	-6.314E-02		
EU-154	873.23	8.	5.	0.003	86.92	1.995E+00		
PA-234	880.53	21.	2.	0.001	283.20	1.854E+00		
y-88	898.04	9.	-1.	-0.001	493.71	-6.887E-02		
AC-228	911.07	9.	1.	0.000	979.80	1.125E-01		
AG-110M	937.49	0.	8.	0.004	35.36	1.164E+00		
EU-152	964.11	38.	-14.	-0.008	69.90	-4.735E+00		
AC-228	968.97	22.	6.	0.003	125.83	1.627E+00		
EU-154	996.33	10.	3.	0.002	169.88	1.400E+00		
PA-234M	1001.00	16.	-3.	-0.002	216.05	-1.999E+01		P
EU-154	1004.77	24.	-8.	-0.004	93.46	-2.336E+00		
Cs-136	1048.07	0.	7.	0.004	37.80	4.764E-01		
RH-106	1050.36	14.	-6.	-0.003	101.37	-1.981E+01		
BI-207	1063.66	10.	-5.	-0.003	146.06	-3.695E-01		
Ga-68	1077.40	0.	6.	0.003	40.82	1.199E+01		
FE-59	1099.25	5.	2.	0.001	281.08	1.828E-01		P
ZN-65	1115.55	11.	6.	0.003	88.74	6.724E-01		
BI-214	1120.29	20.	1.	0.001	590.56	4.141E-01		P
NA-22	1274.53	5.	-2.	-0.001	154.52	-1.478E-01		
FE-59	1291.60	0.	7.	0.004	37.80	1.036E+00		
CO-60	1332.50	0.	6.	0.003	40.82	3.931E-01		
K-40	1460.83	14.	-1.	-0.001	610.49	-7.391E-01		P
La-140	1596.21	23.	-15.	-0.008	46.28	-1.181E+00		P
BI-214	1764.49	19.	-13.	-0.007	54.75	-7.133E+00		P

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting	1 Sigma MDA Bq/Sample
BE-7	#A	1.1978E+00	1.1979E+00	1.026E+02%	4.34E+00
NA-22	#A	-1.4775E-01	-1.4775E-01	1.545E+02%	8.53E-01
K-40	#A	-7.3905E-01	-7.3905E-01	6.105E+02%	1.32E+01
Sc-46	#A	-1.6017E-02	-1.6017E-02	2.057E+03%	1.21E+00

CR-51	#A	-1.5374E+00	-1.5375E+00	1.606E+02%	7.18E+00
MN-54	#A	-6.1090E-02	-6.1090E-02	4.937E+02%	7.76E-01
FE-59	#A	5.5254E-01	5.5255E-01	3.780E+01%	1.33E+00
Co-56	#	5.9360E-01	5.9361E-01	4.681E+01%	5.92E-01
CO-57	#A	1.4803E-01	1.4803E-01	1.098E+02%	5.53E-01
CO-58	#A	-1.6520E-01	-1.6520E-01	1.746E+02%	1.03E+00
CO-60	#A	3.9312E-01	3.9312E-01	4.082E+01%	4.83E-01
ZN-65	#A	6.7244E-01	6.7244E-01	8.874E+01%	2.05E+00
NB-94	#A	2.7157E-01	2.7157E-01	9.948E+01%	6.80E-01
ZR-95	#A	2.5641E-01	2.5641E-01	1.436E+02%	1.00E+00
NB-95	#A	-2.1512E-01	-2.1512E-01	1.311E+02%	9.91E-01
RU-103	#A	-1.0413E-01	-1.0414E-01	1.465E+02%	7.34E-01
RH-106	#A	2.4695E-01	2.4695E-01	1.917E+03%	1.66E+01
AG-108M	#A	-2.7528E-01	-2.7528E-01	9.707E+01%	7.09E-01
AG-110M	#A	3.7562E-01	3.7562E-01	3.536E+01%	1.65E+00
SN-113	#A	1.7175E-01	1.7175E-01	1.587E+02%	9.64E-01
SB-124	#A	2.2810E-01	2.2810E-01	8.659E+01%	1.65E+00
SB-125	#A	2.0866E-01	2.0866E-01	7.448E+01%	2.33E+00
I-131	#A	1.5468E-01	1.5469E-01	1.102E+02%	7.72E-01
Gd-153	#A	-4.8683E-01	-4.8684E-01	1.164E+02%	1.92E+00
Ga-68	#A	1.1777E+01	1.1990E+01	4.082E+01%	1.47E+01
Tc-99m	#A	1.8146E-02	1.8207E-02	1.146E+03%	7.28E-01
BA-133	#A	-1.1958E-01	-1.1958E-01	1.162E+02%	1.11E+00
CS-134	#A	3.2822E-01	3.2822E-01	7.817E+01%	1.66E+00
CS-137	#A	-5.5406E-01	-5.5406E-01	9.249E+01%	1.73E+00
CE-139	#A	-1.8178E-01	-1.8178E-01	1.208E+02%	7.48E-01
Ba-140	#A	-1.0266E+00	-1.0267E+00	6.065E+01%	3.50E+00
La-140	#A	-1.1813E+00	-1.1814E+00	4.628E+01%	1.98E+00
CE-141	#A	9.3776E-02	9.3778E-02	3.354E+02%	1.10E+00
CE-144	#A	0.0000E+00	0.0000E+00	1.000E+03%	6.04E+00
PM-144	#A	-1.3469E-01	-1.3469E-01	2.608E+02%	8.93E-01
EU-152	#A	9.7553E-01	9.7553E-01	4.472E+01%	3.92E+00
EU-154	#A	1.7194E+00	1.7194E+00	8.692E+01%	5.98E+00
EU-155	#A	4.1686E-01	4.1686E-01	1.445E+02%	2.08E+00
HF-181	#A	3.2364E-01	3.2364E-01	1.028E+02%	6.93E-01
Ta-182	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.91E+00
Hg-203	#A	1.1446E-01	1.1446E-01	2.126E+02%	8.51E-01
TL-208	#A	2.4906E-01	2.4906E-01	1.009E+02%	6.60E-01
pm-146	#A	2.5577E-01	2.5577E-01	1.275E+02%	1.55E+00
y-88	#A	-6.8874E-02	-6.8875E-02	4.937E+02%	8.75E-01
Cd-113m	#A	1.7702E+03	1.7702E+03	1.436E+02%	8.89E+03
Cd-109	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.48E+01
Cf-251	#A	-8.0196E-01	-8.0196E-01	1.294E+02%	2.87E+00
Cf-249	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.24E+00
Sn-126	#A	-1.9598E+00	-1.9598E+00	1.344E+02%	8.94E+00
PB-210	A	5.5546E+00	5.5546E+00	1.254E+02%	2.20E+01
PB-212	#A	-9.8895E-01	-9.8895E-01	4.579E+01%	2.31E+00
PB-214	#A	3.4415E-02	3.4415E-02	1.421E+03%	1.76E+00
BI-207	#A	0.0000E+00	0.0000E+00	1.000E+03%	6.11E-01

BI-212 #A	3.7382E+00	3.7382E+00	9.423E+01%	1.21E+01
BI-214 #A	-2.2892E-01	-2.2892E-01	1.110E+02%	3.64E+00
BI-210M#A	-9.1064E-02	-9.1064E-02	1.052E+02%	1.29E+00
AC-228 #A	6.8177E-01	6.8177E-01	1.258E+02%	2.86E+00
TH-227 #A	1.5714E+00	1.5714E+00	8.025E+01%	4.92E+00
TH-229 #A	-2.4796E+00	-2.4796E+00	1.485E+02%	1.23E+01
TH-234 A	1.5941E+00	1.5941E+00	1.524E+02%	1.71E+01
PA-231 #A	4.0717E+00	4.0717E+00	1.227E+02%	2.44E+01
PA-233 #A	-1.6472E-01	-1.6472E-01	1.257E+02%	3.07E+00
PA-234 #A	-3.4556E-02	-3.4556E-02	9.170E+01%	3.49E+00
PA-234M#A	9.1519E+00	9.1519E+00	9.757E+01%	1.35E+02
U-235 #A	3.8232E-01	3.8232E-01	3.445E+02%	4.58E+00
AM-241 #A	4.1868E-01	4.1868E-01	1.149E+02%	1.41E+00
Np-237 #A	-1.0534E+00	-1.0534E+00	2.074E+02%	7.40E+00
Ir-192 #A	1.0537E-01	1.0537E-01	2.406E+02%	6.76E-01
Cs-136 #A	-8.6495E-04	-8.6500E-04	3.780E+01%	1.66E+00
Np-239 #A	4.3672E-01	4.3687E-01	1.419E+02%	2.13E+00
Nd-147 #A	0.0000E+00	0.0000E+00	1.000E+03%	4.00E+00

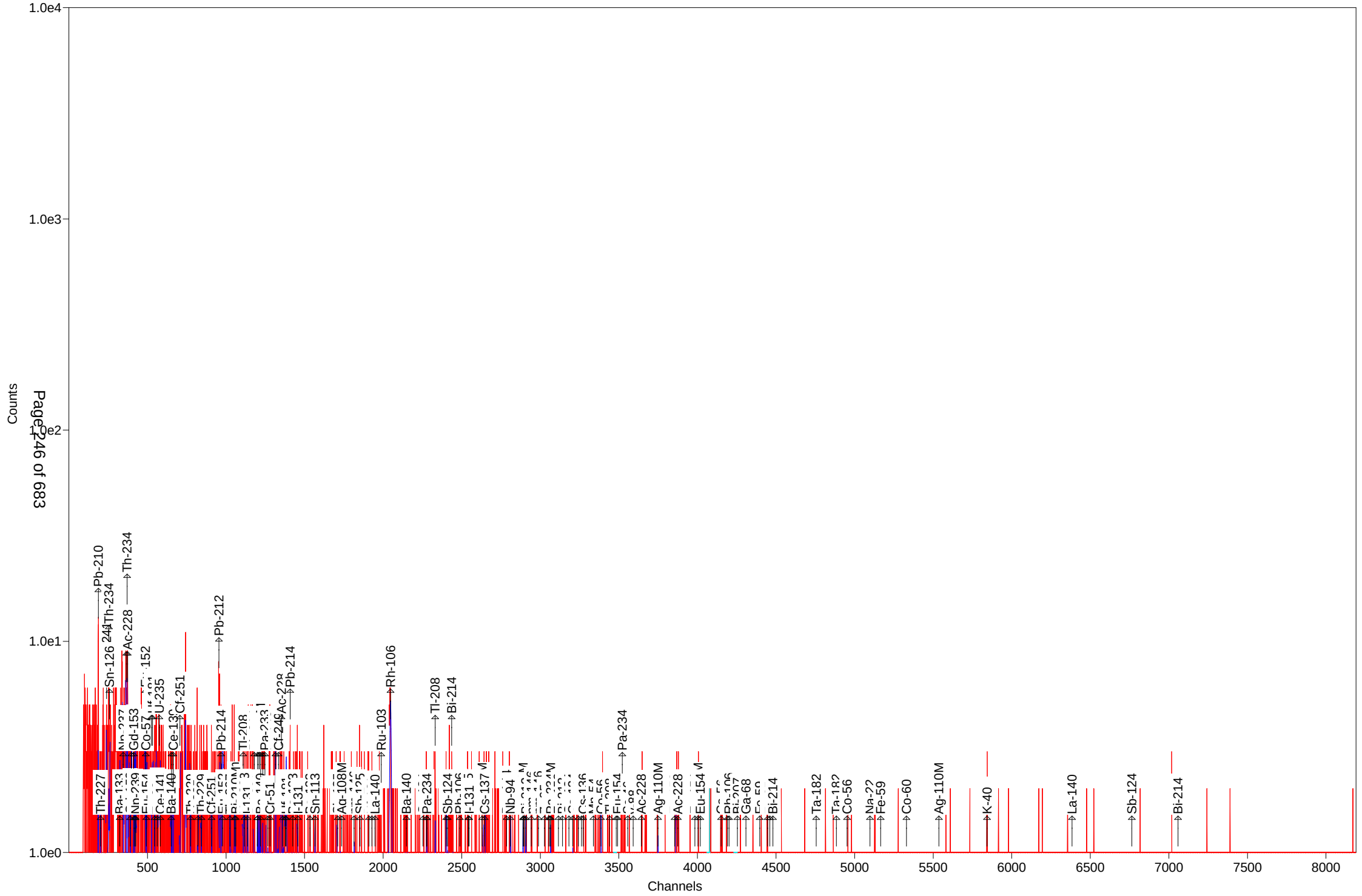
  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 0.000E+00 Bq/Sample
Total Decayed Activity (37.6 to 1999.5 keV) 0.0000000E+00 Bq/Sample

(Page 21 of 21)

264537_Gamma_MB 160-264537~1-A. 17_Gamma_20161128.spc.



Test America St. Louis Spectrum ID: 12_Gamma_20161867

Sample Description: 264537_Gamma_LCS 160-264537~2-A
Detector: Detector #12
Batch ID: 264537
Work Order Number: Gamma
Lot Number: LCS 160-264537~2-A

Decay to Time: 9/1/2016 10:41 Live Time: 1800 sec
Acquisition Time: 9/1/2016 10:42:07 Real Time: 1819 sec
Analysis Time: 9/1/2016 11:13 Dead Time: 1.04 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 12_Soil_TunaCan.Clb
Efficiency Cal Desc: 12_TunaCanCal_90099_100212
Efficiency Cal Date: 10/4/2012 09:05
Energy Cal Date: 2/28/2012 13:26
Library: Client_Long_Rev11.lib
Bkgd Correction File: 12_2016-08-07_1353.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-1.296E+01	104.0	1.348E+01	1.350E+01	4.473E+01
NA-22	-4.658E-01	106.1	4.941E-01	4.946E-01	1.693E+00
K-40	2.669E+00	202.3	5.401E+00	5.402E+00	1.338E+01
Sc-46	1.368E+00	106.1	1.450E+00	1.452E+00	4.830E+00
CR-51	0.000E+00	1.#INF	5.623E+00	5.623E+00	5.788E+01
MN-54	-1.938E+00	60.8	1.179E+00	1.183E+00	3.607E+00
FE-59	2.665E+00	113.1	3.013E+00	3.016E+00	6.344E+00
Co-56	2.980E-01	74.5	2.219E-01	2.224E-01	3.232E+00
CO-57	0.000E+00	1.#INF	7.426E-01	7.426E-01	3.232E+01
CO-58	-2.964E-01	425.9	1.262E+00	1.262E+00	4.256E+00
CO-60	2.058E+02	1.3	2.595E+00	1.065E+01	1.851E+00
ZN-65	3.603E+00	82.8	2.982E+00	2.987E+00	9.898E+00
NB-94	9.289E-01	113.8	1.057E+00	1.058E+00	2.392E+00
ZR-95	-1.941E+00	103.5	2.008E+00	2.011E+00	5.198E+00
NB-95	0.000E+00	1.#INF	7.368E-01	7.368E-01	3.420E+00
RU-103	-2.632E-01	487.6	1.284E+00	1.284E+00	3.008E+00
RH-106	3.923E+00	251.7	9.873E+00	9.875E+00	5.391E+01
AG-108M	4.165E-01	214.2	8.922E-01	8.925E-01	3.162E+00
AG-110M	7.642E-01	217.1	1.659E+00	1.660E+00	6.661E+00
SN-113	3.409E-01	457.4	1.559E+00	1.559E+00	5.227E+00
SB-124	2.007E+00	30.2	6.050E-01	6.139E-01	5.094E+00
SB-125	2.440E+00	155.6	3.798E+00	3.800E+00	9.208E+00
I-131	-4.884E-01	321.2	1.569E+00	1.569E+00	5.625E+00
Gd-153	-2.426E+00	136.7	3.317E+00	3.320E+00	1.099E+01
Ga-68	1.821E+00	3279.7	5.971E+01	5.971E+01	1.273E+02
Tc-99m	-7.933E-01	151.0	1.198E+00	1.198E+00	3.970E+00
BA-133	1.571E+00	130.9	2.056E+00	2.058E+00	6.828E+00
CS-134	1.996E+00	43.1	8.603E-01	8.666E-01	5.215E+00
CS-137	3.693E+02	1.2	4.311E+00	1.969E+01	3.414E+00
CE-139	8.298E-01	101.7	8.435E-01	8.472E-01	2.798E+00
Ba-140	3.329E+00	103.4	3.442E+00	3.446E+00	1.039E+01
La-140	7.840E-01	98.7	7.739E-01	7.750E-01	1.374E+00
CE-141	1.428E+00	151.3	2.161E+00	2.162E+00	7.164E+00

CE-144	0.000E+00	1.#INF	3.457E+00	3.457E+00	2.191E+01
PM-144	-1.341E+00	55.8	7.483E-01	7.515E-01	2.691E+00
EU-152	5.710E+00	79.3	4.530E+00	4.540E+00	1.362E+01
EU-154	7.557E+00	85.2	6.441E+00	6.452E+00	3.265E+01
EU-155	0.000E+00	1.#INF	1.964E+00	1.964E+00	1.550E+01
HF-181	4.834E-01	90.3	4.363E-01	4.370E-01	5.953E+00
Ta-182	5.363E+00	68.4	3.667E+00	3.677E+00	1.415E+01
Hg-203	9.184E-01	100.9	9.262E-01	9.277E-01	3.077E+00
TL-208	4.013E+00	23.4	9.372E-01	9.601E-01	2.064E+00
pm-146	-3.999E+00	88.1	3.525E+00	3.531E+00	7.908E+00
y-88	5.849E-01	131.6	7.695E-01	7.701E-01	3.794E+00
Cd-113m	-1.525E+04	89.6	1.367E+04	1.371E+04	4.532E+04
Cd-109	9.971E+01	19.3	1.921E+01	2.000E+01	4.651E+01
Cf-251	3.226E+00	59.6	1.922E+00	1.943E+00	6.325E+00
Cf-249	0.000E+00	1.#INF	9.666E-01	9.666E-01	6.015E+00
Sn-126	-1.910E+01	231.2	4.417E+01	4.418E+01	1.459E+02
PB-210	1.015E+04	0.9	9.417E+01	6.034E+02	1.794E+02
PB-212	6.276E+00	26.0	1.632E+00	1.682E+00	4.093E+00
PB-214	2.031E+00	163.7	3.326E+00	3.327E+00	1.106E+01
BI-207	2.702E-01	277.2	7.489E-01	7.491E-01	2.536E+00
BI-212	-1.205E+01	112.3	1.353E+01	1.355E+01	4.521E+01
BI-214	7.218E+00	20.1	1.448E+00	1.496E+00	4.339E+00
BI-210M	-2.377E-01	657.7	1.564E+00	1.564E+00	5.244E+00
AC-228	4.902E+00	42.5	2.084E+00	2.099E+00	1.353E+01
TH-227	4.442E+01	54.9	2.441E+01	2.453E+01	8.034E+01
TH-229	1.220E+01	127.9	1.560E+01	1.563E+01	4.590E+01
TH-234	2.228E+01	53.3	1.188E+01	1.193E+01	3.894E+01
PA-231	-5.131E+00	1125.0	5.772E+01	5.772E+01	1.920E+02
PA-233	0.000E+00	1.#INF	1.044E+00	1.044E+00	1.570E+01
PA-234	7.956E+00	70.5	5.611E+00	5.626E+00	1.320E+01
PA-234M	-2.731E+02	77.7	2.122E+02	2.126E+02	6.817E+02
U-235	5.772E+00	49.3	2.845E+00	2.860E+00	3.085E+01
AM-241	1.237E+03	0.8	1.024E+01	6.503E+01	1.519E+01
Np-237	5.663E+00	139.1	7.874E+00	7.880E+00	2.610E+01
Ir-192	1.040E+00	86.7	9.017E-01	9.038E-01	6.558E+00
Cs-136	1.287E+00	82.4	1.060E+00	1.062E+00	3.944E+00
Np-239	3.031E+00	132.9	4.029E+00	4.033E+00	1.335E+01
Nd-147	-7.875E+00	115.8	9.121E+00	9.132E+00	2.122E+01
Total	1.225E+04				

Analyst: kody Saulters

Sample description
264537_Gamma_LCS 160-264537~2-A

Spectrum Filename: C:\User\SPC\Det12\12_Gamma_20161867.An1

Acquisition information
Start time: 9/1/2016 10:42:07 AM
Live time: 1800
Real time: 1819
Dead time: 1.04 %
Detector ID: 12

Detector system
Ge12 S/N10034336

Calibration
Filename: 12_Soil_TunaCan.Clb
12_TunaCanCal_90099_100212

Energy Calibration
Created: 2/28/2012 1:26:42 PM
Zero offset: 0.049 keV
Gain: 0.250 keV/channel
Quadratic: -3.945E-08 keV/channel^2

Efficiency Calibration
Created: 10/4/2012 9:05:44 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.70 %
Log(Eff): -7.827468E-01 + (-3.001271E-01*Log(E)) + (-3.369562E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.96 %
Log(Eff): -2.288409E+01 + (8.352717E+00*Log(E)) + (-8.812368E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev11.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.58keV)
Stop channel: 8000 (1999.36keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 10:41:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2016-08-07_1353.PBC 8/7/2016 1:53:38 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 35 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1219

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.63	17309.	0.93	0.89	2.232E-02	46.54	4.250	1.015E+04	PB210
49.64	153.	57.22	0.89	2.456E-02	50.14	8.000	4.264E+01	TH227
59.56	24962.	0.83	0.87	3.123E-02	59.54	35.900	1.237E+03	AM241
63.51	51.	53.30	0.54	3.350E-02	63.29	3.810	PBC<MDA	TH234
					64.28	9.700	8.612E+00	Sn126
77.06	179.	20.63	0.92	3.963E-02				
79.72	109.	35.33	0.92	4.053E-02				
86.49	57.	139.06	0.93	4.242E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	2.416E+00	EU155
					86.94	9.040	8.185E+00	Sn126
88.03	291.	19.27	1.12	4.278E-02	87.57	37.500	1.010E+01	Sn126
					88.04	3.790	9.971E+01	Cd109
92.82	57.	88.49	0.93	4.382E-02	92.59	5.584	PBC<MDA	TH234
					93.35	5.561	1.299E+01	AC228
106.13	56.	132.90	0.95	4.521E-02	106.13	22.700	PBC<MDA	Np239
114.88	52.	55.16	0.35	4.543E-02				
121.84	25.	132.00	0.96	4.528E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	3.624E-01	CO57
131.29	51.	112.41	0.97	4.468E-02	131.29	18.000	PBC<MDA	PA234
133.02	37.	155.27	0.97	4.453E-02	133.02	43.300	PBC<MDA	HF181
145.44	53.	151.31	0.98	4.318E-02	145.44	48.200	PBC<MDA	CE141
162.66	50.	103.40	1.00	4.072E-02	162.66	6.220	PBC<MDA	Ba140

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
163.38	11.	461.71	1.00	4.061E-02	163.38	5.080	PBC<MDA	U235
165.85	49.	101.65	1.00	4.089E-02	165.85	79.900	PBC<MDA	CE139
175.82	39.	59.59	1.01	3.936E-02	176.60	17.000	3.226E+00	Cf251
177.68	68.	37.73	1.01	3.910E-02				
193.51	42.	127.89	1.03	3.699E-02	193.51	4.400	PBC<MDA	TH229
205.33	97.	49.29	1.04	3.557E-02	205.33	5.010	PBC<MDA	U235
210.85	17.	309.56	1.05	3.496E-02	210.85	2.990	PBC<MDA	TH229
238.72	157.	26.00	0.82	3.219E-02	238.63	43.300	6.276E+00	PB212
277.28	43.	94.59	1.11	2.910E-02	277.28	6.310	PBC<MDA	TL208
279.20	39.	100.85	1.11	2.896E-02	279.20	81.460	PBC<MDA	Hg203
297.90	60.	45.44	0.54	2.771E-02				
328.76	45.	98.71	1.15	2.589E-02	328.76	20.300	PBC<MDA	La140
338.21	90.	42.52	1.67	2.538E-02	338.32	12.010	PBC<MDA	AC228
340.57	20.	240.19	1.17	2.527E-02	340.57	46.900	PBC<MDA	Cs136
344.29	21.	227.25	1.17	2.508E-02	344.29	26.500	PBC<MDA	EU152
345.83	26.	90.25	1.17	2.500E-02	345.83	15.070	PBC<MDA	HF181
351.50	151.	24.06	1.32	2.472E-02	351.93	37.600	PBC<MDA	PB214
356.00	43.	130.89	1.18	2.450E-02	356.00	62.050	PBC<MDA	BA133
359.90	30.	54.03	0.64	2.432E-02				
391.69	9.	457.45	1.21	2.292E-02	391.69	64.000	PBC<MDA	SN113
428.71	28.	155.62	1.24	2.153E-02	427.88	29.600	PBC<MDA	SB125
433.94	12.	376.02	1.25	2.132E-02	433.94	90.480	PBC<MDA	AG108M
468.06	52.	86.71	1.28	2.020E-02	468.06	51.750	PBC<MDA	Ir192
487.02	13.	385.54	1.30	1.964E-02	487.02	45.500	PBC<MDA	La140
511.86	41.	153.12	2.57	1.895E-02	511.86	20.000	PBC<MDA	RH106
537.26	11.	322.98	1.34	1.829E-02	537.26	24.390	PBC<MDA	Ba140
569.32	11.	212.41	1.37	1.754E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	4.121E+00	PA234
					569.70	97.740	3.458E-01	BI207
569.70	8.	277.21	1.37	1.753E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	3.219E+00	PA234
					569.70	97.740	2.702E-01	BI207
583.52	110.	22.27	0.74	1.723E-02	583.02	84.500	4.013E+00	TL208
602.73	35.	131.16	1.40	1.683E-02	602.73	98.260	PBC<MDA	SB124
604.84	35.	132.93	1.40	1.679E-02	604.71	97.620	PBC<MDA	CS134
609.44	100.	20.06	1.41	1.669E-02	609.31	46.090	7.247E+00	BI214
610.30	31.	152.71	1.41	1.667E-02	610.30	5.750	PBC<MDA	RU103
661.76	8900.	1.17	1.43	1.571E-02	661.66	85.210	3.693E+02	CS137
702.41	25.	113.78	1.49	1.503E-02	702.63	97.900	PBC<MDA	NB94
722.79	32.	76.22	1.50	1.472E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	1.321E+00	AG108M
					723.36	20.220	5.937E+00	EU154
722.94	12.	214.24	1.50	1.471E-02	722.79	10.810	4.092E+00	SB124
					722.94	90.840	4.871E-01	AG108M
					723.36	20.220	2.189E+00	EU154
766.41	33.	72.76	1.54	1.409E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
785.42	28.	100.76	1.56	1.383E-02	785.42	1.280	PBC<MDA	BI212

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
795.87	61.	43.09	1.56	1.369E-02	795.87	85.530	2.893E+00	CS134
818.50	35.	82.37	1.58	1.341E-02	818.50	100.000	PBC<MDA	Cs136
860.56	36.	83.53	1.62	1.291E-02	860.56	12.420	PBC<MDA	TL208
873.23	9.	301.26	1.63	1.277E-02	873.23	12.270	PBC<MDA	EU154
889.28	31.	106.06	1.64	1.260E-02	889.28	99.984	PBC<MDA	Sc46
898.04	19.	193.53	1.65	1.250E-02	898.04	93.700	PBC<MDA	y88
937.49	17.	217.11	1.68	1.210E-02	937.49	34.360	PBC<MDA	AG110M
946.02	40.	85.19	1.69	1.202E-02	946.02	13.400	PBC<MDA	PA234
969.61	32.	102.66	1.71	1.180E-02	968.97	17.460	PBC<MDA	AC228
1004.77	39.	85.23	1.74	1.148E-02	1004.77	18.010	PBC<MDA	EU154
1037.84	19.	161.14	1.76	1.119E-02	1037.84	14.130	PBC<MDA	Co56
1048.07	5.	469.47	1.77	1.111E-02	1048.07	80.000	PBC<MDA	Cs136
1050.36	9.	251.66	1.77	1.109E-02	1050.36	1.560	PBC<MDA	RH106
1099.25	29.	113.05	1.81	1.071E-02	1099.25	56.500	PBC<MDA	FE59
1112.29	35.	79.34	1.82	1.061E-02	1112.07	13.644	PBC<MDA	EU152
1115.55	35.	82.77	1.82	1.059E-02	1115.55	50.600	PBC<MDA	ZN65
1118.63	20.	144.89	1.83	1.055E-02	1120.29	15.100	PBC<MDA	BI214
1121.30	32.	88.66	1.83	1.055E-02	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	4.799E+00	Ta182
1139.08	47.	36.04	0.54	1.042E-02				
1173.37	3768.	1.79	1.71	1.018E-02	1173.24	99.900	2.058E+02	CO60
1189.05	19.	104.11	1.88	1.008E-02	1189.05	16.200	PBC<MDA	Ta182
1221.41	7.	228.12	1.91	9.870E-03	1221.41	27.000	PBC<MDA	Ta182
1238.28	13.	93.21	1.92	9.765E-03	1238.28	66.070	PBC<MDA	Co56
1332.66	3416.	1.77	1.88	9.219E-03	1332.50	99.980	2.059E+02	CO60
1384.30	4.	221.56	2.03	8.948E-03	1384.30	24.290	PBC<MDA	AG110M
1460.83	4.	202.33	2.08	8.576E-03	1460.83	10.670	PBC<MDA	K40
1690.98	11.	30.15	2.25	7.633E-03	1690.98	47.790	1.675E+00	SB124
1765.01	5.	117.05	2.30	7.376E-03	1764.49	15.400	PBC<MDA	BI214
1836.06	4.	178.26	2.35	7.144E-03	1836.06	99.200	PBC<MDA	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
307.79	77.12	594.	178.	4.484E+03	20.79	0.919	- D
318.41	79.77	695.	108.	2.672E+03	35.73	0.921	- sD
458.95	114.88	335.	52.	1.152E+03	55.16	0.345	- s
709.95	177.74	295.	68.	1.738E+03	37.73	1.014	- sD
1190.65	297.90	248.	55.	1.988E+03	42.58	1.126	- sD
1404.83	351.50	317.	151.	6.095E+03	24.06	1.318	-
1438.41	359.90	106.	30.	1.227E+03	54.03	0.641	- s
4555.21	1139.08	48.	47.	4.511E+03	36.04	0.545	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.80	46.54	4236.	17309.	9.616	0.93	0.889D
TH-227	200.19	50.14	3768.	160.	0.089	54.94	0.892D
AM-241	237.84	59.56	4250.	24962.	13.868	0.83	0.871
TH-234	253.62	63.51	344.	51.	0.028	53.30	0.538
Sn-126	256.70	64.28	34152.	-113.	-0.063	231.21	0.906
BA-133	323.48	80.99	2360.	-63.	-0.035	254.86	0.922s
Np-237	345.47	86.49	3073.	57.	0.031	139.06	0.928s
EU-155	345.68	86.54	2960.	-60.	-0.033	128.26	0.928s
Sn-126	347.27	86.94	2900.	-60.	-0.034	126.93	0.928
Sn-126	349.78	87.57	2840.	-47.	-0.026	162.61	0.929
Cd-109	351.62	88.03	815.	291.	0.162	19.27	1.120s
TH-234	369.85	92.59	1315.	-92.	-0.051	175.87	0.934
AC-228	372.88	93.35	1242.	57.	0.032	88.49	0.934s
Gd-153	389.47	97.50	3137.	-58.	-0.032	136.72	0.938s
Np-239	397.47	99.50	3195.	-24.	-0.013	338.89	0.940
Gd-153	412.25	103.20	3219.	0.	0.000	1000.00	0.944s
Np-239	414.25	103.70	3219.	0.	0.000	1000.00	0.944s
EU-155	420.70	105.31	3219.	0.	0.000	1000.00	0.946
Np-239	423.96	106.13	2740.	56.	0.031	132.90	0.946
EU-152	486.50	121.78	1289.	25.	0.014	132.00	0.961D
CO-57	487.64	122.06	1329.	0.	0.000	215.19	0.962A
PA-234	524.55	131.29	1633.	51.	0.028	112.41	0.970
HF-181	531.46	133.02	1657.	37.	0.021	155.27	0.972
CE-144	533.51	133.54	1694.	0.	0.000	1000.00	0.973
CO-57	545.24	136.47	3404.	0.	0.000	153.73	0.975A
Tc-99m	561.38	140.51	3308.	-54.	-0.030	150.97	0.979s
U-235	574.47	143.79	3143.	-36.	-0.020	450.09	0.982
CE-141	581.09	145.44	3249.	53.	0.030	151.31	0.984s
Ba-140	649.91	162.66	1324.	50.	0.028	103.40	1.000
U-235	652.79	163.38	1375.	11.	0.006	461.71	1.001s
CE-139	662.68	165.85	1206.	49.	0.027	101.65	1.003s
Cf-251	705.64	176.60	247.	39.	0.022	59.59	1.013D
TH-229	773.22	193.51	799.	42.	0.023	127.89	1.029s
U-235	820.49	205.33	628.	97.	0.054	49.29	1.040s
TH-229	842.54	210.85	818.	17.	0.010	309.56	1.046
Cf-251	907.10	227.00	785.	-7.	-0.004	787.03	1.061

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-212	953.95	238.72	461.	157.	0.087	26.00	0.822s
PB-214	967.05	242.00	1637.	-32.	-0.018	127.89	1.075
EU-152	977.83	244.69	1784.	-55.	-0.031	108.70	1.077s
TH-227	1023.99	256.24	649.	-48.	-0.027	100.34	1.088
Cd-113m	1053.81	263.70	963.	-50.	-0.028	89.64	1.095
BI-210M	1062.33	265.83	885.	-6.	-0.004	657.75	1.097s
TL-208	1108.11	277.28	801.	43.	0.024	94.59	1.107
Hg-203	1115.78	279.20	754.	39.	0.022	100.85	1.109
I-131	1136.16	284.30	613.	-51.	-0.028	79.46	1.114s
PB-214	1179.30	295.09	3310.	-54.	-0.030	75.19	1.124
PB-212	1199.05	300.03	3225.	-49.	-0.027	50.08	1.128
PA-231	1199.21	300.07	3261.	-49.	-0.027	165.03	1.128
PA-233	1199.65	300.18	3311.	-49.	-0.027	166.23	1.128
BA-133	1210.33	302.85	3367.	0.	0.000	1000.00	1.131s
Ba-140	1218.32	304.85	3367.	0.	0.000	1000.00	1.133s
BI-210M	1218.50	304.90	3367.	0.	0.000	1000.00	1.133s
Ir-192	1232.67	308.44	3367.	0.	0.000	1000.00	1.136s
PA-233	1246.95	312.01	3367.	0.	0.000	1000.00	1.139s
Ir-192	1264.85	316.49	3367.	0.	0.000	1000.00	1.143s
CR-51	1279.22	320.08	3367.	0.	0.000	1000.00	1.147s
La-140	1313.91	328.76	954.	45.	0.025	98.71	1.155s
Cf-249	1332.62	333.44	1013.	-33.	-0.018	136.50	1.159s
AC-228	1351.69	338.21	360.	90.	0.050	42.52	1.666s
Cs-136	1361.13	340.57	1184.	20.	0.011	240.19	1.165
EU-152	1375.98	344.29	1183.	21.	0.012	227.25	1.169s
HF-181	1382.15	345.83	273.	26.	0.015	90.25	1.170D
PB-214	1406.55	351.93	1528.	34.	0.019	163.71	1.176
BA-133	1422.81	356.00	1562.	43.	0.024	130.89	1.180s
I-131	1456.73	364.48	1781.	-17.	-0.010	321.24	1.187s
Cf-249	1550.56	387.95	1211.	0.	0.000	1000.00	1.209s
SN-113	1565.51	391.69	843.	9.	0.005	457.45	1.212s
SB-125	1710.19	427.88	488.	28.	0.016	155.62	1.245s
AG-108M	1734.43	433.94	528.	12.	0.007	376.02	1.250
pm-146	1814.18	453.88	632.	-38.	-0.021	53.13	1.268s
SB-125	1852.11	463.37	1110.	-13.	-0.007	152.04	1.277
Ir-192	1870.88	468.06	1009.	52.	0.029	86.71	1.281s
BE-7	1909.00	477.60	1268.	-49.	-0.027	104.02	1.289s
HF-181	1926.61	482.00	1298.	-14.	-0.008	375.10	1.293s
La-140	1946.69	487.02	1282.	13.	0.007	385.54	1.298s
RU-103	1986.82	497.05	394.	-8.	-0.005	487.65	1.307s
RH-106	2046.04	511.86	600.	41.	0.023	153.12	2.570s
Nd-147	2122.56	531.00	364.	-34.	-0.019	115.82	1.337s
Ba-140	2147.60	537.26	300.	11.	0.006	322.98	1.342s
CS-134	2251.48	563.24	303.	-29.	-0.016	48.07	1.365s
CS-134	2275.81	569.32	251.	11.	0.006	212.41	1.370
PA-234	2276.41	569.47	262.	0.	0.000	1000.00	1.370
BI-207	2277.34	569.70	263.	8.	0.005	277.21	1.371
TL-208	2332.61	583.52	122.	105.	0.058	23.36	0.741s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
SB-125	2400.51	600.50	1187.	-37.	-0.020	133.88	1.398s
SB-124	2409.43	602.73	1021.	35.	0.019	131.16	1.399s
CS-134	2417.34	604.71	1051.	35.	0.019	132.93	1.401s
BI-214	2435.75	609.31	152.	100.	0.056	20.06	1.405D
RU-103	2439.69	610.30	1086.	31.	0.017	152.71	1.406
AG-108M	2455.62	614.28	1117.	0.	0.000	1000.00	1.410s
PM-144	2470.74	618.06	1117.	0.	0.000	1000.00	1.413s
RH-106	2486.16	621.92	1117.	0.	0.000	1000.00	1.416s
SB-125	2542.05	635.89	377.	-42.	-0.024	66.54	1.428
I-131	2546.39	636.97	427.	-44.	-0.024	68.76	1.429s
AG-110M	2629.52	657.76	9346.	-20.	-0.011	683.96	1.447s
CS-137	2645.51	661.76	292.	8900.	4.944	1.17	1.431
PM-144	2784.64	696.54	224.	-36.	-0.020	55.80	1.481s
NB-94	2808.99	702.63	169.	25.	0.014	113.78	1.486s
SB-124	2889.61	722.79	278.	32.	0.018	76.22	1.503s
AG-108M	2890.22	722.94	309.	12.	0.007	214.24	1.503s
EU-154	2891.89	723.36	321.	0.	0.000	1000.00	1.503s
ZR-95	2895.26	724.20	321.	0.	0.000	1000.00	1.504s
BI-212	2907.15	727.17	351.	-24.	-0.013	112.27	1.507s
pm-146	2941.34	735.72	219.	-18.	-0.010	172.95	1.514
pm-146	2987.11	747.16	205.	-35.	-0.020	88.15	1.524s
ZR-95	3025.38	756.73	224.	-27.	-0.015	103.49	1.532s
AG-110M	3054.24	763.94	299.	-25.	-0.014	110.69	1.538s
NB-95	3061.63	765.79	324.	0.	0.000	1000.00	1.539s
PA-234M	3064.12	766.41	279.	33.	0.019	72.76	1.540s
EU-152	3114.15	778.92	257.	-29.	-0.016	120.02	1.550
BI-212	3140.15	785.42	168.	28.	0.015	100.76	1.556s
CS-134	3181.95	795.87	140.	61.	0.034	43.09	1.565
CS-134	3206.28	801.95	390.	-12.	-0.007	228.33	1.570
CO-58	3241.58	810.78	462.	-7.	-0.004	425.87	1.577s
La-140	3261.56	815.77	469.	0.	0.000	1000.00	1.581s
Cs-136	3272.49	818.50	394.	35.	0.019	82.37	1.583s
MN-54	3337.89	834.85	318.	-46.	-0.026	60.81	1.597s
Co-56	3385.58	846.77	247.	-27.	-0.015	123.54	1.607s
TL-208	3440.76	860.56	196.	36.	0.020	83.53	1.619
NB-94	3482.90	871.10	330.	-32.	-0.018	82.21	1.627
EU-154	3491.44	873.23	368.	9.	0.005	301.26	1.629s
PA-234	3520.64	880.53	527.	-5.	-0.003	650.85	1.635
PA-234	3531.48	883.24	532.	0.	0.000	1000.00	1.637
AG-110M	3537.26	884.68	532.	0.	0.000	1000.00	1.638
Sc-46	3555.65	889.28	525.	31.	0.017	106.06	1.642
y-88	3590.70	898.04	275.	19.	0.011	193.53	1.649
AC-228	3642.83	911.07	330.	-14.	-0.008	286.52	1.660s
AG-110M	3748.54	937.49	275.	17.	0.009	217.11	1.682s
PA-234	3782.66	946.02	235.	40.	0.022	85.19	1.688
EU-152	3855.05	964.11	581.	-44.	-0.025	78.34	1.703
AC-228	3874.49	968.97	534.	32.	0.018	102.66	1.707
EU-154	3983.96	996.33	567.	-44.	-0.025	77.67	1.729s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PA-234M	4002.64	1001.00	614.	-47.	-0.026	77.68	1.733s
EU-154	4017.76	1004.77	536.	39.	0.022	85.23	1.736s
Co-56	4150.07	1037.84	190.	19.	0.011	161.14	1.762s
Cs-136	4191.00	1048.07	273.	5.	0.003	469.47	1.771s
RH-106	4200.17	1050.36	252.	9.	0.005	251.66	1.772s
FE-59	4395.81	1099.25	203.	29.	0.016	113.05	1.811s
EU-152	4447.13	1112.07	362.	35.	0.019	79.34	1.821s
ZN-65	4461.03	1115.55	396.	35.	0.019	82.77	1.824s
BI-214	4480.00	1120.29	429.	20.	0.011	144.89	1.827s
Sc-46	4481.05	1120.55	449.	0.	0.000	1000.00	1.828s
Ta-182	4484.05	1121.30	382.	32.	0.018	88.66	1.828s
CO-60	4692.44	1173.37	117.	3768.	2.093	1.79	1.708
Ta-182	4755.20	1189.05	75.	19.	0.011	104.11	1.881s
Ta-182	4884.72	1221.41	48.	7.	0.004	228.12	1.906s
Co-56	4952.24	1238.28	28.	13.	0.007	93.21	1.919s
NA-22	5097.34	1274.53	32.	-8.	-0.004	106.07	1.946s
EU-154	5097.39	1274.54	40.	0.	0.000	1000.00	1.946s
FE-59	5165.65	1291.60	34.	-7.	-0.004	198.98	1.959s
CO-60	5330.03	1332.66	36.	3416.	1.898	1.77	1.876
AG-110M	5536.74	1384.30	11.	4.	0.002	221.56	2.029s
EU-152	5631.64	1408.00	11.	-1.	-0.001	598.44	2.046s
K-40	5843.15	1460.83	17.	4.	0.002	202.33	2.085s
La-140	6385.21	1596.21	12.	-1.	-0.001	842.61	2.182s
SB-124	6764.73	1690.98	0.	11.	0.006	30.15	2.247s
BI-214	7059.14	1764.49	13.	5.	0.003	117.05	2.297s
Co-56	7086.61	1771.35	41.	-10.	-0.006	95.94	2.302s
y-88	7345.80	1836.06	6.	4.	0.002	178.26	2.345s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Peak Code	Peak MDA Value Bq/Sample	COMMENTS
BE-7	C	-1.2963E+01				5.31E+01	
			477.60	-1.296E+01	&(	4.473E+01 1.04E+02 1.05E+01	G
NA-22	C	-4.6581E-01				9.50E+02	
			1274.53	-4.658E-01	?(	1.693E+00 1.06E+02 9.99E+01	G
K-40	N	2.6691E+00				4.66E+11	
			1460.83	2.669E+00	?(P	1.338E+01 2.02E+02 1.07E+01	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Sc-46	F	1.3676E+00					8.38E+01	
			889.28	1.368E+00	&(	4.830E+00	1.06E+02	1.00E+02 G
			1120.55	0.000E+00	&	5.342E+00	1.00E+03	1.00E+02 G
MN-54	C	-1.9381E+00					3.12E+02	
			834.85	-1.938E+00	(P	3.607E+00	6.08E+01	1.00E+02 G
FE-59	F	2.6649E+00					4.45E+01	
			1099.25	2.665E+00	&(P	6.344E+00	1.13E+02	5.65E+01 G
			1291.60	-9.528E-01	-	4.067E+00	1.99E+02	4.32E+01 G
Co-56	C	2.9799E-01					7.73E+01	
			846.77	-1.163E+00	?(	3.232E+00	1.24E+02	9.99E+01 G
			1238.28	1.144E+00	?(P	2.346E+00	9.32E+01	6.61E+01 G
			1037.84	6.673E+00	?(	2.351E+01	1.61E+02	1.41E+01 G
			1771.35	-4.879E+00	+	1.588E+01	9.59E+01	1.55E+01 A
CO-58	C	-2.9641E-01					7.09E+01	
			810.78	-2.964E-01	(	4.256E+00	4.26E+02	9.95E+01 G
CO-60	F	2.0582E+02					1.93E+03	
			1332.50	2.059E+02	(P	1.851E+00	1.77E+00	1.00E+02 G
			1173.24	2.058E+02	(P	2.899E+00	1.79E+00	9.99E+01 G
ZN-65	F	3.6027E+00					2.44E+02	
			1115.55	3.603E+00	?(	9.898E+00	8.28E+01	5.06E+01 G
NB-94	I	9.2895E-01					7.41E+06	
			702.63	9.289E-01	?(P	2.392E+00	1.14E+02	9.79E+01 G
			871.10	-1.391E+00	+	3.798E+00	8.22E+01	9.99E+01 G
ZR-95	I	-1.9407E+00					6.40E+01	
			756.73	-1.941E+00	?(P	5.198E+00	1.03E+02	5.45E+01 G
			724.20	0.000E+00	+	7.381E+00	1.00E+03	4.42E+01 G
RU-103	I	-2.6321E-01					3.93E+01	
			497.05	-2.632E-01	(	3.008E+00	4.88E+02	9.09E+01 G
			610.30	1.781E+01	&	9.057E+01	1.53E+02	5.75E+00 GA
RH-106	I	3.9231E+00					3.74E+02	
			621.92	0.000E+00	?(	5.391E+01	1.00E+03	9.93E+00 G
			1050.36	2.890E+01	*(	2.462E+02	2.52E+02	1.56E+00 G
			511.86	6.011E+00		1.713E+01	1.53E+02	2.00E+01 GA
AG-108M	C	4.1646E-01					1.53E+05	
			433.94	3.456E-01	&(	3.162E+00	3.76E+02	9.05E+01 G
			722.94	4.871E-01	&(	3.519E+00	2.14E+02	9.08E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			614.28	0.000E+00	-	5.904E+00	1.00E+03	8.98E+01 G
AG-110M	F	7.6421E-01				2.50E+02		
			884.68	0.000E+00	?(	6.661E+00	1.00E+03	7.27E+01 G
			657.76	-7.440E-01	&	1.686E+01	6.84E+02	9.46E+01 G
			937.49	2.258E+00	?(P	1.069E+01	2.17E+02	3.44E+01 G
			1384.30	9.373E-01	?(	4.703E+00	2.22E+02	2.43E+01 G
			763.94	-4.469E+00	+ P	1.471E+01	1.11E+02	2.23E+01 G
SN-113	F	3.4087E-01				1.15E+02		
			391.69	3.409E-01	&(	5.227E+00	4.57E+02	6.40E+01 G
SB-124	F	2.0065E+00				6.02E+01		
			602.73	1.167E+00	(	5.094E+00	1.31E+02	9.83E+01 G
			1690.98	1.675E+00	?(	1.122E+00	3.02E+01	4.78E+01 G
			722.79	1.110E+01	&(	2.806E+01	7.62E+01	1.08E+01 G
SB-125	I	2.4404E+00				1.01E+03		
			427.88	2.440E+00	&(	9.208E+00	1.56E+02	2.96E+01 G
			600.50	-6.762E+00	&	3.010E+01	1.34E+02	1.79E+01 G
			635.89	-1.288E+01	+	2.830E+01	6.65E+01	1.13E+01 G
			463.37	-3.472E+00	+ P	4.120E+01	1.52E+02	1.05E+01 G
I-131	I	-4.8838E-01				8.02E+00		
			364.48	-4.884E-01	(P	5.625E+00	3.21E+02	8.17E+01 G
			284.30	-1.616E+01	& P	3.737E+01	7.95E+01	6.14E+00 G
			636.97	-2.091E+01	&	4.750E+01	6.88E+01	7.17E+00 G
Gd-153	F	-2.4259E+00				2.42E+02		
			97.50	-2.426E+00	?(	1.099E+01	1.37E+02	3.00E+01 G
			103.20	0.000E+00	+	1.512E+01	1.00E+03	2.18E+01 G
Ga-68	C	1.8206E+00				4.71E-02		
			1077.40	1.821E+00	%(	1.273E+02	3.28E+03	3.30E+00 G
Tc-99m	I	-7.9330E-01				2.51E-01		
			140.51	-7.933E-01	&(	3.970E+00	1.51E+02	8.93E+01 G
BA-133	F	1.5709E+00				3.85E+03		
			356.00	1.571E+00	&(	6.828E+00	1.31E+02	6.20E+01 G
			302.85	0.000E+00	-	3.021E+01	1.00E+03	1.83E+01 G
			383.84	-1.203E+00	&	4.399E+01	1.09E+03	8.94E+00 GA
			80.99	-2.514E+00	+ P	9.134E+00	2.55E+02	3.41E+01 GA
CS-134	I	1.9965E+00				7.54E+02		
			604.71	1.179E+00	?(	5.215E+00	1.33E+02	9.76E+01 G
			795.87	2.893E+00	(	2.744E+00	4.31E+01	8.55E+01 G
			569.32	2.197E+00	(	1.577E+01	2.12E+02	1.54E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			801.95	-5.791E+00	+	4.450E+01	2.28E+02	8.69E+00 G
			563.24	-1.110E+01	+ P	3.157E+01	4.81E+01	8.35E+00 G
CS-137	I	3.6930E+02					1.10E+04	
			661.66	3.693E+02	(	3.414E+00	1.17E+00	8.52E+01 G
CE-139	F	8.2978E-01					1.38E+02	
			165.85	8.298E-01	?(	2.798E+00	1.02E+02	7.99E+01 G
Ba-140	I	3.3287E+00					1.28E+01	
			537.26	1.368E+00	?(P	1.039E+01	3.23E+02	2.44E+01 G
			162.66	1.102E+01	&(	3.778E+01	1.03E+02	6.22E+00 G
			304.85	0.000E+00	-	1.297E+02	1.00E+03	4.29E+00 G
La-140	I	7.8398E-01					1.28E+01	
			1596.21	-7.286E-02	?(	1.374E+00	8.43E+02	9.54E+01 G
			487.02	8.188E-01	?(	1.054E+01	3.86E+02	4.55E+01 G
			328.76	4.733E+00	?(P	1.550E+01	9.87E+01	2.03E+01 G
			815.77	0.000E+00	&	1.840E+01	1.00E+03	2.33E+01 G
CE-141	I	1.4281E+00					3.25E+01	
			145.44	1.428E+00	?(	7.164E+00	1.51E+02	4.82E+01 G
PM-144	C	-1.3410E+00					3.63E+02	
			696.54	-1.341E+00	?(P	2.691E+00	5.58E+01	9.90E+01 G
			618.06	0.000E+00	&	5.377E+00	1.00E+03	9.91E+01 G
EU-152	F	5.7095E+00					4.94E+03	
			344.29	1.797E+00	?(	1.362E+01	2.27E+02	2.65E+01 G
			1112.07	1.331E+01	?(	3.503E+01	7.93E+01	1.36E+01 G
			121.78	1.085E+00	}	7.300E+00	1.32E+02	2.86E+01 G
			778.92	-8.843E+00	+	2.387E+01	1.20E+02	1.29E+01 G
			964.11	-1.423E+01	+	3.693E+01	7.83E+01	1.46E+01 G
			244.69	-1.282E+01	+	4.620E+01	1.09E+02	7.58E+00 G
			1408.00	-3.994E-01	-	5.512E+00	5.98E+02	2.10E+01 GA
EU-154	I	7.5568E+00					3.14E+03	
			873.23	3.212E+00	&(P	3.265E+01	3.01E+02	1.23E+01 G
			123.10	-1.389E-03	&	4.836E+00	1.04E+05	4.08E+01 G
			1274.54	0.000E+00	-	5.322E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	&	1.610E+01	1.00E+03	2.02E+01 G
			1004.77	1.052E+01	?(	2.974E+01	8.52E+01	1.80E+01 G
			996.33	-2.005E+01	+	5.158E+01	7.77E+01	1.06E+01 G
HF-181	F	4.8342E-01					4.24E+01	
			482.00	-4.752E-01	?(	5.953E+00	3.75E+02	8.05E+01 G
			133.02	1.074E+00	?(	5.544E+00	1.55E+02	4.33E+01 G
			345.83	3.906E+00	(	1.174E+01	9.03E+01	1.51E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		136.30	0.000E+00	}	5.828E+01	3.24E+03	5.85E+00 G
Ta-182 F	5.3633E+00					1.14E+02	
		1121.30	4.799E+00	?(	1.415E+01	8.87E+01	3.49E+01 G
		1221.41	1.459E+00	-	7.296E+00	2.28E+02	2.70E+01 G
		1189.05	6.579E+00	?(	1.462E+01	1.04E+02	1.62E+01 G
Hg-203 F	9.1843E-01					4.66E+01	
		279.20	9.184E-01	(	3.077E+00	1.01E+02	8.15E+01 G
TL-208 N	4.0127E+00					6.98E+02	
		583.02	4.013E+00	(P	2.064E+00	2.34E+01	8.45E+01 G
		277.28	1.298E+01	+ P	4.073E+01	9.46E+01	6.31E+00 G
		860.56	1.257E+01	+ P	2.355E+01	8.35E+01	1.24E+01 G
pm-146 C	-3.9985E+00					2.02E+03	
		747.16	-3.999E+00	&(	7.908E+00	8.81E+01	3.40E+01 G
		735.72	-3.117E+00	+	1.219E+01	1.73E+02	2.25E+01 G
		453.88	-1.575E+00	+ P	4.961E+00	5.31E+01	6.50E+01 G
y-88 F	5.8490E-01					1.07E+02	
		898.04	8.998E-01	?(P	3.794E+00	1.94E+02	9.37E+01 G
		1836.06	2.874E-01	?(	1.132E+00	1.78E+02	9.92E+01 G
Cd-113m	-1.5254E+04					5.33E+03	
		263.70	-1.525E+04	(	4.532E+04	8.96E+01	6.00E-03 K
Cd-109 F	9.9713E+01					4.53E+02	
		88.04	9.971E+01	*(	4.651E+01	1.93E+01	3.79E+00 G
Cf-251 T	3.2257E+00					3.28E+05	
		176.60	3.226E+00	!(	6.325E+00	5.96E+01	1.70E+01 G
		227.00	-1.766E+00	+	3.530E+01	7.87E+02	6.30E+00 GA
Sn-126	-1.9103E+01					3.65E+07	
		87.57	-1.616E+00	+	8.715E+00	1.63E+02	3.75E+01 GA
		64.28	-1.910E+01	(	1.459E+02	2.31E+02	9.70E+00 G
		86.94	-8.716E+00	+	3.666E+01	1.27E+02	9.04E+00 GA
PB-210 N	1.0150E+04					8.14E+03	
		46.54	1.015E+04	(P	1.794E+02	9.28E-01	4.25E+00 G
PB-212 N	6.2756E+00					6.98E+02	
		238.63	6.276E+00	(P	4.093E+00	2.60E+01	4.33E+01 G
		300.03	-3.040E+01	- P	1.642E+02	5.01E+01	3.28E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-214	N	2.0314E+00					5.84E+05	
			351.93	2.031E+00	(P	1.106E+01	1.64E+02	3.76E+01 G
			295.09	-5.594E+00	+ P	2.795E+01	7.52E+01	1.93E+01 G
			242.00	-7.528E+00	+ P	4.484E+01	1.28E+02	7.43E+00 GA
BI-207	C	2.7016E-01					1.18E+04	
			569.70	2.702E-01	&(	2.536E+00	2.77E+02	9.77E+01 G
			1063.66	1.869E-01	& P	4.660E+00	1.13E+03	7.45E+01 G
BI-212	N	-1.2054E+01					6.98E+02	
			727.17	-1.205E+01	&(	4.521E+01	1.12E+02	7.55E+00 G
			785.42	8.722E+01	? P	1.982E+02	1.01E+02	1.28E+00 GA
BI-214	N	7.2177E+00					5.84E+05	
			609.31	7.247E+00	(P	4.339E+00	2.01E+01	4.61E+01 G
			1120.29	7.129E+00	&(P	3.457E+01	1.45E+02	1.51E+01 G
			1764.49	2.354E+00	- P	9.652E+00	1.17E+02	1.54E+01 G
BI-210M	T	-2.3775E-01					1.10E+09	
			265.83	-2.377E-01	?(	5.244E+00	6.58E+02	5.00E+01 G
			304.90	0.000E+00	+	1.987E+01	1.00E+03	2.80E+01 G
AC-228	N	4.9020E+00					2.10E+03	
			911.07	-2.169E+00	&(	1.353E+01	2.87E+02	2.90E+01 G
			968.97	8.716E+00	?(	2.978E+01	1.03E+02	1.75E+01 G
			338.32	1.643E+01	(	1.660E+01	4.25E+01	1.20E+01 G
			93.35	1.299E+01	&	3.806E+01	8.85E+01	5.56E+00 XA
TH-227	N	4.4424E+01					7.95E+03	
			50.14	4.442E+01	!(	8.034E+01	5.49E+01	8.00E+00 G
			256.24	-1.241E+01	+	3.140E+01	1.00E+02	7.00E+00 G
TH-229	N	1.2196E+01					2.68E+06	
			193.51	1.422E+01	?(	4.590E+01	1.28E+02	4.40E+00 G
			210.85	9.213E+00	?(	7.227E+01	3.10E+02	2.99E+00 G
TH-234	N	2.2279E+01					1.63E+12	
			63.29	2.228E+01	(P	3.894E+01	5.33E+01	3.81E+00 G
			92.59	-2.084E+01	+ P	3.910E+01	1.76E+02	5.58E+00 G
PA-231	N	-5.1309E+00					1.20E+07	
			302.65	-5.131E+00	%(	1.920E+02	1.12E+03	2.88E+00 G
			300.07	-4.024E+01	+	2.202E+02	1.65E+02	2.46E+00 G
PA-234	N	7.9562E+00					1.63E+12	
			131.29	3.540E+00	(	1.320E+01	1.12E+02	1.80E+01 G
			946.02	1.389E+01	?(	2.558E+01	8.52E+01	1.34E+01 G

```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments
                          569.47 0.000E+00 &   3.019E+01 1.00E+03 8.20E+00 G
                          883.24 0.000E+00 &   5.037E+01 1.00E+03 9.60E+00 G
                          880.53-3.648E+00 -   8.003E+01 6.51E+02 6.00E+00 GA

PA-234M  N  -2.7314E+02                                     1.63E+12
                         1001.00-2.731E+02 ?(P 6.817E+02 7.77E+01 8.37E-01 G
                          766.41 4.482E+02 + P 1.080E+03 7.28E+01 2.94E-01 G

U-235    N   5.7715E+00                                     2.57E+11
                          143.79-4.179E+00 &(P 3.085E+01 4.50E+02 1.10E+01 G
                          205.33 3.028E+01 ?(P 3.724E+01 4.93E+01 5.01E+00 G
                          163.38 3.065E+00 &(P 4.726E+01 4.62E+02 5.08E+00 G

AM-241   T   1.2375E+03                                     1.58E+05
                           59.54 1.237E+03  (  1.519E+01 8.28E-01 3.59E+01 G

Np-237   F   5.6625E+00                                     2.14E+06
                           86.49 5.663E+00 ?(  2.610E+01 1.39E+02 1.31E+01 G

Ir-192   F   1.0398E+00                                     7.40E+01
                          316.49 0.000E+00 ?(  6.558E+00 1.00E+03 8.70E+01 G
                          468.06 2.789E+00 ?(  8.011E+00 8.67E+01 5.18E+01 G
                          308.44 0.000E+00 -   1.766E+01 1.00E+03 3.18E+01 G

Cs-136   F   1.2865E+00                                     1.30E+01
                          818.50 1.443E+00 &(  3.944E+00 8.24E+01 1.00E+02 G
                         1048.07 3.125E-01 -   4.982E+00 4.69E+02 8.00E+01 G
                          340.57 9.537E-01 &(  7.643E+00 2.40E+02 4.69E+01 G

Np-239   T   3.0314E+00                                     2.36E+00
                          103.70 0.000E+00 -   1.373E+01 1.00E+03 2.40E+01 X
                          106.13 3.031E+00 ?(  1.335E+01 1.33E+02 2.27E+01 G
                           99.50-1.960E+00 +   2.207E+01 3.39E+02 1.50E+01 X

Nd-147      -7.8754E+00                                     1.11E+01
                          531.00-7.875E+00  (  2.122E+01 1.16E+02 1.30E+01 G
                           91.10 1.380E-06 %   1.126E+01 2.45E+08 2.83E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
```

+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
Sn-126	64.28	34152.	-113.	-0.063	231.21	-1.910E+01	
BA-133	80.99	2360.	-63.	-0.035	254.86	-2.514E+00	P
Np-237	86.49	3073.	57.	0.031	139.06	5.663E+00	
EU-155	86.54	2960.	-60.	-0.033	128.26	-2.571E+00	
Sn-126	86.94	2900.	-60.	-0.034	126.93	-8.716E+00	
Sn-126	87.57	2840.	-47.	-0.026	162.61	-1.616E+00	
Gd-153	97.50	3137.	-58.	-0.032	136.72	-2.426E+00	
Np-239	99.50	3195.	-24.	-0.013	338.89	-1.960E+00	
Np-239	106.13	2740.	56.	0.031	132.90	3.031E+00	
PA-234	131.29	1633.	51.	0.028	112.41	3.540E+00	
Tc-99m	140.51	3308.	-54.	-0.030	150.97	-7.933E-01	
U-235	143.79	3143.	-36.	-0.020	450.09	-4.179E+00	P
CE-141	145.44	3249.	53.	0.030	151.31	1.428E+00	
Ba-140	162.66	1324.	50.	0.028	103.40	1.102E+01	
U-235	163.38	1375.	11.	0.006	461.71	3.065E+00	P
CE-139	165.85	1206.	49.	0.027	101.65	8.298E-01	
TH-229	193.51	799.	42.	0.023	127.89	1.422E+01	
U-235	205.33	628.	97.	0.054	49.29	3.028E+01	P
TH-229	210.85	818.	17.	0.010	309.56	9.213E+00	
PB-214	242.00	1637.	-32.	-0.018	127.89	-7.528E+00	P
Cd-113m	263.70	963.	-50.	-0.028	89.64	-1.525E+04	
BI-210M	265.83	885.	-6.	-0.004	657.75	-2.377E-01	
Hg-203	279.20	754.	39.	0.022	100.85	9.184E-01	
I-131	284.30	613.	-51.	-0.028	79.46	-1.616E+01	P
PB-214	295.09	3310.	-54.	-0.030	75.19	-5.594E+00	P
PA-231	300.07	3261.	-49.	-0.027	165.03	-4.024E+01	
PA-233	300.18	3311.	-49.	-0.027	166.23	-1.597E+01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
La-140	328.76	954.	45.	0.025	98.71	4.733E+00	P
Cf-249	333.44	1013.	-33.	-0.018	136.50	-4.645E+00	
Cs-136	340.57	1184.	20.	0.011	240.19	9.537E-01	
PB-214	351.93	1528.	34.	0.019	163.71	2.031E+00	P
BA-133	356.00	1562.	43.	0.024	130.89	1.571E+00	
I-131	364.48	1781.	-17.	-0.010	321.24	-4.884E-01	P
SN-113	391.69	843.	9.	0.005	457.45	3.409E-01	
AG-108M	433.94	528.	12.	0.007	376.02	3.456E-01	
pm-146	453.88	632.	-38.	-0.021	53.13	-1.575E+00	P
Ir-192	468.06	1009.	52.	0.029	86.71	2.789E+00	
BE-7	477.60	1268.	-49.	-0.027	104.02	-1.296E+01	
La-140	487.02	1282.	13.	0.007	385.54	8.188E-01	
RU-103	497.05	394.	-8.	-0.005	487.65	-2.632E-01	
RH-106	511.86	600.	41.	0.023	153.12	6.011E+00	
Nd-147	531.00	364.	-34.	-0.019	115.82	-7.875E+00	
Ba-140	537.26	300.	11.	0.006	322.98	1.368E+00	P
BI-207	569.70	263.	8.	0.005	277.21	2.702E-01	
SB-124	602.73	1021.	35.	0.019	131.16	1.167E+00	
RU-103	610.30	1086.	31.	0.017	152.71	1.781E+01	
I-131	636.97	427.	-44.	-0.024	68.76	-2.091E+01	
AG-110M	657.76	9346.	-20.	-0.011	683.96	-7.440E-01	
PM-144	696.54	224.	-36.	-0.020	55.80	-1.341E+00	P
SB-124	722.79	278.	32.	0.018	76.22	1.110E+01	
AG-108M	722.94	309.	12.	0.007	214.24	4.871E-01	
BI-212	727.17	351.	-24.	-0.013	112.27	-1.205E+01	
pm-146	735.72	219.	-18.	-0.010	172.95	-3.117E+00	
pm-146	747.16	205.	-35.	-0.020	88.15	-3.999E+00	
ZR-95	756.73	224.	-27.	-0.015	103.49	-1.941E+00	P
AG-110M	763.94	299.	-25.	-0.014	110.69	-4.469E+00	P
PA-234M	766.41	279.	33.	0.019	72.76	4.482E+02	P
BI-212	785.42	168.	28.	0.015	100.76	8.722E+01	P
CO-58	810.78	462.	-7.	-0.004	425.87	-2.964E-01	
Cs-136	818.50	394.	35.	0.019	82.37	1.443E+00	
MN-54	834.85	318.	-46.	-0.026	60.81	-1.938E+00	P
Co-56	846.77	247.	-27.	-0.015	123.54	-1.163E+00	
EU-154	873.23	368.	9.	0.005	301.26	3.212E+00	P
PA-234	880.53	527.	-5.	-0.003	650.85	-3.648E+00	
Sc-46	889.28	525.	31.	0.017	106.06	1.368E+00	
y-88	898.04	275.	19.	0.011	193.53	8.998E-01	P
AG-110M	937.49	275.	17.	0.009	217.11	2.258E+00	P
PA-234	946.02	235.	40.	0.022	85.19	1.389E+01	
EU-154	996.33	567.	-44.	-0.025	77.67	-2.005E+01	
PA-234M	1001.00	614.	-47.	-0.026	77.68	-2.731E+02	P
EU-154	1004.77	536.	39.	0.022	85.23	1.052E+01	
Co-56	1037.84	190.	19.	0.011	161.14	6.673E+00	
Cs-136	1048.07	273.	5.	0.003	469.47	3.125E-01	
RH-106	1050.36	252.	9.	0.005	251.66	2.890E+01	
FE-59	1099.25	203.	29.	0.016	113.05	2.665E+00	P

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
ZN-65	1115.55	396.	35.	0.019	82.77	3.603E+00		
Ta-182	1121.30	382.	32.	0.018	88.66	4.799E+00		
Ta-182	1189.05	75.	19.	0.011	104.11	6.579E+00		
Ta-182	1221.41	48.	7.	0.004	228.12	1.459E+00		
Co-56	1238.28	28.	13.	0.007	93.21	1.144E+00		P
NA-22	1274.53	32.	-8.	-0.004	106.07	-4.658E-01		
FE-59	1291.60	34.	-7.	-0.004	198.98	-9.528E-01		
AG-110M	1384.30	11.	4.	0.002	221.56	9.373E-01		
K-40	1460.83	17.	4.	0.002	202.33	2.669E+00		P
La-140	1596.21	12.	-1.	-0.001	842.61	-7.286E-02		
SB-124	1690.98	0.	11.	0.006	30.15	1.675E+00		
Co-56	1771.35	41.	-10.	-0.006	95.94	-4.879E+00		
y-88	1836.06	6.	4.	0.002	178.26	2.874E-01		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	-1.2963E+01	-1.2963E+01	1.040E+02%	4.47E+01
NA-22	#A	-4.6581E-01	-4.6581E-01	1.061E+02%	1.69E+00
K-40	#A	2.6691E+00	2.6691E+00	2.023E+02%	1.34E+01
Sc-46	#A	1.3676E+00	1.3676E+00	1.061E+02%	4.83E+00
CR-51	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.79E+01
MN-54	#A	-1.9381E+00	-1.9381E+00	6.081E+01%	3.61E+00
FE-59	#A	2.6649E+00	2.6649E+00	1.131E+02%	6.34E+00
Co-56	#A	2.9798E-01	2.9799E-01	7.447E+01%	3.23E+00
CO-57	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.23E+01
CO-58	#A	-2.9641E-01	-2.9641E-01	4.259E+02%	4.26E+00
CO-60		2.0582E+02	2.0582E+02	1.261E+00%	1.85E+00
ZN-65	#A	3.6027E+00	3.6027E+00	8.277E+01%	9.90E+00
NB-94	#A	9.2895E-01	9.2895E-01	1.138E+02%	2.39E+00
ZR-95	#A	-1.9407E+00	-1.9407E+00	1.035E+02%	5.20E+00
NB-95	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.42E+00
RU-103	#A	-2.6320E-01	-2.6321E-01	4.876E+02%	3.01E+00
RH-106	#A	3.9231E+00	3.9231E+00	2.517E+02%	5.39E+01
AG-108M	#A	4.1646E-01	4.1646E-01	2.142E+02%	3.16E+00
AG-110M	#A	7.6421E-01	7.6421E-01	2.171E+02%	6.66E+00
SN-113	#A	3.4087E-01	3.4087E-01	4.574E+02%	5.23E+00
SB-124	#A	2.0065E+00	2.0065E+00	3.015E+01%	5.09E+00
SB-125	#A	2.4404E+00	2.4404E+00	1.556E+02%	9.21E+00
I-131	#A	-4.8834E-01	-4.8838E-01	3.212E+02%	5.63E+00
Gd-153	#A	-2.4259E+00	-2.4259E+00	1.367E+02%	1.10E+01
Ga-68	#A	1.7999E+00	1.8206E+00	3.280E+03%	1.27E+02
Tc-99m	#A	-7.9160E-01	-7.9330E-01	1.510E+02%	3.97E+00
BA-133	#A	1.5709E+00	1.5709E+00	1.309E+02%	6.83E+00

CS-134 A	1.9965E+00	1.9965E+00	4.309E+01%		5.21E+00
CS-137	3.6930E+02	3.6930E+02	1.167E+00%		3.41E+00
CE-139 #A	8.2977E-01	8.2978E-01	1.017E+02%		2.80E+00
Ba-140 #A	3.3285E+00	3.3287E+00	1.034E+02%		1.04E+01
La-140 #A	7.8395E-01	7.8398E-01	9.871E+01%		1.37E+00
CE-141 #A	1.4281E+00	1.4281E+00	1.513E+02%		7.16E+00
CE-144 #A	0.0000E+00	0.0000E+00	1.000E+03%		2.19E+01
PM-144 #A	-1.3410E+00	-1.3410E+00	5.580E+01%		2.69E+00
EU-152 #A	5.7095E+00	5.7095E+00	7.934E+01%		1.36E+01
EU-154 #A	7.5568E+00	7.5568E+00	8.523E+01%		3.27E+01
EU-155 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.55E+01
HF-181 A	4.8341E-01	4.8342E-01	9.025E+01%		5.95E+00
Ta-182 #A	5.3633E+00	5.3633E+00	6.837E+01%		1.41E+01
Hg-203 #A	9.1842E-01	9.1843E-01	1.009E+02%		3.08E+00
TL-208	4.0127E+00	4.0127E+00	2.336E+01%		2.06E+00
pm-146 #A	-3.9985E+00	-3.9985E+00	8.815E+01%		7.91E+00
y-88 #A	5.8490E-01	5.8490E-01	1.316E+02%		3.79E+00
Cd-113m#A	-1.5254E+04	-1.5254E+04	8.964E+01%		4.53E+04
Cd-109 #	9.9712E+01	9.9713E+01	1.927E+01%		4.65E+01
Cf-251 #A	3.2257E+00	3.2257E+00	5.959E+01%		6.33E+00
Cf-249 #A	0.0000E+00	0.0000E+00	1.000E+03%		6.01E+00
Sn-126 #A	-1.9103E+01	-1.9103E+01	2.312E+02%		1.46E+02
PB-210	1.0150E+04	1.0150E+04	9.277E-01%		1.79E+02
PB-212 #	6.2756E+00	6.2756E+00	2.600E+01%		4.09E+00
PB-214 #A	2.0314E+00	2.0314E+00	1.637E+02%		1.11E+01
BI-207 #A	2.7016E-01	2.7016E-01	2.772E+02%		2.54E+00
BI-212 #A	-1.2054E+01	-1.2054E+01	1.123E+02%		4.52E+01
BI-214	7.2177E+00	7.2177E+00	2.006E+01%		4.34E+00
BI-210M#A	-2.3775E-01	-2.3775E-01	6.577E+02%		5.24E+00
AC-228 A	4.9020E+00	4.9020E+00	4.252E+01%		1.35E+01
TH-227 #A	4.4424E+01	4.4424E+01	5.494E+01%		8.03E+01
TH-229 #A	1.2196E+01	1.2196E+01	1.279E+02%		4.59E+01
TH-234 #A	2.2279E+01	2.2279E+01	5.330E+01%		3.89E+01
PA-231 #A	-5.1309E+00	-5.1309E+00	1.125E+03%		1.92E+02
PA-233 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.57E+01
PA-234 #A	7.9562E+00	7.9562E+00	7.052E+01%		1.32E+01
PA-234M#A	-2.7314E+02	-2.7314E+02	7.768E+01%		6.82E+02
U-235 #A	5.7715E+00	5.7715E+00	4.929E+01%		3.08E+01
AM-241	1.2375E+03	1.2375E+03	8.275E-01%		1.52E+01
Np-237 #A	5.6625E+00	5.6625E+00	1.391E+02%		2.61E+01
Ir-192 #A	1.0398E+00	1.0398E+00	8.671E+01%		6.56E+00
Cs-136 #A	1.2865E+00	1.2865E+00	8.237E+01%		3.94E+00
Np-239 #A	3.0307E+00	3.0314E+00	1.329E+02%		1.34E+01
Nd-147 #A	-7.8750E+00	-7.8754E+00	1.158E+02%		2.12E+01

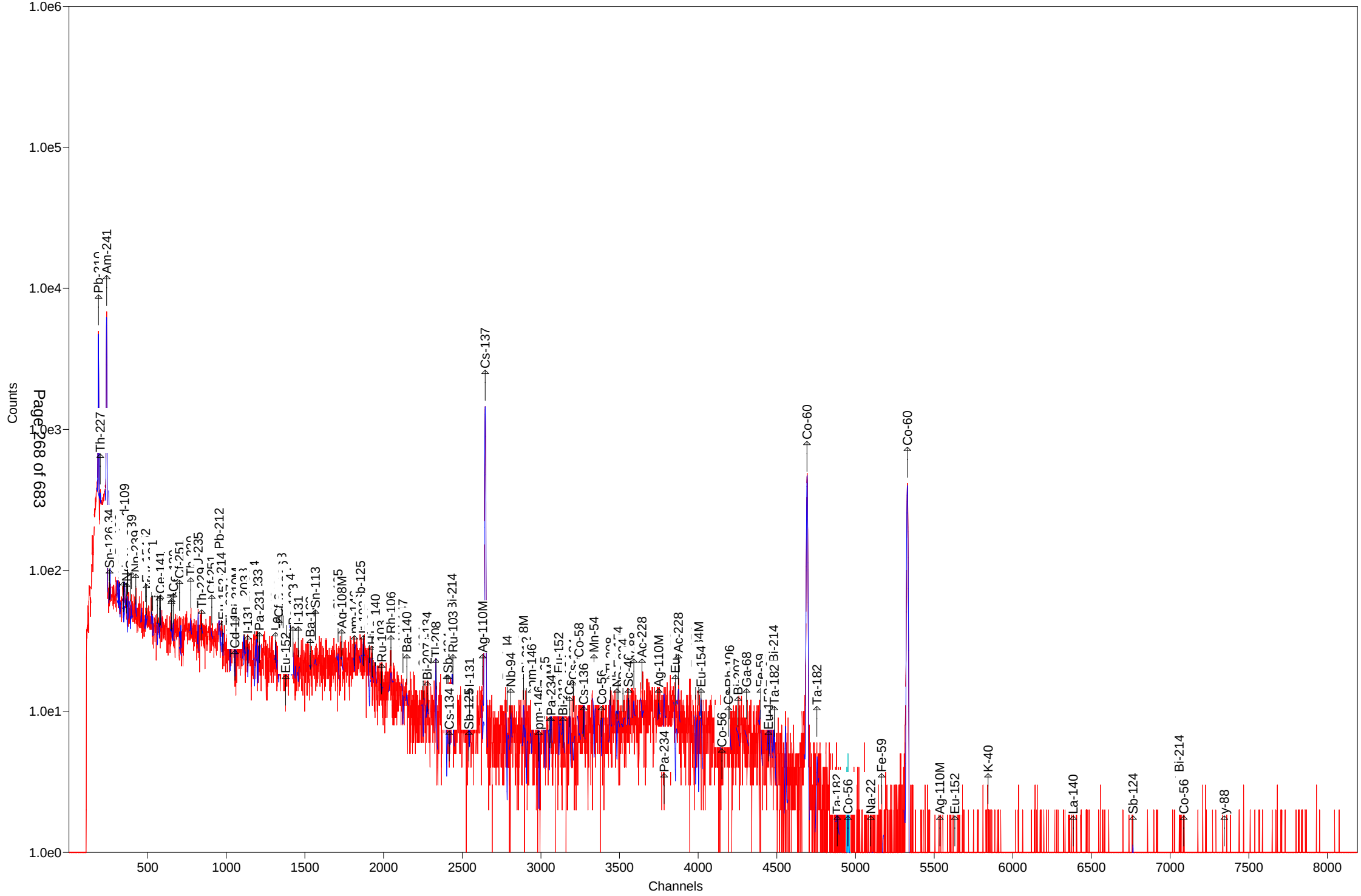
- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.4 keV) 1.215E+04 Bq/Sample
Total Decayed Activity (37.6 to 1999.4 keV) 1.2149927E+04 Bq/Sample

264537_Gamma_LCS 160-264537~2-A. 12_Gamma_20161867.spc.



Test America St. Louis Spectrum ID: 13_Gamma_20160730

Sample Description: 264537_Gamma_160-18552-A-1-B
Detector: Detector #13
Batch ID: 264537
Work Order Number: Gamma
Lot Number: 160-18552-A-1-B

Decay to Time: 9/1/2016 10:43 Live Time: 1800 sec
Acquisition Time: 9/1/2016 10:43:38 Real Time: 1807 sec
Analysis Time: 9/1/2016 11:14 Dead Time: 0.36 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 13_Soil_TunaCan.Clb
Efficiency Cal Desc: 13_Soil_TunaCan_90099_032712
Efficiency Cal Date: 3/29/2012 07:50
Energy Cal Date: 2/23/2012 09:31
Library: Client_Long_Rev11.lib
Bkgd Correction File: 13_2016-08-07_0547.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-5.154E+00	88.9	4.582E+00	4.590E+00	1.528E+01
NA-22	4.229E-01	93.3	3.944E-01	3.950E-01	1.343E+00
K-40	2.214E+02	4.9	1.075E+01	1.562E+01	6.545E+00
Sc-46	5.946E-01	90.8	5.402E-01	5.410E-01	1.812E+00
CR-51	3.270E+00	97.8	3.199E+00	3.204E+00	1.071E+01
MN-54	3.502E-01	114.4	4.006E-01	4.010E-01	9.109E-01
FE-59	8.226E-01	34.0	2.794E-01	2.824E-01	2.394E+00
Co-56	7.428E-01	69.9	5.190E-01	5.204E-01	9.213E-01
CO-57	5.306E-01	154.4	8.191E-01	8.195E-01	2.055E+00
CO-58	2.639E-01	133.2	3.516E-01	3.519E-01	1.209E+00
CO-60	9.126E-02	340.8	3.110E-01	3.111E-01	7.511E-01
ZN-65	-1.652E+00	93.4	1.543E+00	1.545E+00	5.165E+00
NB-94	-6.188E-02	87.6	5.422E-02	5.431E-02	1.576E+00
ZR-95	1.074E+00	89.5	9.611E-01	9.627E-01	2.127E+00
NB-95	5.351E-01	68.7	3.677E-01	3.687E-01	1.219E+00
RU-103	3.771E-01	96.8	3.652E-01	3.657E-01	8.735E-01
RH-106	7.723E+00	103.9	8.022E+00	8.032E+00	2.785E+01
AG-108M	-4.112E-01	111.5	4.587E-01	4.591E-01	1.075E+00
AG-110M	3.167E-01	75.0	2.375E-01	2.380E-01	2.854E+00
SN-113	-6.323E-01	94.9	6.002E-01	6.010E-01	2.281E+00
SB-124	-4.174E-02	116.4	4.856E-02	4.861E-02	2.876E+00
SB-125	4.159E+00	21.5	8.930E-01	9.179E-01	3.070E+00
I-131	1.679E-01	265.6	4.460E-01	4.460E-01	1.071E+00
Gd-153	-1.320E+00	229.3	3.026E+00	3.027E+00	1.004E+01
Ga-68	1.160E+01	141.6	1.642E+01	1.644E+01	3.666E+01
Tc-99m	0.000E+00	1.#INF	1.943E-01	1.943E-01	2.127E+00
BA-133	-6.387E-01	141.0	9.004E-01	9.010E-01	3.013E+00
CS-134	8.820E-01	32.7	2.885E-01	2.921E-01	2.846E+00
CS-137	3.443E-01	126.5	4.356E-01	4.359E-01	1.483E+00
CE-139	-4.317E-01	93.2	4.024E-01	4.045E-01	1.339E+00
Ba-140	-4.854E-01	95.3	4.627E-01	4.634E-01	4.309E+00
La-140	5.449E-01	34.2	1.861E-01	1.884E-01	4.516E-01
CE-141	-6.894E-01	166.5	1.148E+00	1.148E+00	3.989E+00

CE-144	0.000E+00	1.#INF	1.305E+00	1.305E+00	1.635E+01
PM-144	4.844E-01	79.7	3.861E-01	3.869E-01	1.290E+00
EU-152	-1.537E-01	69.5	1.067E-01	1.070E-01	6.996E+00
EU-154	1.651E-01	729.6	1.204E+00	1.204E+00	8.507E+00
EU-155	-1.850E+00	223.2	4.128E+00	4.129E+00	1.370E+01
HF-181	-6.798E-01	93.3	6.344E-01	6.354E-01	2.117E+00
Ta-182	2.433E+00	55.8	1.359E+00	1.364E+00	6.215E+00
Hg-203	2.517E-02	1599.6	4.026E-01	4.026E-01	1.377E+00
TL-208	1.079E+01	6.6	7.141E-01	9.074E-01	8.976E-01
pm-146	6.016E-01	248.4	1.494E+00	1.495E+00	3.394E+00
y-88	1.518E-01	37.8	5.737E-02	5.789E-02	1.279E+00
Cd-113m	3.360E+02	1148.9	3.860E+03	3.860E+03	1.337E+04
Cd-109	-1.076E+01	236.9	2.549E+01	2.550E+01	8.457E+01
Cf-251	-3.392E-01	571.9	1.940E+00	1.940E+00	4.787E+00
Cf-249	5.735E-01	105.1	6.030E-01	6.037E-01	2.021E+00
Sn-126	4.371E+00	110.3	4.821E+00	4.826E+00	1.605E+01
PB-210	-7.731E+00	175.0	1.353E+01	1.354E+01	4.544E+01
PB-212	3.294E+01	3.4	1.109E+00	2.402E+00	1.390E+00
PB-214	1.405E+01	7.9	1.112E+00	1.330E+00	1.854E+00
BI-207	2.148E-01	144.7	3.108E-01	3.110E-01	1.066E+00
BI-212	2.713E+01	21.3	5.768E+00	5.938E+00	1.142E+01
BI-214	1.494E+01	7.7	1.155E+00	1.392E+00	1.619E+00
BI-210M	2.609E-02	2567.7	6.699E-01	6.699E-01	1.680E+00
AC-228	3.195E+01	6.0	1.902E+00	2.504E+00	3.451E+00
TH-227	0.000E+00	1.#INF	3.992E+00	3.992E+00	2.196E+01
TH-229	7.521E+00	101.3	7.617E+00	7.641E+00	1.855E+01
TH-234	1.594E+01	29.1	4.634E+00	4.709E+00	2.375E+01
PA-231	6.749E+00	192.0	1.296E+01	1.296E+01	7.769E+01
PA-233	7.552E-01	194.5	1.469E+00	1.470E+00	6.359E+00
PA-234	9.986E-01	104.1	1.039E+00	1.040E+00	1.004E+01
PA-234M	2.138E+01	84.9	1.816E+01	1.820E+01	2.299E+02
U-235	4.218E+00	81.1	3.421E+00	3.428E+00	1.672E+01
AM-241	2.793E-01	474.8	1.326E+00	1.326E+00	4.465E+00
Np-237	-3.135E+00	242.1	7.590E+00	7.592E+00	2.518E+01
Ir-192	5.676E-01	108.5	6.157E-01	6.167E-01	2.052E+00
Cs-136	1.724E-02	2167.9	3.738E-01	3.738E-01	1.323E+00
Np-239	-1.735E+00	220.5	3.826E+00	3.827E+00	1.269E+01
Nd-147	-2.044E+00	152.2	3.110E+00	3.112E+00	7.474E+00
Total	7.915E+02				

Analyst: kody Saulters

Sample description
264537_Gamma_160-18552-A-1-B

Spectrum Filename: C:\User\SPC\Det13\13_Gamma_20160730.An1

Acquisition information

Start time:	9/1/2016 10:43:38 AM
Live time:	1800
Real time:	1807
Dead time:	0.36 %
Detector ID:	13

Detector system
Ge13 SN/10064006

Calibration

Filename:	13_Soil_TunaCan.Clb

13_Soil_TunaCan_90099_032712

Energy Calibration

Created:	2/23/2012 9:31:24 AM
Zero offset:	0.036 keV
Gain:	0.250 keV/channel
Quadratic:	-2.347E-08 keV/channel^2

Efficiency Calibration

Created:	3/29/2012 7:50:26 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 0.91 %
Log(Eff):	-5.308398E-01 + (-3.057754E-01*Log(E)) + (-3.437570E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.60 %
Log(Eff):	-2.292218E+01 + (8.455931E+00*Log(E)) + (-8.924057E-01*Log(E)^2)

Library Files

Main analysis library:	Client_Long_Rev11.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.55keV)
Stop channel:	8000 (1999.54keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 10:43:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	13_2016-08-07_0547.PBC 8/7/2016 5:47:55 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 28 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1176

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
41.03	339.	11.17	1.46	2.179E-02				
59.54	7.	474.76	1.03	3.802E-02	59.54	35.900	PBC<MDA	AM241
63.28	53.	46.56	0.36	4.068E-02	63.29	3.810	PBC<MDA	TH234
64.28	32.	110.28	1.03	4.135E-02	64.28	9.700	PBC<MDA	Sn126
74.74	373.	7.76	1.04	4.728E-02				
77.06	570.	5.66	1.05	4.835E-02				
84.18	92.	21.97	1.05	5.108E-02				
86.96	201.	11.51	1.06	5.194E-02	86.49	13.100	1.647E+01	Np237
					86.54	30.700	7.026E+00	EU155
					86.94	9.040	2.381E+01	Sn126
					87.57	37.500	5.719E+00	Sn126
89.95	134.	16.62	1.06	5.275E-02				
93.11	134.	17.08	1.06	5.347E-02	92.59	5.584	2.489E+01	TH234
					93.35	5.561	2.492E+01	AC228
121.78	29.	178.46	1.09	5.530E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	3.441E-01	CO57
122.27	29.	179.32	1.09	5.528E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	3.442E-01	CO57
123.10	6.	839.23	1.09	5.523E-02	123.10	40.790	PBC<MDA	EU154
125.94	25.	66.35	1.09	5.505E-02				
128.89	64.	27.79	1.10	5.480E-02				
136.29	21.	251.30	1.10	5.395E-02	136.30	5.850	PBC<MDA	HF181

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					136.47	10.680	2.025E+00	CO57
143.62	29.	179.38	1.11	5.293E-02	143.79	10.960	PBC<MDA	U235
162.66	17.	159.69	1.13	4.963E-02	162.66	6.220	PBC<MDA	Ba140
163.63	22.	122.98	1.13	4.950E-02	163.38	5.080	PBC<MDA	U235
193.51	27.	101.27	1.16	4.533E-02	193.51	4.400	PBC<MDA	TH229
205.33	26.	109.13	1.17	4.356E-02	205.33	5.010	PBC<MDA	U235
208.80	89.	28.84	0.84	4.307E-02				
224.34	22.	39.53	0.49	4.103E-02				
227.00	22.	89.50	1.19	4.071E-02	227.00	6.300	PBC<MDA	Cf251
238.51	947.	4.24	1.22	3.936E-02	238.63	43.300	3.087E+01	PB212
241.94	26.	201.71	1.20	3.897E-02	242.00	7.430	PBC<MDA	PB214
244.69	27.	195.97	1.20	3.868E-02	244.69	7.580	PBC<MDA	EU152
277.58	52.	27.12	1.23	3.549E-02	277.28	6.310	1.299E+01	TL208
295.32	212.	11.11	1.04	3.397E-02	295.09	19.300	1.794E+01	PB214
300.07	20.	191.98	1.25	3.359E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.373E+01	PA231
					300.18	6.200	5.450E+00	PA233
300.18	20.	194.52	1.25	3.358E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.373E+01	PA231
					300.18	6.200	5.450E+00	PA233
300.24	77.	17.08	1.25	3.360E-02	300.03	3.280	3.901E+01	PB212
					300.07	2.460	5.202E+01	PA231
					300.18	6.200	2.065E+01	PA233
316.49	29.	108.48	1.27	3.236E-02	316.49	87.040	PBC<MDA	Ir192
320.08	19.	97.84	1.27	3.211E-02	320.08	9.940	PBC<MDA	CR51
338.32	202.	9.15	0.95	3.088E-02	338.32	12.010	3.022E+01	AC228
351.89	286.	7.91	1.16	3.003E-02	351.93	37.600	1.405E+01	PB214
364.48	7.	265.64	1.31	2.929E-02	364.48	81.700	PBC<MDA	I131
383.84	19.	104.23	1.33	2.823E-02	383.84	8.940	PBC<MDA	BA133
387.73	19.	105.15	1.33	2.802E-02	387.95	66.000	PBC<MDA	Cf249
427.88	7.	241.74	1.37	2.611E-02	427.88	29.600	PBC<MDA	SB125
463.37	67.	21.47	1.40	2.465E-02	463.37	10.470	1.443E+01	SB125
497.05	14.	96.84	1.43	2.341E-02	497.05	90.900	PBC<MDA	RU103
511.86	103.	26.14	2.69	2.292E-02	511.86	20.000	1.249E+01	RH106
563.24	15.	92.99	1.49	2.135E-02	563.24	8.350	PBC<MDA	CS134
569.32	2.	595.82	1.49	2.118E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	6.398E-01	PA234
					569.70	97.740	5.369E-02	BI207
569.47	11.	104.05	1.49	2.118E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	3.519E+00	PA234
					569.70	97.740	2.953E-01	BI207
569.70	8.	144.70	1.49	2.117E-02	569.32	15.380	1.364E+00	CS134
					569.47	8.200	2.559E+00	PA234
					569.70	97.740	2.148E-01	BI207
583.24	342.	6.62	1.43	2.081E-02	583.02	84.500	1.079E+01	TL208
609.28	250.	7.73	1.60	2.014E-02	609.31	46.090	1.494E+01	BI214
					610.30	5.750	1.199E+02	RU103
621.92	17.	170.61	1.54	1.983E-02	621.92	9.930	PBC<MDA	RH106

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
657.76	16.	75.00	1.57	1.902E-02	657.76	94.640	PBC<MDA	AG110M
661.66	10.	126.53	1.57	1.893E-02	661.66	85.210	PBC<MDA	CS137
696.54	16.	79.70	1.60	1.821E-02	696.54	99.000	PBC<MDA	PM144
722.79	9.	186.53	1.62	1.771E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	2.993E-01	AG108M
					723.36	20.220	1.345E+00	EU154
727.32	65.	21.26	1.42	1.763E-02	727.17	7.550	2.713E+01	BI212
747.16	6.	248.41	1.64	1.727E-02	747.16	34.000	PBC<MDA	pm146
756.73	18.	89.52	1.65	1.710E-02	756.73	54.460	PBC<MDA	ZR95
763.94	4.	334.25	1.66	1.698E-02	763.94	22.280	PBC<MDA	AG110M
765.79	16.	68.70	1.66	1.695E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	1.818E+02	PA234M
766.41	13.	84.95	1.66	1.694E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	1.437E+02	PA234M
784.28	16.	88.83	1.67	1.663E-02	785.42	1.280	PBC<MDA	BI212
795.87	31.	32.71	1.68	1.646E-02	795.87	85.530	1.225E+00	CS134
801.95	16.	91.96	1.69	1.636E-02	801.95	8.690	PBC<MDA	CS134
810.78	8.	133.23	1.69	1.623E-02	810.78	99.460	PBC<MDA	CO58
834.85	10.	114.38	1.71	1.587E-02	834.85	99.980	PBC<MDA	MN54
846.77	11.	104.38	1.72	1.569E-02	846.77	99.935	PBC<MDA	Co56
860.88	71.	14.28	1.91	1.550E-02	860.56	12.420	2.052E+01	TL208
871.10	6.	113.04	1.74	1.536E-02	871.10	99.890	PBC<MDA	NB94
889.28	16.	90.85	1.76	1.511E-02	889.28	99.984	PBC<MDA	Sc46
911.27	255.	8.25	1.66	1.483E-02	911.07	29.000	3.300E+01	AC228
964.11	12.	135.60	1.82	1.419E-02	964.11	14.605	PBC<MDA	EU152
969.15	100.	13.69	2.81	1.414E-02	968.97	17.460	2.240E+01	AC228
1037.84	11.	85.77	1.88	1.340E-02	1037.84	14.130	PBC<MDA	Co56
1050.36	10.	118.49	1.89	1.328E-02	1050.36	1.560	PBC<MDA	RH106
1077.40	8.	141.62	1.91	1.301E-02	1077.40	3.300	PBC<MDA	Ga68
1120.14	75.	16.37	2.27	1.262E-02	1120.29	15.100	2.175E+01	BI214
					1120.55	99.987	PBC<MDA	Sc46
1121.30	17.	88.85	1.94	1.261E-02	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	2.087E+00	Ta182
1173.24	3.	472.11	1.98	1.217E-02	1173.24	99.900	PBC<MDA	CO60
1189.05	14.	86.28	1.99	1.204E-02	1189.05	16.200	PBC<MDA	Ta182
1221.41	11.	112.78	2.02	1.179E-02	1221.41	27.000	PBC<MDA	Ta182
1238.28	10.	160.30	2.03	1.166E-02	1238.28	66.070	PBC<MDA	Co56
1274.53	9.	93.26	2.06	1.139E-02	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	1.201E+00	EU154
1291.60	21.	33.96	2.07	1.127E-02	1291.60	43.200	2.434E+00	FE59
1332.50	1.	491.59	2.10	1.100E-02	1332.50	99.980	PBC<MDA	CO60
1460.74	434.	4.85	2.29	1.021E-02	1460.83	10.670	2.214E+02	K40
1596.21	9.	34.16	2.29	9.505E-03	1596.21	95.400	5.449E-01	La140
1690.98	3.	242.22	2.35	9.068E-03	1690.98	47.790	PBC<MDA	SB124
1764.53	12.	76.71	2.40	8.758E-03	1764.49	15.400	PBC<MDA	BI214
1771.35	11.	84.00	2.41	8.730E-03	1771.35	15.480	PBC<MDA	Co56
1836.06	7.	37.80	2.45	8.477E-03	1836.06	99.200	PBC<MDA	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
163.88	41.03	263.	339.	1.556E+04	11.17	1.461	- s
298.69	74.73	233.	373.	7.886E+03	7.76	1.045	- sD
307.94	77.04	235.	570.	1.179E+04	5.66	1.047	- sD
336.37	84.14	166.	92.	1.793E+03	22.49	1.054	- D
347.50	86.92	180.	197.	3.801E+03	11.96	1.056	- D
359.46	89.91	193.	135.	2.552E+03	16.96	1.059	- D
503.38	125.73	133.	29.	5.339E+02	58.40	1.093	- sD
515.19	128.69	126.	64.	1.174E+03	27.69	1.096	- sD
834.71	208.80	117.	72.	1.676E+03	24.23	1.170	- sD
896.84	224.34	26.	22.	5.443E+02	39.53	0.493	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.92	46.54	384.	-16.	-0.009	175.00	1.018s
TH-227	200.32	50.14	400.	0.	0.000	1000.00	1.021s
AM-241	237.89	59.54	527.	7.	0.004	474.76	1.030s
TH-234	252.87	63.28	186.	53.	0.029	46.56	0.360s
Sn-126	256.85	64.28	590.	32.	0.018	110.28	1.035
BA-133	323.66	80.99	4319.	-38.	-0.021	64.58	1.051
Np-237	345.65	86.49	4281.	-38.	-0.021	242.08	1.056
EU-155	345.86	86.54	4243.	-38.	-0.021	241.00	1.056
Sn-126	347.45	86.94	4204.	-38.	-0.021	239.86	1.056
Sn-126	349.97	87.57	4166.	-38.	-0.021	238.61	1.057
Cd-109	351.85	88.04	4111.	-38.	-0.021	236.93	1.057s
Nd-147	364.09	91.10	4073.	-38.	-0.021	235.20	1.060s
TH-234	370.04	92.59	298.	74.	0.041	34.81	1.062D
AC-228	373.08	93.35	3952.	-39.	-0.021	231.25	1.062s
Gd-153	389.67	97.50	3914.	-39.	-0.021	229.27	1.066s
Np-239	397.67	99.50	3875.	-39.	-0.022	227.74	1.068s
Gd-153	412.46	103.20	3836.	-39.	-0.022	225.91	1.071s
Np-239	414.46	103.70	3797.	-39.	-0.022	224.67	1.072s
EU-155	420.91	105.31	3758.	-39.	-0.022	223.18	1.074s
Np-239	424.18	106.13	3708.	-39.	-0.022	220.54	1.074s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	486.74	121.78	1354.	29.	0.016	178.46	1.089s
CO-57	487.88	122.06	1367.	29.	0.016	179.32	1.089s
EU-154	492.03	123.10	1397.	6.	0.004	839.23	1.090s
PA-234	524.80	131.29	1406.	-3.	-0.001	940.76	1.098s
HF-181	531.71	133.02	1403.	0.	0.000	1000.00	1.100s
CE-144	533.77	133.54	1403.	0.	0.000	1000.00	1.100
HF-181	544.81	136.30	1403.	0.	0.000	1000.00	1.103s
CO-57	545.50	136.47	1382.	21.	0.012	251.30	1.103s
Tc-99m	561.64	140.51	1403.	0.	0.000	1000.00	1.106s
U-235	574.74	143.79	1360.	29.	0.016	179.38	1.110s
CE-141	581.36	145.44	1486.	-32.	-0.018	166.49	1.111s
Ba-140	650.21	162.66	360.	17.	0.009	159.69	1.127s
U-235	653.08	163.38	355.	22.	0.012	122.98	1.128s
CE-139	662.98	165.85	406.	-31.	-0.017	93.22	1.130s
Cf-251	705.95	176.60	212.	-5.	-0.003	571.90	1.140s
TH-229	773.56	193.51	188.	27.	0.015	101.27	1.156s
U-235	820.84	205.33	395.	26.	0.015	109.13	1.167s
TH-229	842.90	210.85	482.	-22.	-0.012	127.22	1.172s
Cf-251	907.48	227.00	192.	22.	0.012	89.50	1.186
PB-212	953.99	238.63	73.	1010.	0.561	3.37	1.197D
PB-214	967.44	242.00	1389.	26.	0.015	201.71	1.200s
EU-152	978.22	244.69	1417.	27.	0.015	195.97	1.203
TH-227	1024.40	256.24	192.	-29.	-0.016	94.71	1.213s
TL-208	1108.54	277.28	75.	52.	0.029	27.12	1.233D
I-131	1136.60	284.30	116.	-4.	-0.002	529.54	1.239s
PB-214	1179.75	295.09	47.	201.	0.111	8.61	1.249D
PB-212	1199.51	300.03	49.	77.	0.043	17.08	1.253D
PA-231	1199.67	300.07	759.	20.	0.011	191.98	1.253s
PA-233	1200.11	300.18	779.	20.	0.011	194.52	1.253s
BA-133	1210.79	302.85	801.	0.	0.000	1000.00	1.256
Ba-140	1218.78	304.85	801.	0.	0.000	1000.00	1.257
BI-210M	1218.97	304.90	801.	0.	0.000	1000.00	1.257
Ir-192	1233.14	308.44	801.	0.	0.000	1000.00	1.261s
Ir-192	1265.33	316.49	473.	29.	0.016	108.48	1.268s
CR-51	1279.70	320.08	159.	19.	0.010	97.84	1.271s
La-140	1314.40	328.76	620.	-8.	-0.004	230.77	1.279s
AC-228	1352.63	338.32	44.	196.	0.109	8.59	1.288D
Cs-136	1361.62	340.57	520.	-24.	-0.013	135.09	1.290s
EU-152	1376.48	344.29	452.	-24.	-0.014	69.46	1.293s
HF-181	1382.65	345.83	472.	-24.	-0.013	128.45	1.294s
PB-214	1406.87	351.89	56.	286.	0.159	7.91	1.161
BA-133	1423.33	356.00	438.	-21.	-0.012	140.98	1.303s
I-131	1457.25	364.48	87.	7.	0.004	265.64	1.311s
BA-133	1534.67	383.84	187.	19.	0.011	104.23	1.328s
Cf-249	1551.10	387.95	192.	19.	0.011	105.15	1.332s
SN-113	1566.06	391.69	228.	-20.	-0.011	94.92	1.335s
SB-125	1710.77	427.88	74.	7.	0.004	241.74	1.367s
AG-108M	1735.01	433.94	83.	-17.	-0.010	111.53	1.373

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
pm-146	1814.77	453.88	91.	-3.	-0.002	651.64	1.390s
SB-125	1852.71	463.37	70.	67.	0.037	21.47	1.399
Ir-192	1871.48	468.06	177.	-8.	-0.004	237.83	1.403s
BE-7	1909.62	477.60	207.	-24.	-0.013	88.91	1.411s
HF-181	1927.22	482.00	231.	-24.	-0.013	93.33	1.415s
La-140	1947.31	487.02	257.	-7.	-0.004	331.55	1.419s
RU-103	1987.44	497.05	44.	14.	0.008	96.84	1.428s
RH-106	2046.68	511.86	91.	103.	0.057	26.14	2.691s
Nd-147	2123.21	531.00	61.	-11.	-0.006	152.17	1.458s
Ba-140	2148.25	537.26	70.	-13.	-0.007	104.14	1.463s
CS-134	2252.15	563.24	42.	15.	0.009	92.99	1.486
CS-134	2276.48	569.32	70.	2.	0.001	595.82	1.491s
PA-234	2277.07	569.47	60.	11.	0.006	104.05	1.491s
BI-207	2278.00	569.70	63.	8.	0.004	144.70	1.491s
TL-208	2332.15	583.24	30.	342.	0.190	6.62	1.430
SB-125	2401.19	600.50	484.	-18.	-0.010	171.87	1.518s
SB-124	2410.11	602.73	466.	-18.	-0.010	168.45	1.519
CS-134	2418.03	604.71	448.	-5.	-0.003	653.17	1.521s
BI-214	2436.29	609.28	27.	250.	0.139	7.73	1.605
RU-103	2440.38	610.30	443.	0.	0.000	1000.00	1.526s
AG-108M	2456.31	614.28	443.	0.	0.000	1000.00	1.529s
PM-144	2471.43	618.06	443.	0.	0.000	1000.00	1.533s
RH-106	2486.85	621.92	424.	17.	0.010	170.61	1.536
I-131	2547.08	636.97	71.	-20.	-0.011	93.44	1.549s
AG-110M	2630.23	657.76	66.	16.	0.009	75.00	1.566
CS-137	2645.82	661.66	75.	10.	0.006	126.53	1.570s
PM-144	2785.35	696.54	71.	16.	0.009	79.70	1.599s
NB-94	2809.70	702.63	104.	-11.	-0.006	133.89	1.604s
SB-124	2890.33	722.79	126.	9.	0.005	186.53	1.621s
AG-108M	2890.93	722.94	135.	0.	0.000	1000.00	1.621s
EU-154	2892.61	723.36	135.	0.	0.000	1000.00	1.622s
ZR-95	2895.98	724.20	149.	-14.	-0.008	129.04	1.622s
BI-212	2908.48	727.32	28.	65.	0.036	21.26	1.422
pm-146	2942.07	735.72	71.	-10.	-0.005	127.85	1.632s
pm-146	2987.83	747.16	51.	6.	0.004	248.41	1.641s
ZR-95	3026.11	756.73	50.	18.	0.010	89.52	1.649s
AG-110M	3054.97	763.94	80.	4.	0.002	334.25	1.655s
NB-95	3062.35	765.79	54.	16.	0.009	68.70	1.657s
PA-234M	3064.84	766.41	53.	13.	0.007	84.95	1.657s
EU-152	3114.88	778.92	134.	-24.	-0.013	71.42	1.668s
BI-212	3140.88	785.42	99.	16.	0.009	88.83	1.673s
CS-134	3182.67	795.87	36.	31.	0.017	32.71	1.682s
CS-134	3207.01	801.95	94.	16.	0.009	91.96	1.687s
CO-58	3242.31	810.78	48.	8.	0.004	133.23	1.694s
La-140	3262.29	815.77	56.	0.	0.000	1000.00	1.698s
MN-54	3338.61	834.85	25.	10.	0.006	114.38	1.714s
Co-56	3386.31	846.77	25.	11.	0.006	104.38	1.723s
TL-208	3442.76	860.88	6.	71.	0.040	14.28	1.915s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
NB-94	3483.63	871.10	20.	6.	0.003	113.04	1.743s
PA-234	3521.37	880.53	110.	-19.	-0.011	80.35	1.751s
PA-234	3532.21	883.24	129.	-5.	-0.003	341.66	1.753s
AG-110M	3537.98	884.68	134.	0.	0.000	1000.00	1.754s
Sc-46	3556.37	889.28	100.	16.	0.009	90.85	1.758s
y-88	3591.42	898.04	40.	-4.	-0.002	228.28	1.765s
AC-228	3644.35	911.27	27.	255.	0.142	8.25	1.664
AG-110M	3749.25	937.49	37.	-2.	-0.001	598.81	1.797s
PA-234	3783.37	946.02	43.	-2.	-0.001	872.70	1.803s
EU-152	3855.75	964.11	134.	12.	0.007	135.60	1.818s
AC-228	3875.91	969.15	18.	100.	0.055	13.69	2.808s
EU-154	3984.66	996.33	76.	-17.	-0.009	76.56	1.844s
PA-234M	4003.33	1001.00	93.	-4.	-0.002	305.04	1.847
Co-56	4150.74	1037.84	16.	11.	0.006	85.77	1.876s
Cs-136	4191.67	1048.07	60.	-20.	-0.011	60.12	1.884s
RH-106	4200.83	1050.36	61.	10.	0.005	118.49	1.886s
BI-207	4254.05	1063.66	33.	-2.	-0.001	628.16	1.896s
Ga-68	4309.03	1077.40	21.	8.	0.004	141.62	1.907s
FE-59	4396.46	1099.25	37.	-5.	-0.003	263.98	1.924s
EU-152	4447.77	1112.07	144.	-16.	-0.009	105.91	1.934s
ZN-65	4461.66	1115.55	149.	-19.	-0.011	93.42	1.937s
BI-214	4480.03	1120.14	12.	75.	0.041	16.37	2.271
Sc-46	4481.68	1120.55	130.	-10.	-0.005	167.36	1.941s
Ta-182	4484.68	1121.30	100.	17.	0.009	88.85	1.941s
CO-60	4692.51	1173.24	28.	3.	0.001	472.11	1.981s
Ta-182	4755.78	1189.05	23.	14.	0.008	86.28	1.993s
Ta-182	4885.27	1221.41	29.	11.	0.006	112.78	2.017s
Co-56	4952.78	1238.28	46.	10.	0.006	160.30	2.030s
NA-22	5097.85	1274.53	28.	9.	0.005	93.26	2.057s
EU-154	5097.90	1274.54	37.	0.	0.000	1000.00	2.057s
FE-59	5166.14	1291.60	6.	21.	0.012	33.96	2.070s
CO-60	5329.84	1332.50	7.	1.	0.001	491.59	2.100s
AG-110M	5537.14	1384.30	24.	-4.	-0.002	300.00	2.138s
EU-152	5632.00	1408.00	19.	-4.	-0.002	164.66	2.155s
K-40	5843.08	1460.74	5.	434.	0.241	4.85	2.287
La-140	6385.31	1596.21	0.	9.	0.005	34.16	2.288s
SB-124	6764.67	1690.98	6.	3.	0.001	242.22	2.353s
BI-214	7058.94	1764.49	34.	12.	0.006	76.71	2.402
Co-56	7086.40	1771.35	36.	11.	0.006	84.00	2.407s
y-88	7345.46	1836.06	0.	7.	0.004	37.80	2.449s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample		COMMENTS
BE-7	C	-5.1536E+00					5.31E+01	
			477.60	-5.154E+00	?(	1.528E+01	8.89E+01 1.05E+01	G
NA-22	C	4.2287E-01					9.50E+02	
			1274.53	4.229E-01	?(	1.343E+00	9.33E+01 9.99E+01	G
K-40	N	2.2142E+02					4.66E+11	
			1460.83	2.214E+02	(P	6.545E+00	4.85E+00 1.07E+01	G
Sc-46	F	5.9460E-01					8.38E+01	
			889.28	5.946E-01	&(	1.812E+00	9.08E+01 1.00E+02	G
			1120.55	-4.319E-01	-	2.457E+00	1.67E+02 1.00E+02	G
CR-51	F	3.2697E+00					2.77E+01	
			320.08	3.270E+00	&(P	1.071E+01	9.78E+01 9.94E+00	G
MN-54	C	3.5022E-01					3.12E+02	
			834.85	3.502E-01	(	9.109E-01	1.14E+02 1.00E+02	G
FE-59	F	8.2256E-01					4.45E+01	
			1099.25	-4.094E-01	?(	2.394E+00	2.64E+02 5.65E+01	G
			1291.60	2.434E+00	?(	1.575E+00	3.40E+01 4.32E+01	G
Co-56	C	7.4276E-01					7.73E+01	
			846.77	3.896E-01	?(	9.213E-01	1.04E+02 9.99E+01	G
			1238.28	7.266E-01	(P	2.473E+00	1.60E+02 6.61E+01	G
			1037.84	3.316E+00	?(	6.264E+00	8.58E+01 1.41E+01	G
			1771.35	4.463E+00	?	1.263E+01	8.40E+01 1.55E+01	A
CO-57	C	5.3062E-01					2.72E+02	
			122.06	3.442E-01	?(	2.055E+00	1.79E+02 8.56E+01	G
			136.47	2.025E+00	?(	1.696E+01	2.51E+02 1.07E+01	G
CO-58	C	2.6392E-01					7.09E+01	
			810.78	2.639E-01	?(	1.209E+00	1.33E+02 9.95E+01	G
CO-60	F	9.1264E-02					1.93E+03	
			1332.50	6.068E-02	?(P	7.511E-01	4.92E+02 1.00E+02	G
			1173.24	1.219E-01	&(	1.258E+00	4.72E+02 9.99E+01	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
ZN-65	F	-1.6519E+00					2.44E+02	
			1115.55	-1.652E+00	?(	5.165E+00	9.34E+01	5.06E+01 G
NB-94	I	-6.1882E-02					7.41E+06	
			702.63	-3.468E-01	?(	1.576E+00	1.34E+02	9.79E+01 G
			871.10	2.173E-01	?(	8.530E-01	1.13E+02	9.99E+01 G
ZR-95	I	1.0735E+00					6.40E+01	
			756.73	1.074E+00	?(	2.127E+00	8.95E+01	5.45E+01 G
			724.20	-9.724E-01	-	4.236E+00	1.29E+02	4.42E+01 G
NB-95	I	5.3514E-01					6.40E+01	
			765.79	5.351E-01	&(	1.219E+00	6.87E+01	9.98E+01 G
RU-103	I	3.7709E-01					3.93E+01	
			497.05	3.771E-01	&(P	8.735E-01	9.68E+01	9.09E+01 G
			610.30	0.000E+00	-	4.841E+01	1.00E+03	5.75E+00 GA
RH-106	I	7.7233E+00					3.74E+02	
			621.92	4.866E+00	?(P	2.785E+01	1.71E+02	9.93E+00 G
			1050.36	2.591E+01	?(	1.046E+02	1.18E+02	1.56E+00 G
			511.86	1.249E+01	?	5.717E+00	2.61E+01	2.00E+01 GA
AG-108M	C	-4.1123E-01					1.53E+05	
			433.94	-4.112E-01	?(P	1.075E+00	1.12E+02	9.05E+01 G
			722.94	0.000E+00	+	1.963E+00	1.00E+03	9.08E+01 G
			614.28	0.000E+00	+	3.113E+00	1.00E+03	8.98E+01 G
AG-110M	F	3.1665E-01					2.50E+02	
			884.68	0.000E+00	?(	2.854E+00	1.00E+03	7.27E+01 G
			657.76	5.019E-01	?(P	1.253E+00	7.50E+01	9.46E+01 G
			937.49	-2.601E-01	+	3.475E+00	5.99E+02	3.44E+01 G
			1384.30	-8.579E-01	+	5.478E+00	3.00E+02	2.43E+01 G
			763.94	5.629E-01	?(	6.525E+00	3.34E+02	2.23E+01 G
SN-113	F	-6.3229E-01					1.15E+02	
			391.69	-6.323E-01	?(P	2.281E+00	9.49E+01	6.40E+01 G
SB-124	F	-4.1736E-02					6.02E+01	
			602.73	-5.096E-01	(	2.876E+00	1.68E+02	9.83E+01 G
			1690.98	3.418E-01	?(	1.851E+00	2.42E+02	4.78E+01 G
			722.79	2.515E+00	?(	1.598E+01	1.87E+02	1.08E+01 G
SB-125	I	4.1586E+00					1.01E+03	
			427.88	5.271E-01	?(	3.070E+00	2.42E+02	2.96E+01 G
			600.50	-2.792E+00	+	1.608E+01	1.72E+02	1.79E+01 G
			635.89	1.679E-01	%	9.090E+00	1.52E+03	1.13E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments
                          463.37 1.443E+01  (  8.978E+00 2.15E+01 1.05E+01 G

I-131    I   1.6788E-01                                     8.02E+00
                          364.48 1.679E-01 ?(P 1.071E+00 2.66E+02 8.17E+01 G
                          284.30-1.038E+00 +   1.372E+01 5.30E+02 6.14E+00 G
                          636.97-7.822E+00 +   1.666E+01 9.34E+01 7.17E+00 G

Gd-153   F  -1.3197E+00                                     2.42E+02
                           97.50-1.320E+00 ?(  1.004E+01 2.29E+02 3.00E+01 G
                          103.20-1.801E+00 +   1.350E+01 2.26E+02 2.18E+01 G

Ga-68    C   1.1597E+01                                     4.71E-02
                         1077.40 1.160E+01 ?(  3.666E+01 1.42E+02 3.30E+00 G

BA-133   F  -6.3868E-01                                     3.85E+03
                          356.00-6.387E-01 ?(  3.013E+00 1.41E+02 6.20E+01 G
                          302.85 0.000E+00 +   1.222E+01 1.00E+03 1.83E+01 G
                          383.84 4.191E+00 ?   1.464E+01 1.04E+02 8.94E+00 GA
                           80.99-1.250E+00 + P 1.009E+01 6.46E+01 3.41E+01 GA

CS-134   I   8.8199E-01                                     7.54E+02
                          604.71-1.290E-01 &(  2.846E+00 6.53E+02 9.76E+01 G
                          795.87 1.225E+00 ?(  1.210E+00 3.27E+01 8.55E+01 G
                          569.32 3.410E-01 ?(  7.110E+00 5.96E+02 1.54E+01 G
                          801.95 6.062E+00 ?(  1.871E+01 9.20E+01 8.69E+00 G
                          563.24 4.796E+00 &(P 1.027E+01 9.30E+01 8.35E+00 G

CS-137   I   3.4425E-01                                     1.10E+04
                          661.66 3.443E-01 ?(  1.483E+00 1.27E+02 8.52E+01 G

CE-139   F  -4.3170E-01                                     1.38E+02
                          165.85-4.317E-01 ?(  1.339E+00 9.32E+01 7.99E+01 G

Ba-140   I  -4.8539E-01                                     1.28E+01
                          537.26-1.389E+00 ?(P 4.309E+00 1.04E+02 2.44E+01 G
                          162.66 3.059E+00 &(  1.640E+01 1.60E+02 6.22E+00 G
                          304.85 0.000E+00 +   5.246E+01 1.00E+03 4.29E+00 G

La-140   I   5.4487E-01                                     1.28E+01
                         1596.21 5.449E-01 ?(P 4.516E-01 3.42E+01 9.54E+01 G
                          487.02-3.537E-01 -   3.978E+00 3.32E+02 4.55E+01 G
                          328.76-6.946E-01 & P 1.031E+01 2.31E+02 2.03E+01 G
                          815.77 0.000E+00 -   5.553E+00 1.00E+03 2.33E+01 G

CE-141   I  -6.8942E-01                                     3.25E+01
                          145.44-6.894E-01 ?(P 3.989E+00 1.66E+02 4.82E+01 G
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Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PM-144	C 4.8443E-01					3.63E+02	
		696.54	4.844E-01	&(	1.290E+00	7.97E+01	9.90E+01 G
		618.06	0.000E+00	-	2.836E+00	1.00E+03	9.91E+01 G
EU-152	F -1.5367E-01					4.94E+03	
		344.29	-1.677E+00	?(P	6.996E+00	6.95E+01	2.65E+01 G
		1112.07	-5.285E+00	+	1.881E+01	1.06E+02	1.36E+01 G
		121.78	1.030E+00	+	6.122E+00	1.78E+02	2.86E+01 G
		778.92	-6.135E+00	+	1.453E+01	7.14E+01	1.29E+01 G
		964.11	3.310E+00	+ P	1.518E+01	1.36E+02	1.46E+01 G
		244.69	5.173E+00	&(P	3.375E+01	1.96E+02	7.58E+00 G
		1408.00	-9.215E-01	+ P	5.743E+00	1.65E+02	2.10E+01 GA
EU-154	I 1.6508E-01					3.14E+03	
		873.23	1.969E-01	%(	8.507E+00	1.19E+03	1.23E+01 G
		123.10	1.555E-01	&(	4.362E+00	8.39E+02	4.08E+01 G
		1274.54	0.000E+00	-	4.303E+00	1.00E+03	3.52E+01 G
		723.36	0.000E+00	-	8.825E+00	1.00E+03	2.02E+01 G
		1004.77	2.244E-01	%	1.089E+01	1.39E+03	1.80E+01 G
		996.33	-6.425E+00	+	1.640E+01	7.66E+01	1.06E+01 G
EU-155	I -1.8496E+00					1.81E+03	
		105.31	-1.850E+00	(	1.370E+01	2.23E+02	2.12E+01 G
		86.54	-1.338E+00	+	1.069E+01	2.41E+02	3.07E+01 G
HF-181	F -6.7981E-01					4.24E+01	
		482.00	-6.798E-01	@(	2.117E+00	9.33E+01	8.05E+01 G
		133.02	0.000E+00	+	4.184E+00	1.00E+03	4.33E+01 G
		345.83	-2.937E+00	+	1.261E+01	1.28E+02	1.51E+01 G
		136.30	0.000E+00	+	3.119E+01	1.00E+03	5.85E+00 G
Ta-182	F 2.4331E+00					1.14E+02	
		1121.30	2.087E+00	?(	6.215E+00	8.89E+01	3.49E+01 G
		1221.41	2.005E+00	?(P	4.818E+00	1.13E+02	2.70E+01 G
		1189.05	3.891E+00	&(P	7.120E+00	8.63E+01	1.62E+01 G
Hg-203	F 2.5168E-02					4.66E+01	
		279.20	2.517E-02	%(	1.377E+00	1.60E+03	8.15E+01 G
TL-208	N 1.0790E+01					6.98E+02	
		583.02	1.079E+01	(P	8.976E-01	6.62E+00	8.45E+01 G
		277.28	1.299E+01	+	1.066E+01	2.71E+01	6.31E+00 G
		860.56	2.052E+01	+ P	4.044E+00	1.43E+01	1.24E+01 G
pm-146	C 6.0160E-01					2.02E+03	
		747.16	6.016E-01	&(P	3.394E+00	2.48E+02	3.40E+01 G
		735.72	-1.355E+00	+ P	5.915E+00	1.28E+02	2.25E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			453.88	-1.025E-01	-	1.611E+00	6.52E+02	6.50E+01 G
y-88	F	1.5179E-01					1.07E+02	
			898.04	-1.771E-01	?(P	1.279E+00	2.28E+02	9.37E+01 G
			1836.06	4.625E-01	?(	4.869E-01	3.78E+01	9.92E+01 G
Cd-113m		3.3601E+02					5.33E+03	
			263.70	3.360E+02	&(	1.337E+04	1.15E+03	6.00E-03 K
Cd-109	F	-1.0760E+01					4.53E+02	
			88.04	-1.076E+01	?(	8.457E+01	2.37E+02	3.79E+00 G
Cf-251	T	-3.3924E-01					3.28E+05	
			176.60	-3.392E-01	&(	4.787E+00	5.72E+02	1.70E+01 G
			227.00	4.874E+00	&	1.456E+01	8.95E+01	6.30E+00 GA
Cf-249	T	5.7350E-01					1.28E+05	
			387.95	5.735E-01	?(	2.021E+00	1.05E+02	6.60E+01 G
			333.44	3.821E-01	%	1.351E+01	1.05E+03	1.55E+01 G
Sn-126		4.3714E+00					3.65E+07	
			87.57	-1.090E+00	-	8.625E+00	2.39E+02	3.75E+01 GA
			64.28	4.371E+00	(	1.605E+01	1.10E+02	9.70E+00 G
			86.94	-4.533E+00	+	3.607E+01	2.40E+02	9.04E+00 GA
PB-210	N	-7.7314E+00					8.14E+03	
			46.54	-7.731E+00	?(	4.544E+01	1.75E+02	4.25E+00 G
PB-212	N	3.2939E+01					6.98E+02	
			238.63	3.294E+01	(	1.390E+00	3.37E+00	4.33E+01 G
			300.03	3.901E+01	+	1.775E+01	1.71E+01	3.28E+00 GA
PB-214	N	1.4055E+01					5.84E+05	
			351.93	1.405E+01	(P	1.854E+00	7.91E+00	3.76E+01 G
			295.09	1.700E+01	+ P	2.945E+00	8.61E+00	1.93E+01 G
			242.00	5.037E+00	& P	3.384E+01	2.02E+02	7.43E+00 GA
BI-207	C	2.1476E-01					1.18E+04	
			569.70	2.148E-01	?(	1.066E+00	1.45E+02	9.77E+01 G
			1063.66	-1.245E-01	+ P	1.677E+00	6.28E+02	7.45E+01 G
BI-212	N	2.7129E+01					6.98E+02	
			727.17	2.713E+01	(	1.142E+01	2.13E+01	7.55E+00 G
			785.42	4.295E+01	&	1.279E+02	8.88E+01	1.28E+00 GA
BI-214	N	1.4945E+01					5.84E+05	
			609.31	1.494E+01	(P	1.619E+00	7.73E+00	4.61E+01 G
			1120.29	2.175E+01	+ P	5.576E+00	1.64E+01	1.51E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			1764.49	4.796E+00	- P	1.228E+01	7.67E+01	1.54E+01 G
BI-210M	T	2.6090E-02					1.10E+09	
			265.83	2.609E-02	&(P	1.680E+00	2.57E+03	5.00E+01 G
			304.90	0.000E+00	-	8.039E+00	1.00E+03	2.80E+01 G
AC-228	N	3.1946E+01					2.10E+03	
			911.07	3.300E+01	(P	3.451E+00	8.25E+00	2.90E+01 G
			968.97	2.240E+01	- P	5.118E+00	1.37E+01	1.75E+01 G
			338.32	2.941E+01	(P	5.019E+00	8.59E+00	1.20E+01 G
			93.35	-7.192E+00	-	5.518E+01	2.31E+02	5.56E+00 XA
TH-229	N	7.5212E+00					2.68E+06	
			193.51	7.521E+00	&(	1.855E+01	1.01E+02	4.40E+00 G
			210.85	-9.765E+00	& P	4.562E+01	1.27E+02	2.99E+00 G
TH-234	N	1.5942E+01					1.63E+12	
			63.29	1.900E+01	(P	2.375E+01	4.66E+01	3.81E+00 G
			92.59	1.385E+01	(	1.549E+01	3.48E+01	5.58E+00 G
PA-231	N	6.7491E+00					1.20E+07	
			302.65	7.840E-01	%(	7.769E+01	2.95E+03	2.88E+00 G
			300.07	1.373E+01	(	8.812E+01	1.92E+02	2.46E+00 G
PA-233	C	7.5522E-01					7.82E+08	
			312.01	-5.336E-02	%(P	6.359E+00	1.54E+03	3.60E+01 G
			300.18	5.450E+00	(	3.543E+01	1.95E+02	6.20E+00 G
PA-234	N	9.9857E-01					1.63E+12	
			131.29	-1.495E-01	&(P	1.004E+01	9.41E+02	1.80E+01 G
			946.02	-6.963E-01	& P	9.617E+00	8.73E+02	1.34E+01 G
			569.47	3.519E+00	?(	1.241E+01	1.04E+02	8.20E+00 G
			883.24	-1.809E+00	+	2.121E+01	3.42E+02	9.60E+00 G
			880.53	-1.171E+01	&	3.136E+01	8.03E+01	6.00E+00 GA
PA-234M	N	2.1383E+01					1.63E+12	
			1001.00	-2.160E+01	?(P	2.299E+02	3.05E+02	8.37E-01 G
			766.41	1.437E+02	&(	4.103E+02	8.49E+01	2.94E-01 G
U-235	N	4.2176E+00					2.57E+11	
			143.79	2.800E+00	?(P	1.672E+01	1.79E+02	1.10E+01 G
			205.33	6.667E+00	?(P	2.427E+01	1.09E+02	5.01E+00 G
			163.38	4.861E+00	?(	2.000E+01	1.23E+02	5.08E+00 G
AM-241	T	2.7933E-01					1.58E+05	
			59.54	2.793E-01	&(P	4.465E+00	4.75E+02	3.59E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

Np-237   F  -3.1355E+00                                      2.14E+06
                           86.49-3.135E+00  (  2.518E+01 2.42E+02 1.31E+01 G

Ir-192   F   5.6763E-01                                      7.40E+01
                          316.49 5.676E-01 ?(  2.052E+00 1.08E+02 8.70E+01 G
                          468.06-3.510E-01 -   2.839E+00 2.38E+02 5.18E+01 G
                          308.44 0.000E+00 -   7.147E+00 1.00E+03 3.18E+01 G

Cs-136   F   1.7244E-02                                      1.30E+01
                          818.50 1.724E-02 %(  1.323E+00 2.17E+03 1.00E+02 G
                         1048.07-1.027E+00 +   2.026E+00 6.01E+01 8.00E+01 G
                          340.57-9.303E-01 +   4.198E+00 1.35E+02 4.69E+01 G

Np-239   T  -1.7348E+00                                      2.36E+00
                          103.70-1.635E+00 &   1.219E+01 2.25E+02 2.40E+01 X
                          106.13-1.735E+00 &(  1.269E+01 2.21E+02 2.27E+01 G
                           99.50-2.630E+00 +   1.987E+01 2.28E+02 1.50E+01 X

Nd-147      -2.0438E+00                                      1.11E+01
                          531.00-2.044E+00 ?(  7.474E+00 1.52E+02 1.30E+01 G
                           91.10-1.424E+00 +   1.111E+01 2.35E+02 2.83E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
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M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
A - Not in Average
C - Coincidence Peak

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
PB-210	46.54	384.	-16.	-0.009	175.00	-7.731E+00	
AM-241	59.54	527.	7.	0.004	474.76	2.793E-01	P
BA-133	80.99	4319.	-38.	-0.021	64.58	-1.250E+00	P
Np-237	86.49	4281.	-38.	-0.021	242.08	-3.135E+00	
EU-155	86.54	4243.	-38.	-0.021	241.00	-1.338E+00	
Cd-109	88.04	4111.	-38.	-0.021	236.93	-1.076E+01	
Nd-147	91.10	4073.	-38.	-0.021	235.20	-1.424E+00	
Gd-153	97.50	3914.	-39.	-0.021	229.27	-1.320E+00	
Np-239	99.50	3875.	-39.	-0.022	227.74	-2.630E+00	
Gd-153	103.20	3836.	-39.	-0.022	225.91	-1.801E+00	
Np-239	103.70	3797.	-39.	-0.022	224.67	-1.635E+00	
EU-155	105.31	3758.	-39.	-0.022	223.18	-1.850E+00	
Np-239	106.13	3708.	-39.	-0.022	220.54	-1.735E+00	
EU-152	121.78	1354.	29.	0.016	178.46	1.030E+00	
EU-154	123.10	1397.	6.	0.004	839.23	1.555E-01	
PA-234	131.29	1406.	-3.	-0.001	940.76	-1.495E-01	P
CE-141	145.44	1486.	-32.	-0.018	166.49	-6.894E-01	P
Ba-140	162.66	360.	17.	0.009	159.69	3.059E+00	
CE-139	165.85	406.	-31.	-0.017	93.22	-4.317E-01	
Cf-251	176.60	212.	-5.	-0.003	571.90	-3.392E-01	
TH-229	193.51	188.	27.	0.015	101.27	7.521E+00	
TH-229	210.85	482.	-22.	-0.012	127.22	-9.765E+00	P
Cf-251	227.00	192.	22.	0.012	89.50	4.874E+00	
EU-152	244.69	1417.	27.	0.015	195.97	5.173E+00	P
TH-227	256.24	192.	-29.	-0.016	94.71	-6.186E+00	
I-131	284.30	116.	-4.	-0.002	529.54	-1.038E+00	
PA-231	300.07	759.	20.	0.011	191.98	1.373E+01	
PA-233	300.18	779.	20.	0.011	194.52	5.450E+00	
Ir-192	316.49	473.	29.	0.016	108.48	5.676E-01	
CR-51	320.08	159.	19.	0.010	97.84	3.270E+00	P
Cs-136	340.57	520.	-24.	-0.013	135.09	-9.303E-01	
EU-152	344.29	452.	-24.	-0.014	69.46	-1.677E+00	P
HF-181	345.83	472.	-24.	-0.013	128.45	-2.937E+00	
BA-133	356.00	438.	-21.	-0.012	140.98	-6.387E-01	
I-131	364.48	87.	7.	0.004	265.64	1.679E-01	P
BA-133	383.84	187.	19.	0.011	104.23	4.191E+00	
SN-113	391.69	228.	-20.	-0.011	94.92	-6.323E-01	P
AG-108M	433.94	83.	-17.	-0.010	111.53	-4.112E-01	P
pm-146	453.88	91.	-3.	-0.002	651.64	-1.025E-01	
Ir-192	468.06	177.	-8.	-0.004	237.83	-3.510E-01	
BE-7	477.60	207.	-24.	-0.013	88.91	-5.154E+00	
HF-181	482.00	231.	-24.	-0.013	93.33	-6.798E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RU-103	497.05	44.	14.	0.008	96.84	3.771E-01	P
RH-106	511.86	91.	103.	0.057	26.14	1.249E+01	
Nd-147	531.00	61.	-11.	-0.006	152.17	-2.044E+00	
Ba-140	537.26	70.	-13.	-0.007	104.14	-1.389E+00	P
CS-134	563.24	42.	15.	0.009	92.99	4.796E+00	P
CS-134	569.32	70.	2.	0.001	595.82	3.410E-01	
PA-234	569.47	60.	11.	0.006	104.05	3.519E+00	
BI-207	569.70	63.	8.	0.004	144.70	2.148E-01	
SB-124	602.73	466.	-18.	-0.010	168.45	-5.096E-01	
CS-134	604.71	448.	-5.	-0.003	653.17	-1.290E-01	
RH-106	621.92	424.	17.	0.010	170.61	4.866E+00	P
I-131	636.97	71.	-20.	-0.011	93.44	-7.822E+00	
AG-110M	657.76	66.	16.	0.009	75.00	5.019E-01	P
CS-137	661.66	75.	10.	0.006	126.53	3.443E-01	
PM-144	696.54	71.	16.	0.009	79.70	4.844E-01	
NB-94	702.63	104.	-11.	-0.006	133.89	-3.468E-01	
SB-124	722.79	126.	9.	0.005	186.53	2.515E+00	
ZR-95	724.20	149.	-14.	-0.008	129.04	-9.724E-01	
pm-146	735.72	71.	-10.	-0.005	127.85	-1.355E+00	P
pm-146	747.16	51.	6.	0.004	248.41	6.016E-01	P
ZR-95	756.73	50.	18.	0.010	89.52	1.074E+00	
AG-110M	763.94	80.	4.	0.002	334.25	5.629E-01	
NB-95	765.79	54.	16.	0.009	68.70	5.351E-01	
PA-234M	766.41	53.	13.	0.007	84.95	1.437E+02	
EU-152	778.92	134.	-24.	-0.013	71.42	-6.135E+00	
CS-134	795.87	36.	31.	0.017	32.71	1.225E+00	
CS-134	801.95	94.	16.	0.009	91.96	6.062E+00	
CO-58	810.78	48.	8.	0.004	133.23	2.639E-01	
MN-54	834.85	25.	10.	0.006	114.38	3.502E-01	
Co-56	846.77	25.	11.	0.006	104.38	3.896E-01	
NB-94	871.10	20.	6.	0.003	113.04	2.173E-01	
PA-234	880.53	110.	-19.	-0.011	80.35	-1.171E+01	
PA-234	883.24	129.	-5.	-0.003	341.66	-1.809E+00	
Sc-46	889.28	100.	16.	0.009	90.85	5.946E-01	
y-88	898.04	40.	-4.	-0.002	228.28	-1.771E-01	P
AG-110M	937.49	37.	-2.	-0.001	598.81	-2.601E-01	
PA-234	946.02	43.	-2.	-0.001	872.70	-6.963E-01	P
EU-152	964.11	134.	12.	0.007	135.60	3.310E+00	P
EU-154	996.33	76.	-17.	-0.009	76.56	-6.425E+00	
PA-234M	1001.00	93.	-4.	-0.002	305.04	-2.160E+01	P
Co-56	1037.84	16.	11.	0.006	85.77	3.316E+00	
Cs-136	1048.07	60.	-20.	-0.011	60.12	-1.027E+00	
RH-106	1050.36	61.	10.	0.005	118.49	2.591E+01	
BI-207	1063.66	33.	-2.	-0.001	628.16	-1.245E-01	P
Ga-68	1077.40	21.	8.	0.004	141.62	1.160E+01	
FE-59	1099.25	37.	-5.	-0.003	263.98	-4.094E-01	
EU-152	1112.07	144.	-16.	-0.009	105.91	-5.285E+00	
ZN-65	1115.55	149.	-19.	-0.011	93.42	-1.652E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
Sc-46	1120.55	130.	-10.	-0.005	167.36	-4.319E-01		
Ta-182	1121.30	100.	17.	0.009	88.85	2.087E+00		
CO-60	1173.24	28.	3.	0.001	472.11	1.219E-01		
Ta-182	1189.05	23.	14.	0.008	86.28	3.891E+00		P
Ta-182	1221.41	29.	11.	0.006	112.78	2.005E+00		P
Co-56	1238.28	46.	10.	0.006	160.30	7.266E-01		P
NA-22	1274.53	28.	9.	0.005	93.26	4.229E-01		
FE-59	1291.60	6.	21.	0.012	33.96	2.434E+00		
CO-60	1332.50	7.	1.	0.001	491.59	6.068E-02		P
AG-110M	1384.30	24.	-4.	-0.002	300.00	-8.579E-01		
EU-152	1408.00	19.	-4.	-0.002	164.66	-9.215E-01		P
SB-124	1690.98	6.	3.	0.001	242.22	3.418E-01		
Co-56	1771.35	36.	11.	0.006	84.00	4.463E+00		
y-88	1836.06	0.	7.	0.004	37.80	4.625E-01		

P - Peakbackground subtraction

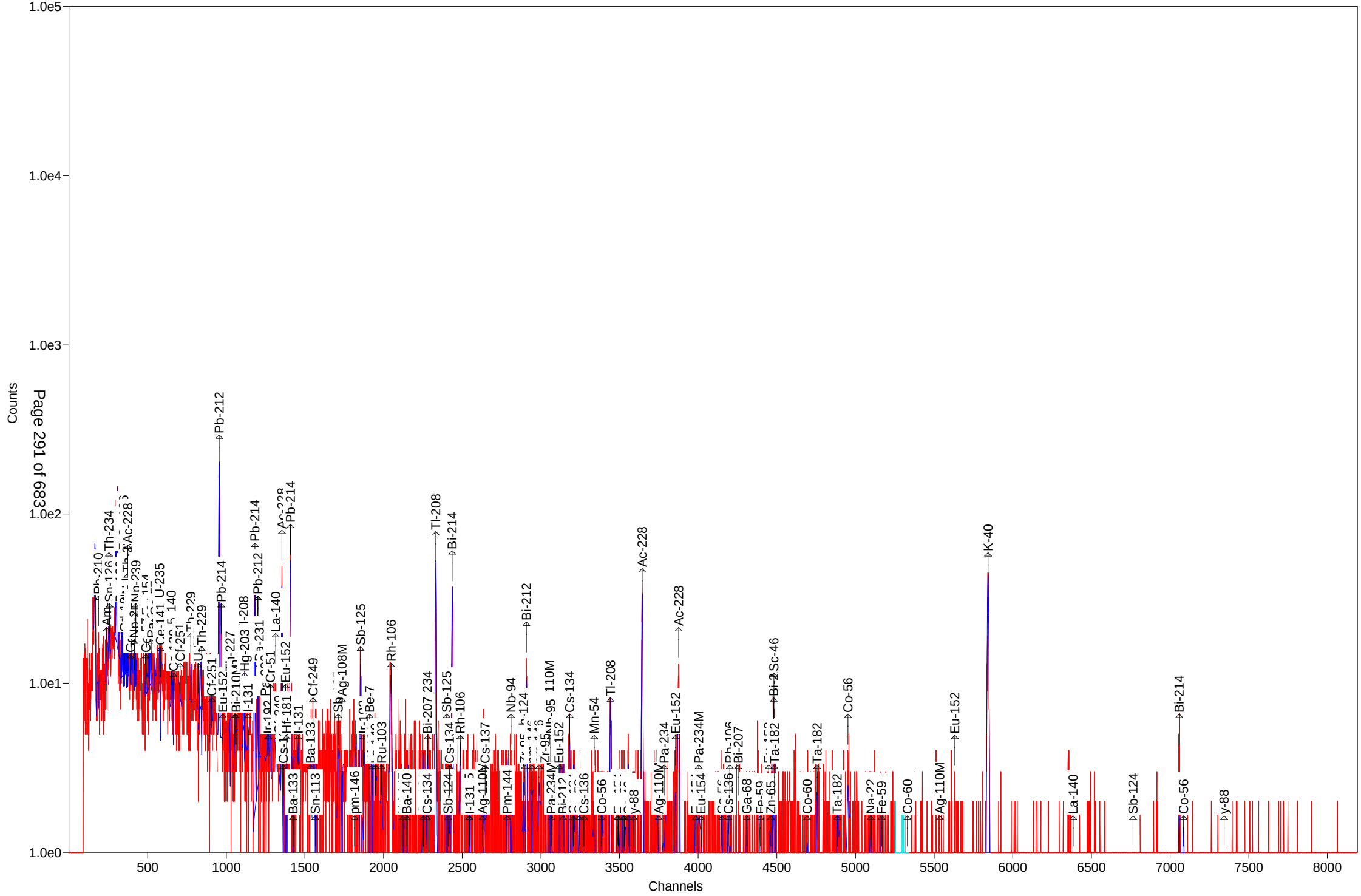
***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	-5.1536E+00	-5.1536E+00	8.891E+01%	1.53E+01
NA-22	#A	4.2287E-01	4.2287E-01	9.326E+01%	1.34E+00
K-40		2.2142E+02	2.2142E+02	4.854E+00%	6.54E+00
Sc-46	#A	5.9459E-01	5.9460E-01	9.085E+01%	1.81E+00
CR-51	#A	3.2697E+00	3.2697E+00	9.784E+01%	1.07E+01
MN-54	#A	3.5022E-01	3.5022E-01	1.144E+02%	9.11E-01
FE-59	#A	8.2255E-01	8.2256E-01	3.396E+01%	2.39E+00
Co-56	#A	7.4275E-01	7.4276E-01	6.988E+01%	9.21E-01
CO-57	#A	5.3062E-01	5.3062E-01	1.544E+02%	2.05E+00
CO-58	#A	2.6392E-01	2.6392E-01	1.332E+02%	1.21E+00
CO-60	#A	9.1264E-02	9.1264E-02	3.408E+02%	7.51E-01
ZN-65	#A	-1.6519E+00	-1.6519E+00	9.342E+01%	5.16E+00
NB-94	#A	-6.1882E-02	-6.1882E-02	8.761E+01%	1.58E+00
ZR-95	#A	1.0735E+00	1.0735E+00	8.952E+01%	2.13E+00
NB-95	#A	5.3514E-01	5.3514E-01	6.870E+01%	1.22E+00
RU-103	#A	3.7709E-01	3.7709E-01	9.684E+01%	8.74E-01
RH-106	#A	7.7233E+00	7.7233E+00	1.039E+02%	2.78E+01
AG-108M	#A	-4.1123E-01	-4.1123E-01	1.115E+02%	1.07E+00
AG-110M	#A	3.1665E-01	3.1665E-01	7.500E+01%	2.85E+00
SN-113	#A	-6.3229E-01	-6.3229E-01	9.492E+01%	2.28E+00
SB-124	#A	-4.1736E-02	-4.1736E-02	1.164E+02%	2.88E+00
SB-125	#C	4.1586E+00	4.1586E+00	2.147E+01%	3.07E+00
I-131	#A	1.6787E-01	1.6788E-01	2.656E+02%	1.07E+00
Gd-153	#A	-1.3197E+00	-1.3197E+00	2.293E+02%	1.00E+01
Ga-68	#A	1.1523E+01	1.1597E+01	1.416E+02%	3.67E+01
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.13E+00

BA-133 #A	-6.3868E-01	-6.3868E-01	1.410E+02%	3.01E+00
CS-134 #A	8.8199E-01	8.8199E-01	3.271E+01%	2.85E+00
CS-137 #A	3.4425E-01	3.4425E-01	1.265E+02%	1.48E+00
CE-139 #A	-4.3170E-01	-4.3170E-01	9.322E+01%	1.34E+00
Ba-140 #A	-4.8538E-01	-4.8539E-01	9.532E+01%	4.31E+00
La-140 #	5.4485E-01	5.4487E-01	3.416E+01%	4.52E-01
CE-141 #A	-6.8942E-01	-6.8942E-01	1.665E+02%	3.99E+00
CE-144 #A	0.0000E+00	0.0000E+00	1.000E+03%	1.64E+01
PM-144 #A	4.8443E-01	4.8443E-01	7.970E+01%	1.29E+00
EU-152 #A	-1.5367E-01	-1.5367E-01	6.946E+01%	7.00E+00
EU-154 #A	1.6508E-01	1.6508E-01	7.296E+02%	8.51E+00
EU-155 #A	-1.8496E+00	-1.8496E+00	2.232E+02%	1.37E+01
HF-181 #A	-6.7980E-01	-6.7981E-01	9.333E+01%	2.12E+00
Ta-182 #A	2.4331E+00	2.4331E+00	5.584E+01%	6.21E+00
Hg-203 #A	2.5168E-02	2.5168E-02	1.600E+03%	1.38E+00
TL-208	1.0790E+01	1.0790E+01	6.619E+00%	8.98E-01
pm-146 #A	6.0160E-01	6.0160E-01	2.484E+02%	3.39E+00
y-88 #A	1.5179E-01	1.5179E-01	3.780E+01%	1.28E+00
Cd-113m#B	3.3601E+02	3.3601E+02	1.149E+03%	1.34E+04
Cd-109 #A	-1.0760E+01	-1.0760E+01	2.369E+02%	8.46E+01
Cf-251 #A	-3.3924E-01	-3.3924E-01	5.719E+02%	4.79E+00
Cf-249 #A	5.7350E-01	5.7350E-01	1.051E+02%	2.02E+00
Sn-126 A	4.3714E+00	4.3714E+00	1.103E+02%	1.61E+01
PB-210 #A	-7.7314E+00	-7.7314E+00	1.750E+02%	4.54E+01
PB-212	3.2939E+01	3.2939E+01	3.367E+00%	1.39E+00
PB-214	1.4055E+01	1.4055E+01	7.910E+00%	1.85E+00
BI-207 #A	2.1476E-01	2.1476E-01	1.447E+02%	1.07E+00
BI-212	2.7129E+01	2.7129E+01	2.126E+01%	1.14E+01
BI-214	1.4945E+01	1.4945E+01	7.730E+00%	1.62E+00
BI-210M#A	2.6090E-02	2.6090E-02	2.568E+03%	1.68E+00
AC-228	3.1946E+01	3.1946E+01	5.953E+00%	3.45E+00
TH-227 #A	0.0000E+00	0.0000E+00	1.000E+03%	2.20E+01
TH-229 #A	7.5212E+00	7.5212E+00	1.013E+02%	1.86E+01
TH-234 A	1.5942E+01	1.5942E+01	2.907E+01%	2.37E+01
PA-231 #A	6.7491E+00	6.7491E+00	1.920E+02%	7.77E+01
PA-233 #A	7.5522E-01	7.5522E-01	1.945E+02%	6.36E+00
PA-234 #A	9.9857E-01	9.9857E-01	1.041E+02%	1.00E+01
PA-234M#A	2.1383E+01	2.1383E+01	8.495E+01%	2.30E+02
U-235 #A	4.2176E+00	4.2176E+00	8.111E+01%	1.67E+01
AM-241 #A	2.7933E-01	2.7933E-01	4.748E+02%	4.47E+00
Np-237 #A	-3.1355E+00	-3.1355E+00	2.421E+02%	2.52E+01
Ir-192 #A	5.6763E-01	5.6763E-01	1.085E+02%	2.05E+00
Cs-136 #A	1.7244E-02	1.7244E-02	2.168E+03%	1.32E+00
Np-239 #A	-1.7346E+00	-1.7348E+00	2.205E+02%	1.27E+01
Nd-147 #A	-2.0437E+00	-2.0438E+00	1.522E+02%	7.47E+00

```
  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded
-----------------------------   S U M M A R Y   ----------------------------
Total Activity (   37.6 to  1999.5 keV)     3.692E+02  Bq/Sample
Total Decayed Activity (   37.6 to  1999.5 keV) 3.6916733E+02  Bq/Sample
```

264537_Gamma_160-18552-A-1-B. 13_Gamma_20160730.spc.



Test America St. Louis Spectrum ID: 12_Gamma_20161868

Sample Description: 264537_Gamma_160-18552-A-1-C DU
Detector: Detector #12
Batch ID: 264537
Work Order Number: Gamma
Lot Number: 160-18552-A-1-C DU

Decay to Time: 9/1/2016 11:36 Live Time: 1800 sec
Acquisition Time: 9/1/2016 11:37:04 Real Time: 1813 sec
Analysis Time: 9/1/2016 12:07 Dead Time: 0.71 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 12_Soil_TunaCan.Clb
Efficiency Cal Desc: 12_TunaCanCal_90099_100212
Efficiency Cal Date: 10/4/2012 09:05
Energy Cal Date: 2/28/2012 13:26
Library: Client_Long_Rev11.lib
Bkgd Correction File: 12_2016-08-07_1353.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	4.446E+00	105.9	4.710E+00	4.716E+00	1.582E+01
NA-22	3.943E-01	61.7	2.431E-01	2.439E-01	7.844E-01
K-40	2.399E+02	5.1	1.226E+01	1.735E+01	8.496E+00
Sc-46	-2.132E-01	265.4	5.658E-01	5.659E-01	1.956E+00
CR-51	0.000E+00	1.#INF	1.557E+00	1.557E+00	2.214E+01
MN-54	9.133E-01	42.6	3.887E-01	3.916E-01	8.548E-01
FE-59	-3.342E-01	209.8	7.011E-01	7.013E-01	2.239E+00
Co-56	1.116E+00	43.6	4.873E-01	4.906E-01	8.569E-01
CO-57	-2.390E-02	1431.2	3.420E-01	3.420E-01	1.164E+00
CO-58	-7.172E-01	83.7	6.003E-01	6.015E-01	2.007E+00
CO-60	7.516E-02	89.1	6.697E-02	6.708E-02	1.504E+00
ZN-65	0.000E+00	1.#INF	2.933E-01	2.933E-01	4.941E+00
NB-94	-1.283E-01	421.2	5.404E-01	5.405E-01	1.589E+00
ZR-95	7.372E-01	122.1	9.002E-01	9.010E-01	2.107E+00
NB-95	6.684E-01	79.8	5.333E-01	5.344E-01	1.781E+00
RU-103	1.895E-01	248.7	4.713E-01	4.714E-01	1.147E+00
RH-106	-3.622E+00	111.0	4.022E+00	4.026E+00	3.343E+01
AG-108M	3.744E-01	119.9	4.489E-01	4.493E-01	1.118E+00
AG-110M	4.519E-01	87.6	3.959E-01	3.965E-01	2.346E+00
SN-113	5.527E-01	109.3	6.040E-01	6.047E-01	2.035E+00
SB-124	4.984E-02	583.1	2.906E-01	2.906E-01	3.227E+00
SB-125	3.533E+00	25.6	9.053E-01	9.231E-01	3.869E+00
I-131	4.762E-01	101.6	4.840E-01	4.846E-01	1.197E+00
Gd-153	1.259E+00	92.5	1.164E+00	1.167E+00	4.897E+00
Ga-68	-1.819E+00	1289.7	2.346E+01	2.346E+01	5.287E+01
Tc-99m	-4.624E-01	154.5	7.144E-01	7.149E-01	2.378E+00
BA-133	-7.183E-01	151.2	1.086E+00	1.087E+00	3.639E+00
CS-134	5.432E-01	51.6	2.802E-01	2.816E-01	3.448E+00
CS-137	6.017E-01	85.4	5.141E-01	5.151E-01	1.725E+00
CE-139	4.191E-01	100.7	4.221E-01	4.240E-01	1.409E+00
Ba-140	1.004E+00	104.5	1.050E+00	1.051E+00	4.731E+00
La-140	-1.496E-01	83.9	1.256E-01	1.258E-01	1.638E+00
CE-141	-8.412E-01	163.3	1.374E+00	1.374E+00	4.571E+00

CE-144	-3.446E+00	151.8	5.232E+00	5.235E+00	1.742E+01
PM-144	4.271E-01	123.4	5.269E-01	5.273E-01	1.227E+00
EU-152	7.208E-01	117.3	8.456E-01	8.464E-01	7.767E+00
EU-154	3.846E+00	63.2	2.432E+00	2.440E+00	1.428E+01
EU-155	0.000E+00	1.#INF	1.067E+00	1.067E+00	6.669E+00
HF-181	1.361E-01	469.9	6.396E-01	6.396E-01	2.190E+00
Ta-182	2.426E+00	75.7	1.836E+00	1.840E+00	6.160E+00
Hg-203	-4.082E-01	118.2	4.826E-01	4.832E-01	1.621E+00
TL-208	1.155E+01	7.6	8.831E-01	1.067E+00	1.297E+00
pm-146	3.829E-01	198.2	7.590E-01	7.593E-01	3.745E+00
y-88	-4.755E-01	120.2	5.714E-01	5.719E-01	1.527E+00
Cd-113m	-7.582E+03	115.9	8.790E+03	8.803E+03	2.936E+04
Cd-109	0.000E+00	1.#INF	1.595E+01	1.595E+01	5.348E+01
Cf-251	1.942E-01	1140.5	2.215E+00	2.215E+00	5.734E+00
Cf-249	6.464E-01	102.1	6.598E-01	6.607E-01	2.528E+00
Sn-126	-5.370E+00	92.2	4.953E+00	4.961E+00	1.647E+01
PB-210	-3.339E+01	38.4	1.281E+01	1.296E+01	6.413E+01
PB-212	3.473E+01	3.8	1.317E+00	2.604E+00	2.052E+00
PB-214	1.592E+01	8.2	1.311E+00	1.550E+00	2.320E+00
BI-207	2.226E-01	89.0	1.981E-01	1.984E-01	1.243E+00
BI-212	3.608E+01	15.6	5.641E+00	5.944E+00	1.017E+01
BI-214	1.402E+01	9.7	1.355E+00	1.538E+00	2.294E+00
BI-210M	-8.830E-01	109.6	9.681E-01	9.695E-01	3.234E+00
AC-228	3.515E+01	5.3	1.878E+00	2.597E+00	2.504E+00
TH-227	6.163E+00	113.4	6.986E+00	6.994E+00	2.337E+01
TH-229	-2.276E-01	3876.9	8.823E+00	8.823E+00	2.289E+01
TH-234	1.178E+01	40.6	4.784E+00	4.824E+00	2.664E+01
PA-231	0.000E+00	1.#INF	3.981E+00	3.981E+00	7.353E+01
PA-233	0.000E+00	1.#INF	5.975E-01	5.975E-01	6.007E+00
PA-234	-7.818E-02	134.5	1.052E-01	1.053E-01	1.061E+01
PA-234M	4.133E+01	76.3	3.156E+01	3.162E+01	2.274E+02
U-235	-4.179E+00	67.8	2.832E+00	2.840E+00	1.924E+01
AM-241	-3.297E-02	5186.2	1.710E+00	1.710E+00	5.768E+00
Np-237	0.000E+00	1.#INF	5.004E+00	5.004E+00	1.666E+01
Ir-192	2.925E-01	118.3	3.461E-01	3.465E-01	2.509E+00
Cs-136	-6.218E-01	101.3	6.298E-01	6.308E-01	1.450E+00
Np-239	1.308E+00	107.3	1.404E+00	1.406E+00	4.688E+00
Nd-147	-3.706E+00	105.9	3.923E+00	3.929E+00	9.330E+00
Total	4.750E+02				

Analyst: kody Saulters

Sample description
264537_Gamma_160-18552-A-1-C DU

Spectrum Filename: C:\User\SPC\Det12\12_Gamma_20161868.An1

Acquisition information
Start time: 9/1/2016 11:37:04 AM
Live time: 1800
Real time: 1813
Dead time: 0.71 %
Detector ID: 12

Detector system
Ge12 S/N10034336

Calibration
Filename: 12_Soil_TunaCan.Clb
12_TunaCanCal_90099_100212

Energy Calibration
Created: 2/28/2012 1:26:42 PM
Zero offset: 0.049 keV
Gain: 0.250 keV/channel
Quadratic: -3.945E-08 keV/channel^2

Efficiency Calibration
Created: 10/4/2012 9:05:44 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.70 %
Log(Eff): -7.827468E-01 + (-3.001271E-01*Log(E)) + (-3.369562E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.96 %
Log(Eff): -2.288409E+01 + (8.352717E+00*Log(E)) + (-8.812368E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev11.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.58keV)
Stop channel: 8000 (1999.36keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 11:36:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2016-08-07_1353.PBC 8/7/2016 1:53:38 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 26 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1324

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
50.14	22.	113.36	0.89	2.496E-02	50.14	8.000	PBC<MDA	TH227
63.42	38.	49.52	0.91	3.338E-02	63.29	3.810	PBC<MDA	TH234
74.84	319.	8.70	0.92	3.877E-02				
77.14	475.	6.49	0.92	3.962E-02				
87.26	175.	13.18	0.93	4.260E-02	86.49	13.100	1.745E+01	Np237
					86.54	30.700	7.443E+00	EU155
					86.94	9.040	2.522E+01	Sn126
					87.57	37.500	6.059E+00	Sn126
					88.04	3.790	5.980E+01	Cd109
90.08	107.	18.06	0.93	4.321E-02				
92.58	37.	64.39	0.93	4.369E-02	92.59	5.584	PBC<MDA	TH234
93.34	34.	130.08	0.93	4.382E-02	93.35	5.561	PBC<MDA	AC228
97.50	26.	134.01	0.94	4.443E-02	97.50	30.000	PBC<MDA	Gd153
103.20	26.	127.42	0.94	4.502E-02	103.20	21.800	PBC<MDA	Gd153
103.70	9.	389.27	0.94	4.505E-02	103.70	24.000	PBC<MDA	Np239
106.13	24.	107.31	0.95	4.521E-02	106.13	22.700	PBC<MDA	Np239
123.10	4.	581.22	0.96	4.522E-02	123.10	40.790	PBC<MDA	EU154
162.66	23.	104.51	1.00	4.072E-02	162.66	6.220	PBC<MDA	Ba140
165.85	25.	100.72	1.00	4.089E-02	165.85	79.900	PBC<MDA	CE139
209.15	122.	18.91	1.03	3.514E-02				
227.00	3.	829.32	1.06	3.329E-02	227.00	6.300	PBC<MDA	Cf251
238.59	865.	4.20	1.02	3.220E-02	238.63	43.300	3.447E+01	PB212

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
241.96	88.	20.37	1.07	3.189E-02	242.00	7.430	2.056E+01	PB214
256.24	4.	500.91	1.09	3.069E-02	256.24	7.000	PBC<MDA	TH227
270.06	67.	22.59	0.73	2.962E-02				
277.05	70.	20.39	1.29	2.910E-02	277.28	6.310	2.125E+01	TL208
295.09	194.	10.69	0.82	2.789E-02	295.09	19.300	2.001E+01	PB214
299.88	68.	23.99	0.84	2.757E-02	300.03	3.280	4.185E+01	PB212
					300.07	2.460	5.580E+01	PA231
					300.18	6.200	2.215E+01	PA233
328.76	18.	102.60	1.15	2.589E-02	328.76	20.300	PBC<MDA	La140
333.44	19.	102.08	1.16	2.564E-02	333.44	15.510	PBC<MDA	Cf249
338.28	208.	9.95	1.27	2.539E-02	338.32	12.010	3.790E+01	AC228
351.82	266.	8.24	1.09	2.470E-02	351.93	37.600	1.592E+01	PB214
364.48	17.	101.63	1.19	2.410E-02	364.48	81.700	PBC<MDA	I131
387.95	5.	416.18	1.21	2.307E-02	387.95	66.000	PBC<MDA	Cf249
390.23	19.	42.65	0.71	2.298E-02				
391.84	15.	109.29	1.21	2.292E-02	391.69	64.000	PBC<MDA	SN113
433.94	13.	119.91	1.25	2.132E-02	433.94	90.480	PBC<MDA	AG108M
463.37	66.	25.63	1.28	2.035E-02	463.37	10.470	1.722E+01	SB125
468.06	15.	118.32	1.28	2.020E-02	468.06	51.750	PBC<MDA	Ir192
477.60	17.	105.93	1.29	1.991E-02	477.60	10.520	PBC<MDA	BE7
482.00	4.	469.93	1.29	1.978E-02	482.00	80.500	PBC<MDA	HF181
497.05	6.	248.70	1.31	1.935E-02	497.05	90.900	PBC<MDA	RU103
511.86	140.	21.20	2.57	1.895E-02	511.86	20.000	2.048E+01	RH106
563.24	11.	145.46	1.36	1.768E-02	563.24	8.350	PBC<MDA	CS134
569.32	14.	67.23	1.37	1.754E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	5.520E+00	PA234
					569.70	97.740	4.633E-01	BI207
569.47	4.	283.05	1.37	1.754E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	1.433E+00	PA234
					569.70	97.740	1.203E-01	BI207
583.24	303.	7.65	1.37	1.724E-02	583.02	84.500	1.155E+01	TL208
609.41	194.	9.66	1.84	1.669E-02	609.31	46.090	1.402E+01	BI214
					610.30	5.750	1.125E+02	RU103
661.66	14.	85.44	1.45	1.571E-02	661.66	85.210	PBC<MDA	CS137
696.54	12.	123.37	1.48	1.513E-02	696.54	99.000	PBC<MDA	PM144
723.36	7.	234.95	1.50	1.471E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	2.771E-01	AG108M
					723.36	20.220	1.245E+00	EU154
727.36	72.	15.64	1.33	1.465E-02	727.17	7.550	3.608E+01	BI212
735.72	7.	198.24	1.51	1.452E-02	735.72	22.500	PBC<MDA	pm146
756.73	10.	122.11	1.53	1.422E-02	756.73	54.460	PBC<MDA	ZR95
765.79	17.	79.78	1.54	1.410E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
766.41	16.	76.34	1.54	1.409E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
785.69	44.	25.68	0.95	1.383E-02	785.42	1.280	1.390E+02	BI212
795.87	12.	81.73	1.56	1.369E-02	795.87	85.530	PBC<MDA	CS134
801.95	12.	90.96	1.57	1.362E-02	801.95	8.690	PBC<MDA	CS134

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
834.85	22.	42.56	1.60	1.321E-02	834.85	99.980	9.133E-01	MN54
846.77	21.	43.64	1.61	1.307E-02	846.77	99.935	8.932E-01	Co56
860.11	51.	14.10	1.69	1.291E-02	860.56	12.420	1.760E+01	TL208
873.23	15.	81.80	1.63	1.277E-02	873.23	12.270	PBC<MDA	EU154
880.53	10.	81.49	1.63	1.269E-02	880.53	6.000	PBC<MDA	PA234
911.29	225.	7.28	1.55	1.236E-02	911.07	29.000	3.480E+01	AC228
946.02	5.	244.95	1.69	1.202E-02	946.02	13.400	PBC<MDA	PA234
964.11	13.	139.75	1.70	1.184E-02	964.11	14.605	PBC<MDA	EU152
969.06	126.	10.24	1.55	1.180E-02	968.97	17.460	3.384E+01	AC228
1001.00	-3.	402.22	1.73	1.151E-02	1001.00	0.837	PBC<MDA	PA234M
1004.77	11.	96.45	1.74	1.148E-02	1004.77	18.010	PBC<MDA	EU154
1037.84	5.	201.66	1.76	1.119E-02	1037.84	14.130	PBC<MDA	Co56
1048.07	5.	115.45	1.77	1.111E-02	1048.07	80.000	PBC<MDA	Cs136
1050.36	5.	164.66	1.77	1.109E-02	1050.36	1.560	PBC<MDA	RH106
1063.66	9.	88.96	1.78	1.099E-02	1063.66	74.500	PBC<MDA	BI207
1120.30	28.	32.08	1.83	1.055E-02	1120.29	15.100	9.865E+00	BI214
					1120.55	99.987	PBC<MDA	Sc46
1121.32	13.	95.15	1.83	1.055E-02	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	1.920E+00	Ta182
1173.24	12.	89.20	1.87	1.018E-02	1173.24	99.900	PBC<MDA	CO60
1189.00	10.	117.78	1.88	1.008E-02	1189.05	16.200	PBC<MDA	Ta182
1238.28	15.	88.38	1.92	9.765E-03	1238.28	66.070	PBC<MDA	Co56
1274.53	7.	61.67	1.95	9.547E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	1.120E+00	EU154
1274.54	2.	269.56	1.95	9.547E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	3.134E-01	EU154
1384.30	7.	87.59	2.03	8.948E-03	1384.30	24.290	PBC<MDA	AG110M
1407.29	9.	97.22	2.05	8.829E-03	1408.00	21.005	PBC<MDA	EU152
1460.84	395.	5.11	1.67	8.576E-03	1460.83	10.670	2.399E+02	K40
1690.98	1.	600.00	2.25	7.633E-03	1690.98	47.790	PBC<MDA	SB124
1764.21	44.	16.21	2.30	7.376E-03	1764.49	15.400	2.143E+01	BI214
1836.06	1.	945.38	2.35	7.144E-03	1836.06	99.200	PBC<MDA	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
298.89	74.80	224.	319.	8.217E+03	8.70	0.916	- D
308.09	77.10	238.	475.	1.199E+04	6.49	0.919	- D
359.67	90.06	160.	94.	2.184E+03	21.54	0.931	- sD
835.74	209.15	98.	122.	3.467E+03	18.91	1.029	- s
1079.25	270.06	54.	67.	2.262E+03	22.59	0.730	- s
1560.30	390.23	35.	24.	1.041E+03	40.39	1.211	- sD

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.80	46.54	524.	-57.	-0.032	38.36	0.889s
TH-227	200.19	50.14	304.	22.	0.012	113.36	0.893s
TH-234	252.73	63.29	156.	38.	0.021	49.52	0.906D
Sn-126	256.70	64.28	414.	-32.	-0.018	92.25	0.906s
BA-133	323.48	80.99	1733.	-36.	-0.020	77.55	0.922
Np-237	345.47	86.49	1237.	0.	0.000	159.38	0.928A
EU-155	345.68	86.54	1323.	-35.	-0.019	149.13	0.928s
Sn-126	347.27	86.94	1200.	-35.	-0.019	142.13	0.928s
Sn-126	349.78	87.57	1060.	23.	0.013	114.20	0.929D
Cd-109	351.66	88.04	1083.	0.	0.000	1000.00	0.929A
Nd-147	363.89	91.10	1083.	0.	0.000	1000.00	0.932s
TH-234	369.85	92.59	268.	37.	0.021	64.39	0.933D
AC-228	372.88	93.35	972.	34.	0.019	130.08	0.934s
Gd-153	389.47	97.50	607.	26.	0.015	134.01	0.938
Gd-153	412.25	103.20	545.	26.	0.015	127.42	0.944s
Np-239	414.25	103.70	571.	9.	0.005	389.27	0.944
EU-155	420.70	105.31	580.	0.	0.000	1000.00	0.946s
Np-239	423.96	106.13	324.	24.	0.013	107.31	0.946s
EU-152	486.50	121.78	335.	-23.	-0.013	114.46	0.961s
EU-154	491.79	123.10	315.	4.	0.002	581.22	0.963s
PA-234	524.55	131.29	1048.	-31.	-0.017	151.01	0.970s
HF-181	531.46	133.02	1033.	-31.	-0.017	149.76	0.972s
CE-144	533.51	133.54	1064.	-31.	-0.017	151.82	0.973s
HF-181	544.55	136.30	1094.	-31.	-0.017	153.55	0.975s
CO-57	545.24	136.47	1118.	-31.	-0.017	151.53	0.975s
Tc-99m	561.38	140.51	1171.	-32.	-0.018	154.49	0.979
U-235	574.47	143.79	1207.	-36.	-0.020	67.77	0.982s
CE-141	581.09	145.44	1308.	-32.	-0.018	163.29	0.984s
Ba-140	649.91	162.66	285.	23.	0.013	104.51	1.000s
U-235	652.79	163.38	313.	-28.	-0.016	86.40	1.001
CE-139	662.68	165.85	296.	25.	0.014	100.72	1.003s
U-235	820.49	205.33	446.	-27.	-0.015	91.28	1.040s
TH-229	842.54	210.85	441.	-25.	-0.014	122.22	1.046s
Cf-251	907.10	227.00	176.	3.	0.002	829.32	1.061s
PB-212	953.60	238.63	110.	871.	0.484	3.79	1.071D
PB-214	967.05	242.00	115.	88.	0.049	20.37	1.074D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	977.83	244.69	1312.	-22.	-0.012	229.17	1.077
TH-227	1023.99	256.24	95.	4.	0.002	500.91	1.088s
Cd-113m	1053.81	263.70	396.	-25.	-0.014	115.93	1.095s
BI-210M	1062.33	265.83	328.	-24.	-0.013	109.63	1.097s
TL-208	1107.19	277.05	41.	70.	0.039	20.39	1.292s
Hg-203	1115.78	279.20	201.	-17.	-0.010	118.23	1.109s
I-131	1136.16	284.30	126.	-24.	-0.013	60.93	1.114s
PB-214	1179.29	295.09	59.	194.	0.108	10.69	0.823s
PB-212	1198.46	299.88	48.	68.	0.038	23.99	0.844s
PA-231	1199.21	300.07	492.	-16.	-0.009	204.07	1.128s
PA-233	1199.65	300.18	477.	0.	0.000	1000.00	1.128s
PA-231	1209.52	302.65	477.	0.	0.000	1000.00	1.131s
BA-133	1210.33	302.85	477.	0.	0.000	1000.00	1.131s
Ba-140	1218.32	304.85	477.	0.	0.000	1000.00	1.133
BI-210M	1218.50	304.90	477.	0.	0.000	1000.00	1.133
Ir-192	1232.67	308.44	477.	0.	0.000	1000.00	1.136s
PA-233	1246.95	312.01	477.	0.	0.000	1000.00	1.139s
Ir-192	1264.85	316.49	477.	0.	0.000	1000.00	1.143s
CR-51	1279.22	320.08	477.	0.	0.000	1000.00	1.147s
La-140	1313.91	328.76	159.	18.	0.010	102.60	1.155s
Cf-249	1332.62	333.44	176.	19.	0.010	102.08	1.159s
AC-228	1351.97	338.28	49.	208.	0.116	9.95	1.270s
Cs-136	1361.13	340.57	370.	-17.	-0.009	164.97	1.165s
EU-152	1375.98	344.29	375.	-15.	-0.008	188.46	1.169
HF-181	1382.15	345.83	429.	-21.	-0.012	140.27	1.170s
PB-214	1406.12	351.82	60.	266.	0.148	8.24	1.090
BA-133	1422.81	356.00	432.	-20.	-0.011	151.24	1.180s
I-131	1456.73	364.48	73.	17.	0.009	101.63	1.187s
BA-133	1534.13	383.84	278.	-21.	-0.012	114.64	1.205
Cf-249	1550.56	387.95	204.	5.	0.003	416.18	1.209s
SN-113	1565.51	391.69	120.	15.	0.008	109.29	1.212s
SB-125	1710.19	427.88	80.	-15.	-0.008	119.57	1.245s
AG-108M	1734.43	433.94	60.	13.	0.007	119.91	1.250s
pm-146	1814.18	453.88	72.	-5.	-0.003	340.25	1.268
SB-125	1852.11	463.37	110.	66.	0.037	25.63	1.277
Ir-192	1870.88	468.06	145.	15.	0.008	118.32	1.281s
BE-7	1909.00	477.60	149.	17.	0.009	105.93	1.289s
HF-181	1926.61	482.00	166.	4.	0.002	469.93	1.293s
La-140	1946.69	487.02	176.	-11.	-0.006	178.37	1.298s
RU-103	1986.82	497.05	52.	6.	0.003	248.70	1.307s
RH-106	2046.04	511.86	113.	140.	0.078	21.20	2.570s
Nd-147	2122.56	531.00	65.	-16.	-0.009	105.85	1.337s
CS-134	2251.48	563.24	61.	11.	0.006	145.46	1.365
CS-134	2275.81	569.32	39.	14.	0.008	67.23	1.370s
PA-234	2276.41	569.47	53.	4.	0.002	283.05	1.370s
BI-207	2277.34	569.70	58.	-2.	-0.001	725.72	1.371s
TL-208	2331.47	583.24	45.	303.	0.168	7.65	1.375
SB-125	2400.51	600.50	411.	-10.	-0.005	293.24	1.398s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
SB-124	2409.43	602.73	401.	0.	0.000	1000.00	1.399s
CS-134	2417.34	604.71	451.	-19.	-0.010	160.93	1.401s
BI-214	2436.15	609.41	39.	194.	0.108	9.66	1.842s
RU-103	2439.69	610.30	432.	-19.	-0.011	157.05	1.406s
AG-108M	2455.62	614.28	414.	-19.	-0.011	153.27	1.410s
PM-144	2470.74	618.06	395.	-13.	-0.007	225.40	1.413s
RH-106	2486.16	621.92	420.	-20.	-0.011	148.99	1.416s
SB-125	2542.05	635.89	72.	-11.	-0.006	110.21	1.428s
I-131	2546.39	636.97	96.	-14.	-0.008	105.10	1.429s
AG-110M	2629.52	657.76	64.	-8.	-0.004	145.77	1.447s
CS-137	2645.12	661.66	70.	14.	0.008	85.44	1.451s
PM-144	2784.64	696.54	42.	12.	0.006	123.37	1.481s
NB-94	2808.99	702.63	71.	-3.	-0.002	421.22	1.486s
SB-124	2889.61	722.79	132.	-4.	-0.002	426.66	1.503s
AG-108M	2890.22	722.94	128.	0.	0.000	1000.00	1.503s
EU-154	2891.89	723.36	119.	7.	0.004	234.95	1.503s
ZR-95	2895.26	724.20	126.	0.	0.000	1000.00	1.504s
BI-212	2907.92	727.36	14.	72.	0.040	15.64	1.327
pm-146	2941.34	735.72	37.	7.	0.004	198.24	1.514s
ZR-95	3025.38	756.73	33.	10.	0.006	122.11	1.532s
AG-110M	3054.24	763.94	102.	-23.	-0.013	54.75	1.538
NB-95	3061.63	765.79	83.	17.	0.009	79.78	1.539s
PA-234M	3064.12	766.41	63.	16.	0.009	76.34	1.540s
EU-152	3114.15	778.92	42.	-9.	-0.005	156.35	1.550
BI-212	3141.25	785.69	15.	44.	0.025	25.68	0.951s
CS-134	3181.95	795.87	43.	12.	0.007	81.73	1.565
CS-134	3206.28	801.95	55.	12.	0.007	90.96	1.570s
CO-58	3241.58	810.78	97.	-17.	-0.010	83.71	1.577s
Cs-136	3272.49	818.50	48.	-15.	-0.008	101.29	1.583s
MN-54	3337.89	834.85	14.	22.	0.012	42.56	1.597s
Co-56	3385.58	846.77	14.	21.	0.012	43.64	1.607s
TL-208	3438.94	860.11	0.	51.	0.028	14.10	1.687s
NB-94	3482.90	871.10	65.	-20.	-0.011	60.12	1.627s
EU-154	3491.44	873.23	65.	15.	0.008	81.80	1.629s
PA-234	3520.64	880.53	31.	10.	0.006	81.49	1.635s
PA-234	3531.48	883.24	66.	-6.	-0.004	183.17	1.637s
AG-110M	3537.26	884.68	60.	0.	0.000	1000.00	1.638s
Sc-46	3555.65	889.28	80.	-5.	-0.003	265.36	1.642
y-88	3590.70	898.04	40.	-10.	-0.006	120.16	1.649s
AC-228	3643.72	911.29	8.	225.	0.125	7.28	1.546
AG-110M	3748.54	937.49	50.	-16.	-0.009	74.96	1.682s
PA-234	3782.66	946.02	30.	5.	0.003	244.95	1.688s
EU-152	3855.05	964.11	165.	13.	0.007	139.75	1.703
AC-228	3874.84	969.06	10.	126.	0.070	10.24	1.554
EU-154	3983.96	996.33	52.	-6.	-0.004	162.45	1.729s
PA-234M	4002.64	1001.00	62.	-3.	-0.002	402.22	1.733s
EU-154	4017.76	1004.77	49.	11.	0.006	96.45	1.736s
Co-56	4150.07	1037.84	20.	5.	0.003	201.66	1.762s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Cs-136	4191.00	1048.07	14.	5.	0.003	115.45	1.771
RH-106	4200.17	1050.36	31.	5.	0.003	164.66	1.772s
BI-207	4253.39	1063.66	10.	9.	0.005	88.96	1.783s
FE-59	4395.81	1099.25	22.	-4.	-0.002	209.81	1.811s
EU-152	4447.13	1112.07	105.	-12.	-0.006	128.72	1.821
ZN-65	4461.03	1115.55	93.	0.	0.000	1000.00	1.824s
BI-214	4480.00	1120.29	27.	28.	0.016	32.08	1.828D
Sc-46	4481.05	1120.55	93.	0.	0.000	1000.00	1.828s
Ta-182	4484.05	1121.30	67.	13.	0.007	95.15	1.828s
CO-60	4691.91	1173.24	22.	12.	0.007	89.20	1.869s
Ta-182	4755.20	1189.05	27.	10.	0.006	117.78	1.881s
Ta-182	4884.72	1221.41	43.	-2.	-0.001	894.20	1.906s
Co-56	4952.24	1238.28	33.	15.	0.008	88.38	1.919s
NA-22	5097.34	1274.53	5.	7.	0.004	61.67	1.946s
EU-154	5097.39	1274.54	12.	2.	0.001	269.56	1.946s
FE-59	5165.65	1291.60	23.	-2.	-0.001	674.39	1.959s
CO-60	5329.39	1332.50	23.	-9.	-0.005	154.28	1.990s
AG-110M	5536.74	1384.30	6.	7.	0.004	87.59	2.029s
EU-152	5631.64	1408.00	11.	9.	0.005	97.22	2.046s
K-40	5843.19	1460.84	6.	395.	0.220	5.11	1.669
La-140	6385.21	1596.21	18.	-8.	-0.004	132.88	2.182s
SB-124	6764.73	1690.98	6.	1.	0.001	600.00	2.247s
BI-214	7059.14	1764.49	3.	44.	0.024	16.21	2.297s
Co-56	7086.61	1771.35	58.	-8.	-0.004	138.96	2.302s
y-88	7345.80	1836.06	6.	1.	0.000	945.38	2.345s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	4.4463E+00				5.31E+01	
			477.60	4.446E+00	?(	1.582E+01 1.06E+02 1.05E+01	G
NA-22	C	3.9426E-01				9.50E+02	
			1274.53	3.943E-01	?(	7.844E-01 6.17E+01 9.99E+01	G
K-40	N	2.3991E+02				4.66E+11	
			1460.83	2.399E+02	(P	8.496E+00 5.11E+00 1.07E+01	G
Sc-46	F	-2.1322E-01				8.38E+01	
			889.28	-2.132E-01	&(	1.956E+00 2.65E+02 1.00E+02	G
			1120.55	0.000E+00	+	2.509E+00 1.00E+03 1.00E+02	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
MN-54	C 9.1333E-01					3.12E+02	
		834.85	9.133E-01	?(P	8.548E-01	4.26E+01	1.00E+02 G
FE-59	F -3.3418E-01					4.45E+01	
		1099.25	-3.342E-01	?(P	2.239E+00	2.10E+02	5.65E+01 G
		1291.60	-2.269E-01	+	3.389E+00	6.74E+02	4.32E+01 G
Co-56	C 1.1165E+00					7.73E+01	
		846.77	8.932E-01	?(	8.569E-01	4.36E+01	9.99E+01 G
		1238.28	1.317E+00	(P	2.540E+00	8.84E+01	6.61E+01 G
		1037.84	1.756E+00	?(	8.271E+00	2.02E+02	1.41E+01 G
		1771.35	-3.911E+00	-	1.864E+01	1.39E+02	1.55E+01 A
CO-57	C -2.3897E-02					2.72E+02	
		122.06	-2.390E-02	%(	1.164E+00	1.43E+03	8.56E+01 G
		136.47	-3.698E+00	+	1.865E+01	1.52E+02	1.07E+01 G
CO-58	C -7.1719E-01					7.09E+01	
		810.78	-7.172E-01	?(	2.007E+00	8.37E+01	9.95E+01 G
CO-60	F 7.5162E-02					1.93E+03	
		1332.50	-5.288E-01	?(P	1.504E+00	1.54E+02	1.00E+02 G
		1173.24	6.796E-01	?(P	1.329E+00	8.92E+01	9.99E+01 G
NB-94	I -1.2830E-01					7.41E+06	
		702.63	-1.283E-01	&(P	1.589E+00	4.21E+02	9.79E+01 G
		871.10	-8.868E-01	+	1.751E+00	6.01E+01	9.99E+01 G
ZR-95	I 7.3722E-01					6.40E+01	
		756.73	7.372E-01	&(P	2.107E+00	1.22E+02	5.45E+01 G
		724.20	0.000E+00	&	4.711E+00	1.00E+03	4.42E+01 G
NB-95	I 6.6843E-01					6.40E+01	
		765.79	6.684E-01	?(	1.781E+00	7.98E+01	9.98E+01 G
RU-103	I 1.8951E-01					3.93E+01	
		497.05	1.895E-01	(	1.147E+00	2.49E+02	9.09E+01 G
		610.30	-1.097E+01	+	5.773E+01	1.57E+02	5.75E+00 GA
RH-106	I -3.6222E+00					3.74E+02	
		621.92	-6.699E+00	?(	3.343E+01	1.49E+02	9.93E+00 G
		1050.36	1.596E+01	?(	9.204E+01	1.65E+02	1.56E+00 G
		511.86	2.048E+01	?	7.671E+00	2.12E+01	2.00E+01 GA
AG-108M	C 3.7439E-01					1.53E+05	
		433.94	3.744E-01	?(	1.118E+00	1.20E+02	9.05E+01 G
		722.94	0.000E+00	-	2.304E+00	1.00E+03	9.08E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			614.28	-7.071E-01	+	3.632E+00	1.53E+02	8.98E+01 G
AG-110M	F	4.5194E-01					2.50E+02	
			884.68	0.000E+00	&(	2.346E+00	1.00E+03	7.27E+01 G
			657.76	-2.976E-01	+	1.488E+00	1.46E+02	9.46E+01 G
			937.49	-2.151E+00	+ P	4.769E+00	7.50E+01	3.44E+01 G
			1384.30	1.804E+00	?(	3.528E+00	8.76E+01	2.43E+01 G
			763.94	-4.060E+00	+ P	8.802E+00	5.47E+01	2.23E+01 G
SN-113	F	5.5266E-01					1.15E+02	
			391.69	5.527E-01	?(	2.035E+00	1.09E+02	6.40E+01 G
SB-124	F	4.9837E-02					6.02E+01	
			602.73	0.000E+00	?(	3.227E+00	1.00E+03	9.83E+01 G
			1690.98	1.523E-01	?(	2.151E+00	6.00E+02	4.78E+01 G
			722.79	-1.339E+00	+	1.963E+01	4.27E+02	1.08E+01 G
SB-125	I	3.5328E+00					1.01E+03	
			427.88	-1.307E+00	?(	3.869E+00	1.20E+02	2.96E+01 G
			600.50	-1.813E+00	+	1.791E+01	2.93E+02	1.79E+01 G
			635.89	-3.441E+00	+	1.286E+01	1.10E+02	1.13E+01 G
			463.37	1.722E+01	(P	1.345E+01	2.56E+01	1.05E+01 G
I-131	I	4.7621E-01					8.02E+00	
			364.48	4.762E-01	&(P	1.197E+00	1.02E+02	8.17E+01 G
			284.30	-7.479E+00	+ P	1.739E+01	6.09E+01	6.14E+00 G
			636.97	-6.554E+00	+	2.323E+01	1.05E+02	7.17E+00 G
Gd-153	F	1.2590E+00					2.42E+02	
			97.50	1.095E+00	&(	4.897E+00	1.34E+02	3.00E+01 G
			103.20	1.485E+00	&(	6.313E+00	1.27E+02	2.18E+01 G
Ga-68	C	-1.8188E+00					4.71E-02	
			1077.40	-1.819E+00	%(	5.287E+01	1.29E+03	3.30E+00 G
Tc-99m	I	-4.6243E-01					2.51E-01	
			140.51	-4.624E-01	?(	2.378E+00	1.54E+02	8.93E+01 G
BA-133	F	-7.1833E-01					3.85E+03	
			356.00	-7.183E-01	?(	3.639E+00	1.51E+02	6.20E+01 G
			302.85	0.000E+00	&	1.156E+01	1.00E+03	1.83E+01 G
			383.84	-5.596E+00	&	2.148E+01	1.15E+02	8.94E+00 GA
			80.99	-1.428E+00	+ P	7.842E+00	7.76E+01	3.41E+01 GA
CS-134	I	5.4317E-01					7.54E+02	
			604.71	-6.395E-01	&(	3.448E+00	1.61E+02	9.76E+01 G
			795.87	5.769E-01	(	1.584E+00	8.17E+01	8.55E+01 G
			569.32	2.943E+00	?(	6.551E+00	6.72E+01	1.54E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			801.95	5.729E+00	?(	1.757E+01	9.10E+01	8.69E+00 G
			563.24	4.208E+00	&(P	1.470E+01	1.45E+02	8.35E+00 G
CS-137	I	6.0170E-01					1.10E+04	
			661.66	6.017E-01	?(	1.725E+00	8.54E+01	8.52E+01 G
CE-139	F	4.1910E-01					1.38E+02	
			165.85	4.191E-01	&(	1.409E+00	1.01E+02	7.99E+01 G
Ba-140	I	1.0044E+00					1.28E+01	
			537.26	-4.323E-02	%(P	4.731E+00	4.43E+03	2.44E+01 G
			162.66	5.112E+00	*(	1.785E+01	1.05E+02	6.22E+00 G
			304.85	0.000E+00	&	4.961E+01	1.00E+03	4.29E+00 G
La-140	I	-1.4963E-01					1.28E+01	
			1596.21	-5.829E-01	?(	1.638E+00	1.33E+02	9.54E+01 G
			487.02	-6.633E-01	&	4.009E+00	1.78E+02	4.55E+01 G
			328.76	1.887E+00	?(P	6.490E+00	1.03E+02	2.03E+01 G
			815.77	2.379E-01	%	8.301E+00	1.00E+03	2.33E+01 G
CE-141	I	-8.4118E-01					3.25E+01	
			145.44	-8.412E-01	?(	4.571E+00	1.63E+02	4.82E+01 G
CE-144	I	-3.4459E+00					2.85E+02	
			133.54	-3.446E+00	?(	1.742E+01	1.52E+02	1.11E+01 G
PM-144	C	4.2707E-01					3.63E+02	
			696.54	4.271E-01	?(P	1.227E+00	1.23E+02	9.90E+01 G
			618.06	-4.263E-01	+	3.233E+00	2.25E+02	9.91E+01 G
EU-152	F	7.2078E-01					4.94E+03	
			344.29	-1.226E+00	?(	7.767E+00	1.88E+02	2.65E+01 G
			1112.07	-4.426E+00	+	1.932E+01	1.29E+02	1.36E+01 G
			121.78	-9.875E-01	+	3.778E+00	1.14E+02	2.86E+01 G
			778.92	-2.776E+00	+	1.015E+01	1.56E+02	1.29E+01 G
			964.11	4.253E+00	(	2.007E+01	1.40E+02	1.46E+01 G
			244.69	-5.198E+00	&	3.971E+01	2.29E+02	7.58E+00 G
			1408.00	2.596E+00	?	5.512E+00	9.72E+01	2.10E+01 GA
EU-154	I	3.8455E+00					3.14E+03	
			873.23	5.216E+00	?(P	1.428E+01	8.18E+01	1.23E+01 G
			123.10	1.305E-01	-	2.573E+00	5.81E+02	4.08E+01 G
			1274.54	3.134E-01	-	3.129E+00	2.70E+02	3.52E+01 G
			723.36	1.245E+00	-	1.002E+01	2.35E+02	2.02E+01 G
			1004.77	2.912E+00	?(	9.511E+00	9.64E+01	1.80E+01 G
			996.33	-2.949E+00	-	1.655E+01	1.62E+02	1.06E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
HF-181	F 1.3610E-01					4.24E+01	
		482.00	1.361E-01	?(	2.190E+00	4.70E+02	8.05E+01 G
		133.02	-8.810E-01	+	4.394E+00	1.50E+02	4.33E+01 G
		345.83	-3.116E+00	+	1.463E+01	1.40E+02	1.51E+01 G
		136.30	-6.589E+00	+	3.369E+01	1.54E+02	5.85E+00 G
Ta-182	F 2.4258E+00					1.14E+02	
		1121.30	1.920E+00	?(	6.160E+00	9.51E+01	3.49E+01 G
		1221.41	-3.475E-01	-	6.911E+00	8.94E+02	2.70E+01 G
		1189.05	3.516E+00	?(	9.111E+00	1.18E+02	1.62E+01 G
Hg-203	F -4.0819E-01					4.66E+01	
		279.20	-4.082E-01	?(	1.621E+00	1.18E+02	8.15E+01 G
TL-208	N 1.1551E+01					6.98E+02	
		583.02	1.155E+01	(P	1.297E+00	7.65E+00	8.45E+01 G
		277.28	2.125E+01	+ P	9.825E+00	2.04E+01	6.31E+00 G
		860.56	1.760E+01	+ P	2.553E+00	1.41E+01	1.24E+01 G
pm-146	C 3.8287E-01					2.02E+03	
		747.16	-1.138E-01	%(	3.745E+00	1.38E+03	3.40E+01 G
		735.72	1.133E+00	(	5.301E+00	1.98E+02	2.25E+01 G
		453.88	-2.089E-01	+ P	1.749E+00	3.40E+02	6.50E+01 G
y-88	F -4.7550E-01					1.07E+02	
		898.04	-4.755E-01	?(P	1.527E+00	1.20E+02	9.37E+01 G
		1836.06	5.226E-02	+	1.132E+00	9.45E+02	9.92E+01 G
Cd-113m	-7.5820E+03					5.33E+03	
		263.70	-7.582E+03	*(	2.936E+04	1.16E+02	6.00E-03 K
Cf-251	T 1.9423E-01					3.28E+05	
		176.60	1.942E-01	%(	5.734E+00	1.14E+03	1.70E+01 G
		227.00	7.948E-01	?	1.710E+01	8.29E+02	6.30E+00 GA
Cf-249	T 6.4640E-01					1.28E+05	
		387.95	1.782E-01	?(	2.528E+00	4.16E+02	6.60E+01 G
		333.44	2.639E+00	&(	9.027E+00	1.02E+02	1.55E+01 G
Sn-126	-5.3696E+00					3.65E+07	
		87.57	7.888E-01	}	5.362E+00	1.14E+02	3.75E+01 GA
		64.28	-5.370E+00	?(	1.647E+01	9.22E+01	9.70E+00 G
		86.94	-5.018E+00	}	2.372E+01	1.42E+02	9.04E+00 GA
PB-210	N -3.3390E+01					8.14E+03	
		46.54	-3.339E+01	*(P	6.413E+01	3.84E+01	4.25E+00 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-212	N 3.4729E+01					6.98E+02	
		238.63	3.473E+01	(P	2.052E+00	3.79E+00	4.33E+01 G
		300.03	4.185E+01	+ P	2.147E+01	2.40E+01	3.28E+00 GA
PB-214	N 1.5918E+01					5.84E+05	
		351.93	1.592E+01	(P	2.320E+00	8.24E+00	3.76E+01 G
		295.09	2.001E+01	+ P	3.978E+00	1.07E+01	1.93E+01 G
		242.00	2.056E+01	+ P	1.237E+01	2.04E+01	7.43E+00 GA
BI-207	C 2.2265E-01					1.18E+04	
		569.70	-4.863E-02	?(	1.243E+00	7.26E+02	9.77E+01 G
		1063.66	5.786E-01	?(P	1.197E+00	8.90E+01	7.45E+01 G
BI-212	N 3.6080E+01					6.98E+02	
		727.17	3.608E+01	(	1.017E+01	1.56E+01	7.55E+00 G
		785.42	1.390E+02	+ P	6.458E+01	2.57E+01	1.28E+00 GA
BI-214	N 1.4016E+01					5.84E+05	
		609.31	1.402E+01	(P	2.294E+00	9.66E+00	4.61E+01 G
		1120.29	9.865E+00	- P	9.355E+00	3.21E+01	1.51E+01 G
		1764.49	2.143E+01	+ P	5.391E+00	1.62E+01	1.54E+01 G
BI-210M	T -8.8303E-01					1.10E+09	
		265.83	-8.830E-01	?(	3.234E+00	1.10E+02	5.00E+01 G
		304.90	0.000E+00	&	7.602E+00	1.00E+03	2.80E+01 G
AC-228	N 3.5154E+01					2.10E+03	
		911.07	3.480E+01	(	2.504E+00	7.28E+00	2.90E+01 G
		968.97	3.384E+01	(	4.604E+00	1.02E+01	1.75E+01 G
		338.32	3.790E+01	(	6.438E+00	9.95E+00	1.20E+01 G
		93.35	7.796E+00	-	3.374E+01	1.30E+02	5.56E+00 XA
TH-227	N 6.1629E+00					7.95E+03	
		50.14	6.163E+00	&(	2.337E+01	1.13E+02	8.00E+00 G
		256.24	9.481E-01	&	1.247E+01	5.01E+02	7.00E+00 G
TH-229	N -2.2758E-01					2.68E+06	
		193.51	-2.276E-01	%(	2.289E+01	3.88E+03	4.40E+00 G
		210.85	-1.309E+01	+	5.346E+01	1.22E+02	2.99E+00 G
TH-234	N 1.1780E+01					1.63E+12	
		63.29	1.659E+01	(P	2.664E+01	4.95E+01	3.81E+00 G
		92.59	8.495E+00	(P	1.798E+01	6.44E+01	5.58E+00 G
PA-234	N -7.8184E-02					1.63E+12	
		131.29	-2.109E+00	&(	1.061E+01	1.51E+02	1.80E+01 G
		946.02	1.725E+00	?(	9.741E+00	2.45E+02	1.34E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments
                          569.47 1.433E+00 ?(  1.419E+01 2.83E+02 8.20E+00 G
                          883.24-2.946E+00 +   1.860E+01 1.83E+02 9.60E+00 G
                          880.53 7.621E+00 &   2.091E+01 8.15E+01 6.00E+00 GA

PA-234M  N   4.1333E+01                                      1.63E+12
                         1001.00-1.773E+01 ?(P 2.274E+02 4.02E+02 8.37E-01 G
                          766.41 2.095E+02 ?(P 5.333E+02 7.63E+01 2.94E-01 G

U-235    N  -4.1787E+00                                      2.57E+11
                          143.79-4.179E+00 *(P 1.924E+01 6.78E+01 1.10E+01 G
                          205.33-8.308E+00 + P 3.151E+01 9.13E+01 5.01E+00 G
                          163.38-7.567E+00 & P 2.294E+01 8.64E+01 5.08E+00 G

AM-241   T  -3.2974E-02                                      1.58E+05
                           59.54-3.297E-02 %(  5.768E+00 5.19E+03 3.59E+01 G

Ir-192   F   2.9252E-01                                      7.40E+01
                          316.49 0.000E+00 &(  2.509E+00 1.00E+03 8.70E+01 G
                          468.06 7.845E-01 *(  3.128E+00 1.18E+02 5.18E+01 G
                          308.44 0.000E+00 -   6.757E+00 1.00E+03 3.18E+01 G

Cs-136   F  -6.2176E-01                                      1.30E+01
                          818.50-6.218E-01 ?(  1.450E+00 1.01E+02 1.00E+02 G
                         1048.07 3.143E-01 +   1.272E+00 1.15E+02 8.00E+01 G
                          340.57-7.813E-01 +   4.327E+00 1.65E+02 4.69E+01 G

Np-239   T   1.3081E+00                                      2.36E+00
                          103.70 4.479E-01 ?   5.863E+00 3.89E+02 2.40E+01 X
                          106.13 1.308E+00 &(  4.688E+00 1.07E+02 2.27E+01 G
                           99.50 8.800E-02 %   9.948E+00 3.35E+03 1.50E+01 X

Nd-147      -3.7061E+00                                      1.11E+01
                          531.00-3.706E+00 ?(  9.330E+00 1.06E+02 1.30E+01 G
                           91.10 0.000E+00 +   7.057E+00 1.00E+03 2.83E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
```

& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
PB-210	46.54	524.	-57.	-0.032	38.36	-3.339E+01	P
TH-227	50.14	304.	22.	0.012	113.36	6.163E+00	
BA-133	80.99	1733.	-36.	-0.020	77.55	-1.428E+00	P
EU-155	86.54	1323.	-35.	-0.019	149.13	-1.480E+00	
Gd-153	97.50	607.	26.	0.015	134.01	1.095E+00	
Gd-153	103.20	545.	26.	0.015	127.42	1.485E+00	
Np-239	103.70	571.	9.	0.005	389.27	4.479E-01	
Np-239	106.13	324.	24.	0.013	107.31	1.308E+00	
EU-154	123.10	315.	4.	0.002	581.22	1.305E-01	
PA-234	131.29	1048.	-31.	-0.017	151.01	-2.109E+00	
HF-181	133.02	1033.	-31.	-0.017	149.76	-8.810E-01	
CE-144	133.54	1064.	-31.	-0.017	151.82	-3.446E+00	
HF-181	136.30	1094.	-31.	-0.017	153.55	-6.589E+00	
CO-57	136.47	1118.	-31.	-0.017	151.53	-3.698E+00	
Tc-99m	140.51	1171.	-32.	-0.018	154.49	-4.624E-01	
U-235	143.79	1207.	-36.	-0.020	67.77	-4.179E+00	P
CE-141	145.44	1308.	-32.	-0.018	163.29	-8.412E-01	
Ba-140	162.66	285.	23.	0.013	104.51	5.112E+00	
U-235	163.38	313.	-28.	-0.016	86.40	-7.567E+00	P
CE-139	165.85	296.	25.	0.014	100.72	4.191E-01	
U-235	205.33	446.	-27.	-0.015	91.28	-8.308E+00	P
TH-229	210.85	441.	-25.	-0.014	122.22	-1.309E+01	
Cf-251	227.00	176.	3.	0.002	829.32	7.948E-01	
TH-227	256.24	95.	4.	0.002	500.91	9.481E-01	
Cd-113m	263.70	396.	-25.	-0.014	115.93	-7.582E+03	
BI-210M	265.83	328.	-24.	-0.013	109.63	-8.830E-01	
Hg-203	279.20	201.	-17.	-0.010	118.23	-4.082E-01	
I-131	284.30	126.	-24.	-0.013	60.93	-7.479E+00	P
PA-231	300.07	492.	-16.	-0.009	204.07	-1.270E+01	
La-140	328.76	159.	18.	0.010	102.60	1.887E+00	P

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
Cf-249	333.44	176.	19.	0.010	102.08	2.639E+00		
Cs-136	340.57	370.	-17.	-0.009	164.97	-7.813E-01		
HF-181	345.83	429.	-21.	-0.012	140.27	-3.116E+00		
BA-133	356.00	432.	-20.	-0.011	151.24	-7.183E-01		
I-131	364.48	73.	17.	0.009	101.63	4.762E-01		P
BA-133	383.84	278.	-21.	-0.012	114.64	-5.596E+00		
Cf-249	387.95	204.	5.	0.003	416.18	1.782E-01		
SB-125	427.88	80.	-15.	-0.008	119.57	-1.307E+00		
AG-108M	433.94	60.	13.	0.007	119.91	3.744E-01		
pm-146	453.88	72.	-5.	-0.003	340.25	-2.089E-01		P
SB-125	463.37	110.	66.	0.037	25.63	1.722E+01		P
Ir-192	468.06	145.	15.	0.008	118.32	7.845E-01		
BE-7	477.60	149.	17.	0.009	105.93	4.446E+00		
HF-181	482.00	166.	4.	0.002	469.93	1.361E-01		
La-140	487.02	176.	-11.	-0.006	178.37	-6.633E-01		
RU-103	497.05	52.	6.	0.003	248.70	1.895E-01		
RH-106	511.86	113.	140.	0.078	21.20	2.048E+01		
Nd-147	531.00	65.	-16.	-0.009	105.85	-3.706E+00		
CS-134	563.24	61.	11.	0.006	145.46	4.208E+00		P
CS-134	569.32	39.	14.	0.008	67.23	2.943E+00		
PA-234	569.47	53.	4.	0.002	283.05	1.433E+00		
BI-207	569.70	58.	-2.	-0.001	725.72	-4.863E-02		
SB-125	600.50	411.	-10.	-0.005	293.24	-1.813E+00		
CS-134	604.71	451.	-19.	-0.010	160.93	-6.395E-01		
RU-103	610.30	432.	-19.	-0.011	157.05	-1.097E+01		
AG-108M	614.28	414.	-19.	-0.011	153.27	-7.071E-01		
PM-144	618.06	395.	-13.	-0.007	225.40	-4.263E-01		
RH-106	621.92	420.	-20.	-0.011	148.99	-6.699E+00		
SB-125	635.89	72.	-11.	-0.006	110.21	-3.441E+00		
I-131	636.97	96.	-14.	-0.008	105.10	-6.554E+00		
AG-110M	657.76	64.	-8.	-0.004	145.77	-2.976E-01		
CS-137	661.66	70.	14.	0.008	85.44	6.017E-01		
PM-144	696.54	42.	12.	0.006	123.37	4.271E-01		P
NB-94	702.63	71.	-3.	-0.002	421.22	-1.283E-01		P
SB-124	722.79	132.	-4.	-0.002	426.66	-1.339E+00		
EU-154	723.36	119.	7.	0.004	234.95	1.245E+00		
pm-146	735.72	37.	7.	0.004	198.24	1.133E+00		
ZR-95	756.73	33.	10.	0.006	122.11	7.372E-01		P
AG-110M	763.94	102.	-23.	-0.013	54.75	-4.060E+00		P
NB-95	765.79	83.	17.	0.009	79.78	6.684E-01		
PA-234M	766.41	63.	16.	0.009	76.34	2.095E+02		P
CS-134	795.87	43.	12.	0.007	81.73	5.769E-01		
CS-134	801.95	55.	12.	0.007	90.96	5.729E+00		
CO-58	810.78	97.	-17.	-0.010	83.71	-7.172E-01		
Cs-136	818.50	48.	-15.	-0.008	101.29	-6.218E-01		
NB-94	871.10	65.	-20.	-0.011	60.12	-8.868E-01		
EU-154	873.23	65.	15.	0.008	81.80	5.216E+00		P
PA-234	880.53	31.	10.	0.006	81.49	7.621E+00		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
PA-234	883.24	66.	-6.	-0.004	183.17	-2.946E+00		
Sc-46	889.28	80.	-5.	-0.003	265.36	-2.132E-01		
y-88	898.04	40.	-10.	-0.006	120.16	-4.755E-01		P
AG-110M	937.49	50.	-16.	-0.009	74.96	-2.151E+00		P
PA-234	946.02	30.	5.	0.003	244.95	1.725E+00		
EU-154	996.33	52.	-6.	-0.004	162.45	-2.949E+00		
PA-234M	1001.00	62.	-3.	-0.002	402.22	-1.773E+01		P
EU-154	1004.77	49.	11.	0.006	96.45	2.912E+00		
Cs-136	1048.07	14.	5.	0.003	115.45	3.143E-01		
RH-106	1050.36	31.	5.	0.003	164.66	1.596E+01		
BI-207	1063.66	10.	9.	0.005	88.96	5.786E-01		P
FE-59	1099.25	22.	-4.	-0.002	209.81	-3.342E-01		P
CO-60	1173.24	22.	12.	0.007	89.20	6.796E-01		P
NA-22	1274.53	5.	7.	0.004	61.67	3.943E-01		
EU-154	1274.54	12.	2.	0.001	269.56	3.134E-01		
FE-59	1291.60	23.	-2.	-0.001	674.39	-2.269E-01		
CO-60	1332.50	23.	-9.	-0.005	154.28	-5.288E-01		P
AG-110M	1384.30	6.	7.	0.004	87.59	1.804E+00		
La-140	1596.21	18.	-8.	-0.004	132.88	-5.829E-01		
SB-124	1690.98	6.	1.	0.001	600.00	1.523E-01		
y-88	1836.06	6.	1.	0.000	945.38	5.226E-02		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	4.4463E+00	4.4463E+00	1.059E+02%	1.58E+01
NA-22	#A	3.9426E-01	3.9426E-01	6.167E+01%	7.84E-01
K-40		2.3991E+02	2.3991E+02	5.109E+00%	8.50E+00
Sc-46	#A	-2.1322E-01	-2.1322E-01	2.654E+02%	1.96E+00
CR-51	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.21E+01
MN-54	#	9.1333E-01	9.1333E-01	4.256E+01%	8.55E-01
FE-59	#A	-3.3417E-01	-3.3418E-01	2.098E+02%	2.24E+00
Co-56	#	1.1165E+00	1.1165E+00	4.364E+01%	8.57E-01
CO-57	#A	-2.3897E-02	-2.3897E-02	1.431E+03%	1.16E+00
CO-58	#A	-7.1718E-01	-7.1719E-01	8.371E+01%	2.01E+00
CO-60	#A	7.5162E-02	7.5162E-02	8.910E+01%	1.50E+00
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	4.94E+00
NB-94	#A	-1.2830E-01	-1.2830E-01	4.212E+02%	1.59E+00
ZR-95	#A	7.3721E-01	7.3722E-01	1.221E+02%	2.11E+00
NB-95	#A	6.6843E-01	6.6843E-01	7.978E+01%	1.78E+00
RU-103	#A	1.8951E-01	1.8951E-01	2.487E+02%	1.15E+00
RH-106	#A	-3.6222E+00	-3.6222E+00	1.110E+02%	3.34E+01
AG-108M	#A	3.7439E-01	3.7439E-01	1.199E+02%	1.12E+00
AG-110M	#A	4.5194E-01	4.5194E-01	8.759E+01%	2.35E+00

SN-113 #A	5.5266E-01	5.5266E-01	1.093E+02%		2.03E+00
SB-124 #A	4.9836E-02	4.9837E-02	5.831E+02%		3.23E+00
SB-125 #A	3.5328E+00	3.5328E+00	2.563E+01%		3.87E+00
I-131 #A	4.7618E-01	4.7621E-01	1.016E+02%		1.20E+00
Gd-153 #A	1.2590E+00	1.2590E+00	9.246E+01%		4.90E+00
Ga-68 #A	-1.7991E+00	-1.8188E+00	1.290E+03%		5.29E+01
Tc-99m #A	-4.6148E-01	-4.6243E-01	1.545E+02%		2.38E+00
BA-133 #A	-7.1833E-01	-7.1833E-01	1.512E+02%		3.64E+00
CS-134 #A	5.4316E-01	5.4317E-01	5.159E+01%		3.45E+00
CS-137 #A	6.0170E-01	6.0170E-01	8.544E+01%		1.72E+00
CE-139 #A	4.1910E-01	4.1910E-01	1.007E+02%		1.41E+00
Ba-140 #A	1.0043E+00	1.0044E+00	1.045E+02%		4.73E+00
La-140 #A	-1.4962E-01	-1.4963E-01	8.394E+01%		1.64E+00
CE-141 #A	-8.4117E-01	-8.4118E-01	1.633E+02%		4.57E+00
CE-144 #A	-3.4459E+00	-3.4459E+00	1.518E+02%		1.74E+01
PM-144 #A	4.2707E-01	4.2707E-01	1.234E+02%		1.23E+00
EU-152 A	7.2078E-01	7.2078E-01	1.173E+02%		7.77E+00
EU-154 #A	3.8455E+00	3.8455E+00	6.323E+01%		1.43E+01
EU-155 #A	0.0000E+00	0.0000E+00	1.000E+03%		6.67E+00
HF-181 #A	1.3610E-01	1.3610E-01	4.699E+02%		2.19E+00
Ta-182 #A	2.4258E+00	2.4258E+00	7.570E+01%		6.16E+00
Hg-203 #A	-4.0819E-01	-4.0819E-01	1.182E+02%		1.62E+00
TL-208	1.1551E+01	1.1551E+01	7.645E+00%		1.30E+00
pm-146 #A	3.8287E-01	3.8287E-01	1.982E+02%		3.75E+00
y-88 #A	-4.7550E-01	-4.7550E-01	1.202E+02%		1.53E+00
Cd-113m#A	-7.5820E+03	-7.5820E+03	1.159E+02%		2.94E+04
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%		5.35E+01
Cf-251 #A	1.9423E-01	1.9423E-01	1.140E+03%		5.73E+00
Cf-249 #A	6.4640E-01	6.4640E-01	1.021E+02%		2.53E+00
Sn-126 #A	-5.3696E+00	-5.3696E+00	9.225E+01%		1.65E+01
PB-210 #A	-3.3390E+01	-3.3390E+01	3.836E+01%		6.41E+01
PB-212	3.4729E+01	3.4729E+01	3.791E+00%		2.05E+00
PB-214	1.5918E+01	1.5918E+01	8.238E+00%		2.32E+00
BI-207 #A	2.2265E-01	2.2265E-01	8.896E+01%		1.24E+00
BI-212	3.6080E+01	3.6080E+01	1.564E+01%		1.02E+01
BI-214	1.4016E+01	1.4016E+01	9.665E+00%		2.29E+00
BI-210M#A	-8.8303E-01	-8.8303E-01	1.096E+02%		3.23E+00
AC-228	3.5154E+01	3.5154E+01	5.343E+00%		2.50E+00
TH-227 #A	6.1629E+00	6.1629E+00	1.134E+02%		2.34E+01
TH-229 #A	-2.2758E-01	-2.2758E-01	3.877E+03%		2.29E+01
TH-234 A	1.1780E+01	1.1780E+01	4.061E+01%		2.66E+01
PA-231 #A	0.0000E+00	0.0000E+00	1.000E+03%		7.35E+01
PA-233 #A	0.0000E+00	0.0000E+00	7.071E+02%		6.01E+00
PA-234 #A	-7.8184E-02	-7.8184E-02	1.345E+02%		1.06E+01
PA-234M#A	4.1333E+01	4.1333E+01	7.634E+01%		2.27E+02
U-235 #A	-4.1787E+00	-4.1787E+00	6.777E+01%		1.92E+01
AM-241 #A	-3.2974E-02	-3.2974E-02	5.186E+03%		5.77E+00
Np-237 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.67E+01
Ir-192 #A	2.9252E-01	2.9252E-01	1.183E+02%		2.51E+00

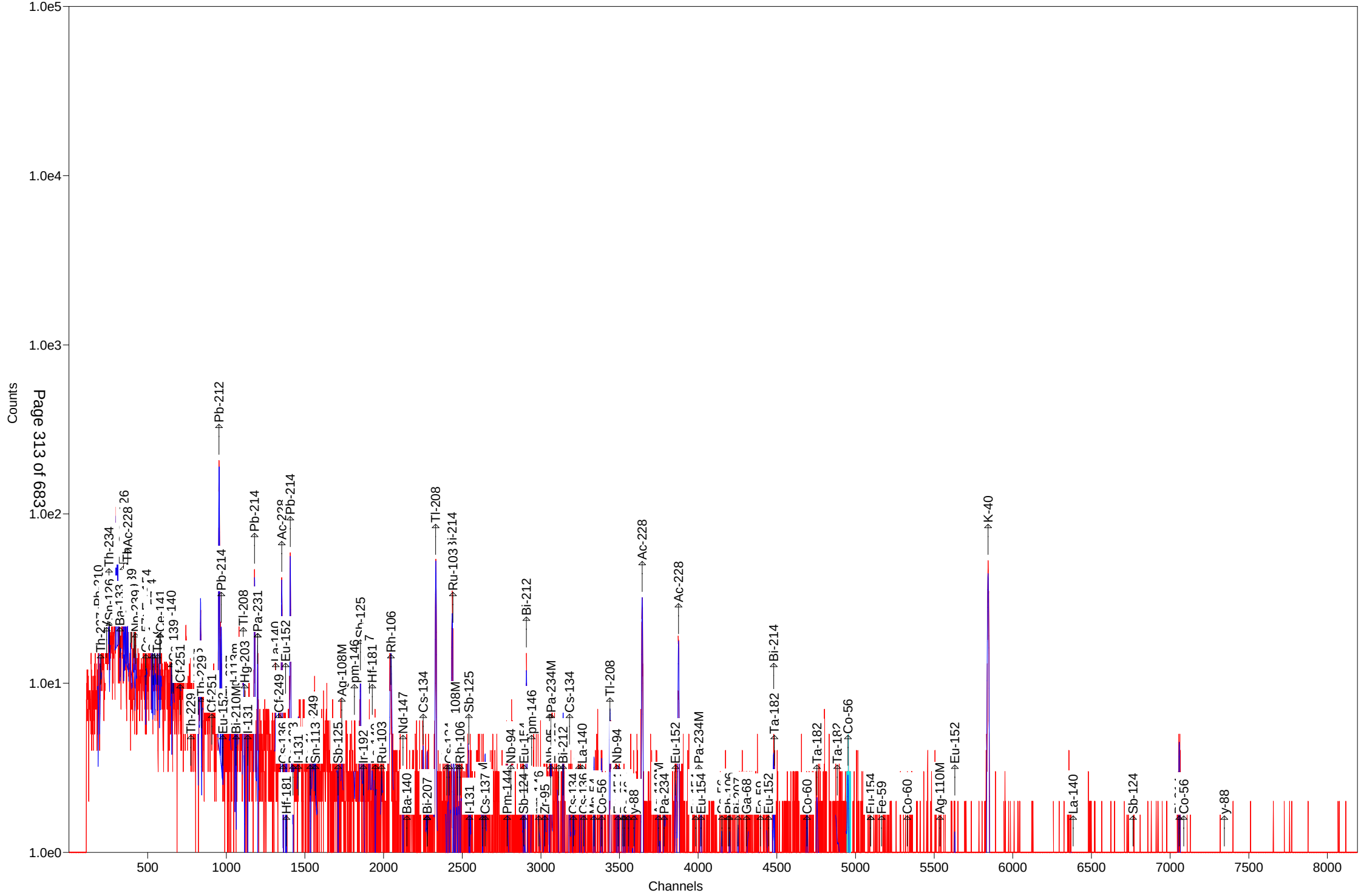
Cs-136 #A	-6.2174E-01	-6.2176E-01	1.013E+02%	1.45E+00
Np-239 #A	1.3078E+00	1.3081E+00	1.073E+02%	4.69E+00
Nd-147 #A	-3.7059E+00	-3.7061E+00	1.059E+02%	9.33E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.4 keV) 3.991E+02 Bq/Sample
Total Decayed Activity (37.6 to 1999.4 keV) 3.9913580E+02 Bq/Sample

264537_Gamma_160-18552-A-1-C DU. 12_Gamma_20161868.spc.



Test America St. Louis Spectrum ID: 8_Gamma_20161402

Sample Description: 264537_Gamma_160-18552-A-2-B
Detector: Detector # 8
Batch ID: 264537
Work Order Number: Gamma
Lot Number: 160-18552-A-2-B

Decay to Time: 9/1/2016 10:46 Live Time: 1800 sec
Acquisition Time: 9/1/2016 10:46:55 Real Time: 1847 sec
Analysis Time: 9/1/2016 11:18 Dead Time: 2.55 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 8_Soil_TunaCan.Clb
Efficiency Cal Desc: 8_Soil_TunaCan_90099_032712
Efficiency Cal Date: 3/28/2012 10:35
Energy Cal Date: 2/28/2012 10:34
Library: Client_Long_Rev11.lib
Bkgd Correction File: 8_2016-08-08_1838.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-2.339E+00	193.3	4.521E+00	4.522E+00	1.551E+01
NA-22	-1.246E+00	57.4	7.145E-01	7.172E-01	2.329E+00
K-40	2.740E+02	5.6	1.539E+01	2.082E+01	9.713E+00
Sc-46	4.781E-01	102.1	4.883E-01	4.889E-01	2.080E+00
CR-51	-5.792E+00	124.3	7.201E+00	7.208E+00	1.713E+01
MN-54	-9.303E-02	731.6	6.806E-01	6.806E-01	1.638E+00
FE-59	-7.522E-01	166.7	1.254E+00	1.254E+00	2.940E+00
Co-56	-2.817E-02	146.3	4.121E-02	4.124E-02	1.554E+00
CO-57	2.329E-01	154.0	3.588E-01	3.590E-01	1.208E+00
CO-58	1.004E-01	545.9	5.479E-01	5.480E-01	1.937E+00
CO-60	7.463E-02	114.0	8.511E-02	8.519E-02	1.932E+00
ZN-65	0.000E+00	1.#INF	5.986E-01	5.986E-01	6.550E+00
NB-94	3.138E-01	74.2	2.327E-01	2.333E-01	1.539E+00
ZR-95	1.541E+00	50.0	7.705E-01	7.746E-01	1.901E+00
NB-95	0.000E+00	1.#INF	2.440E-01	2.440E-01	1.939E+00
RU-103	2.422E-01	202.9	4.913E-01	4.914E-01	1.209E+00
RH-106	4.134E+00	93.8	3.877E+00	3.883E+00	1.670E+01
AG-108M	4.074E-01	127.8	5.209E-01	5.213E-01	1.254E+00
AG-110M	5.715E-01	81.7	4.668E-01	4.677E-01	2.720E+00
SN-113	-8.010E-01	105.4	8.446E-01	8.456E-01	2.836E+00
SB-124	-4.932E-01	213.2	1.052E+00	1.052E+00	3.549E+00
SB-125	2.131E+00	64.6	1.377E+00	1.381E+00	2.775E+00
I-131	7.250E-01	99.0	7.175E-01	7.185E-01	1.304E+00
Gd-153	-1.502E+00	164.4	2.469E+00	2.471E+00	8.212E+00
Ga-68	2.084E+01	89.3	1.861E+01	1.865E+01	4.310E+01
Tc-99m	0.000E+00	1.#INF	1.437E-01	1.437E-01	2.180E+00
BA-133	-3.337E-02	89.0	2.969E-02	2.974E-02	3.706E+00
CS-134	1.129E+00	44.0	4.968E-01	5.002E-01	3.369E+00
CS-137	-6.847E-01	117.2	8.023E-01	8.031E-01	2.318E+00
CE-139	-4.851E-01	111.2	5.397E-01	5.416E-01	1.802E+00
Ba-140	3.154E-01	107.1	3.379E-01	3.382E-01	5.311E+00
La-140	6.851E-02	84.6	5.792E-02	5.804E-02	2.238E+00
CE-141	-1.032E+00	140.6	1.451E+00	1.452E+00	4.827E+00

CE-144	0.000E+00	1.#INF	2.010E+00	2.010E+00	1.664E+01
PM-144	4.472E-01	68.4	3.061E-01	3.070E-01	1.674E+00
EU-152	2.078E+00	36.4	7.554E-01	7.632E-01	9.824E+00
EU-154	3.679E-01	85.5	3.145E-01	3.150E-01	1.254E+01
EU-155	8.141E-01	204.2	1.663E+00	1.663E+00	5.598E+00
HF-181	0.000E+00	1.#INF	2.640E-01	2.640E-01	2.118E+00
Ta-182	-3.290E+00	94.7	3.116E+00	3.120E+00	1.046E+01
Hg-203	-4.737E-01	115.4	5.467E-01	5.474E-01	1.837E+00
TL-208	8.846E+00	8.8	7.799E-01	9.049E-01	1.163E+00
pm-146	9.830E-01	34.9	3.429E-01	3.467E-01	4.388E+00
y-88	3.322E-01	40.8	1.356E-01	1.367E-01	1.598E+00
Cd-113m	-5.471E+03	111.4	6.093E+03	6.103E+03	2.052E+04
Cd-109	0.000E+00	1.#INF	2.149E+01	2.149E+01	7.148E+01
Cf-251	1.574E+00	134.7	2.121E+00	2.126E+00	5.452E+00
Cf-249	5.347E-01	166.5	8.904E-01	8.908E-01	2.605E+00
Sn-126	7.413E-01	850.0	6.301E+00	6.302E+00	2.122E+01
PB-210	-2.091E+01	45.4	9.491E+00	9.570E+00	7.057E+01
PB-212	3.051E+01	4.3	1.305E+00	2.366E+00	1.851E+00
PB-214	1.395E+01	8.1	1.135E+00	1.347E+00	1.571E+00
BI-207	0.000E+00	1.#INF	1.175E-01	1.175E-01	1.352E+00
BI-212	3.586E+01	18.6	6.667E+00	6.922E+00	1.126E+01
BI-214	1.214E+01	11.0	1.341E+00	1.482E+00	2.022E+00
BI-210M	-9.620E-01	128.0	1.231E+00	1.232E+00	2.712E+00
AC-228	2.807E+01	6.9	1.948E+00	2.417E+00	2.234E+00
TH-227	8.089E+00	104.3	8.438E+00	8.450E+00	2.815E+01
TH-229	3.137E+00	262.3	8.229E+00	8.232E+00	2.396E+01
TH-234	-2.703E+01	60.5	1.636E+01	1.642E+01	5.575E+01
PA-231	1.619E+01	116.4	1.884E+01	1.886E+01	8.479E+01
PA-233	1.016E+00	164.7	1.673E+00	1.674E+00	7.648E+00
PA-234	-2.112E+00	141.6	2.992E+00	2.994E+00	9.976E+00
PA-234M	2.385E+02	27.6	6.592E+01	6.701E+01	1.844E+02
U-235	-5.157E+00	54.9	2.833E+00	2.845E+00	1.977E+01
AM-241	9.782E-01	186.2	1.822E+00	1.822E+00	6.097E+00
Np-237	0.000E+00	1.#INF	6.588E+00	6.588E+00	2.190E+01
Ir-192	5.988E-01	76.9	4.605E-01	4.619E-01	1.970E+00
Cs-136	1.748E-01	73.6	1.287E-01	1.291E-01	2.144E+00
Np-239	-1.140E+00	144.5	1.648E+00	1.649E+00	5.521E+00
Nd-147	2.850E+00	120.7	3.439E+00	3.443E+00	8.367E+00
Total	7.161E+02				

Analyst: kody Saulters

Sample description
264537_Gamma_160-18552-A-2-B

Spectrum Filename: C:\User\SPC\Det8\8_Gamma_20161402.An1

Acquisition information
Start time: 9/1/2016 10:46:55 AM
Live time: 1800
Real time: 1847
Dead time: 2.55 %
Detector ID: 8

Detector system
Ge 8 SN/174

Calibration
Filename: 8_Soil_TunaCan.Clb
8_Soil_TunaCan_90099_032712

Energy Calibration
Created: 2/28/2012 10:34:41 AM
Zero offset: 0.052 keV
Gain: 0.250 keV/channel
Quadratic: 5.282E-10 keV/channel^2

Efficiency Calibration
Created: 3/28/2012 10:35:20 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.39 %
Log(Eff): -1.098764E-01 + (-4.958544E-01*Log(E)) + (-2.572270E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.71 %
Log(Eff): -2.525301E+01 + (9.398253E+00*Log(E)) + (-1.000034E+00*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev11.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.55keV)
Stop channel: 8000 (1999.97keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 10:46:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	8_2016-08-08_1838.PBC 8/8/2016 6:38:16 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 24 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.1322

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
50.14	26.	104.31	1.01	2.267E-02	50.14	8.000	PBC<MDA	TH227
59.54	18.	186.24	1.02	2.881E-02	59.54	35.900	PBC<MDA	AM241
63.45	4.	850.05	1.03	3.146E-02	63.29	3.810	PBC<MDA	TH234
					64.28	9.700	7.413E-01	Sn126
74.67	204.	12.88	1.03	3.611E-02				
77.11	354.	7.65	1.04	3.698E-02				
87.16	138.	14.74	1.04	3.975E-02	86.49	13.100	1.481E+01	Np237
					86.54	30.700	6.320E+00	EU155
					86.94	9.040	2.142E+01	Sn126
					87.57	37.500	5.145E+00	Sn126
					88.04	3.790	5.079E+01	Cd109
89.89	107.	17.62	1.05	4.028E-02				
92.81	153.	13.45	1.05	4.075E-02	92.59	5.584	PBC<MDA	TH234
					93.35	5.561	3.749E+01	AC228
103.52	13.	204.24	1.06	4.185E-02	103.20	21.800	PBC<MDA	Gd153
					103.70	24.000	7.204E-01	Np239
					105.31	21.200	8.141E-01	EU155
103.70	22.	121.39	1.06	4.178E-02	103.20	21.800	PBC<MDA	Gd153
					103.70	24.000	1.222E+00	Np239
					105.31	21.200	1.381E+00	EU155
121.78	24.	91.40	1.07	4.148E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	3.776E-01	CO57

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
122.06	15.	154.02	1.07	4.146E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	2.329E-01	CO57
176.60	17.	134.74	1.11	3.460E-02	176.60	17.000	PBC<MDA	Cf251
185.85	54.	37.60	0.75	3.328E-02				
193.51	6.	373.04	1.13	3.226E-02	193.51	4.400	PBC<MDA	TH229
210.85	7.	368.85	1.14	3.020E-02	210.85	2.990	PBC<MDA	TH229
238.66	582.	4.95	0.96	2.744E-02	238.63	43.300	2.720E+01	PB212
242.03	81.	19.13	1.16	2.714E-02	242.00	7.430	2.227E+01	PB214
277.36	45.	25.12	1.19	2.440E-02	277.28	6.310	1.614E+01	TL208
284.30	17.	98.97	1.19	2.393E-02	284.30	6.140	PBC<MDA	I131
295.41	136.	14.63	0.69	2.322E-02	295.09	19.300	1.685E+01	PB214
300.07	18.	161.22	1.20	2.293E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.750E+01	PA231
					300.18	6.200	6.945E+00	PA233
300.18	18.	164.65	1.20	2.293E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.750E+01	PA231
					300.18	6.200	6.946E+00	PA233
300.23	17.	168.27	1.20	2.294E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	PBC<MDA	PA231
					300.18	6.200	PBC<MDA	PA233
302.65	18.	167.81	1.21	2.278E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	2.369E+00	BA133
302.85	19.	168.24	1.21	2.277E-02	302.65	2.880	1.589E+01	PA231
					302.85	18.330	2.498E+00	BA133
304.85	19.	171.18	1.21	2.265E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	1.646E+00	BI210M
304.90	6.	577.85	1.21	2.265E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	4.932E-01	BI210M
316.49	17.	115.87	1.22	2.199E-02	316.49	87.040	PBC<MDA	Ir192
328.76	16.	166.03	1.23	2.133E-02	328.76	20.300	PBC<MDA	La140
333.44	17.	166.52	1.23	2.110E-02	333.44	15.510	PBC<MDA	Cf249
338.14	122.	12.11	0.96	2.086E-02	338.32	12.010	2.717E+01	AC228
340.57	16.	176.51	1.23	2.074E-02	340.57	46.900	PBC<MDA	Cs136
351.84	191.	8.14	1.15	2.021E-02	351.93	37.600	1.395E+01	PB214
364.48	9.	172.40	1.25	1.965E-02	364.48	81.700	PBC<MDA	I131
383.84	14.	113.72	1.27	1.885E-02	383.84	8.940	PBC<MDA	BA133
427.88	11.	91.91	1.30	1.728E-02	427.88	29.600	PBC<MDA	SB125
433.94	11.	127.85	1.30	1.708E-02	433.94	90.480	PBC<MDA	AG108M
453.70	25.	34.89	0.69	1.647E-02	453.88	65.000	1.315E+00	pm146
463.37	15.	90.90	1.32	1.620E-02	463.37	10.470	PBC<MDA	SB125
468.06	11.	101.16	1.33	1.606E-02	468.06	51.750	PBC<MDA	Ir192
487.02	10.	127.53	1.34	1.555E-02	487.02	45.500	PBC<MDA	La140
497.05	6.	202.86	1.35	1.530E-02	497.05	90.900	PBC<MDA	RU103
511.86	95.	26.23	2.61	1.494E-02	511.86	20.000	1.767E+01	RH106
531.00	10.	120.67	1.37	1.449E-02	531.00	13.000	PBC<MDA	Nd147
563.24	24.	44.00	1.39	1.381E-02	563.24	8.350	PBC<MDA	CS134
569.32	11.	67.86	1.40	1.369E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	5.370E+00	PA234

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					569.70	97.740	4.506E-01	BI207
569.47	2.	409.78	1.40	1.369E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	1.066E+00	PA234
					569.70	97.740	8.945E-02	BI207
583.18	181.	8.82	1.27	1.342E-02	583.02	84.500	8.846E+00	TL208
604.71	14.	163.95	1.42	1.303E-02	604.71	97.620	PBC<MDA	CS134
609.28	130.	11.04	1.49	1.294E-02	609.31	46.090	1.214E+01	BI214
					610.30	5.750	9.744E+01	RU103
618.06	22.	68.45	1.43	1.279E-02	618.06	99.100	PBC<MDA	PM144
621.92	2.	633.83	1.43	1.273E-02	621.92	9.930	PBC<MDA	RH106
657.76	12.	81.68	1.45	1.215E-02	657.76	94.640	PBC<MDA	AG110M
702.63	4.	357.33	1.48	1.150E-02	702.63	97.900	PBC<MDA	NB94
724.20	12.	105.41	1.50	1.121E-02	724.20	44.150	PBC<MDA	ZR95
726.71	54.	18.59	0.60	1.118E-02	727.17	7.550	3.586E+01	BI212
747.20	2.	523.72	1.51	1.093E-02	747.16	34.000	PBC<MDA	pm146
756.73	18.	50.00	1.52	1.081E-02	756.73	54.460	PBC<MDA	ZR95
763.94	11.	86.43	1.52	1.072E-02	763.94	22.280	PBC<MDA	AG110M
766.41	2.	587.25	1.53	1.070E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
778.92	17.	36.36	1.53	1.055E-02	778.92	12.940	6.958E+00	EU152
786.46	18.	44.22	1.54	1.048E-02	785.42	1.280	7.250E+01	BI212
795.87	6.	176.38	1.54	1.036E-02	795.87	85.530	PBC<MDA	CS134
810.78	2.	545.91	1.55	1.020E-02	810.78	99.460	PBC<MDA	CO58
859.83	45.	15.16	0.75	9.703E-03	860.56	12.420	2.053E+01	TL208
871.10	8.	74.17	1.59	9.604E-03	871.10	99.890	PBC<MDA	NB94
880.53	8.	116.14	1.60	9.517E-03	880.53	6.000	PBC<MDA	PA234
889.28	1.	994.99	1.60	9.438E-03	889.28	99.984	PBC<MDA	Sc46
911.29	129.	9.20	1.51	9.245E-03	911.07	29.000	2.673E+01	AC228
964.11	6.	225.74	1.65	8.814E-03	964.11	14.605	PBC<MDA	EU152
968.95	85.	14.21	1.65	8.776E-03	968.97	17.460	3.092E+01	AC228
996.33	6.	87.67	1.67	8.571E-03	996.33	10.600	PBC<MDA	EU154
1001.00	31.	27.64	1.67	8.537E-03	1001.00	0.837	2.385E+02	PA234M
1037.84	4.	252.77	1.69	8.278E-03	1037.84	14.130	PBC<MDA	Co56
1048.07	6.	73.63	1.70	8.209E-03	1048.07	80.000	PBC<MDA	Cs136
1050.36	6.	93.79	1.70	8.193E-03	1050.36	1.560	PBC<MDA	RH106
1077.40	8.	89.32	1.72	8.017E-03	1077.40	3.300	PBC<MDA	Ga68
1112.07	6.	223.63	1.74	7.803E-03	1112.07	13.644	PBC<MDA	EU152
1120.55	13.	102.12	1.74	7.752E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	8.974E-01	Sc46
					1121.30	34.900	2.572E+00	Ta182
1120.66	10.	97.99	1.74	7.754E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	PBC<MDA	Ta182
1173.24	8.	127.88	1.77	7.453E-03	1173.24	99.900	PBC<MDA	CO60
1460.75	324.	5.62	1.94	6.165E-03	1460.83	10.670	2.740E+02	K40
1764.38	29.	18.57	2.07	5.226E-03	1764.49	15.400	2.002E+01	BI214
1836.06	6.	40.82	2.10	5.046E-03	1836.06	99.200	PBC<MDA	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
298.47	74.63	243.	204.	5.649E+03	12.88	1.034	- D
308.25	77.08	190.	354.	9.584E+03	7.65	1.036	- sD
359.12	89.93	127.	105.	2.617E+03	17.96	1.046	- sD
370.81	92.85	134.	155.	3.811E+03	13.24	1.048	- sD
743.23	185.85	115.	54.	1.631E+03	37.60	0.753	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.96	46.54	513.	-32.	-0.018	45.40	1.012s
TH-227	200.37	50.14	366.	26.	0.015	104.31	1.015s
AM-241	237.95	59.54	565.	18.	0.010	186.24	1.022s
TH-234	252.96	63.29	615.	-57.	-0.032	60.52	1.025
Sn-126	256.93	64.28	597.	4.	0.002	850.05	1.026
BA-133	323.77	80.99	1561.	-39.	-0.022	143.30	1.039s
Np-237	345.77	86.49	1875.	0.	0.000	185.02	1.043A
EU-155	345.98	86.54	1842.	18.	0.010	137.73	1.043D
Sn-126	347.57	86.94	1730.	5.	0.003	503.54	1.044D
Sn-126	350.09	87.57	1556.	20.	0.011	120.86	1.044D
Cd-109	351.97	88.04	1696.	0.	0.000	175.88	1.044A
Nd-147	364.21	91.10	1522.	-33.	-0.019	166.33	1.047D
TH-234	370.17	92.59	726.	-22.	-0.012	175.88	1.048
AC-228	373.21	93.35	1535.	-33.	-0.019	166.73	1.049
Gd-153	389.81	97.50	1502.	-34.	-0.019	164.41	1.052s
Gd-153	412.62	103.20	1454.	-38.	-0.021	142.90	1.056s
Np-239	414.62	103.70	347.	22.	0.012	121.39	1.057s
EU-155	421.07	105.31	346.	13.	0.007	204.24	1.058s
Np-239	424.34	106.13	388.	-20.	-0.011	144.55	1.058s
EU-152	486.92	121.78	231.	24.	0.013	91.40	1.071s
CO-57	488.06	122.06	255.	15.	0.008	154.02	1.071s
PA-234	525.00	131.29	761.	-28.	-0.015	141.63	1.078s
HF-181	531.92	133.02	789.	-5.	-0.003	789.05	1.079s
CE-144	533.98	133.54	794.	0.	0.000	1000.00	1.080s
HF-181	545.02	136.30	794.	0.	0.000	1000.00	1.082

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-57	545.72	136.47	794.	0.	0.000	1000.00	1.082
Tc-99m	561.86	140.51	794.	0.	0.000	1000.00	1.085s
U-235	574.97	143.79	1027.	-40.	-0.022	54.92	1.087
CE-141	581.59	145.44	1172.	-35.	-0.019	140.58	1.089s
Ba-140	650.47	162.66	373.	-29.	-0.016	97.14	1.102s
U-235	653.35	163.38	403.	-30.	-0.017	72.64	1.102s
CE-139	663.24	165.85	384.	-25.	-0.014	111.24	1.104s
Cf-251	706.23	176.60	139.	17.	0.009	134.74	1.112s
TH-229	773.87	193.51	158.	6.	0.004	373.04	1.125
U-235	821.17	205.33	167.	-15.	-0.008	139.54	1.134
TH-229	843.24	210.85	157.	7.	0.004	368.85	1.138s
Cf-251	907.84	227.00	164.	-20.	-0.011	127.34	1.151s
PB-212	954.37	238.63	63.	653.	0.363	4.28	1.159D
PB-214	967.84	242.00	79.	81.	0.045	19.13	1.162D
EU-152	978.62	244.69	996.	-23.	-0.013	193.10	1.164s
TH-227	1024.81	256.24	112.	-21.	-0.012	101.05	1.172s
Cd-113m	1054.65	263.70	132.	-15.	-0.008	111.36	1.178s
BI-210M	1063.18	265.83	160.	-22.	-0.012	127.96	1.179s
TL-208	1108.99	277.28	41.	45.	0.025	25.12	1.188D
Hg-203	1116.66	279.20	181.	-17.	-0.009	115.40	1.189s
I-131	1137.05	284.30	68.	17.	0.009	98.97	1.193
PB-214	1180.22	295.09	411.	18.	0.010	163.62	1.201s
PB-212	1199.98	300.03	385.	17.	0.009	168.27	1.205
PA-231	1200.14	300.07	401.	18.	0.010	161.22	1.205
PA-233	1200.58	300.18	419.	18.	0.010	164.65	1.205
PA-231	1210.46	302.65	437.	18.	0.010	167.81	1.207s
BA-133	1211.27	302.85	489.	19.	0.010	168.24	1.207s
Ba-140	1219.26	304.85	508.	19.	0.010	171.18	1.208s
BI-210M	1219.45	304.90	526.	6.	0.003	577.85	1.208s
Ir-192	1233.62	308.44	532.	0.	0.000	1000.00	1.211s
Ir-192	1265.82	316.49	196.	17.	0.010	115.87	1.217s
CR-51	1280.20	320.08	189.	-23.	-0.013	124.33	1.219s
La-140	1314.91	328.76	355.	16.	0.009	166.03	1.226s
Cf-249	1333.63	333.44	372.	17.	0.009	166.52	1.229s
AC-228	1352.44	338.14	26.	122.	0.068	12.11	0.958s
Cs-136	1362.15	340.57	388.	16.	0.009	176.51	1.234s
EU-152	1377.01	344.29	404.	0.	0.000	1000.00	1.237s
HF-181	1383.19	345.83	432.	-18.	-0.010	167.35	1.238s
PB-214	1407.23	351.84	16.	191.	0.106	8.14	1.154
BA-133	1423.87	356.00	296.	-17.	-0.010	88.99	1.245s
I-131	1457.81	364.48	56.	9.	0.005	172.40	1.252s
BA-133	1535.24	383.84	126.	14.	0.008	113.72	1.266s
Cf-249	1551.68	387.95	140.	0.	0.000	1000.00	1.269s
SN-113	1566.64	391.69	154.	-17.	-0.010	105.44	1.271s
SB-125	1711.39	427.88	24.	11.	0.006	91.91	1.297s
AG-108M	1735.64	433.94	48.	11.	0.006	127.85	1.301s
pm-146	1814.68	453.70	13.	25.	0.014	34.89	0.694s
SB-125	1853.36	463.37	80.	15.	0.008	90.90	1.322

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ir-192	1872.14	468.06	60.	11.	0.006	101.16	1.325s
BE-7	1910.28	477.60	88.	-7.	-0.004	193.25	1.332s
HF-181	1927.89	482.00	95.	0.	0.000	1000.00	1.335s
La-140	1947.98	487.02	82.	10.	0.006	127.53	1.339s
RU-103	1988.12	497.05	35.	6.	0.003	202.86	1.346
RH-106	2047.36	511.86	77.	95.	0.053	26.23	2.606s
Nd-147	2123.91	531.00	30.	10.	0.005	120.67	1.369s
Ba-140	2148.95	537.26	44.	-10.	-0.005	128.83	1.373s
CS-134	2252.86	563.24	22.	24.	0.014	44.00	1.391s
CS-134	2277.20	569.32	22.	11.	0.006	67.86	1.395s
PA-234	2277.80	569.47	38.	2.	0.001	409.78	1.395s
BI-207	2278.73	569.70	41.	0.	0.000	1000.00	1.396s
TL-208	2332.62	583.18	20.	181.	0.100	8.82	1.266
SB-125	2401.92	600.50	304.	-15.	-0.008	168.96	1.416s
SB-124	2410.85	602.73	289.	-11.	-0.006	213.23	1.418s
CS-134	2418.76	604.71	255.	14.	0.008	163.95	1.419s
BI-214	2437.06	609.28	17.	130.	0.072	11.04	1.494
PM-144	2472.18	618.06	105.	22.	0.012	68.45	1.428s
RH-106	2487.60	621.92	57.	2.	0.001	633.83	1.431s
SB-125	2543.49	635.89	35.	-4.	-0.002	233.02	1.440s
I-131	2547.83	636.97	55.	-8.	-0.004	136.17	1.441s
AG-110M	2630.98	657.76	45.	12.	0.007	81.68	1.455s
CS-137	2646.58	661.66	75.	-13.	-0.007	117.18	1.457s
PM-144	2786.11	696.54	47.	-2.	-0.001	865.09	1.480s
NB-94	2810.46	702.63	37.	4.	0.002	357.33	1.484s
SB-124	2891.09	722.79	117.	-15.	-0.008	106.96	1.497s
AG-108M	2891.70	722.94	102.	-11.	-0.006	133.96	1.498s
ZR-95	2896.74	724.20	74.	12.	0.007	105.41	1.498s
BI-212	2906.80	726.71	10.	54.	0.030	18.59	0.602s
pm-146	2942.83	735.72	37.	-3.	-0.002	392.68	1.506s
pm-146	2988.59	747.16	33.	2.	0.001	523.72	1.513s
ZR-95	3026.87	756.73	14.	18.	0.010	50.00	1.519s
AG-110M	3055.73	763.94	44.	11.	0.006	86.43	1.524s
NB-95	3063.11	765.79	55.	0.	0.000	1000.00	1.525
PA-234M	3065.60	766.41	57.	2.	0.001	587.25	1.526s
EU-152	3115.64	778.92	5.	17.	0.009	36.36	1.534s
BI-212	3141.64	785.42	9.	18.	0.010	44.22	1.538s
CS-134	3183.43	795.87	53.	6.	0.003	176.38	1.544s
CS-134	3207.77	801.95	68.	-8.	-0.004	152.93	1.548s
CO-58	3243.06	810.78	49.	2.	0.001	545.91	1.554s
La-140	3263.04	815.77	51.	0.	0.000	1000.00	1.557s
Cs-136	3273.97	818.50	61.	-8.	-0.004	145.27	1.559s
MN-54	3339.36	834.85	33.	-2.	-0.001	731.57	1.569s
Co-56	3387.05	846.77	28.	-5.	-0.003	147.30	1.577s
TL-208	3439.31	859.83	0.	45.	0.025	15.16	0.750s
NB-94	3484.36	871.10	12.	8.	0.004	74.17	1.592s
EU-154	3492.89	873.23	26.	-5.	-0.003	146.77	1.593s
PA-234	3522.10	880.53	43.	8.	0.005	116.14	1.598s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PA-234	3532.94	883.24	51.	0.	0.000	1000.00	1.599s
AG-110M	3538.71	884.68	44.	-1.	-0.001	711.51	1.600s
Sc-46	3557.10	889.28	49.	1.	0.001	994.99	1.603s
AC-228	3645.13	911.29	3.	129.	0.072	9.20	1.509
AG-110M	3749.96	937.49	40.	-16.	-0.009	90.43	1.633s
PA-234	3784.07	946.02	30.	-5.	-0.003	125.94	1.638s
EU-152	3856.43	964.11	81.	6.	0.003	225.74	1.649s
AC-228	3875.88	968.97	31.	85.	0.047	14.21	1.652
EU-154	3985.31	996.33	10.	6.	0.003	87.67	1.668s
PA-234M	4003.99	1001.00	20.	31.	0.017	27.64	1.671s
EU-154	4019.10	1004.77	72.	-10.	-0.006	123.61	1.673s
Co-56	4151.36	1037.84	20.	4.	0.002	252.77	1.693s
Cs-136	4192.29	1048.07	6.	6.	0.003	73.63	1.698s
RH-106	4201.45	1050.36	12.	6.	0.003	93.79	1.700s
BI-207	4254.65	1063.66	35.	-15.	-0.008	90.47	1.708s
Ga-68	4309.61	1077.40	10.	8.	0.005	89.32	1.716s
FE-59	4397.02	1099.25	20.	-6.	-0.003	166.70	1.728s
EU-152	4448.32	1112.07	82.	6.	0.003	223.63	1.736s
ZN-65	4462.20	1115.55	88.	0.	0.000	1000.00	1.738s
BI-214	4481.17	1120.29	42.	10.	0.006	97.99	1.740s
Sc-46	4482.22	1120.55	75.	13.	0.007	102.12	1.740s
Ta-182	4485.22	1121.30	107.	-16.	-0.009	94.71	1.741s
CO-60	4692.97	1173.24	20.	8.	0.004	127.88	1.770s
Ta-182	4756.23	1189.05	35.	-12.	-0.007	79.85	1.779s
Ta-182	4885.67	1221.41	37.	-7.	-0.004	192.95	1.797s
NA-22	5098.16	1274.53	32.	-16.	-0.009	57.36	1.826s
FE-59	5166.43	1291.60	32.	-9.	-0.005	146.71	1.835s
CO-60	5330.06	1332.50	19.	-5.	-0.003	188.85	1.857s
AG-110M	5537.25	1384.30	16.	-3.	-0.002	326.00	1.884s
EU-152	5632.07	1408.00	16.	-5.	-0.003	201.17	1.896s
K-40	5843.07	1460.75	4.	324.	0.180	5.62	1.937
La-140	6384.93	1596.21	17.	-7.	-0.004	143.21	1.990s
SB-124	6764.03	1690.98	23.	-14.	-0.008	83.31	2.034s
BI-214	7058.07	1764.49	0.	29.	0.016	18.57	2.067
Co-56	7085.51	1771.35	29.	0.	0.000	1000.00	2.070s
y-88	7344.36	1836.06	0.	6.	0.003	40.82	2.098s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

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*****   S U M M A R Y   O F   L I B R A R Y   P E A K   U S A G E   *****
- Nuclide -  Average     ------------- Peak --------------
Name   Code  Activity     Energy   Activity Code MDA Value
             Bq/Sample     keV     Bq/Sample     Bq/Sample      COMMENTS
_____________________________________________________________________________

BE-7     C  -2.3392E+00                                     5.31E+01
                          477.60-2.339E+00 ?(  1.551E+01 1.93E+02 1.05E+01 G

NA-22    C  -1.2457E+00                                     9.50E+02
                         1274.53-1.246E+00 ?(  2.329E+00 5.74E+01 9.99E+01 G

K-40     N   2.7400E+02                                     4.66E+11
                         1460.83 2.740E+02  (P 9.713E+00 5.62E+00 1.07E+01 G

Sc-46    F   4.7813E-01                                     8.38E+01
                          889.28 5.887E-02 ?(  2.080E+00 9.95E+02 1.00E+02 G
                         1120.55 8.974E-01 ?(  3.096E+00 1.02E+02 1.00E+02 G

CR-51    F  -5.7922E+00                                     2.77E+01
                          320.08-5.792E+00 &(P 1.713E+01 1.24E+02 9.94E+00 G

MN-54    C  -9.3033E-02                                     3.12E+02
                          834.85-9.303E-02 ?(  1.638E+00 7.32E+02 1.00E+02 G

FE-59    F  -7.5218E-01                                     4.45E+01
                         1099.25-7.522E-01 ?(P 2.940E+00 1.67E+02 5.65E+01 G
                         1291.60-1.687E+00 +   5.450E+00 1.47E+02 4.32E+01 G

Co-56    C  -2.8174E-02                                     7.73E+01
                          846.77-2.989E-01 ?(P 1.554E+00 1.47E+02 9.99E+01 G
                         1238.28 1.182E-01 %   3.436E+00 1.29E+03 6.61E+01 G
                         1037.84 1.886E+00 &(P 1.119E+01 2.53E+02 1.41E+01 G
                         1771.35 0.000E+00 +   1.916E+01 1.00E+03 1.55E+01  A

CO-57    C   2.3292E-01                                     2.72E+02
                          122.06 2.329E-01 &(  1.208E+00 1.54E+02 8.56E+01 G
                          136.47 0.000E+00 &   1.743E+01 1.00E+03 1.07E+01 G

CO-58    C   1.0037E-01                                     7.09E+01
                          810.78 1.004E-01 ?(  1.937E+00 5.46E+02 9.95E+01 G

CO-60    F   7.4631E-02                                     1.93E+03
                         1332.50-4.473E-01  (P 1.932E+00 1.89E+02 1.00E+02 G
                         1173.24 5.970E-01 ?(  1.757E+00 1.28E+02 9.99E+01 G
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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
NB-94	I	3.1376E-01					7.41E+06	
			702.63	1.809E-01	?(	1.539E+00	3.57E+02	9.79E+01 G
			871.10	4.440E-01	?(	1.105E+00	7.42E+01	9.99E+01 G
ZR-95	I	1.5409E+00					6.40E+01	
			756.73	1.699E+00	&(	1.901E+00	5.00E+01	5.45E+01 G
			724.20	1.346E+00	?(	4.802E+00	1.05E+02	4.42E+01 G
RU-103	I	2.4218E-01					3.93E+01	
			497.05	2.422E-01	?(P	1.209E+00	2.03E+02	9.09E+01 G
			610.30	1.652E+00	%	5.913E+01	1.05E+03	5.75E+00 GA
RH-106	I	4.1337E+00					3.74E+02	
			621.92	7.479E-01	?(	1.670E+01	6.34E+02	9.93E+00 G
			1050.36	2.569E+01	&(	8.312E+01	9.38E+01	1.56E+00 G
			511.86	1.767E+01	?	8.109E+00	2.62E+01	2.00E+01 GA
AG-108M	C	4.0741E-01					1.53E+05	
			433.94	4.074E-01	?(	1.254E+00	1.28E+02	9.05E+01 G
			722.94	-5.958E-01	+	2.710E+00	1.34E+02	9.08E+01 G
			614.28	3.669E-07	&	3.819E+00	3.05E+08	8.98E+01 G
AG-110M	F	5.7147E-01					2.50E+02	
			884.68	-1.075E-01	?(	2.720E+00	7.12E+02	7.27E+01 G
			657.76	5.986E-01	?(	1.641E+00	8.17E+01	9.46E+01 G
			937.49	-2.866E+00	+	5.765E+00	9.04E+01	3.44E+01 G
			1384.30	-1.104E+00	+ P	7.583E+00	3.26E+02	2.43E+01 G
			763.94	2.671E+00	?(P	7.777E+00	8.64E+01	2.23E+01 G
SN-113	F	-8.0102E-01					1.15E+02	
			391.69	-8.010E-01	?(	2.836E+00	1.05E+02	6.40E+01 G
SB-124	F	-4.9321E-01					6.02E+01	
			602.73	-4.932E-01	?(	3.549E+00	2.13E+02	9.83E+01 G
			1690.98	-3.031E+00	+	5.335E+00	8.33E+01	4.78E+01 G
			722.79	-6.737E+00	+	2.427E+01	1.07E+02	1.08E+01 G
SB-125	I	2.1305E+00					1.01E+03	
			427.88	1.200E+00	?(	2.775E+00	9.19E+01	2.96E+01 G
			600.50	-3.508E+00	+	1.994E+01	1.69E+02	1.79E+01 G
			635.89	-1.441E+00	&	1.185E+01	2.33E+02	1.13E+01 G
			463.37	4.761E+00	?(	1.454E+01	9.09E+01	1.05E+01 G
I-131	I	7.2497E-01					8.02E+00	
			364.48	3.006E-01	&(P	1.304E+00	1.72E+02	8.17E+01 G
			284.30	6.372E+00	?(P	1.558E+01	9.90E+01	6.14E+00 G
			636.97	-4.968E+00	+	2.321E+01	1.36E+02	7.17E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Gd-153	F	-1.5017E+00					2.42E+02	
			97.50	-1.502E+00	&(	8.212E+00	1.64E+02	3.00E+01 G
			103.20	-2.318E+00	+	1.101E+01	1.43E+02	2.18E+01 G
Ga-68	C	2.0840E+01					4.71E-02	
			1077.40	2.084E+01	?(	4.310E+01	8.93E+01	3.30E+00 G
BA-133	F	-3.3366E-02					3.85E+03	
			356.00	-7.811E-01	?(P	3.706E+00	8.90E+01	6.20E+01 G
			302.85	2.498E+00	&(	1.408E+01	1.68E+02	1.83E+01 G
			383.84	4.724E+00	?	1.811E+01	1.14E+02	8.94E+00 GA
			80.99	-1.675E+00	+	7.977E+00	1.43E+02	3.41E+01 GA
CS-134	I	1.1292E+00					7.54E+02	
			604.71	6.098E-01	&(	3.369E+00	1.64E+02	9.76E+01 G
			795.87	3.761E-01	?(	2.296E+00	1.76E+02	8.55E+01 G
			569.32	2.862E+00	&(	6.439E+00	6.79E+01	1.54E+01 G
			801.95	-4.863E+00	+	2.551E+01	1.53E+02	8.69E+00 G
			563.24	1.172E+01	@(	1.176E+01	4.40E+01	8.35E+00 G
CS-137	I	-6.8471E-01					1.10E+04	
			661.66	-6.847E-01	&(P	2.318E+00	1.17E+02	8.52E+01 G
CE-139	F	-4.8514E-01					1.38E+02	
			165.85	-4.851E-01	?(	1.802E+00	1.11E+02	7.99E+01 G
Ba-140	I	3.1540E-01					1.28E+01	
			537.26	-1.518E+00	?(P	5.311E+00	1.29E+02	2.44E+01 G
			162.66	-7.126E+00	&	2.306E+01	9.71E+01	6.22E+00 G
			304.85	1.074E+01	?(	6.158E+01	1.71E+02	4.29E+00 G
La-140	I	6.8509E-02					1.28E+01	
			1596.21	-7.144E-01	?(	2.238E+00	1.43E+02	9.54E+01 G
			487.02	8.112E-01	?(	3.519E+00	1.28E+02	4.55E+01 G
			328.76	2.083E+00	?(P	1.162E+01	1.66E+02	2.03E+01 G
			815.77	0.000E+00	-	8.462E+00	1.00E+03	2.33E+01 G
CE-141	I	-1.0322E+00					3.25E+01	
			145.44	-1.032E+00	&(	4.827E+00	1.41E+02	4.82E+01 G
PM-144	C	4.4717E-01					3.63E+02	
			696.54	-8.339E-02	?(P	1.674E+00	8.65E+02	9.90E+01 G
			618.06	9.772E-01	?(	2.215E+00	6.84E+01	9.91E+01 G
EU-152	F	2.0775E+00					4.94E+03	
			344.29	0.000E+00	(	9.824E+00	1.00E+03	2.65E+01 G
			1112.07	3.044E+00	?(	2.346E+01	2.24E+02	1.36E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			121.78	1.131E+00	&(	3.446E+00	9.14E+01	2.86E+01 G
			778.92	6.958E+00	&(P	5.300E+00	3.64E+01	1.29E+01 G
			964.11	2.474E+00	?(	1.925E+01	2.26E+02	1.46E+01 G
			244.69	-6.330E+00	+	4.078E+01	1.93E+02	7.58E+00 G
			1408.00	-2.102E+00	+ P	8.885E+00	2.01E+02	2.10E+01 GA
EU-154	I	3.6791E-01					3.14E+03	
			873.23	-2.441E+00	?(	1.254E+01	1.47E+02	1.23E+01 G
			123.10	6.467E-02	& P	2.405E+00	1.09E+03	4.08E+01 G
			1274.54	-1.023E-01	%	7.927E+00	2.17E+03	3.52E+01 G
			723.36	3.263E-01	%	1.146E+01	1.01E+03	2.02E+01 G
			1004.77	-3.652E+00	+	1.537E+01	1.24E+02	1.80E+01 G
			996.33	3.619E+00	?(	1.089E+01	8.77E+01	1.06E+01 G
EU-155	I	8.1409E-01					1.81E+03	
			105.31	8.141E-01	&(	5.598E+00	2.04E+02	2.12E+01 G
			86.54	8.141E-01	}	9.261E+00	1.38E+02	3.07E+01 G
Ta-182	F	-3.2899E+00					1.14E+02	
			1121.30	-3.290E+00	&(	1.046E+01	9.47E+01	3.49E+01 G
			1221.41	-2.096E+00	+	8.913E+00	1.93E+02	2.70E+01 G
			1189.05	-5.694E+00	+ P	1.414E+01	7.98E+01	1.62E+01 G
Hg-203	F	-4.7374E-01					4.66E+01	
			279.20	-4.737E-01	?(	1.837E+00	1.15E+02	8.15E+01 G
TL-208	N	8.8462E+00					6.98E+02	
			583.02	8.846E+00	(P	1.163E+00	8.82E+00	8.45E+01 G
			277.28	1.614E+01	+ P	1.170E+01	2.51E+01	6.31E+00 G
			860.56	2.053E+01	+ P	3.397E+00	1.52E+01	1.24E+01 G
pm-146	C	9.8297E-01					2.02E+03	
			747.16	3.489E-01	?(	4.388E+00	5.24E+02	3.40E+01 G
			735.72	-7.436E-01	+	6.957E+00	3.93E+02	2.25E+01 G
			453.88	1.315E+00	@(	1.001E+00	3.49E+01	6.50E+01 G
y-88	F	3.3223E-01					1.07E+02	
			898.04	-2.111E-02	%(	1.598E+00	3.08E+03	9.37E+01 G
			1836.06	6.660E-01	?(	8.180E-01	4.08E+01	9.92E+01 G
Cd-113m		-5.4713E+03					5.33E+03	
			263.70	-5.471E+03	?(	2.052E+04	1.11E+02	6.00E-03 K
Cf-251	T	1.5742E+00					3.28E+05	
			176.60	1.574E+00	*(	5.452E+00	1.35E+02	1.70E+01 G
			227.00	-6.182E+00	+	1.928E+01	1.27E+02	6.30E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Cf-249	T	5.3474E-01					1.28E+05	
			387.95	0.000E+00	(	2.605E+00	1.00E+03	6.60E+01 G
			333.44	2.810E+00	&(	1.571E+01	1.67E+02	1.55E+01 G
Sn-126		7.4130E-01					3.65E+07	
			87.57	7.413E-01	}	6.938E+00	1.21E+02	3.75E+01 GA
			64.28	7.413E-01	&(	2.122E+01	8.50E+02	9.70E+00 G
			86.94	7.413E-01	}	3.043E+01	5.04E+02	9.04E+00 GA
PB-210	N	-2.0906E+01					8.14E+03	
			46.54	-2.091E+01	?(P	7.057E+01	4.54E+01	4.25E+00 G
PB-212	N	3.0508E+01					6.98E+02	
			238.63	3.051E+01	(P	1.851E+00	4.28E+00	4.33E+01 G
			300.03	1.231E+01	- P	6.951E+01	1.68E+02	3.28E+00 GA
PB-214	N	1.3948E+01					5.84E+05	
			351.93	1.395E+01	(P	1.571E+00	8.14E+00	3.76E+01 G
			295.09	2.194E+00	-	1.204E+01	1.64E+02	1.93E+01 G
			242.00	2.227E+01	+	1.217E+01	1.91E+01	7.43E+00 GA
BI-212	N	3.5862E+01					6.98E+02	
			727.17	3.586E+01	(P	1.126E+01	1.86E+01	7.55E+00 G
			785.42	7.250E+01	& P	7.071E+01	4.42E+01	1.28E+00 GA
BI-214	N	1.2140E+01					5.84E+05	
			609.31	1.214E+01	(P	2.022E+00	1.10E+01	4.61E+01 G
			1120.29	4.714E+00	- P	1.568E+01	9.80E+01	1.51E+01 G
			1764.49	2.002E+01	+	5.088E+00	1.86E+01	1.54E+01 G
BI-210M	T	-9.6202E-01					1.10E+09	
			265.83	-9.620E-01	?(P	2.712E+00	1.28E+02	5.00E+01 G
			304.90	4.932E-01	+	9.604E+00	5.78E+02	2.80E+01 G
AC-228	N	2.8068E+01					2.10E+03	
			911.07	2.673E+01	(	2.234E+00	9.20E+00	2.90E+01 G
			968.97	3.092E+01	?(	1.035E+01	1.42E+01	1.75E+01 G
			338.32	2.717E+01	@(	5.821E+00	1.21E+01	1.20E+01 G
			93.35	-8.176E+00	&	4.534E+01	1.67E+02	5.56E+00 XA
TH-227	N	8.0891E+00					7.95E+03	
			50.14	8.089E+00	?(	2.815E+01	1.04E+02	8.00E+00 G
			256.24	-6.420E+00	-	1.591E+01	1.01E+02	7.00E+00 G
TH-229	N	3.1371E+00					2.68E+06	
			193.51	2.479E+00	&(	2.396E+01	3.73E+02	4.40E+00 G
			210.85	4.106E+00	?(P	3.754E+01	3.69E+02	2.99E+00 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

TH-234   N  -2.7026E+01                                     1.63E+12
                          63.29-2.703E+01  (P 5.575E+01 6.05E+01 3.81E+00 G
                          92.59-5.260E+00 + P 3.133E+01 1.76E+02 5.58E+00 G

PA-231   N   1.6189E+01                                     1.20E+07
                         302.65 1.507E+01 &(  8.479E+01 1.68E+02 2.88E+00 G
                         300.07 1.750E+01 ?(  9.462E+01 1.61E+02 2.46E+00 G

PA-233   C   1.0163E+00                                     7.82E+08
                         312.01-4.852E-03 %(P 7.648E+00 4.01E+04 3.60E+01 G
                         300.18 6.946E+00 ?(  3.835E+01 1.65E+02 6.20E+00 G

PA-234   N  -2.1124E+00                                     1.63E+12
                         131.29-2.112E+00 ?(  9.976E+00 1.42E+02 1.80E+01 G
                         946.02-2.507E+00 + P 1.315E+01 1.26E+02 1.34E+01 G
                         569.47 1.066E+00 +   1.553E+01 4.10E+02 8.20E+00 G
                         883.24 0.000E+00 +   2.194E+01 1.00E+03 9.60E+00 G
                         880.53 8.107E+00 &   3.225E+01 1.16E+02 6.00E+00 GA

PA-234M  N   2.3852E+02                                     1.63E+12
                        1001.00 2.385E+02 ?(P 1.844E+02 2.76E+01 8.37E-01 G
                         766.41 3.244E+01 - P 6.703E+02 5.87E+02 2.94E-01 G

U-235    N  -5.1575E+00                                     2.57E+11
                         143.79-5.157E+00 ?(P 1.977E+01 5.49E+01 1.10E+01 G
                         205.33-5.285E+00 + P 2.262E+01 1.40E+02 5.01E+00 G
                         163.38-9.194E+00 + P 2.942E+01 7.26E+01 5.08E+00 G

AM-241   T   9.7816E-01                                     1.58E+05
                          59.54 9.782E-01 ?(P 6.097E+00 1.86E+02 3.59E+01 G

Ir-192   F   5.9876E-01                                     7.40E+01
                         316.49 5.063E-01 &(  1.970E+00 1.16E+02 8.70E+01 G
                         468.06 7.542E-01 ?(  2.584E+00 1.01E+02 5.18E+01 G
                         308.44 0.000E+00 -   8.592E+00 1.00E+03 3.18E+01 G

Cs-136   F   1.7484E-01                                     1.30E+01
                         818.50-4.300E-01 ?(  2.144E+00 1.45E+02 1.00E+02 G
                        1048.07 4.996E-01 ?(  1.234E+00 7.36E+01 8.00E+01 G
                         340.57 9.105E-01  (  5.397E+00 1.77E+02 4.69E+01 G

Np-239   T  -1.1400E+00                                     2.36E+00
                         103.70 1.222E+00 ?   4.961E+00 1.21E+02 2.40E+01 X
                         106.13-1.140E+00  (  5.521E+00 1.45E+02 2.27E+01 G
                          99.50-4.514E-01 %   1.617E+01 1.07E+03 1.50E+01 X
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Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Nd-147	2.8503E+00					1.11E+01	
		531.00	2.850E+00	&(	8.367E+00	1.21E+02	1.30E+01 G
		91.10	-1.618E+00	-	8.949E+00	1.66E+02	2.83E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
PB-210	46.54	513.	-32.	-0.018	45.40	-2.091E+01	P
TH-227	50.14	366.	26.	0.015	104.31	8.089E+00	
AM-241	59.54	565.	18.	0.010	186.24	9.782E-01	P
TH-234	63.29	615.	-57.	-0.032	60.52	-2.703E+01	P
BA-133	80.99	1561.	-39.	-0.022	143.30	-1.675E+00	
Nd-147	91.10	1522.	-33.	-0.019	166.33	-1.618E+00	
TH-234	92.59	726.	-22.	-0.012	175.88	-5.260E+00	P
Gd-153	97.50	1502.	-34.	-0.019	164.41	-1.502E+00	
Gd-153	103.20	1454.	-38.	-0.021	142.90	-2.318E+00	
Np-239	103.70	347.	22.	0.012	121.39	1.222E+00	
Np-239	106.13	388.	-20.	-0.011	144.55	-1.140E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	121.78	231.	24.	0.013	91.40	1.131E+00	
CO-57	122.06	255.	15.	0.008	154.02	2.329E-01	
PA-234	131.29	761.	-28.	-0.015	141.63	-2.112E+00	
HF-181	133.02	789.	-5.	-0.003	789.05	-1.601E-01	
U-235	143.79	1027.	-40.	-0.022	54.92	-5.157E+00	P
CE-141	145.44	1172.	-35.	-0.019	140.58	-1.032E+00	
Ba-140	162.66	373.	-29.	-0.016	97.14	-7.126E+00	
U-235	163.38	403.	-30.	-0.017	72.64	-9.194E+00	P
CE-139	165.85	384.	-25.	-0.014	111.24	-4.851E-01	
Cf-251	176.60	139.	17.	0.009	134.74	1.574E+00	
TH-229	193.51	158.	6.	0.004	373.04	2.479E+00	
U-235	205.33	167.	-15.	-0.008	139.54	-5.285E+00	P
TH-229	210.85	157.	7.	0.004	368.85	4.106E+00	P
Cf-251	227.00	164.	-20.	-0.011	127.34	-6.182E+00	
EU-152	244.69	996.	-23.	-0.013	193.10	-6.330E+00	
TH-227	256.24	112.	-21.	-0.012	101.05	-6.420E+00	
Cd-113m	263.70	132.	-15.	-0.008	111.36	-5.471E+03	
BI-210M	265.83	160.	-22.	-0.012	127.96	-9.620E-01	P
Hg-203	279.20	181.	-17.	-0.009	115.40	-4.737E-01	
I-131	284.30	68.	17.	0.009	98.97	6.372E+00	P
PA-231	300.07	401.	18.	0.010	161.22	1.750E+01	
PA-233	300.18	419.	18.	0.010	164.65	6.946E+00	
PA-231	302.65	437.	18.	0.010	167.81	1.507E+01	
BA-133	302.85	489.	19.	0.010	168.24	2.498E+00	
Ba-140	304.85	508.	19.	0.010	171.18	1.074E+01	
BI-210M	304.90	526.	6.	0.003	577.85	4.932E-01	
Ir-192	316.49	196.	17.	0.010	115.87	5.063E-01	
CR-51	320.08	189.	-23.	-0.013	124.33	-5.792E+00	P
La-140	328.76	355.	16.	0.009	166.03	2.083E+00	P
Cf-249	333.44	372.	17.	0.009	166.52	2.810E+00	
Cs-136	340.57	388.	16.	0.009	176.51	9.105E-01	
HF-181	345.83	432.	-18.	-0.010	167.35	-3.193E+00	
BA-133	356.00	296.	-17.	-0.010	88.99	-7.811E-01	P
I-131	364.48	56.	9.	0.005	172.40	3.006E-01	P
BA-133	383.84	126.	14.	0.008	113.72	4.724E+00	
SN-113	391.69	154.	-17.	-0.010	105.44	-8.010E-01	
SB-125	427.88	24.	11.	0.006	91.91	1.200E+00	
AG-108M	433.94	48.	11.	0.006	127.85	4.074E-01	
SB-125	463.37	80.	15.	0.008	90.90	4.761E+00	
Ir-192	468.06	60.	11.	0.006	101.16	7.542E-01	
BE-7	477.60	88.	-7.	-0.004	193.25	-2.339E+00	
La-140	487.02	82.	10.	0.006	127.53	8.112E-01	
RU-103	497.05	35.	6.	0.003	202.86	2.422E-01	P
RH-106	511.86	77.	95.	0.053	26.23	1.767E+01	
Nd-147	531.00	30.	10.	0.005	120.67	2.850E+00	
Ba-140	537.26	44.	-10.	-0.005	128.83	-1.518E+00	P
CS-134	563.24	22.	24.	0.014	44.00	1.172E+01	
CS-134	569.32	22.	11.	0.006	67.86	2.862E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
PA-234	569.47	38.	2.	0.001	409.78	1.066E+00		
SB-125	600.50	304.	-15.	-0.008	168.96	-3.508E+00		
SB-124	602.73	289.	-11.	-0.006	213.23	-4.932E-01		
CS-134	604.71	255.	14.	0.008	163.95	6.098E-01		
PM-144	618.06	105.	22.	0.012	68.45	9.772E-01		
RH-106	621.92	57.	2.	0.001	633.83	7.479E-01		
SB-125	635.89	35.	-4.	-0.002	233.02	-1.441E+00		
I-131	636.97	55.	-8.	-0.004	136.17	-4.968E+00		
AG-110M	657.76	45.	12.	0.007	81.68	5.986E-01		
CS-137	661.66	75.	-13.	-0.007	117.18	-6.847E-01		P
PM-144	696.54	47.	-2.	-0.001	865.09	-8.339E-02		P
NB-94	702.63	37.	4.	0.002	357.33	1.809E-01		
SB-124	722.79	117.	-15.	-0.008	106.96	-6.737E+00		
AG-108M	722.94	102.	-11.	-0.006	133.96	-5.958E-01		
ZR-95	724.20	74.	12.	0.007	105.41	1.346E+00		
ZR-95	756.73	14.	18.	0.010	50.00	1.699E+00		
AG-110M	763.94	44.	11.	0.006	86.43	2.671E+00		P
EU-152	778.92	5.	17.	0.009	36.36	6.958E+00		P
CS-134	795.87	53.	6.	0.003	176.38	3.761E-01		
CS-134	801.95	68.	-8.	-0.004	152.93	-4.863E+00		
CO-58	810.78	49.	2.	0.001	545.91	1.004E-01		
Cs-136	818.50	61.	-8.	-0.004	145.27	-4.300E-01		
MN-54	834.85	33.	-2.	-0.001	731.57	-9.303E-02		
Co-56	846.77	28.	-5.	-0.003	147.30	-2.989E-01		P
NB-94	871.10	12.	8.	0.004	74.17	4.440E-01		
EU-154	873.23	26.	-5.	-0.003	146.77	-2.441E+00		
PA-234	880.53	43.	8.	0.005	116.14	8.107E+00		
AG-110M	884.68	44.	-1.	-0.001	711.51	-1.075E-01		
Sc-46	889.28	49.	1.	0.001	994.99	5.887E-02		
AG-110M	937.49	40.	-16.	-0.009	90.43	-2.866E+00		
PA-234	946.02	30.	-5.	-0.003	125.94	-2.507E+00		P
EU-152	964.11	81.	6.	0.003	225.74	2.474E+00		
EU-154	996.33	10.	6.	0.003	87.67	3.619E+00		
EU-154	1004.77	72.	-10.	-0.006	123.61	-3.652E+00		
Co-56	1037.84	20.	4.	0.002	252.77	1.886E+00		P
Cs-136	1048.07	6.	6.	0.003	73.63	4.996E-01		
RH-106	1050.36	12.	6.	0.003	93.79	2.569E+01		
BI-207	1063.66	35.	-15.	-0.008	90.47	-1.380E+00		
Ga-68	1077.40	10.	8.	0.005	89.32	2.084E+01		
FE-59	1099.25	20.	-6.	-0.003	166.70	-7.522E-01		P
EU-152	1112.07	82.	6.	0.003	223.63	3.044E+00		
Sc-46	1120.55	75.	13.	0.007	102.12	8.974E-01		
Ta-182	1121.30	107.	-16.	-0.009	94.71	-3.290E+00		
CO-60	1173.24	20.	8.	0.004	127.88	5.970E-01		
Ta-182	1189.05	35.	-12.	-0.007	79.85	-5.694E+00		P
Ta-182	1221.41	37.	-7.	-0.004	192.95	-2.096E+00		
NA-22	1274.53	32.	-16.	-0.009	57.36	-1.246E+00		
FE-59	1291.60	32.	-9.	-0.005	146.71	-1.687E+00		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-60	1332.50	19.	-5.	-0.003	188.85	-4.473E-01	P
AG-110M	1384.30	16.	-3.	-0.002	326.00	-1.104E+00	P
EU-152	1408.00	16.	-5.	-0.003	201.17	-2.102E+00	P
La-140	1596.21	17.	-7.	-0.004	143.21	-7.144E-01	
SB-124	1690.98	23.	-14.	-0.008	83.31	-3.031E+00	
y-88	1836.06	0.	6.	0.003	40.82	6.660E-01	

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	-2.3391E+00	-2.3392E+00	1.933E+02%	1.55E+01
NA-22	#A	-1.2457E+00	-1.2457E+00	5.736E+01%	2.33E+00
K-40		2.7400E+02	2.7400E+02	5.615E+00%	9.71E+00
Sc-46	#A	4.7813E-01	4.7813E-01	1.021E+02%	2.08E+00
CR-51	#A	-5.7921E+00	-5.7922E+00	1.243E+02%	1.71E+01
MN-54	#A	-9.3033E-02	-9.3033E-02	7.316E+02%	1.64E+00
FE-59	#A	-7.5217E-01	-7.5218E-01	1.667E+02%	2.94E+00
Co-56	#A	-2.8174E-02	-2.8174E-02	1.463E+02%	1.55E+00
CO-57	#A	2.3292E-01	2.3292E-01	1.540E+02%	1.21E+00
CO-58	#A	1.0037E-01	1.0037E-01	5.459E+02%	1.94E+00
CO-60	#A	7.4631E-02	7.4631E-02	1.140E+02%	1.93E+00
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	6.55E+00
NB-94	#A	3.1376E-01	3.1376E-01	7.417E+01%	1.54E+00
ZR-95	#A	1.5409E+00	1.5409E+00	5.000E+01%	1.90E+00
NB-95	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.94E+00
RU-103	#A	2.4217E-01	2.4218E-01	2.029E+02%	1.21E+00
RH-106	#A	4.1337E+00	4.1337E+00	9.379E+01%	1.67E+01
AG-108M	#A	4.0741E-01	4.0741E-01	1.278E+02%	1.25E+00
AG-110M	#A	5.7147E-01	5.7147E-01	8.168E+01%	2.72E+00
SN-113	#A	-8.0102E-01	-8.0102E-01	1.054E+02%	2.84E+00
SB-124	#A	-4.9321E-01	-4.9321E-01	2.132E+02%	3.55E+00
SB-125	#A	2.1305E+00	2.1305E+00	6.463E+01%	2.77E+00
I-131	#A	7.2493E-01	7.2497E-01	9.897E+01%	1.30E+00
Gd-153	#A	-1.5017E+00	-1.5017E+00	1.644E+02%	8.21E+00
Ga-68	#A	2.0646E+01	2.0840E+01	8.932E+01%	4.31E+01
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.18E+00
BA-133	#A	-3.3366E-02	-3.3366E-02	8.899E+01%	3.71E+00
CS-134	#A	1.1292E+00	1.1292E+00	4.400E+01%	3.37E+00
CS-137	#A	-6.8471E-01	-6.8471E-01	1.172E+02%	2.32E+00
CE-139	#A	-4.8514E-01	-4.8514E-01	1.112E+02%	1.80E+00
Ba-140	#A	3.1539E-01	3.1540E-01	1.071E+02%	5.31E+00
La-140	#A	6.8507E-02	6.8509E-02	8.455E+01%	2.24E+00
CE-141	#A	-1.0322E+00	-1.0322E+00	1.406E+02%	4.83E+00
CE-144	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.66E+01

PM-144 #A	4.4717E-01	4.4717E-01	6.845E+01%	1.67E+00
EU-152 #A	2.0775E+00	2.0775E+00	3.636E+01%	9.82E+00
EU-154 #A	3.6791E-01	3.6791E-01	8.548E+01%	1.25E+01
EU-155 #A	8.1409E-01	8.1409E-01	2.042E+02%	5.60E+00
HF-181 #A	0.0000E+00	0.0000E+00	7.071E+02%	2.12E+00
Ta-182 #A	-3.2899E+00	-3.2899E+00	9.471E+01%	1.05E+01
Hg-203 #A	-4.7373E-01	-4.7374E-01	1.154E+02%	1.84E+00
TL-208	8.8462E+00	8.8462E+00	8.817E+00%	1.16E+00
pm-146 #A	9.8297E-01	9.8297E-01	3.489E+01%	4.39E+00
y-88 #A	3.3223E-01	3.3223E-01	4.082E+01%	1.60E+00
Cd-113m#A	-5.4713E+03	-5.4713E+03	1.114E+02%	2.05E+04
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%	7.15E+01
Cf-251 #A	1.5742E+00	1.5742E+00	1.347E+02%	5.45E+00
Cf-249 #A	5.3474E-01	5.3474E-01	1.665E+02%	2.60E+00
Sn-126 A	7.4130E-01	7.4130E-01	8.500E+02%	2.12E+01
PB-210 #A	-2.0906E+01	-2.0906E+01	4.540E+01%	7.06E+01
PB-212	3.0508E+01	3.0508E+01	4.279E+00%	1.85E+00
PB-214	1.3948E+01	1.3948E+01	8.140E+00%	1.57E+00
BI-207 #A	0.0000E+00	0.0000E+00	1.000E+03%	1.35E+00
BI-212 #	3.5862E+01	3.5862E+01	1.859E+01%	1.13E+01
BI-214	1.2140E+01	1.2140E+01	1.104E+01%	2.02E+00
BI-210M#A	-9.6202E-01	-9.6202E-01	1.280E+02%	2.71E+00
AC-228	2.8068E+01	2.8068E+01	6.939E+00%	2.23E+00
TH-227 #A	8.0891E+00	8.0891E+00	1.043E+02%	2.81E+01
TH-229 #A	3.1371E+00	3.1371E+00	2.623E+02%	2.40E+01
TH-234 #A	-2.7026E+01	-2.7026E+01	6.052E+01%	5.58E+01
PA-231 #A	1.6189E+01	1.6189E+01	1.164E+02%	8.48E+01
PA-233 #A	1.0163E+00	1.0163E+00	1.647E+02%	7.65E+00
PA-234 #A	-2.1124E+00	-2.1124E+00	1.416E+02%	9.98E+00
PA-234M#	2.3852E+02	2.3852E+02	2.764E+01%	1.84E+02
U-235 #A	-5.1575E+00	-5.1575E+00	5.492E+01%	1.98E+01
AM-241 #A	9.7816E-01	9.7816E-01	1.862E+02%	6.10E+00
Np-237 #A	0.0000E+00	0.0000E+00	1.000E+03%	2.19E+01
Ir-192 #A	5.9876E-01	5.9876E-01	7.691E+01%	1.97E+00
Cs-136 #A	1.7483E-01	1.7484E-01	7.363E+01%	2.14E+00
Np-239 #A	-1.1398E+00	-1.1400E+00	1.445E+02%	5.52E+00
Nd-147 #A	2.8502E+00	2.8503E+00	1.207E+02%	8.37E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

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-----------------------------   S U M M A R Y   -----------------------------
Total Activity (   37.5 to  2000.0 keV)     4.034E+02  Bq/Sample
Total Decayed Activity (   37.5 to  2000.0 keV) 4.0337622E+02  Bq/Sample
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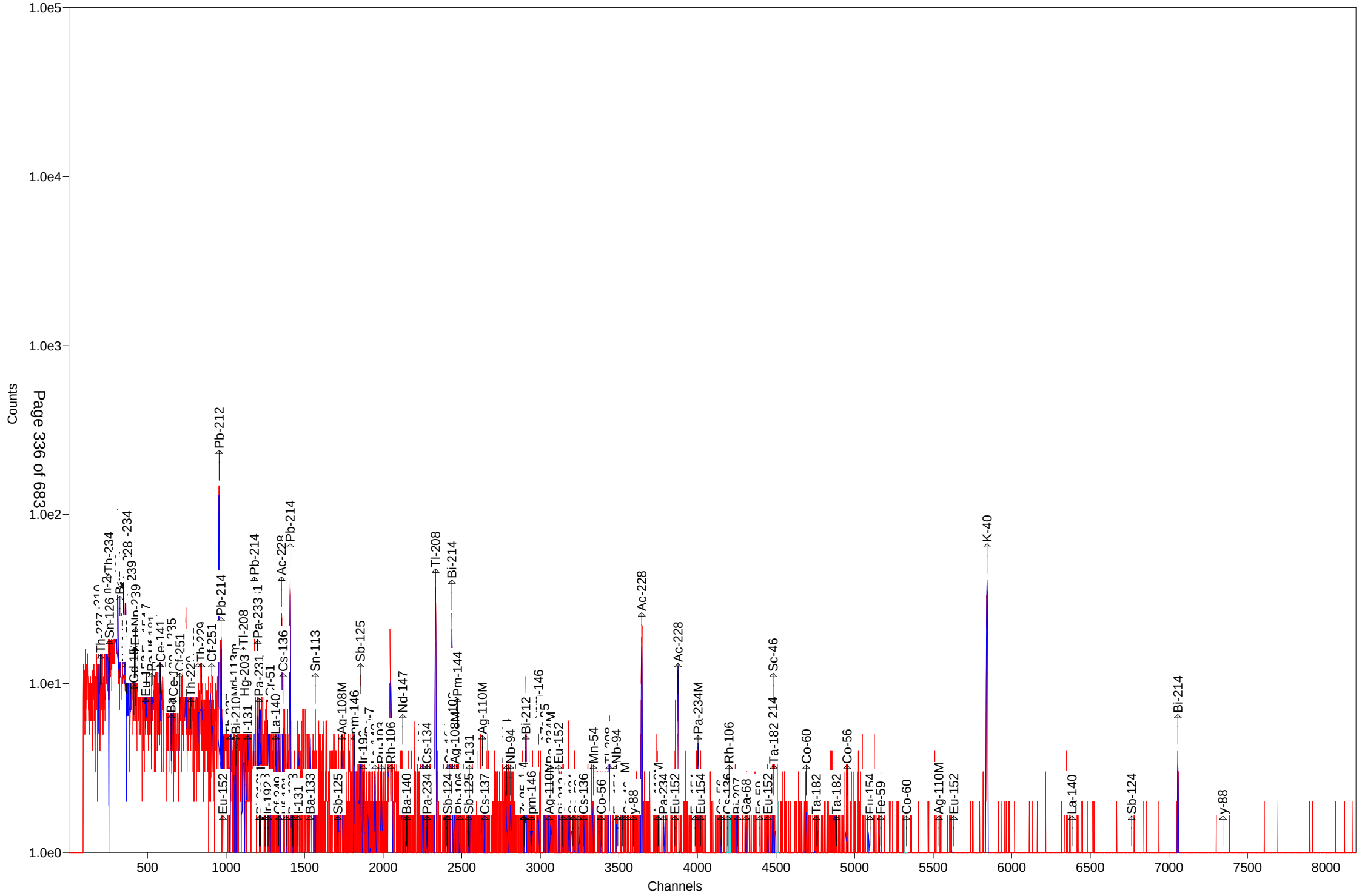
264537_Gamma_160-18552-A-2-B. 8_Gamma_20161402.spc.



Test America St. Louis Spectrum ID: 7_Gamma_20162139

Sample Description: 264537_Gamma_160-18552-A-3-B
Detector: Detector # 7
Batch ID: 264537
Work Order Number: Gamma
Lot Number: 160-18552-A-3-B

Decay to Time: 9/1/2016 10:47 Live Time: 1800 sec
Acquisition Time: 9/1/2016 10:47:40 Real Time: 1829 sec
Analysis Time: 9/1/2016 11:18 Dead Time: 1.57 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 7_Soil_TunaCan.Clb
Efficiency Cal Desc: 7_TunaCan_90099_032712
Efficiency Cal Date: 3/16/2012 11:45
Energy Cal Date: 2/23/2012 08:40
Library: Client_Long_Rev11.lib
Bkgd Correction File: 7_2016-07-31_1448.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	1.402E+00	302.6	4.243E+00	4.243E+00	1.455E+01
NA-22	8.951E-02	512.3	4.586E-01	4.586E-01	1.671E+00
K-40	2.976E+02	4.9	1.468E+01	2.115E+01	7.938E+00
Sc-46	-4.754E-01	145.8	6.931E-01	6.935E-01	2.450E+00
CR-51	-1.025E-02	27751.8	2.845E+00	2.845E+00	2.143E+01
MN-54	8.969E-01	58.0	5.202E-01	5.222E-01	1.200E+00
FE-59	5.510E-01	161.9	8.923E-01	8.927E-01	2.779E+00
Co-56	1.736E+00	18.5	3.209E-01	3.330E-01	1.531E+00
CO-57	5.448E-03	5589.0	3.045E-01	3.045E-01	1.034E+00
CO-58	-9.078E-01	35.6	3.235E-01	3.269E-01	2.467E+00
CO-60	5.240E-01	111.8	5.857E-01	5.862E-01	1.294E+00
ZN-65	-1.182E-01	1343.9	1.589E+00	1.589E+00	5.540E+00
NB-94	-2.292E-02	179.7	4.119E-02	4.121E-02	1.672E+00
ZR-95	1.001E+00	90.7	9.079E-01	9.094E-01	2.108E+00
NB-95	8.249E-01	77.6	6.400E-01	6.414E-01	2.132E+00
RU-103	-1.793E-01	285.2	5.113E-01	5.114E-01	1.203E+00
RH-106	1.202E+01	76.0	9.134E+00	9.156E+00	3.239E+01
AG-108M	3.673E-01	95.1	3.492E-01	3.497E-01	8.719E-01
AG-110M	2.541E-01	221.6	5.630E-01	5.632E-01	3.130E+00
SN-113	0.000E+00	1.#INF	3.331E-01	3.331E-01	2.468E+00
SB-124	-6.127E-01	177.3	1.086E+00	1.087E+00	3.642E+00
SB-125	4.732E+00	28.7	1.359E+00	1.380E+00	2.916E+00
I-131	4.559E-01	77.4	3.531E-01	3.539E-01	1.230E+00
Gd-153	-3.226E-01	313.3	1.011E+00	1.011E+00	2.723E+00
Ga-68	2.576E+01	88.0	2.266E+01	2.271E+01	4.956E+01
Tc-99m	3.086E-01	120.4	3.716E-01	3.720E-01	1.240E+00
BA-133	-7.055E-01	158.0	1.115E+00	1.116E+00	3.732E+00
CS-134	5.045E-01	67.9	3.428E-01	3.438E-01	3.609E+00
CS-137	-6.812E-01	109.8	7.479E-01	7.487E-01	2.516E+00
CE-139	3.544E-01	106.9	3.787E-01	3.802E-01	1.264E+00
Ba-140	-5.511E-01	370.8	2.043E+00	2.043E+00	5.130E+00
La-140	3.108E-01	91.4	2.841E-01	2.846E-01	1.943E+00
CE-141	-6.123E-01	111.8	6.844E-01	6.851E-01	2.282E+00

CE-144	-2.924E+00	126.1	3.687E+00	3.690E+00	1.228E+01
PM-144	5.384E-01	92.7	4.988E-01	4.996E-01	1.155E+00
EU-152	9.179E-01	102.8	9.438E-01	9.450E-01	7.177E+00
EU-154	1.558E+00	153.6	2.394E+00	2.395E+00	1.292E+01
EU-155	1.136E+00	136.8	1.554E+00	1.556E+00	5.192E+00
HF-181	-6.877E-03	8137.9	5.596E-01	5.596E-01	1.956E+00
Ta-182	2.467E+00	58.5	1.444E+00	1.449E+00	5.275E+00
Hg-203	-2.955E-01	145.4	4.298E-01	4.301E-01	1.450E+00
TL-208	9.456E+00	7.6	7.206E-01	8.717E-01	9.482E-01
pm-146	2.078E-01	95.8	1.990E-01	1.993E-01	4.224E+00
y-88	3.491E-01	169.2	5.907E-01	5.909E-01	1.364E+00
Cd-113m	4.977E+03	92.5	4.603E+03	4.614E+03	1.542E+04
Cd-109	0.000E+00	1.#INF	1.343E+01	1.343E+01	4.501E+01
Cf-251	-1.646E+00	125.5	2.065E+00	2.070E+00	5.265E+00
Cf-249	4.223E-01	102.9	4.348E-01	4.353E-01	2.374E+00
Sn-126	1.380E+01	30.2	4.173E+00	4.236E+00	1.042E+01
PB-210	1.285E+01	69.6	8.945E+00	8.977E+00	2.628E+01
PB-212	2.754E+01	4.0	1.101E+00	2.095E+00	1.678E+00
PB-214	1.855E+01	7.4	1.367E+00	1.672E+00	2.094E+00
BI-207	-1.113E-02	3015.0	3.354E-01	3.354E-01	1.194E+00
BI-212	3.378E+01	25.9	8.738E+00	8.913E+00	1.559E+01
BI-214	1.843E+01	7.5	1.381E+00	1.681E+00	1.829E+00
BI-210M	-3.722E-01	444.5	1.655E+00	1.655E+00	2.133E+00
AC-228	2.834E+01	6.8	1.931E+00	2.412E+00	3.416E+00
TH-227	4.199E+00	107.2	4.501E+00	4.507E+00	2.242E+01
TH-229	-8.131E+00	105.4	8.568E+00	8.593E+00	2.179E+01
TH-234	-1.264E+01	93.5	1.182E+01	1.184E+01	3.956E+01
PA-231	0.000E+00	1.#INF	6.808E+00	6.808E+00	7.051E+01
PA-233	0.000E+00	1.#INF	5.793E-01	5.793E-01	5.790E+00
PA-234	-1.803E+00	156.4	2.820E+00	2.821E+00	7.215E+00
PA-234M	8.759E+01	79.2	6.933E+01	6.947E+01	2.321E+02
U-235	-3.078E+00	157.2	4.837E+00	4.840E+00	9.619E+00
AM-241	4.109E-01	324.0	1.331E+00	1.331E+00	3.583E+00
Np-237	0.000E+00	1.#INF	4.368E+00	4.368E+00	1.453E+01
Ir-192	0.000E+00	1.#INF	2.721E-01	2.721E-01	2.424E+00
Cs-136	-9.337E-01	93.4	8.721E-01	8.737E-01	2.915E+00
Np-239	6.098E-01	274.4	1.673E+00	1.674E+00	5.605E+00
Nd-147	-3.696E+00	114.6	4.238E+00	4.243E+00	1.008E+01
Total	5.590E+03				

Analyst: kody Saulters

Sample description
264537_Gamma_160-18552-A-3-B

Spectrum Filename: C:\User\SPC\Det7\7_Gamma_20162139.An1

Acquisition information

Start time:	9/1/2016 10:47:40 AM
Live time:	1800
Real time:	1829
Dead time:	1.57 %
Detector ID:	7

Detector system
Ge 7 SN/154

Calibration

Filename:	7_Soil_TunaCan.Clb

7_TunaCan_90099_032712

Energy Calibration

Created:	2/23/2012 8:40:56 AM
Zero offset:	0.117 keV
Gain:	0.250 keV/channel
Quadratic:	3.508E-09 keV/channel^2

Efficiency Calibration

Created:	3/16/2012 11:45:14 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 0.87 %
Log(Eff):	6.716580E-01 + (-6.166540E-01*Log(E)) + (-2.065917E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.48 %
Log(Eff):	-2.689695E+01 + (1.019544E+01*Log(E)) + (-1.081671E+00*Log(E)^2)

Library Files

Main analysis library:	Client_Long_Rev11.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.61keV)
Stop channel:	8000 (2000.13keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 10:47:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	7_2016-07-31_1448.PBC 7/31/2016 2:48:35 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 25 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1497

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.50	24.	69.61	1.05	2.483E-02	46.54	4.250	PBC<MDA	PB210
50.14	22.	122.25	0.84	2.841E-02	50.14	8.000	PBC<MDA	TH227
59.54	10.	323.97	0.85	3.701E-02	59.54	35.900	PBC<MDA	AM241
63.88	98.	30.23	1.79	4.080E-02	63.29	3.810	PBC<MDA	TH234
					64.28	9.700	1.380E+01	Sn126
74.85	321.	9.08	0.87	4.768E-02				
77.17	507.	6.15	0.87	4.890E-02				
87.20	181.	12.92	0.88	5.305E-02	86.49	13.100	1.452E+01	Np237
					86.54	30.700	6.195E+00	EU155
					86.94	9.040	2.099E+01	Sn126
					87.57	37.500	5.040E+00	Sn126
					88.04	3.790	4.973E+01	Cd109
89.83	120.	19.06	0.88	5.383E-02				
91.10	32.	156.52	0.88	5.415E-02	91.10	28.300	PBC<MDA	Nd147
92.59	8.	631.04	0.89	5.452E-02	92.59	5.584	PBC<MDA	TH234
93.18	160.	13.86	0.89	5.470E-02	93.35	5.561	2.918E+01	AC228
99.50	18.	224.43	0.89	5.580E-02	99.50	15.000	PBC<MDA	Np239
103.23	20.	200.19	0.90	5.626E-02	103.20	21.800	PBC<MDA	Gd153
					103.70	24.000	8.299E-01	Np239
105.31	24.	136.83	0.90	5.638E-02	105.31	21.200	PBC<MDA	EU155
106.13	14.	274.38	0.90	5.643E-02	106.13	22.700	PBC<MDA	Np239
121.78	26.	101.05	0.92	5.608E-02	121.78	28.580	PBC<MDA	EU152

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					122.06	85.600	2.956E-01	CO57
140.51	26.	120.39	0.94	5.336E-02	140.51	89.300	PBC<MDA	Tc99m
165.85	25.	106.87	0.96	4.881E-02	165.85	79.900	PBC<MDA	CE139
238.62	745.	5.45	1.01	3.602E-02	238.63	43.300	2.654E+01	PB212
242.02	107.	17.15	1.04	3.560E-02	242.00	7.430	2.254E+01	PB214
244.69	21.	228.91	1.05	3.526E-02	244.69	7.580	PBC<MDA	EU152
256.24	12.	176.15	1.06	3.392E-02	256.24	7.000	PBC<MDA	TH227
263.70	18.	92.48	1.07	3.310E-02	263.70	0.006	PBC<MDA	Cd113m
277.60	16.	105.12	1.08	3.172E-02	277.28	6.310	PBC<MDA	TL208
295.34	232.	9.72	0.91	3.007E-02	295.09	19.300	2.219E+01	PB214
300.17	47.	30.70	0.73	2.966E-02	300.03	3.280	2.655E+01	PB212
					300.07	2.460	3.541E+01	PA231
					300.18	6.200	PBC<MDA	PA233
328.76	18.	91.42	1.13	2.744E-02	328.76	20.300	PBC<MDA	La140
333.44	17.	102.95	1.14	2.711E-02	333.44	15.510	PBC<MDA	Cf249
338.38	167.	11.73	1.04	2.677E-02	338.32	12.010	2.886E+01	AC228
352.09	325.	7.37	1.20	2.587E-02	351.93	37.600	1.855E+01	PB214
383.84	8.	252.36	1.19	2.402E-02	383.84	8.940	PBC<MDA	BA133
427.88	13.	104.27	1.23	2.186E-02	427.88	29.600	PBC<MDA	SB125
433.94	13.	95.07	1.24	2.160E-02	433.94	90.480	PBC<MDA	AG108M
453.88	15.	95.77	1.26	2.077E-02	453.88	65.000	PBC<MDA	pm146
463.37	58.	28.71	1.27	2.040E-02	463.37	10.470	1.496E+01	SB125
477.60	5.	302.58	1.28	1.987E-02	477.60	10.520	PBC<MDA	BE7
511.86	122.	19.27	2.56	1.870E-02	511.86	20.000	1.817E+01	RH106
563.24	9.	170.86	1.36	1.720E-02	563.24	8.350	PBC<MDA	CS134
569.32	13.	67.95	1.37	1.704E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	5.010E+00	PA234
					569.70	97.740	4.205E-01	BI207
583.30	240.	7.62	1.31	1.668E-02	583.02	84.500	9.456E+00	TL208
609.45	245.	7.49	1.14	1.605E-02	609.31	46.090	1.843E+01	BI214
					610.30	5.750	1.479E+02	RU103
621.92	15.	183.04	1.42	1.576E-02	621.92	9.930	PBC<MDA	RH106
636.97	15.	77.45	1.43	1.543E-02	636.97	7.170	PBC<MDA	I131
696.54	14.	92.66	1.49	1.426E-02	696.54	99.000	PBC<MDA	PM144
723.36	8.	195.35	1.51	1.379E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	3.472E-01	AG108M
					723.36	20.220	1.561E+00	EU154
727.24	63.	25.87	1.01	1.373E-02	727.17	7.550	3.378E+01	BI212
756.73	13.	90.69	1.54	1.325E-02	756.73	54.460	PBC<MDA	ZR95
765.79	19.	77.58	1.55	1.311E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	2.802E+02	PA234M
834.85	20.	57.99	1.61	1.213E-02	834.85	99.980	PBC<MDA	MN54
861.45	9.	160.47	1.63	1.181E-02	860.56	12.420	PBC<MDA	TL208
871.10	4.	200.00	1.64	1.168E-02	871.10	99.890	PBC<MDA	NB94
873.23	4.	237.17	1.64	1.166E-02	873.23	12.270	PBC<MDA	EU154
898.04	7.	169.22	1.66	1.137E-02	898.04	93.700	PBC<MDA	y88
911.25	157.	9.61	1.87	1.122E-02	911.07	29.000	2.684E+01	AC228
964.11	10.	158.90	1.72	1.066E-02	964.11	14.605	PBC<MDA	EU152

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
969.28	102.	13.70	1.67	1.062E-02	968.97	17.460	3.047E+01	AC228
1001.00	14.	79.15	1.75	1.031E-02	1001.00	0.837	PBC<MDA	PA234M
1050.36	15.	76.02	1.79	9.871E-03	1050.36	1.560	PBC<MDA	RH106
1077.40	13.	87.99	1.81	9.646E-03	1077.40	3.300	PBC<MDA	Ga68
1099.25	5.	224.30	1.83	9.472E-03	1099.25	56.500	PBC<MDA	FE59
1120.35	30.	30.64	1.85	9.311E-03	1120.29	15.100	1.169E+01	BI214
					1120.55	99.987	PBC<MDA	Sc46
1121.36	11.	82.41	1.85	9.303E-03	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	1.902E+00	Ta182
1189.23	2.	836.90	1.90	8.821E-03	1189.05	16.200	PBC<MDA	Ta182
1220.61	13.	83.15	1.92	8.608E-03	1221.41	27.000	PBC<MDA	Ta182
1238.28	47.	18.49	1.94	8.501E-03	1238.28	66.070	4.660E+00	Co56
1274.53	1.	512.35	1.96	8.280E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	2.542E-01	EU154
1291.60	3.	233.60	1.98	8.180E-03	1291.60	43.200	PBC<MDA	FE59
1332.50	7.	111.77	2.01	7.951E-03	1332.50	99.980	PBC<MDA	CO60
1384.30	4.	221.56	2.04	7.678E-03	1384.30	24.290	PBC<MDA	AG110M
1408.00	19.	37.13	2.06	7.560E-03	1408.00	21.005	6.709E+00	EU152
1460.76	418.	4.93	1.51	7.309E-03	1460.83	10.670	2.976E+02	K40
1764.71	11.	66.89	2.29	6.141E-03	1764.49	15.400	PBC<MDA	BI214
1771.35	7.	126.15	2.29	6.119E-03	1771.35	15.480	PBC<MDA	Co56
1836.06	1.	945.38	2.33	5.919E-03	1836.06	99.200	PBC<MDA	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
298.97	74.83	265.	321.	6.743E+03	9.08	0.867	- D
308.26	77.15	231.	507.	1.036E+04	6.15	0.870	- D
358.51	89.91	173.	137.	2.547E+03	16.04	0.883	- D

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.53	46.50	103.	24.	0.014	69.61	1.047s
TH-227	200.12	50.14	365.	22.	0.012	122.25	0.840s
AM-241	237.70	59.54	317.	10.	0.005	323.97	0.850s
TH-234	252.71	63.29	517.	-35.	-0.019	93.51	0.854s
Sn-126	255.08	63.88	236.	98.	0.055	30.23	1.794s
Np-237	345.53	86.49	1463.	0.	0.000	171.85	0.880A
EU-155	345.74	86.54	1431.	-32.	-0.018	170.00	0.880D
Sn-126	349.85	87.57	1161.	135.	0.075	18.86	0.881D
Cd-109	351.73	88.04	1192.	0.	0.000	1000.00	0.881A
Nd-147	363.97	91.10	1224.	32.	0.018	156.52	0.885s
TH-234	369.93	92.59	1253.	8.	0.004	631.04	0.886s
AC-228	372.97	93.35	165.	160.	0.089	13.86	0.887D
Gd-153	389.57	97.50	287.	-10.	-0.005	313.34	0.892s
Np-239	397.57	99.50	807.	18.	0.010	224.43	0.894
Gd-153	412.38	103.20	825.	0.	0.000	1000.00	0.898s
Np-239	414.38	103.70	805.	20.	0.011	200.19	0.898s
EU-155	420.83	105.31	547.	24.	0.014	136.83	0.900s
Np-239	424.10	106.13	737.	14.	0.008	274.38	0.901
EU-152	486.69	121.78	320.	26.	0.014	101.05	0.918s
EU-154	491.98	123.10	326.	-26.	-0.014	100.15	0.919
PA-234	524.77	131.29	728.	-32.	-0.018	156.41	0.928s
HF-181	531.68	133.02	759.	-32.	-0.018	123.65	0.930s
CE-144	533.74	133.54	791.	-32.	-0.018	126.10	0.930s
HF-181	544.79	136.30	823.	-9.	-0.005	451.14	0.933s
Tc-99m	561.63	140.51	465.	26.	0.014	120.39	0.938s
U-235	574.73	143.79	436.	-32.	-0.018	157.17	0.941s
CE-141	581.35	145.44	470.	-28.	-0.015	111.78	0.943s
Ba-140	650.24	162.66	437.	-28.	-0.015	108.15	0.961
U-235	653.11	163.38	313.	-12.	-0.007	416.86	0.962
CE-139	663.01	165.85	341.	25.	0.014	106.87	0.965s
Cf-251	706.00	176.60	238.	-23.	-0.013	125.50	0.976s
TH-229	773.64	193.51	235.	-28.	-0.015	105.37	0.994s
TH-229	843.01	210.85	239.	-7.	-0.004	395.68	1.012s
PB-212	954.15	238.63	91.	773.	0.430	4.00	1.041D
PB-214	967.61	242.00	116.	107.	0.060	17.15	1.045D
EU-152	978.39	244.69	1187.	21.	0.012	228.91	1.048s
TH-227	1024.59	256.24	117.	12.	0.006	176.15	1.060
Cd-113m	1054.43	263.70	126.	18.	0.010	92.48	1.067
BI-210M	1062.96	265.83	168.	-11.	-0.006	444.52	1.070s
TL-208	1108.77	277.28	131.	16.	0.009	105.12	1.081
Hg-203	1116.44	279.20	191.	-14.	-0.008	145.42	1.083s
I-131	1136.83	284.30	119.	-18.	-0.010	95.36	1.089s
PB-214	1180.99	295.34	58.	232.	0.129	9.75	0.910
PB-212	1200.34	300.17	47.	47.	0.026	30.70	0.729s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PA-231	1199.92	300.07	540.	-21.	-0.011	160.45	1.105s
PA-233	1200.36	300.18	520.	-13.	-0.007	256.41	1.105s
PA-231	1210.24	302.65	507.	0.	0.000	1000.00	1.107
BA-133	1211.05	302.85	507.	0.	0.000	1000.00	1.108
Ba-140	1219.04	304.85	507.	0.	0.000	1000.00	1.110s
BI-210M	1219.23	304.90	507.	0.	0.000	1000.00	1.110s
Ir-192	1233.41	308.44	507.	0.	0.000	1000.00	1.113s
PA-233	1247.69	312.01	507.	0.	0.000	1000.00	1.117s
Ir-192	1265.61	316.49	507.	0.	0.000	1000.00	1.122s
La-140	1314.69	328.76	123.	18.	0.010	91.42	1.134s
Cf-249	1333.41	333.44	141.	17.	0.009	102.95	1.139s
AC-228	1353.18	338.38	50.	167.	0.093	11.73	1.038
Cs-136	1361.93	340.57	442.	-22.	-0.012	137.92	1.146s
EU-152	1376.80	344.29	353.	-20.	-0.011	132.27	1.150
PB-214	1408.02	352.09	53.	325.	0.180	7.37	1.202s
BA-133	1423.66	356.00	499.	-20.	-0.011	158.03	1.162s
I-131	1457.59	364.48	84.	-6.	-0.003	301.85	1.170s
BA-133	1535.03	383.84	183.	8.	0.004	252.36	1.189s
Cf-249	1551.47	387.95	191.	0.	0.000	1000.00	1.193s
SN-113	1566.43	391.69	191.	0.	0.000	1000.00	1.197s
SB-125	1711.18	427.88	45.	13.	0.007	104.27	1.233s
AG-108M	1735.43	433.94	36.	13.	0.007	95.07	1.239s
pm-146	1815.20	453.88	52.	15.	0.009	95.77	1.258s
SB-125	1853.15	463.37	108.	58.	0.032	28.71	1.268s
Ir-192	1871.93	468.06	165.	0.	0.000	1000.00	1.272s
BE-7	1910.07	477.60	125.	5.	0.003	302.58	1.282
La-140	1947.77	487.02	65.	-18.	-0.010	91.38	1.291s
RU-103	1987.91	497.05	57.	-6.	-0.003	285.18	1.301
RH-106	2047.15	511.86	67.	122.	0.068	19.27	2.565s
Nd-147	2123.70	531.00	74.	-16.	-0.009	114.65	1.333s
Ba-140	2148.74	537.26	65.	-4.	-0.002	370.75	1.339
CS-134	2252.65	563.24	52.	9.	0.005	170.86	1.364s
CS-134	2276.99	569.32	30.	13.	0.007	67.95	1.369s
TL-208	2332.91	583.30	21.	240.	0.133	7.62	1.307
SB-125	2401.71	600.50	494.	-18.	-0.010	180.75	1.399s
SB-124	2410.64	602.73	476.	-18.	-0.010	177.30	1.401s
BI-214	2437.52	609.45	22.	245.	0.136	7.49	1.141
RU-103	2440.91	610.30	491.	-18.	-0.010	179.16	1.408s
AG-108M	2456.84	614.28	473.	-17.	-0.010	177.99	1.412s
PM-144	2471.96	618.06	456.	0.	0.000	1000.00	1.415s
RH-106	2487.38	621.92	361.	15.	0.008	183.04	1.419s
SB-125	2543.28	635.89	62.	-13.	-0.007	90.04	1.432s
I-131	2547.62	636.97	60.	15.	0.008	77.45	1.433s
AG-110M	2630.77	657.76	143.	-23.	-0.013	77.90	1.452
CS-137	2646.36	661.66	139.	-16.	-0.009	109.79	1.455s
PM-144	2785.90	696.54	33.	14.	0.008	92.66	1.487s
NB-94	2810.25	702.63	70.	-6.	-0.003	298.61	1.493s
SB-124	2890.87	722.79	125.	-2.	-0.001	865.02	1.511s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AG-108M	2891.48	722.94	123.	0.	0.000	1000.00	1.511s
EU-154	2893.15	723.36	113.	8.	0.004	195.35	1.511s
ZR-95	2896.52	724.20	121.	0.	0.000	1000.00	1.512s
BI-212	2908.69	727.24	32.	63.	0.035	25.87	1.006s
pm-146	2942.61	735.72	61.	-17.	-0.009	102.12	1.523s
pm-146	2988.37	747.16	47.	-5.	-0.003	373.40	1.533
ZR-95	3026.65	756.73	28.	13.	0.007	90.69	1.541s
AG-110M	3055.51	763.94	130.	-26.	-0.014	65.58	1.548s
NB-95	3062.89	765.79	104.	19.	0.011	77.58	1.549
EU-152	3115.41	778.92	56.	-19.	-0.010	87.54	1.561s
BI-212	3141.41	785.42	66.	-16.	-0.009	46.19	1.567s
CS-134	3207.54	801.95	47.	-5.	-0.003	295.30	1.581
CO-58	3242.84	810.78	126.	-20.	-0.011	35.64	1.589s
La-140	3262.82	815.77	146.	-20.	-0.011	36.08	1.593s
Cs-136	3273.74	818.50	178.	-21.	-0.012	93.40	1.596s
MN-54	3339.13	834.85	25.	20.	0.011	57.99	1.610
Co-56	3386.82	846.77	42.	-4.	-0.002	267.60	1.620s
TL-208	3442.00	860.56	40.	9.	0.005	160.47	1.632s
NB-94	3484.13	871.10	30.	4.	0.002	200.00	1.641s
EU-154	3492.66	873.23	43.	4.	0.002	237.17	1.643s
PA-234	3521.86	880.53	72.	-15.	-0.008	83.34	1.649s
PA-234	3532.70	883.24	88.	-3.	-0.002	421.91	1.652s
Sc-46	3556.86	889.28	105.	-10.	-0.005	145.80	1.657s
y-88	3591.90	898.04	25.	7.	0.004	169.22	1.664s
AC-228	3644.76	911.25	14.	157.	0.087	9.61	1.869s
AG-110M	3749.71	937.49	55.	-20.	-0.011	86.32	1.697s
PA-234	3783.82	946.02	30.	-3.	-0.002	405.52	1.704s
EU-152	3856.18	964.11	130.	10.	0.006	158.90	1.719s
AC-228	3876.86	969.28	17.	102.	0.056	13.70	1.674
EU-154	3985.06	996.33	71.	-6.	-0.003	197.61	1.746s
PA-234M	4003.73	1001.00	51.	14.	0.008	79.15	1.750s
EU-154	4018.84	1004.77	82.	-13.	-0.007	101.62	1.753s
Cs-136	4192.02	1048.07	58.	-18.	-0.010	62.92	1.788s
RH-106	4201.18	1050.36	60.	15.	0.008	76.02	1.790s
BI-207	4254.38	1063.66	53.	-16.	-0.009	104.60	1.801s
Ga-68	4309.34	1077.40	21.	13.	0.007	87.99	1.812s
FE-59	4396.74	1099.25	27.	5.	0.003	224.30	1.829s
EU-152	4448.04	1112.07	107.	-16.	-0.009	96.63	1.839s
BI-214	4480.88	1120.29	26.	30.	0.016	30.64	1.845D
Sc-46	4481.94	1120.55	68.	-11.	-0.006	111.79	1.846s
Ta-182	4484.94	1121.30	36.	11.	0.006	82.41	1.846s
CO-60	4692.68	1173.24	43.	-17.	-0.009	53.70	1.886s
Ta-182	4755.93	1189.05	37.	2.	0.001	836.90	1.899s
Ta-182	4885.37	1221.41	21.	13.	0.007	83.15	1.923s
Co-56	4952.84	1238.28	6.	47.	0.026	18.49	1.936s
NA-22	5097.84	1274.53	23.	1.	0.001	512.35	1.963s
EU-154	5097.89	1274.54	24.	0.	0.000	1000.00	1.963s
FE-59	5166.10	1291.60	12.	3.	0.002	233.60	1.975s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-60	5329.71	1332.50	12.	7.	0.004	111.77	2.005s
AG-110M	5536.89	1384.30	11.	4.	0.002	221.56	2.042s
EU-152	5631.70	1408.00	6.	19.	0.011	37.13	2.059s
K-40	5842.72	1460.76	3.	418.	0.232	4.93	1.512s
La-140	6384.49	1596.21	18.	0.	0.000	1000.00	2.185s
SB-124	6763.55	1690.98	12.	-2.	-0.001	424.26	2.245s
BI-214	7057.56	1764.49	20.	11.	0.006	66.89	2.290s
Co-56	7084.99	1771.35	33.	7.	0.004	126.15	2.294s
y-88	7343.81	1836.06	6.	1.	0.000	945.38	2.332s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	1.4022E+00				5.31E+01	
			477.60	1.402E+00	(P	1.455E+01 3.03E+02 1.05E+01	G
NA-22	C	8.9511E-02				9.50E+02	
			1274.53	8.951E-02	?(	1.671E+00 5.12E+02 9.99E+01	G
K-40	N	2.9759E+02				4.66E+11	
			1460.83	2.976E+02	(P	7.938E+00 4.93E+00 1.07E+01	G
Sc-46	F	-4.7536E-01				8.38E+01	
			889.28	-4.754E-01	?(P	2.450E+00 1.46E+02 1.00E+02	G
			1120.55	-6.462E-01	+	2.452E+00 1.12E+02 1.00E+02	G
CR-51	F	-1.0253E-02				2.77E+01	
			320.08	-1.025E-02	%(P	2.143E+01 2.78E+04 9.94E+00	G
MN-54	C	8.9693E-01				3.12E+02	
			834.85	8.969E-01	(P	1.200E+00 5.80E+01 1.00E+02	G
FE-59	F	5.5105E-01				4.45E+01	
			1099.25	5.536E-01	?(	2.779E+00 2.24E+02 5.65E+01	G
			1291.60	5.477E-01	?(P	2.912E+00 2.34E+02 4.32E+01	G
Co-56	C	1.7357E+00				7.73E+01	
			846.77	-1.975E-01	?(P	1.531E+00 2.68E+02 9.99E+01	G
			1238.28	4.660E+00	?(P	1.387E+00 1.85E+01 6.61E+01	G
			1037.84	3.940E-01	%	1.193E+01 1.30E+03 1.41E+01	G
			1771.35	3.979E+00	? P	1.734E+01 1.26E+02 1.55E+01	A

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-57	C 5.4476E-03					2.72E+02	
		122.06	5.448E-03	%(	1.034E+00	5.59E+03	8.56E+01 G
		136.47	3.045E-01	%	1.243E+01	1.21E+03	1.07E+01 G
CO-58	C -9.0778E-01					7.09E+01	
		810.78	-9.078E-01	?(P	2.467E+00	3.56E+01	9.95E+01 G
CO-60	F 5.2400E-01					1.93E+03	
		1332.50	5.240E-01	?(P	1.294E+00	1.12E+02	1.00E+02 G
		1173.24	-1.056E+00	+ P	2.071E+00	5.37E+01	9.99E+01 G
ZN-65	F -1.1825E-01					2.44E+02	
		1115.55	-1.182E-01	&(	5.540E+00	1.34E+03	5.06E+01 G
NB-94	I -2.2923E-02					7.41E+06	
		702.63	-2.406E-01	?(	1.672E+00	2.99E+02	9.79E+01 G
		871.10	1.904E-01	&(	1.344E+00	2.00E+02	9.99E+01 G
ZR-95	I 1.0011E+00					6.40E+01	
		756.73	1.001E+00	?(	2.108E+00	9.07E+01	5.45E+01 G
		724.20	0.000E+00	&	4.930E+00	1.00E+03	4.42E+01 G
NB-95	I 8.2492E-01					6.40E+01	
		765.79	8.249E-01	?(	2.132E+00	7.76E+01	9.98E+01 G
RU-103	I -1.7928E-01					3.93E+01	
		497.05	-1.793E-01	?(P	1.203E+00	2.85E+02	9.09E+01 G
		610.30	-1.064E+01	+	6.389E+01	1.79E+02	5.75E+00 GA
RH-106	I 1.2016E+01					3.74E+02	
		621.92	5.265E+00	?(	3.239E+01	1.83E+02	9.93E+00 G
		1050.36	5.499E+01	&(	1.395E+02	7.60E+01	1.56E+00 G
		511.86	1.817E+01	?	6.053E+00	1.93E+01	2.00E+01 GA
AG-108M	C 3.6735E-01					1.53E+05	
		433.94	3.673E-01	(	8.719E-01	9.51E+01	9.05E+01 G
		722.94	0.000E+00	-	2.411E+00	1.00E+03	9.08E+01 G
		614.28	-6.769E-01	+	4.039E+00	1.78E+02	8.98E+01 G
AG-110M	F 2.5412E-01					2.50E+02	
		884.68	-2.598E-02	%(P	3.130E+00	3.64E+03	7.27E+01 G
		657.76	-8.833E-01	&	2.289E+00	7.79E+01	9.46E+01 G
		937.49	-2.894E+00	+	5.510E+00	8.63E+01	3.44E+01 G
		1384.30	1.092E+00	?(	5.480E+00	2.22E+02	2.43E+01 G
		763.94	-4.899E+00	+	1.061E+01	6.56E+01	2.23E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SB-124	F	-6.1271E-01					6.02E+01	
			602.73	-6.127E-01	?(	3.642E+00	1.77E+02	9.83E+01 G
			1690.98	-3.640E-01	+	3.431E+00	4.24E+02	4.78E+01 G
			722.79	-6.828E-01	+	2.040E+01	8.65E+02	1.08E+01 G
SB-125	I	4.7321E+00					1.01E+03	
			427.88	1.116E+00	?(P	2.916E+00	1.04E+02	2.96E+01 G
			600.50	-3.355E+00	+	2.032E+01	1.81E+02	1.79E+01 G
			635.89	-4.131E+00	+	1.252E+01	9.00E+01	1.13E+01 G
			463.37	1.496E+01	*(	1.327E+01	2.87E+01	1.05E+01 G
I-131	I	4.5593E-01					8.02E+00	
			364.48	-1.625E-01	&(	1.230E+00	3.02E+02	8.17E+01 G
			284.30	-5.123E+00	+ P	1.557E+01	9.54E+01	6.14E+00 G
			636.97	7.503E+00	?(	1.941E+01	7.74E+01	7.17E+00 G
Gd-153	F	-3.2256E-01					2.42E+02	
			97.50	-3.226E-01	?(	2.723E+00	3.13E+02	3.00E+01 G
			103.20	0.000E+00	+	6.191E+00	1.00E+03	2.18E+01 G
Ga-68	C	2.5759E+01					4.71E-02	
			1077.40	2.576E+01	?(	4.956E+01	8.80E+01	3.30E+00 G
Tc-99m	I	3.0863E-01					2.51E-01	
			140.51	3.086E-01	?(	1.240E+00	1.20E+02	8.93E+01 G
BA-133	F	-7.0550E-01					3.85E+03	
			356.00	-7.055E-01	?(	3.732E+00	1.58E+02	6.20E+01 G
			302.85	0.000E+00	+	1.109E+01	1.00E+03	1.83E+01 G
			383.84	1.984E+00	?	1.703E+01	2.52E+02	8.94E+00 GA
			80.99	3.523E-02	% P	2.880E+00	3.03E+03	3.41E+01 GA
CS-134	I	5.0454E-01					7.54E+02	
			604.71	-8.466E-02	&(	3.609E+00	1.26E+03	9.76E+01 G
			795.87	-3.419E-02	%	2.232E+00	1.86E+03	8.55E+01 G
			569.32	2.671E+00	?(	6.015E+00	6.79E+01	1.54E+01 G
			801.95	-2.541E+00	+	1.767E+01	2.95E+02	8.69E+00 G
			563.24	3.403E+00	&(P	1.407E+01	1.71E+02	8.35E+00 G
CS-137	I	-6.8120E-01					1.10E+04	
			661.66	-6.812E-01	?(	2.516E+00	1.10E+02	8.52E+01 G
CE-139	F	3.5439E-01					1.38E+02	
			165.85	3.544E-01	&(	1.264E+00	1.07E+02	7.99E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ba-140	I	-5.5112E-01					1.28E+01	
			537.26	-5.511E-01	(P	5.130E+00	3.71E+02	2.44E+01 G
			162.66	-5.120E+00	&	1.846E+01	1.08E+02	6.22E+00 G
			304.85	0.000E+00	+	4.763E+01	1.00E+03	4.29E+00 G
La-140	I	3.1079E-01					1.28E+01	
			1596.21	0.000E+00	?(	1.943E+00	1.00E+03	9.54E+01 G
			487.02	-1.096E+00	& P	2.509E+00	9.14E+01	4.55E+01 G
			328.76	1.771E+00	?(P	5.422E+00	9.14E+01	2.03E+01 G
			815.77	-3.865E+00	+ P	1.136E+01	3.61E+01	2.33E+01 G
CE-141	I	-6.1228E-01					3.25E+01	
			145.44	-6.123E-01	?(	2.282E+00	1.12E+02	4.82E+01 G
CE-144	I	-2.9239E+00					2.85E+02	
			133.54	-2.924E+00	*(	1.228E+01	1.26E+02	1.11E+01 G
PM-144	C	5.3837E-01					3.63E+02	
			696.54	5.384E-01	(	1.155E+00	9.27E+01	9.90E+01 G
			618.06	0.000E+00	-	3.615E+00	1.00E+03	9.91E+01 G
EU-152	F	9.1793E-01					4.94E+03	
			344.29	-1.620E+00	?(	7.177E+00	1.32E+02	2.65E+01 G
			1112.07	-6.803E+00	+	2.208E+01	9.66E+01	1.36E+01 G
			121.78	8.849E-01	+	2.983E+00	1.01E+02	2.86E+01 G
			778.92	-6.251E+00	+	1.250E+01	8.75E+01	1.29E+01 G
			964.11	3.693E+00	?(	1.993E+01	1.59E+02	1.46E+01 G
			244.69	4.444E+00	?(P	3.393E+01	2.29E+02	7.58E+00 G
			1408.00	6.709E+00	? P	4.882E+00	3.71E+01	2.10E+01 GA
EU-154	I	1.5582E+00					3.14E+03	
			873.23	1.554E+00	?(	1.292E+01	2.37E+02	1.23E+01 G
			123.10	-6.328E-01	+	2.114E+00	1.00E+02	4.08E+01 G
			1274.54	0.000E+00	-	4.869E+00	1.00E+03	3.52E+01 G
			723.36	1.561E+00	?(	1.042E+01	1.95E+02	2.02E+01 G
			1004.77	-3.934E+00	+	1.349E+01	1.02E+02	1.80E+01 G
			996.33	-3.122E+00	+	2.127E+01	1.98E+02	1.06E+01 G
EU-155	I	1.1361E+00					1.81E+03	
			105.31	1.136E+00	*(	5.192E+00	1.37E+02	2.12E+01 G
			86.54	-1.084E+00	+	6.134E+00	1.70E+02	3.07E+01 G
HF-181	F	-6.8770E-03					4.24E+01	
			482.00	-6.877E-03	%(P	1.956E+00	8.14E+03	8.05E+01 G
			133.02	-7.473E-01	+	3.077E+00	1.24E+02	4.33E+01 G
			345.83	-2.521E-01	%	1.277E+01	1.49E+03	1.51E+01 G
			136.30	-1.582E+00	+	2.393E+01	4.51E+02	5.85E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ta-182	F	2.4666E+00					1.14E+02	
			1121.30	1.902E+00	?(	5.275E+00	8.24E+01	3.49E+01 G
			1221.41	3.196E+00	?(	5.793E+00	8.31E+01	2.70E+01 G
			1189.05	6.480E-01	-	1.212E+01	8.37E+02	1.62E+01 G
Hg-203	F	-2.9554E-01					4.66E+01	
			279.20	-2.955E-01	?(	1.450E+00	1.45E+02	8.15E+01 G
TL-208	N	9.4562E+00					6.98E+02	
			583.02	9.456E+00	(	9.482E-01	7.62E+00	8.45E+01 G
			277.28	4.405E+00	- P	1.556E+01	1.05E+02	6.31E+00 G
			860.56	3.359E+00	& P	1.221E+01	1.60E+02	1.24E+01 G
pm-146	C	2.0778E-01					2.02E+03	
			747.16	-6.013E-01	?(P	4.224E+00	3.73E+02	3.40E+01 G
			735.72	-3.030E+00	+	7.091E+00	1.02E+02	2.25E+01 G
			453.88	6.310E-01	&(P	1.500E+00	9.58E+01	6.50E+01 G
y-88	F	3.4906E-01					1.07E+02	
			898.04	3.491E-01	(P	1.364E+00	1.69E+02	9.37E+01 G
			1836.06	6.308E-02	-	1.366E+00	9.45E+02	9.92E+01 G
Cd-113m		4.9774E+03					5.33E+03	
			263.70	4.977E+03	(	1.542E+04	9.25E+01	6.00E-03 K
Cf-251	T	-1.6457E+00					3.28E+05	
			176.60	-1.646E+00	&(	5.265E+00	1.25E+02	1.70E+01 G
			227.00	-3.130E-01	%	1.453E+01	1.78E+03	6.30E+00 GA
Cf-249	T	4.2231E-01					1.28E+05	
			387.95	0.000E+00	&(	2.374E+00	1.00E+03	6.60E+01 G
			333.44	2.219E+00	?(	7.672E+00	1.03E+02	1.55E+01 G
Sn-126		1.3803E+01					3.65E+07	
			87.57	3.759E+00	}	4.501E+00	1.89E+01	3.75E+01 GA
			64.28	1.380E+01	*(	1.042E+01	3.02E+01	9.70E+00 G
			86.94	0.000E+00	}	1.967E+01	2.71E+03	9.04E+00 GA
PB-210	N	1.2851E+01					8.14E+03	
			46.54	1.285E+01	(P	2.628E+01	6.96E+01	4.25E+00 G
PB-212	N	2.7545E+01					6.98E+02	
			238.63	2.754E+01	(P	1.678E+00	4.00E+00	4.33E+01 G
			300.03	2.655E+01	P	1.988E+01	3.07E+01	3.28E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-214	N	1.8547E+01					5.84E+05	
			351.93	1.855E+01	@(P	2.094E+00	7.37E+00	3.76E+01 G
			295.09	2.219E+01	+ P	3.657E+00	9.75E+00	1.93E+01 G
			242.00	2.254E+01	+	1.110E+01	1.72E+01	7.43E+00 GA
BI-207	C	-1.1126E-02					1.18E+04	
			569.70	-1.113E-02	%(	1.194E+00	3.01E+03	9.77E+01 G
			1063.66	-1.248E+00	+	2.808E+00	1.05E+02	7.45E+01 G
BI-212	N	3.3776E+01					6.98E+02	
			727.17	3.378E+01	(	1.559E+01	2.59E+01	7.55E+00 G
			785.42	-5.251E+01	- P	1.369E+02	4.62E+01	1.28E+00 GA
BI-214	N	1.8430E+01					5.84E+05	
			609.31	1.843E+01	(P	1.829E+00	7.49E+00	4.61E+01 G
			1120.29	1.169E+01	- P	1.050E+01	3.06E+01	1.51E+01 G
			1764.49	6.322E+00	- P	1.398E+01	6.69E+01	1.54E+01 G
BI-210M	T	-3.7223E-01					1.10E+09	
			265.83	-3.722E-01	?(P	2.133E+00	4.45E+02	5.00E+01 G
			304.90	0.000E+00	+	7.299E+00	1.00E+03	2.80E+01 G
AC-228	N	2.8340E+01					2.10E+03	
			911.07	2.684E+01	@(P	3.416E+00	9.61E+00	2.90E+01 G
			968.97	3.047E+01	(	6.627E+00	1.37E+01	1.75E+01 G
			338.32	2.886E+01	(	6.162E+00	1.17E+01	1.20E+01 G
			93.35	2.918E+01		1.144E+01	1.39E+01	5.56E+00 XA
TH-227	N	4.1988E+00					7.95E+03	
			50.14	5.484E+00	?(	2.242E+01	1.22E+02	8.00E+00 G
			256.24	2.730E+00	(	1.245E+01	1.76E+02	7.00E+00 G
TH-229	N	-8.1313E+00					2.68E+06	
			193.51	-8.131E+00	*(	2.179E+01	1.05E+02	4.40E+00 G
			210.85	-3.105E+00	+ P	3.473E+01	3.96E+02	2.99E+00 G
TH-234	N	-1.2643E+01					1.63E+12	
			63.29	-1.264E+01	*(P	3.956E+01	9.35E+01	3.81E+00 G
			92.59	1.451E+00	+ P	3.060E+01	6.31E+02	5.58E+00 G
PA-234	N	-1.8026E+00					1.63E+12	
			131.29	-1.803E+00	?(P	7.215E+00	1.56E+02	1.80E+01 G
			946.02	-1.147E+00	+	1.079E+01	4.06E+02	1.34E+01 G
			569.47	1.602E-01	%	1.400E+01	2.45E+03	8.20E+00 G
			883.24	-1.587E+00	+	2.322E+01	4.22E+02	9.60E+00 G
			880.53	-1.214E+01	+	3.389E+01	8.33E+01	6.00E+00 GA

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PA-234M  N   8.7585E+01                                      1.63E+12
                        1001.00 8.759E+01 ?(  2.321E+02 7.92E+01 8.37E-01 G
                         766.41 1.518E+01 &   6.865E+02 1.30E+03 2.94E-01 G

U-235    N  -3.0777E+00                                      2.57E+11
                         143.79-3.078E+00  (P 9.619E+00 1.57E+02 1.10E+01 G
                         205.33 4.642E-01 & P 1.859E+01 1.54E+03 5.01E+00 G
                         163.38-2.736E+00 + P 1.929E+01 4.17E+02 5.08E+00 G

AM-241   T   4.1094E-01                                      1.58E+05
                          59.54 4.109E-01 ?(P 3.583E+00 3.24E+02 3.59E+01 G

Cs-136   F  -9.3369E-01                                      1.30E+01
                         818.50-9.337E-01 &(  2.915E+00 9.34E+01 1.00E+02 G
                        1048.07-1.299E+00 +   2.693E+00 6.29E+01 8.00E+01 G
                         340.57-9.711E-01 +   4.481E+00 1.38E+02 4.69E+01 G

Np-239   T   6.0983E-01                                      2.36E+00
                         103.70 8.299E-01 ?   5.552E+00 2.00E+02 2.40E+01 X
                         106.13 6.098E-01  (  5.605E+00 2.74E+02 2.27E+01 G
                          99.50 1.195E+00     8.968E+00 2.24E+02 1.50E+01 X

Nd-147      -3.6964E+00                                      1.11E+01
                         531.00-3.696E+00 ?(  1.008E+01 1.15E+02 1.30E+01 G
                          91.10 1.153E+00 +   6.009E+00 1.57E+02 2.83E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
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I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	365.	22.	0.012	122.25	5.484E+00	
AM-241	59.54	317.	10.	0.005	323.97	4.109E-01	P
TH-234	63.29	517.	-35.	-0.019	93.51	-1.264E+01	P
EU-155	86.54	1431.	-32.	-0.018	170.00	-1.084E+00	
Nd-147	91.10	1224.	32.	0.018	156.52	1.153E+00	
TH-234	92.59	1253.	8.	0.004	631.04	1.451E+00	P
Gd-153	97.50	287.	-10.	-0.005	313.34	-3.226E-01	
EU-155	105.31	547.	24.	0.014	136.83	1.136E+00	
EU-152	121.78	320.	26.	0.014	101.05	8.849E-01	
EU-154	123.10	326.	-26.	-0.014	100.15	-6.328E-01	
PA-234	131.29	728.	-32.	-0.018	156.41	-1.803E+00	P
HF-181	133.02	759.	-32.	-0.018	123.65	-7.473E-01	
CE-144	133.54	791.	-32.	-0.018	126.10	-2.924E+00	
HF-181	136.30	823.	-9.	-0.005	451.14	-1.582E+00	
Tc-99m	140.51	465.	26.	0.014	120.39	3.086E-01	
U-235	143.79	436.	-32.	-0.018	157.17	-3.078E+00	P
CE-141	145.44	470.	-28.	-0.015	111.78	-6.123E-01	
Ba-140	162.66	437.	-28.	-0.015	108.15	-5.120E+00	
U-235	163.38	313.	-12.	-0.007	416.86	-2.736E+00	P
CE-139	165.85	341.	25.	0.014	106.87	3.544E-01	
Cf-251	176.60	238.	-23.	-0.013	125.50	-1.646E+00	
TH-229	193.51	235.	-28.	-0.015	105.37	-8.131E+00	
TH-229	210.85	239.	-7.	-0.004	395.68	-3.105E+00	P
EU-152	244.69	1187.	21.	0.012	228.91	4.444E+00	P
TH-227	256.24	117.	12.	0.006	176.15	2.730E+00	
Cd-113m	263.70	126.	18.	0.010	92.48	4.977E+03	
BI-210M	265.83	168.	-11.	-0.006	444.52	-3.722E-01	P
Hg-203	279.20	191.	-14.	-0.008	145.42	-2.955E-01	
I-131	284.30	119.	-18.	-0.010	95.36	-5.123E+00	P
PA-231	300.07	540.	-21.	-0.011	160.45	-1.575E+01	
PA-233	300.18	520.	-13.	-0.007	256.41	-3.823E+00	
La-140	328.76	123.	18.	0.010	91.42	1.771E+00	P
Cf-249	333.44	141.	17.	0.009	102.95	2.219E+00	
Cs-136	340.57	442.	-22.	-0.012	137.92	-9.711E-01	
EU-152	344.29	353.	-20.	-0.011	132.27	-1.620E+00	
BA-133	356.00	499.	-20.	-0.011	158.03	-7.055E-01	
I-131	364.48	84.	-6.	-0.003	301.85	-1.625E-01	
BA-133	383.84	183.	8.	0.004	252.36	1.984E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AG-108M	433.94	36.	13.	0.007	95.07	3.673E-01	
pm-146	453.88	52.	15.	0.009	95.77	6.310E-01	P
BE-7	477.60	125.	5.	0.003	302.58	1.402E+00	P
La-140	487.02	65.	-18.	-0.010	91.38	-1.096E+00	P
RU-103	497.05	57.	-6.	-0.003	285.18	-1.793E-01	P
RH-106	511.86	67.	122.	0.068	19.27	1.817E+01	
Nd-147	531.00	74.	-16.	-0.009	114.65	-3.696E+00	
Ba-140	537.26	65.	-4.	-0.002	370.75	-5.511E-01	P
CS-134	563.24	52.	9.	0.005	170.86	3.403E+00	P
CS-134	569.32	30.	13.	0.007	67.95	2.671E+00	
SB-124	602.73	476.	-18.	-0.010	177.30	-6.127E-01	
RU-103	610.30	491.	-18.	-0.010	179.16	-1.064E+01	
AG-108M	614.28	473.	-17.	-0.010	177.99	-6.769E-01	
RH-106	621.92	361.	15.	0.008	183.04	5.265E+00	
I-131	636.97	60.	15.	0.008	77.45	7.503E+00	
AG-110M	657.76	143.	-23.	-0.013	77.90	-8.833E-01	
CS-137	661.66	139.	-16.	-0.009	109.79	-6.812E-01	
PM-144	696.54	33.	14.	0.008	92.66	5.384E-01	
NB-94	702.63	70.	-6.	-0.003	298.61	-2.406E-01	
SB-124	722.79	125.	-2.	-0.001	865.02	-6.828E-01	
EU-154	723.36	113.	8.	0.004	195.35	1.561E+00	
pm-146	735.72	61.	-17.	-0.009	102.12	-3.030E+00	
pm-146	747.16	47.	-5.	-0.003	373.40	-6.013E-01	P
ZR-95	756.73	28.	13.	0.007	90.69	1.001E+00	
AG-110M	763.94	130.	-26.	-0.014	65.58	-4.899E+00	
NB-95	765.79	104.	19.	0.011	77.58	8.249E-01	
EU-152	778.92	56.	-19.	-0.010	87.54	-6.251E+00	
CS-134	801.95	47.	-5.	-0.003	295.30	-2.541E+00	
CO-58	810.78	126.	-20.	-0.011	35.64	-9.078E-01	P
La-140	815.77	146.	-20.	-0.011	36.08	-3.865E+00	P
Cs-136	818.50	178.	-21.	-0.012	93.40	-9.337E-01	
NB-94	871.10	30.	4.	0.002	200.00	1.904E-01	
EU-154	873.23	43.	4.	0.002	237.17	1.554E+00	
PA-234	880.53	72.	-15.	-0.008	83.34	-1.214E+01	
PA-234	883.24	88.	-3.	-0.002	421.91	-1.587E+00	
Sc-46	889.28	105.	-10.	-0.005	145.80	-4.754E-01	P
y-88	898.04	25.	7.	0.004	169.22	3.491E-01	P
AG-110M	937.49	55.	-20.	-0.011	86.32	-2.894E+00	
PA-234	946.02	30.	-3.	-0.002	405.52	-1.147E+00	
EU-152	964.11	130.	10.	0.006	158.90	3.693E+00	
EU-154	996.33	71.	-6.	-0.003	197.61	-3.122E+00	
PA-234M	1001.00	51.	14.	0.008	79.15	8.759E+01	
EU-154	1004.77	82.	-13.	-0.007	101.62	-3.934E+00	
Cs-136	1048.07	58.	-18.	-0.010	62.92	-1.299E+00	
RH-106	1050.36	60.	15.	0.008	76.02	5.499E+01	
BI-207	1063.66	53.	-16.	-0.009	104.60	-1.248E+00	
Ga-68	1077.40	21.	13.	0.007	87.99	2.576E+01	
FE-59	1099.25	27.	5.	0.003	224.30	5.536E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
EU-152	1112.07	107.	-16.	-0.009	96.63	-6.803E+00		
Sc-46	1120.55	68.	-11.	-0.006	111.79	-6.462E-01		
CO-60	1173.24	43.	-17.	-0.009	53.70	-1.056E+00		P
NA-22	1274.53	23.	1.	0.001	512.35	8.951E-02		
FE-59	1291.60	12.	3.	0.002	233.60	5.477E-01		P
CO-60	1332.50	12.	7.	0.004	111.77	5.240E-01		P
AG-110M	1384.30	11.	4.	0.002	221.56	1.092E+00		
EU-152	1408.00	6.	19.	0.011	37.13	6.709E+00		P
SB-124	1690.98	12.	-2.	-0.001	424.26	-3.640E-01		
y-88	1836.06	6.	1.	0.000	945.38	6.308E-02		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

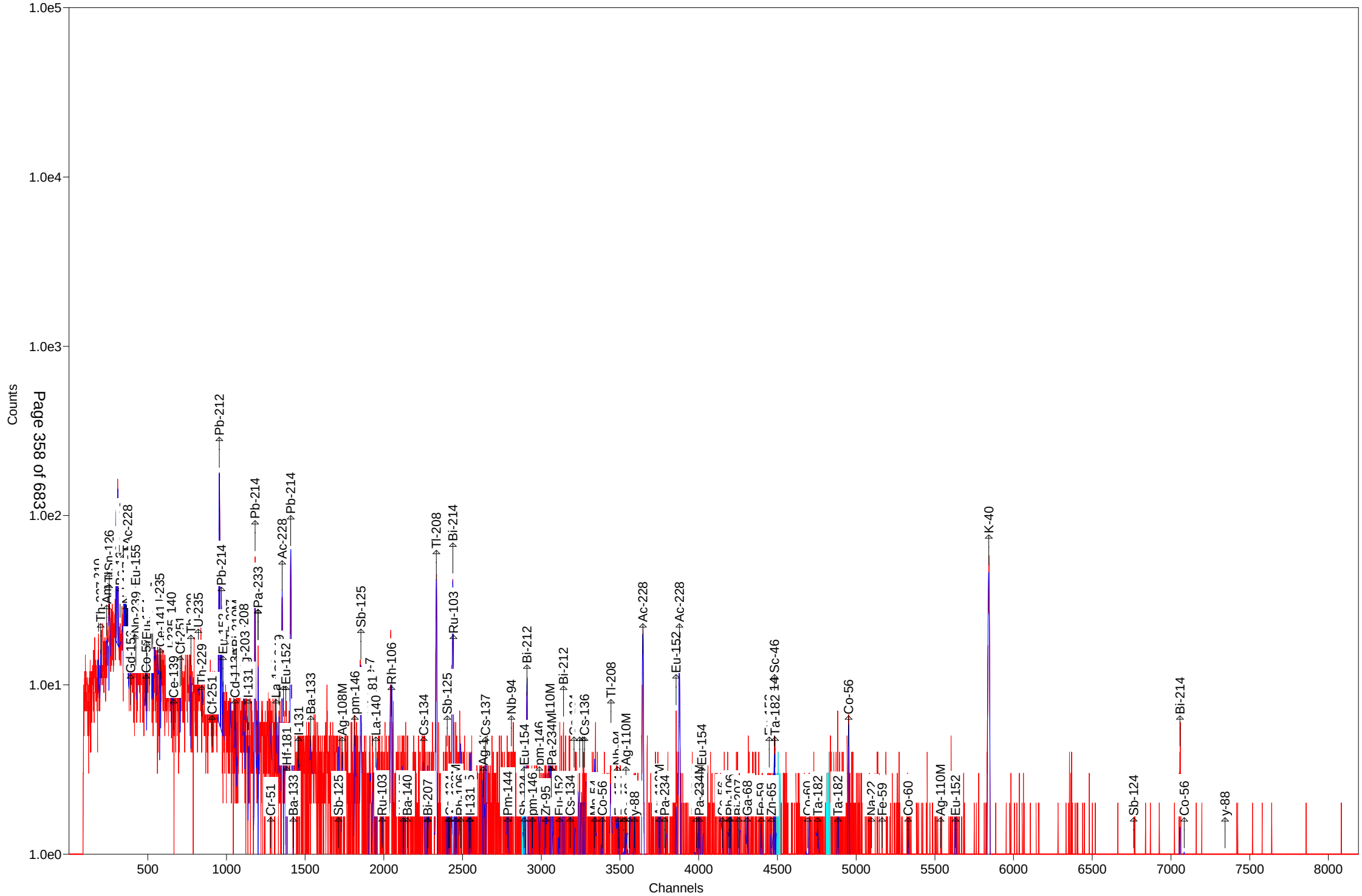
Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting	1 Sigma MDA Bq/Sample
BE-7	#A	1.4022E+00	1.4022E+00	3.026E+02%	1.46E+01
NA-22	#A	8.9511E-02	8.9511E-02	5.123E+02%	1.67E+00
K-40		2.9759E+02	2.9759E+02	4.934E+00%	7.94E+00
Sc-46	#A	-4.7535E-01	-4.7536E-01	1.458E+02%	2.45E+00
CR-51	#A	-1.0253E-02	-1.0253E-02	2.775E+04%	2.14E+01
MN-54	A	8.9693E-01	8.9693E-01	5.799E+01%	1.20E+00
FE-59	#A	5.5105E-01	5.5105E-01	1.619E+02%	2.78E+00
Co-56	#C	1.7357E+00	1.7357E+00	1.849E+01%	1.53E+00
CO-57	#A	5.4476E-03	5.4476E-03	5.589E+03%	1.03E+00
CO-58	#A	-9.0778E-01	-9.0778E-01	3.564E+01%	2.47E+00
CO-60	#A	5.2400E-01	5.2400E-01	1.118E+02%	1.29E+00
ZN-65	#A	-1.1825E-01	-1.1825E-01	1.344E+03%	5.54E+00
NB-94	#A	-2.2923E-02	-2.2923E-02	1.797E+02%	1.67E+00
ZR-95	#A	1.0011E+00	1.0011E+00	9.069E+01%	2.11E+00
NB-95	#A	8.2492E-01	8.2492E-01	7.758E+01%	2.13E+00
RU-103	#A	-1.7928E-01	-1.7928E-01	2.852E+02%	1.20E+00
RH-106	#A	1.2016E+01	1.2016E+01	7.602E+01%	3.24E+01
AG-108M	#A	3.6735E-01	3.6735E-01	9.507E+01%	8.72E-01
AG-110M	#A	2.5412E-01	2.5412E-01	2.216E+02%	3.13E+00
SN-113	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.47E+00
SB-124	#A	-6.1271E-01	-6.1271E-01	1.773E+02%	3.64E+00
SB-125	#C	4.7321E+00	4.7321E+00	2.871E+01%	2.92E+00
I-131	#A	4.5591E-01	4.5593E-01	7.745E+01%	1.23E+00
Gd-153	#A	-3.2256E-01	-3.2256E-01	3.133E+02%	2.72E+00
Ga-68	#A	2.5584E+01	2.5759E+01	8.799E+01%	4.96E+01
Tc-99m	#A	3.0823E-01	3.0863E-01	1.204E+02%	1.24E+00
BA-133	#A	-7.0550E-01	-7.0550E-01	1.580E+02%	3.73E+00
CS-134	#A	5.0454E-01	5.0454E-01	6.795E+01%	3.61E+00
CS-137	#A	-6.8120E-01	-6.8120E-01	1.098E+02%	2.52E+00
CE-139	#A	3.5439E-01	3.5439E-01	1.069E+02%	1.26E+00

Ba-140 #A	-5.5110E-01	-5.5112E-01	3.708E+02%		5.13E+00
La-140 #A	3.1078E-01	3.1079E-01	9.142E+01%		1.94E+00
CE-141 #A	-6.1227E-01	-6.1228E-01	1.118E+02%		2.28E+00
CE-144 #A	-2.9239E+00	-2.9239E+00	1.261E+02%		1.23E+01
PM-144 #A	5.3837E-01	5.3837E-01	9.266E+01%		1.15E+00
EU-152 #A	9.1793E-01	9.1793E-01	1.028E+02%		7.18E+00
EU-154 #A	1.5582E+00	1.5582E+00	1.536E+02%		1.29E+01
EU-155 #A	1.1361E+00	1.1361E+00	1.368E+02%		5.19E+00
HF-181 #A	-6.8769E-03	-6.8770E-03	8.138E+03%		1.96E+00
Ta-182 #A	2.4666E+00	2.4666E+00	5.853E+01%		5.28E+00
Hg-203 #A	-2.9554E-01	-2.9554E-01	1.454E+02%		1.45E+00
TL-208	9.4562E+00	9.4562E+00	7.621E+00%		9.48E-01
pm-146 #A	2.0778E-01	2.0778E-01	9.577E+01%		4.22E+00
y-88 #A	3.4906E-01	3.4906E-01	1.692E+02%		1.36E+00
Cd-113m#A	4.9774E+03	4.9774E+03	9.248E+01%		1.54E+04
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%		4.50E+01
Cf-251 #A	-1.6457E+00	-1.6457E+00	1.255E+02%		5.27E+00
Cf-249 #A	4.2231E-01	4.2231E-01	1.029E+02%		2.37E+00
Sn-126 #	1.3803E+01	1.3803E+01	3.023E+01%		1.04E+01
PB-210 A	1.2851E+01	1.2851E+01	6.961E+01%		2.63E+01
PB-212	2.7545E+01	2.7545E+01	3.999E+00%		1.68E+00
PB-214	1.8547E+01	1.8547E+01	7.368E+00%		2.09E+00
BI-207 #A	-1.1126E-02	-1.1126E-02	3.015E+03%		1.19E+00
BI-212	3.3776E+01	3.3776E+01	2.587E+01%		1.56E+01
BI-214	1.8430E+01	1.8430E+01	7.494E+00%		1.83E+00
BI-210M#A	-3.7223E-01	-3.7223E-01	4.445E+02%		2.13E+00
AC-228	2.8340E+01	2.8340E+01	6.812E+00%		3.42E+00
TH-227 #A	4.1988E+00	4.1988E+00	1.072E+02%		2.24E+01
TH-229 #A	-8.1313E+00	-8.1313E+00	1.054E+02%		2.18E+01
TH-234 #A	-1.2643E+01	-1.2643E+01	9.351E+01%		3.96E+01
PA-231 #A	0.0000E+00	0.0000E+00	1.000E+03%		7.05E+01
PA-233 #A	0.0000E+00	0.0000E+00	1.000E+03%		5.79E+00
PA-234 #A	-1.8026E+00	-1.8026E+00	1.564E+02%		7.22E+00
PA-234M#A	8.7585E+01	8.7585E+01	7.915E+01%		2.32E+02
U-235 #A	-3.0777E+00	-3.0777E+00	1.572E+02%		9.62E+00
AM-241 #A	4.1094E-01	4.1094E-01	3.240E+02%		3.58E+00
Np-237 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.45E+01
Ir-192 #A	0.0000E+00	0.0000E+00	5.774E+02%		2.42E+00
Cs-136 #A	-9.3367E-01	-9.3369E-01	9.340E+01%		2.91E+00
Np-239 A	6.0975E-01	6.0983E-01	2.744E+02%		5.61E+00
Nd-147 #A	-3.6963E+00	-3.6964E+00	1.146E+02%		1.01E+01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

```
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded
-----------------------------   S U M M A R Y   -----------------------------
Total Activity (   37.6 to  2000.1 keV)     4.612E+02  Bq/Sample
Total Decayed Activity (   37.6 to  2000.1 keV) 4.6123160E+02  Bq/Sample
```

264537_Gamma_160-18552-A-3-B. 7_Gamma_20162139.spc.



Test America St. Louis Spectrum ID: 5_Gamma_20161667

Sample Description: 264537_Gamma_160-18552-A-4-B
Detector: Detector # 5
Batch ID: 264537
Work Order Number: Gamma
Lot Number: 160-18552-A-4-B

Decay to Time: 9/1/2016 10:48 Live Time: 1800 sec
Acquisition Time: 9/1/2016 10:49:04 Real Time: 1809 sec
Analysis Time: 9/1/2016 11:19 Dead Time: 0.50 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 5_Soil_TunaCan.Clb
Efficiency Cal Desc: 5_Soil_TunaCan_90099_032612
Efficiency Cal Date: 3/27/2012 17:20
Energy Cal Date: 2/28/2012 19:35
Library: Client_Long_Rev11.lib
Bkgd Correction File: 5_2016-07-31_1355.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	5.627E+00	85.9	4.833E+00	4.842E+00	1.623E+01
NA-22	5.179E-01	96.8	5.014E-01	5.021E-01	1.741E+00
K-40	2.586E+02	6.7	1.731E+01	2.179E+01	1.663E+01
Sc-46	-9.473E-01	101.7	9.637E-01	9.649E-01	3.252E+00
CR-51	4.378E+00	106.2	4.648E+00	4.654E+00	1.566E+01
MN-54	6.122E-01	129.1	7.904E-01	7.910E-01	1.862E+00
FE-59	-9.099E-01	187.7	1.708E+00	1.709E+00	3.945E+00
Co-56	6.925E-01	91.6	6.342E-01	6.352E-01	1.580E+00
CO-57	0.000E+00	1.#INF	2.292E-01	2.292E-01	1.477E+00
CO-58	-1.036E+00	88.7	9.186E-01	9.202E-01	3.081E+00
CO-60	-5.001E-01	196.0	9.802E-01	9.806E-01	2.711E+00
ZN-65	-9.786E-01	239.7	2.345E+00	2.346E+00	8.074E+00
NB-94	7.170E-01	92.0	6.594E-01	6.604E-01	1.592E+00
ZR-95	7.141E-01	106.2	7.585E-01	7.594E-01	3.840E+00
NB-95	6.470E-01	129.2	8.362E-01	8.368E-01	2.845E+00
RU-103	-5.439E-01	102.2	5.557E-01	5.564E-01	1.701E+00
RH-106	-1.696E+00	199.2	3.377E+00	3.379E+00	4.530E+01
AG-108M	2.250E-01	246.1	5.538E-01	5.539E-01	1.580E+00
AG-110M	1.290E-01	206.2	2.660E-01	2.661E-01	3.874E+00
SN-113	-1.046E+00	106.1	1.110E+00	1.111E+00	4.049E+00
SB-124	4.600E-01	245.6	1.130E+00	1.130E+00	3.829E+00
SB-125	5.046E+00	20.9	1.055E+00	1.086E+00	5.102E+00
I-131	-3.432E-01	238.2	8.176E-01	8.178E-01	1.608E+00
Gd-153	-9.145E-01	145.3	1.329E+00	1.330E+00	4.460E+00
Ga-68	2.495E+01	90.5	2.257E+01	2.262E+01	5.233E+01
Tc-99m	3.731E-01	137.4	5.124E-01	5.129E-01	1.717E+00
BA-133	-8.166E-01	169.4	1.383E+00	1.384E+00	4.652E+00
CS-134	1.223E+00	45.8	5.602E-01	5.638E-01	3.936E+00
CS-137	3.285E-02	1858.2	6.104E-01	6.104E-01	2.174E+00
CE-139	2.959E-01	175.7	5.198E-01	5.206E-01	1.752E+00
Ba-140	7.637E-01	112.5	8.591E-01	8.600E-01	6.547E+00
La-140	-1.438E-01	117.2	1.686E-01	1.687E-01	3.062E+00
CE-141	7.338E-01	124.1	9.108E-01	9.115E-01	3.048E+00

CE-144	-9.163E-02	3443.4	3.155E+00	3.155E+00	1.516E+01
PM-144	4.039E-01	169.6	6.850E-01	6.854E-01	1.780E+00
EU-152	1.294E+00	224.4	2.905E+00	2.906E+00	1.019E+01
EU-154	5.683E-01	48.9	2.779E-01	2.794E-01	2.130E+01
EU-155	-1.842E+00	142.8	2.630E+00	2.632E+00	8.778E+00
HF-181	-8.683E-01	98.0	8.507E-01	8.518E-01	2.856E+00
Ta-182	3.447E+00	63.7	2.194E+00	2.201E+00	9.658E+00
Hg-203	-6.186E-01	90.6	5.606E-01	5.617E-01	1.978E+00
TL-208	1.374E+01	8.0	1.096E+00	1.307E+00	1.386E+00
pm-146	-1.024E+00	166.1	1.701E+00	1.702E+00	6.104E+00
y-88	2.673E-01	44.7	1.195E-01	1.203E-01	2.112E+00
Cd-113m	-9.073E+03	96.2	8.727E+03	8.746E+03	2.918E+04
Cd-109	3.757E+00	514.8	1.934E+01	1.934E+01	6.474E+01
Cf-251	1.465E+00	146.7	2.149E+00	2.153E+00	5.827E+00
Cf-249	-5.855E-01	119.6	7.003E-01	7.010E-01	3.614E+00
Sn-126	2.994E+00	194.5	5.823E+00	5.825E+00	1.957E+01
PB-210	1.699E+01	73.2	1.244E+01	1.248E+01	3.566E+01
PB-212	3.151E+01	5.1	1.610E+00	2.598E+00	3.183E+00
PB-214	1.873E+01	9.2	1.722E+00	1.978E+00	2.864E+00
BI-207	7.565E-01	51.5	3.895E-01	3.915E-01	2.026E+00
BI-212	4.975E+01	16.0	7.943E+00	8.353E+00	1.339E+01
BI-214	1.575E+01	11.7	1.848E+00	2.021E+00	3.193E+00
BI-210M	9.335E-01	101.7	9.493E-01	9.509E-01	3.184E+00
AC-228	3.565E+01	6.6	2.354E+00	2.975E+00	5.340E+00
TH-227	2.106E+00	206.8	4.356E+00	4.357E+00	2.141E+01
TH-229	-6.103E+00	177.8	1.085E+01	1.086E+01	2.932E+01
TH-234	2.008E+01	29.4	5.910E+00	6.003E+00	3.410E+01
PA-231	-2.040E+01	140.2	2.860E+01	2.862E+01	9.580E+01
PA-233	5.263E-01	249.7	1.314E+00	1.315E+00	3.458E+00
PA-234	2.800E+00	107.6	3.012E+00	3.015E+00	9.118E+00
PA-234M	0.000E+00	1.#INF	3.278E+01	3.278E+01	3.148E+02
U-235	0.000E+00	1.#INF	2.516E+00	2.516E+00	1.408E+01
AM-241	9.084E-01	175.7	1.596E+00	1.597E+00	4.549E+00
Np-237	8.079E+00	34.5	2.788E+00	2.824E+00	8.910E+00
Ir-192	5.098E-01	90.2	4.597E-01	4.607E-01	1.544E+00
Cs-136	6.592E-01	78.9	5.199E-01	5.213E-01	2.608E+00
Np-239	-7.709E-01	325.4	2.509E+00	2.509E+00	8.415E+00
Nd-147	3.941E+00	98.9	3.898E+00	3.904E+00	9.806E+00
Total	5.444E+02				

Analyst: kody Saulters

Sample description
264537_Gamma_160-18552-A-4-B

Spectrum Filename: C:\User\SPC\Det5\5_Gamma_20161667.An1

Acquisition information
Start time: 9/1/2016 10:49:04 AM
Live time: 1800
Real time: 1809
Dead time: 0.50 %
Detector ID: 5

Detector system
Ge 5 SN/157

Calibration
Filename: 5_Soil_TunaCan.Clb
5_Soil_TunaCan_90099_032612

Energy Calibration
Created: 2/28/2012 7:35:48 PM
Zero offset: 0.158 keV
Gain: 0.250 keV/channel
Quadratic: 3.911E-08 keV/channel^2

Efficiency Calibration
Created: 3/27/2012 5:20:37 PM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.87 %
Log(Eff): 6.466115E-01 + (-7.830454E-01*Log(E)) + (-4.117504E-03*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.43 %
Log(Eff): -2.462251E+01 + (9.075211E+00*Log(E)) + (-9.664422E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev11.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.62keV)
Stop channel: 8000 (2000.81keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 10:48:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	5_2016-07-31_1355.PBC 7/31/2016 1:55:22 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 29 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.2645

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.48	23.	73.23	1.35	1.788E-02	46.54	4.250	PBC<MDA	PB210
50.14	4.	537.94	0.79	2.012E-02	50.14	8.000	PBC<MDA	TH227
59.54	15.	175.72	0.80	2.533E-02	59.54	35.900	PBC<MDA	AM241
63.47	78.	28.18	0.73	2.720E-02	63.29	3.810	PBC<MDA	TH234
64.28	14.	194.47	0.80	2.757E-02	64.28	9.700	PBC<MDA	Sn126
74.83	237.	10.78	0.81	3.152E-02				
77.18	345.	8.33	0.82	3.222E-02				
86.43	65.	34.50	0.82	3.435E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	3.446E+00	EU155
87.51	70.	33.23	0.83	3.454E-02	87.57	37.500	PBC<MDA	Sn126
88.00	9.	514.82	0.83	3.462E-02	88.04	3.790	PBC<MDA	Cd109
89.90	115.	19.89	1.20	3.491E-02				
92.53	67.	33.79	0.83	3.527E-02	92.59	5.584	PBC<MDA	TH234
93.29	29.	156.97	0.83	3.536E-02	93.35	5.561	PBC<MDA	AC228
99.50	22.	117.82	0.84	3.592E-02	99.50	15.000	PBC<MDA	Np239
121.78	6.	419.96	0.86	3.584E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.027E-01	CO57
123.10	18.	124.61	0.86	3.575E-02	123.10	40.790	PBC<MDA	EU154
131.29	17.	185.45	0.87	3.509E-02	131.29	18.000	PBC<MDA	PA234
139.95	20.	137.36	0.88	3.411E-02	140.51	89.300	PBC<MDA	Tc99m
146.28	21.	124.12	0.88	3.351E-02	145.44	48.200	PBC<MDA	CE141
162.66	21.	112.50	0.90	3.113E-02	162.66	6.220	PBC<MDA	Ba140

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
165.85	13.	175.68	0.91	3.133E-02	165.85	79.900	PBC<MDA	CE139
176.60	13.	146.74	0.92	2.975E-02	176.60	17.000	PBC<MDA	Cf251
209.55	75.	22.51	0.64	2.583E-02				
238.76	612.	5.16	1.15	2.318E-02	238.63	43.300	3.385E+01	PB212
242.17	63.	24.36	0.98	2.293E-02	242.00	7.430	2.061E+01	PB214
244.69	19.	224.44	0.98	2.272E-02	244.69	7.580	PBC<MDA	EU152
256.24	8.	206.82	1.00	2.186E-02	256.24	7.000	PBC<MDA	TH227
265.83	18.	101.69	1.00	2.121E-02	265.83	50.000	PBC<MDA	BI210M
277.67	25.	51.58	1.38	2.048E-02	277.28	6.310	PBC<MDA	TL208
295.22	141.	14.34	1.23	1.944E-02	295.09	19.300	2.088E+01	PB214
300.23	36.	5.91	1.04	1.918E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	4.202E+01	PA231
					300.18	6.200	PBC<MDA	PA233
312.01	6.	249.74	1.05	1.857E-02	312.01	36.000	PBC<MDA	PA233
316.49	15.	90.17	1.05	1.835E-02	316.49	87.040	PBC<MDA	Ir192
320.08	14.	106.17	1.06	1.818E-02	320.08	9.940	PBC<MDA	CR51
328.76	16.	119.74	1.07	1.778E-02	328.76	20.300	PBC<MDA	La140
333.44	4.	440.04	1.07	1.757E-02	333.44	15.510	PBC<MDA	Cf249
338.36	144.	11.59	0.93	1.736E-02	338.32	12.010	3.826E+01	AC228
340.57	15.	160.98	1.08	1.727E-02	340.57	46.900	PBC<MDA	Cs136
352.14	213.	9.20	1.13	1.679E-02	351.93	37.600	1.873E+01	PB214
427.88	5.	309.61	1.16	1.428E-02	427.88	29.600	PBC<MDA	SB125
463.37	54.	20.91	1.19	1.336E-02	463.37	10.470	2.162E+01	SB125
477.60	14.	85.89	1.20	1.303E-02	477.60	10.520	PBC<MDA	BE7
511.86	77.	32.73	2.48	1.230E-02	511.86	20.000	1.747E+01	RH106
531.00	11.	98.89	1.25	1.193E-02	531.00	13.000	PBC<MDA	Nd147
583.57	231.	7.94	1.65	1.102E-02	583.02	84.500	1.374E+01	TL208
600.50	9.	229.91	1.31	1.076E-02	600.50	17.860	PBC<MDA	SB125
602.73	9.	245.58	1.32	1.073E-02	602.73	98.260	PBC<MDA	SB124
604.71	9.	238.59	1.32	1.070E-02	604.71	97.620	PBC<MDA	CS134
609.64	142.	11.16	1.27	1.063E-02	609.31	46.090	1.555E+01	BI214
					610.30	5.750	1.297E+02	RU103
614.28	9.	246.07	1.33	1.056E-02	614.28	89.850	PBC<MDA	AG108M
618.06	9.	249.83	1.33	1.051E-02	618.06	99.100	PBC<MDA	PM144
635.89	10.	72.35	1.34	1.026E-02	635.89	11.310	PBC<MDA	SB125
657.76	4.	206.16	1.36	9.974E-03	657.76	94.640	PBC<MDA	AG110M
696.54	5.	229.47	1.40	9.507E-03	696.54	99.000	PBC<MDA	PM144
702.63	12.	91.96	1.40	9.438E-03	702.63	97.900	PBC<MDA	NB94
724.20	13.	106.22	1.42	9.202E-03	724.20	44.150	PBC<MDA	ZR95
727.56	62.	15.97	1.19	9.166E-03	727.17	7.550	4.975E+01	BI212
765.79	10.	129.23	1.45	8.781E-03	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	2.198E+02	PA234M
795.87	27.	45.81	1.48	8.503E-03	795.87	85.530	PBC<MDA	CS134
818.50	9.	126.74	1.50	8.305E-03	818.50	100.000	PBC<MDA	Cs136
834.85	9.	129.10	1.51	8.168E-03	834.85	99.980	PBC<MDA	MN54
846.77	2.	434.58	1.52	8.072E-03	846.77	99.935	PBC<MDA	Co56
860.11	13.	97.97	1.53	7.963E-03	860.56	12.420	PBC<MDA	TL208
880.53	11.	90.01	1.54	7.812E-03	880.53	6.000	PBC<MDA	PA234

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
883.24	10.	107.56	1.55	7.791E-03	883.24	9.600	PBC<MDA	PA234
911.37	141.	10.30	2.05	7.591E-03	911.07	29.000	3.566E+01	AC228
946.02	2.	398.21	1.60	7.355E-03	946.02	13.400	PBC<MDA	PA234
964.11	5.	242.81	1.61	7.239E-03	964.11	14.605	PBC<MDA	EU152
969.29	77.	12.33	1.74	7.209E-03	968.97	17.460	3.385E+01	AC228
996.33	2.	392.01	1.63	7.042E-03	996.33	10.600	PBC<MDA	EU154
1004.77	7.	48.91	1.64	6.992E-03	1004.77	18.010	PBC<MDA	EU154
1048.07	5.	118.32	1.67	6.749E-03	1048.07	80.000	PBC<MDA	Cs136
1050.36	2.	326.83	1.67	6.736E-03	1050.36	1.560	PBC<MDA	RH106
1063.66	16.	51.49	1.68	6.666E-03	1063.66	74.500	PBC<MDA	BI207
1077.40	8.	90.50	1.69	6.594E-03	1077.40	3.300	PBC<MDA	Ga68
1120.12	14.	89.91	1.72	6.381E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
1120.55	2.	686.23	1.72	6.380E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	1.646E-01	Sc46
					1121.30	34.900	4.717E-01	Ta182
1121.13	13.	85.97	1.72	6.376E-03	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	3.344E+00	Ta182
1188.30	2.	531.73	1.77	6.069E-03	1189.05	16.200	PBC<MDA	Ta182
1222.65	10.	93.89	1.79	5.934E-03	1221.41	27.000	PBC<MDA	Ta182
1238.28	11.	91.58	1.80	5.866E-03	1238.28	66.070	PBC<MDA	Co56
1274.53	5.	96.82	1.83	5.725E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	1.471E+00	EU154
1408.00	7.	87.98	1.91	5.264E-03	1408.00	21.005	PBC<MDA	EU152
1461.46	254.	6.69	2.01	5.103E-03	1460.83	10.670	2.586E+02	K40
1765.46	20.	32.26	2.11	4.351E-03	1764.49	15.400	1.634E+01	BI214
1836.06	5.	44.72	2.15	4.208E-03	1836.06	99.200	PBC<MDA	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
298.95	74.85	207.	237.	7.510E+03	10.78	0.813	- D
308.37	77.21	239.	345.	1.070E+04	8.33	0.815	- D
359.02	89.90	153.	91.	2.616E+03	21.81	0.828	- sD
838.24	209.55	70.	75.	2.904E+03	22.51	0.636	- s
1181.12	295.25	55.	146.	7.510E+03	13.74	1.228	- sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.46	46.48	98.	23.	0.013	73.23	1.353s
TH-227	200.11	50.14	162.	4.	0.002	537.94	0.787s
AM-241	237.72	59.54	237.	15.	0.008	175.72	0.797
TH-234	252.74	63.29	170.	41.	0.023	48.21	0.801D
Sn-126	256.71	64.28	386.	14.	0.008	194.47	0.802s
BA-133	323.61	80.99	321.	-26.	-0.014	111.02	0.819s
Np-237	345.63	86.49	222.	65.	0.036	34.50	0.825D
EU-155	345.84	86.54	1176.	-28.	-0.016	171.72	0.825s
Sn-126	347.43	86.94	1147.	-28.	-0.016	169.60	0.825D
Sn-126	349.95	87.57	1010.	70.	0.039	33.23	0.826D
Cd-109	351.83	88.04	1039.	9.	0.005	514.82	0.826A
Nd-147	364.08	91.10	1059.	0.	0.000	1000.00	0.829s
TH-234	370.05	92.59	222.	67.	0.037	33.79	0.831D
AC-228	373.09	93.35	1028.	29.	0.016	156.97	0.832s
Gd-153	389.70	97.50	321.	-18.	-0.010	145.31	0.836s
Np-239	397.71	99.50	335.	22.	0.012	117.82	0.838s
Gd-153	412.52	103.20	391.	-14.	-0.008	203.89	0.842s
Np-239	414.52	103.70	405.	0.	0.000	1000.00	0.842s
EU-155	420.98	105.31	647.	-25.	-0.014	142.79	0.844s
Np-239	424.25	106.13	683.	-11.	-0.006	325.41	0.845s
EU-152	486.88	121.78	280.	6.	0.003	419.96	0.861s
CO-57	488.03	122.06	286.	0.	0.000	1000.00	0.861s
EU-154	492.18	123.10	231.	18.	0.010	124.61	0.862s
PA-234	524.99	131.29	469.	17.	0.009	185.45	0.871s
HF-181	531.91	133.02	486.	0.	0.000	1000.00	0.872s
HF-181	545.02	136.30	486.	0.	0.000	1000.00	0.876s
CO-57	545.72	136.47	502.	-26.	-0.014	124.95	0.876
Tc-99m	561.88	140.51	361.	20.	0.011	137.36	0.880s
U-235	574.99	143.79	381.	0.	0.000	1000.00	0.883s
CE-141	581.61	145.44	340.	21.	0.012	124.12	0.885
Ba-140	650.54	162.66	264.	21.	0.012	112.50	0.902s
U-235	653.42	163.38	229.	-4.	-0.002	561.72	0.903s
CE-139	663.32	165.85	268.	13.	0.007	175.68	0.905
Cf-251	706.34	176.60	117.	13.	0.007	146.74	0.916s
TH-229	774.03	193.51	173.	-13.	-0.007	177.83	0.933s
U-235	821.35	205.33	158.	-21.	-0.011	107.02	0.945s
TH-229	843.44	210.85	255.	-22.	-0.012	104.02	0.950s
Cf-251	908.08	227.00	183.	-25.	-0.014	98.70	0.966s
PB-212	954.64	238.63	138.	570.	0.316	5.11	0.978D
PB-214	968.10	242.00	87.	63.	0.035	24.36	0.981D
EU-152	978.89	244.69	907.	19.	0.011	224.44	0.984
TH-227	1025.11	256.24	78.	8.	0.004	206.82	0.995
Cd-113m	1054.97	263.70	192.	-21.	-0.012	96.18	1.002s
BI-210M	1063.50	265.83	155.	18.	0.010	101.69	1.005s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
TL-208	1110.89	277.67	43.	25.	0.014	51.58	1.384s
Hg-203	1117.00	279.20	146.	-18.	-0.010	90.62	1.017s
I-131	1137.41	284.30	103.	-9.	-0.005	221.35	1.022s
PB-214	1180.60	295.09	268.	-23.	-0.013	74.63	1.033s
PB-212	1200.37	300.03	60.	36.	0.020	5.91	1.038A
PA-231	1200.53	300.07	448.	-20.	-0.011	150.56	1.038
PA-233	1200.97	300.18	428.	-20.	-0.011	147.22	1.038s
PA-231	1210.86	302.65	389.	-20.	-0.011	140.18	1.040D
BA-133	1211.66	302.85	396.	-20.	-0.011	141.46	1.040s
Ba-140	1219.66	304.85	416.	-20.	-0.011	144.66	1.042
PA-233	1248.32	312.01	70.	6.	0.004	249.74	1.049s
Ir-192	1266.25	316.49	80.	15.	0.008	90.17	1.053
CR-51	1280.63	320.08	107.	14.	0.008	106.17	1.057s
La-140	1315.35	328.76	100.	16.	0.009	119.74	1.065s
Cf-249	1334.08	333.44	73.	4.	0.002	440.04	1.070s
AC-228	1353.79	338.36	38.	144.	0.080	11.59	0.930s
Cs-136	1362.62	340.57	283.	15.	0.008	160.98	1.077s
HF-181	1383.66	345.83	74.	-10.	-0.006	161.22	1.082
PB-214	1408.90	352.14	41.	213.	0.118	9.20	1.127
BA-133	1424.36	356.00	323.	-15.	-0.008	169.41	1.091s
I-131	1458.32	364.48	59.	-8.	-0.005	238.22	1.099s
BA-133	1535.78	383.84	171.	-16.	-0.009	114.84	1.117s
Cf-249	1552.22	387.95	187.	-17.	-0.009	119.61	1.121
SN-113	1567.19	391.69	219.	-19.	-0.010	106.13	1.125s
SB-125	1711.99	427.88	60.	5.	0.003	309.61	1.158s
AG-108M	1736.25	433.94	52.	-2.	-0.001	765.05	1.164s
pm-146	1816.05	453.88	57.	-9.	-0.005	169.70	1.182s
SB-125	1854.01	463.37	38.	54.	0.030	20.91	1.191s
Ir-192	1872.79	468.06	112.	-8.	-0.005	183.17	1.195s
BE-7	1910.94	477.59	64.	14.	0.008	85.89	1.204s
HF-181	1928.56	482.00	119.	-16.	-0.009	97.97	1.208s
La-140	1948.65	487.02	64.	-12.	-0.007	92.05	1.212s
RU-103	1988.80	497.05	48.	-11.	-0.006	102.17	1.221s
RH-106	2048.06	511.86	87.	77.	0.043	32.73	2.485s
Nd-147	2124.62	531.00	28.	11.	0.006	98.89	1.252s
Ba-140	2149.67	537.26	45.	-3.	-0.002	393.98	1.258s
CS-134	2253.60	563.24	52.	-2.	-0.001	709.46	1.280s
CS-134	2277.94	569.32	48.	-7.	-0.004	144.98	1.286s
PA-234	2278.54	569.47	61.	-3.	-0.002	353.77	1.286
BI-207	2279.47	569.70	64.	0.	0.000	1000.00	1.286
TL-208	2334.96	583.57	19.	231.	0.128	7.97	1.646s
SB-125	2402.69	600.50	216.	9.	0.005	229.91	1.313s
SB-124	2411.61	602.73	225.	9.	0.005	245.58	1.315s
CS-134	2419.53	604.71	234.	9.	0.005	238.59	1.317s
BI-214	2439.27	609.64	30.	137.	0.076	11.73	1.271
RU-103	2441.89	610.30	243.	9.	0.005	242.26	1.322s
AG-108M	2457.82	614.28	252.	9.	0.005	246.07	1.325s
PM-144	2472.94	618.06	262.	9.	0.005	249.83	1.328s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RH-106	2488.37	621.92	309.	-7.	-0.004	227.73	1.332s
SB-125	2544.26	635.89	23.	10.	0.006	72.35	1.344s
I-131	2548.61	636.97	52.	-11.	-0.006	143.32	1.345s
AG-110M	2631.76	657.76	32.	4.	0.002	206.16	1.362s
PM-144	2786.90	696.54	35.	5.	0.003	229.47	1.395s
NB-94	2811.25	702.63	26.	12.	0.007	91.96	1.400s
SB-124	2891.88	722.79	126.	-15.	-0.008	110.71	1.417s
AG-108M	2892.48	722.94	112.	-7.	-0.004	225.77	1.417s
EU-154	2894.16	723.36	105.	0.	0.000	1000.00	1.418s
ZR-95	2897.53	724.20	90.	13.	0.007	106.22	1.418s
BI-212	2910.97	727.56	9.	62.	0.034	15.97	1.185
pm-146	2943.61	735.72	65.	-19.	-0.011	88.58	1.428
pm-146	2989.37	747.16	44.	-6.	-0.003	166.12	1.437s
AG-110M	3056.50	763.94	80.	-20.	-0.011	68.58	1.451s
NB-95	3063.89	765.79	82.	10.	0.006	129.23	1.453s
PA-234M	3066.38	766.41	97.	-19.	-0.011	76.12	1.453s
EU-152	3116.41	778.92	51.	-16.	-0.009	96.29	1.463s
BI-212	3142.41	785.42	56.	-4.	-0.002	400.00	1.468s
CS-134	3184.19	795.87	28.	27.	0.015	45.81	1.477s
CO-58	3243.82	810.78	87.	-16.	-0.009	88.65	1.489s
La-140	3263.80	815.77	103.	-16.	-0.009	95.39	1.493s
Cs-136	3274.72	818.50	61.	9.	0.005	126.74	1.495s
MN-54	3340.10	834.85	28.	9.	0.005	129.10	1.508s
Co-56	3387.78	846.77	19.	2.	0.001	434.58	1.518s
TL-208	3442.95	860.56	33.	13.	0.007	97.97	1.529s
NB-94	3485.08	871.10	35.	-11.	-0.006	113.87	1.537s
EU-154	3493.61	873.23	54.	-7.	-0.004	149.96	1.539s
PA-234	3522.80	880.53	41.	11.	0.006	90.01	1.544s
PA-234	3533.64	883.24	52.	10.	0.006	107.56	1.547s
Sc-46	3557.79	889.28	84.	-13.	-0.007	101.73	1.551s
y-88	3592.83	898.04	28.	-2.	-0.001	565.69	1.558s
AC-228	3646.12	911.37	16.	141.	0.079	10.30	2.050s
PA-234	3784.70	946.02	19.	2.	0.001	398.21	1.595s
EU-152	3857.05	964.11	85.	5.	0.003	242.81	1.609s
AC-228	3877.77	969.29	3.	77.	0.043	12.33	1.741
EU-154	3985.88	996.33	41.	2.	0.001	392.01	1.633s
PA-234M	4004.55	1001.00	43.	0.	0.000	1000.00	1.636s
EU-154	4019.65	1004.77	2.	7.	0.004	48.91	1.639s
Co-56	4151.87	1037.84	30.	-5.	-0.003	178.03	1.664
Cs-136	4192.77	1048.07	15.	5.	0.003	118.32	1.671s
RH-106	4201.93	1050.36	25.	2.	0.001	326.83	1.673s
BI-207	4255.11	1063.66	10.	16.	0.009	51.49	1.682s
Ga-68	4310.04	1077.40	10.	8.	0.005	90.50	1.692s
FE-59	4397.41	1099.25	25.	-6.	-0.003	187.70	1.708s
EU-152	4448.68	1112.07	105.	-15.	-0.008	102.68	1.717s
ZN-65	4462.56	1115.55	91.	-6.	-0.003	239.66	1.720
BI-214	4481.51	1120.29	69.	14.	0.008	89.91	1.723
Sc-46	4482.57	1120.55	83.	2.	0.001	686.23	1.723

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ta-182	4485.56	1121.30	60.	13.	0.007	85.97	1.724s
CO-60	4693.21	1173.24	30.	-7.	-0.004	166.17	1.760s
Ta-182	4756.42	1189.05	20.	2.	0.001	531.73	1.771s
Ta-182	4885.79	1221.41	16.	10.	0.006	93.89	1.793s
Co-56	4953.23	1238.28	16.	11.	0.006	91.58	1.804
NA-22	5098.13	1274.53	11.	5.	0.003	96.82	1.828s
EU-154	5098.19	1274.54	16.	0.	0.000	1000.00	1.828s
FE-59	5166.35	1291.60	27.	-4.	-0.002	324.36	1.840s
CO-60	5329.85	1332.50	27.	-5.	-0.003	196.02	1.866s
AG-110M	5536.88	1384.30	21.	-10.	-0.006	93.46	1.899s
EU-152	5631.62	1408.00	5.	7.	0.004	87.98	1.914s
K-40	5845.27	1461.46	8.	254.	0.141	6.69	2.014
La-140	6383.73	1596.21	23.	-6.	-0.003	201.47	2.024s
SB-124	6762.39	1690.98	11.	-5.	-0.003	154.24	2.076s
BI-214	7056.06	1764.49	10.	20.	0.011	32.26	2.114s
Co-56	7083.46	1771.35	43.	-10.	-0.005	99.38	2.117s
y-88	7341.96	1836.06	0.	5.	0.003	44.72	2.149s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample		COMMENTS
BE-7	C	5.6275E+00					5.31E+01	
			477.60	5.627E+00	?(	1.623E+01	8.59E+01	1.05E+01 G
NA-22	C	5.1787E-01					9.50E+02	
			1274.53	5.179E-01	&(	1.741E+00	9.68E+01	9.99E+01 G
K-40	N	2.5864E+02					4.66E+11	
			1460.83	2.586E+02	(P	1.663E+01	6.69E+00	1.07E+01 G
Sc-46	F	-9.4732E-01					8.38E+01	
			889.28	-9.473E-01	?(	3.252E+00	1.02E+02	1.00E+02 G
			1120.55	1.646E-01	+	3.936E+00	6.86E+02	1.00E+02 G
CR-51	F	4.3777E+00					2.77E+01	
			320.08	4.378E+00	?(	1.566E+01	1.06E+02	9.94E+00 G
MN-54	C	6.1223E-01					3.12E+02	
			834.85	6.122E-01	?(	1.862E+00	1.29E+02	1.00E+02 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
FE-59	F	-9.0994E-01					4.45E+01	
			1099.25	-9.099E-01	?(	3.945E+00	1.88E+02	5.65E+01 G
			1291.60	-8.330E-01	+	6.082E+00	3.24E+02	4.32E+01 G
Co-56	C	6.9249E-01					7.73E+01	
			846.77	1.475E-01	?(P	1.580E+00	4.35E+02	9.99E+01 G
			1238.28	1.517E+00	?(P	3.084E+00	9.16E+01	6.61E+01 G
			1037.84	-3.082E+00	& P	1.640E+01	1.78E+02	1.41E+01 G
			1771.35	-8.137E+00	+	2.748E+01	9.94E+01	1.55E+01 A
CO-58	C	-1.0362E+00					7.09E+01	
			810.78	-1.036E+00	?(	3.081E+00	8.87E+01	9.95E+01 G
CO-60	F	-5.0007E-01					1.93E+03	
			1332.50	-5.001E-01	?(P	2.711E+00	1.96E+02	1.00E+02 G
			1173.24	-6.760E-01	+ P	2.576E+00	1.66E+02	9.99E+01 G
ZN-65	F	-9.7859E-01					2.44E+02	
			1115.55	-9.786E-01	&(	8.074E+00	2.40E+02	5.06E+01 G
NB-94	I	7.1699E-01					7.41E+06	
			702.63	7.170E-01	?(	1.592E+00	9.20E+01	9.79E+01 G
			871.10	-7.869E-01	- P	2.141E+00	1.14E+02	9.99E+01 G
ZR-95	I	7.1409E-01					6.40E+01	
			756.73	-1.534E-01	%(	3.840E+00	1.01E+03	5.45E+01 G
			724.20	1.784E+00	?(	6.399E+00	1.06E+02	4.42E+01 G
NB-95	I	6.4701E-01					6.40E+01	
			765.79	6.470E-01	?(	2.845E+00	1.29E+02	9.98E+01 G
RU-103	I	-5.4391E-01					3.93E+01	
			497.05	-5.439E-01	?(P	1.701E+00	1.02E+02	9.09E+01 G
			610.30	8.363E+00	?	6.860E+01	2.42E+02	5.75E+00 GA
RH-106	I	-1.6957E+00					3.74E+02	
			621.92	-3.793E+00	?(P	4.530E+01	2.28E+02	9.93E+00 G
			1050.36	1.165E+01	&(P	1.370E+02	3.27E+02	1.56E+00 G
			511.86	1.747E+01	?	1.041E+01	3.27E+01	2.00E+01 GA
AG-108M	C	2.2504E-01					1.53E+05	
			433.94	-8.724E-02	?(P	1.580E+00	7.65E+02	9.05E+01 G
			722.94	-4.459E-01	+	3.449E+00	2.26E+02	9.08E+01 G
			614.28	5.395E-01	?(	4.494E+00	2.46E+02	8.98E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AG-110M	F	1.2903E-01					2.50E+02	
			884.68	-9.519E-03	%(P	3.874E+00	1.31E+04	7.27E+01 G
			657.76	2.354E-01	&(	1.711E+00	2.06E+02	9.46E+01 G
			937.49	-1.454E-01	%	4.984E+00	1.38E+03	3.44E+01 G
			1384.30	-4.464E+00	+ P	1.040E+01	9.35E+01	2.43E+01 G
			763.94	-5.537E+00	+	1.258E+01	6.86E+01	2.23E+01 G
SN-113	F	-1.0460E+00					1.15E+02	
			391.69	-1.046E+00	?(P	4.049E+00	1.06E+02	6.40E+01 G
SB-124	F	4.6004E-01					6.02E+01	
			602.73	4.600E-01	@(P	3.829E+00	2.46E+02	9.83E+01 G
			1690.98	-1.375E+00	+	4.742E+00	1.54E+02	4.78E+01 G
			722.79	-8.241E+00	+	3.074E+01	1.11E+02	1.08E+01 G
SB-125	I	5.0456E+00					1.01E+03	
			427.88	6.510E-01	?(P	5.102E+00	3.10E+02	2.96E+01 G
			600.50	2.639E+00	?(	2.057E+01	2.30E+02	1.79E+01 G
			635.89	5.001E+00	?(	1.207E+01	7.23E+01	1.13E+01 G
			463.37	2.162E+01	@(P	1.241E+01	2.09E+01	1.05E+01 G
I-131	I	-3.4322E-01					8.02E+00	
			364.48	-3.432E-01	&(P	1.608E+00	2.38E+02	8.17E+01 G
			284.30	-3.910E+00	+	2.252E+01	2.21E+02	6.14E+00 G
			636.97	-8.535E+00	+ P	2.754E+01	1.43E+02	7.17E+00 G
Gd-153	F	-9.1455E-01					2.42E+02	
			97.50	-9.145E-01	?(	4.460E+00	1.45E+02	3.00E+01 G
			103.20	-9.761E-01	+	6.692E+00	2.04E+02	2.18E+01 G
Ga-68	C	2.4945E+01					4.71E-02	
			1077.40	2.495E+01	?(	5.233E+01	9.05E+01	3.30E+00 G
Tc-99m	I	3.7306E-01					2.51E-01	
			140.51	3.731E-01	&(	1.717E+00	1.37E+02	8.93E+01 G
BA-133	F	-8.1660E-01					3.85E+03	
			356.00	-8.166E-01	?(	4.652E+00	1.69E+02	6.20E+01 G
			302.85	-3.208E+00	+	1.520E+01	1.41E+02	1.83E+01 G
			383.84	-6.555E+00	+	2.530E+01	1.15E+02	8.94E+00 GA
			80.99	-1.272E+00	& P	4.234E+00	1.11E+02	3.41E+01 GA
CS-134	I	1.2228E+00					7.54E+02	
			604.71	4.871E-01	?(	3.936E+00	2.39E+02	9.76E+01 G
			795.87	2.063E+00	(	2.091E+00	4.58E+01	8.55E+01 G
			569.32	-2.247E+00	+	1.123E+01	1.45E+02	1.54E+01 G
			801.95	7.448E-01	% P	2.231E+01	1.24E+03	8.69E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			563.24	-1.172E+00	+	2.128E+01	7.09E+02	8.35E+00 G
CS-137	I	3.2847E-02					1.10E+04	
			661.66	3.285E-02	%(P	2.174E+00	1.86E+03	8.52E+01 G
CE-139	F	2.9591E-01					1.38E+02	
			165.85	2.959E-01	&(	1.752E+00	1.76E+02	7.99E+01 G
Ba-140	I	7.6367E-01					1.28E+01	
			537.26	-5.655E-01	?(P	6.547E+00	3.94E+02	2.44E+01 G
			162.66	5.975E+00	?(	2.250E+01	1.12E+02	6.22E+00 G
			304.85	-1.381E+01	+	6.690E+01	1.45E+02	4.29E+00 G
La-140	I	-1.4384E-01					1.28E+01	
			1596.21	-6.969E-01	?(	3.062E+00	2.01E+02	9.54E+01 G
			487.02	-1.183E+00	+ P	3.821E+00	9.20E+01	4.55E+01 G
			328.76	2.455E+00	&(P	7.592E+00	1.20E+02	2.03E+01 G
			815.77	-4.462E+00	+	1.430E+01	9.54E+01	2.33E+01 G
CE-141	I	7.3378E-01					3.25E+01	
			145.44	7.338E-01	&(	3.048E+00	1.24E+02	4.82E+01 G
CE-144	I	-9.1629E-02					2.85E+02	
			133.54	-9.163E-02	%(P	1.516E+01	3.44E+03	1.11E+01 G
PM-144	C	4.0389E-01					3.63E+02	
			696.54	3.148E-01	?(	1.780E+00	2.29E+02	9.90E+01 G
			618.06	4.929E-01	?(	4.167E+00	2.50E+02	9.91E+01 G
EU-152	F	1.2943E+00					4.94E+03	
			344.29	1.049E-01	%(	1.019E+01	2.86E+03	2.65E+01 G
			1112.07	-9.269E+00	+	3.205E+01	1.03E+02	1.36E+01 G
			121.78	3.074E-01	&(	4.379E+00	4.20E+02	2.86E+01 G
			778.92	-8.100E+00	+	1.790E+01	9.63E+01	1.29E+01 G
			964.11	2.861E+00	?(P	2.395E+01	2.43E+02	1.46E+01 G
			244.69	6.155E+00	(P	4.615E+01	2.24E+02	7.58E+00 G
			1408.00	3.340E+00	?	6.769E+00	8.80E+01	2.10E+01 GA
EU-154	I	5.6829E-01					3.14E+03	
			873.23	-4.125E+00	?(	2.130E+01	1.50E+02	1.23E+01 G
			123.10	6.702E-01	+ P	2.804E+00	1.25E+02	4.08E+01 G
			1274.54	0.000E+00	&	5.888E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	+	1.505E+01	1.00E+03	2.02E+01 G
			1004.77	3.078E+00	?(	4.336E+00	4.89E+01	1.80E+01 G
			996.33	1.737E+00	?(	2.413E+01	3.92E+02	1.06E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
EU-155	I	-1.8418E+00					1.81E+03	
			105.31	-1.842E+00	*(	8.778E+00	1.43E+02	2.12E+01 G
			86.54	-1.496E+00	+	8.558E+00	1.72E+02	3.07E+01 G
HF-181	F	-8.6831E-01					4.24E+01	
			482.00	-8.683E-01	?(	2.856E+00	9.80E+01	8.05E+01 G
			133.02	0.000E+00	+	3.874E+00	1.00E+03	4.33E+01 G
			345.83	-2.203E+00	+	9.266E+00	1.61E+02	1.51E+01 G
			136.30	0.000E+00	+	2.895E+01	1.00E+03	5.85E+00 G
Ta-182	F	3.4471E+00					1.14E+02	
			1121.30	3.344E+00	?(	9.658E+00	8.60E+01	3.49E+01 G
			1221.41	3.580E+00	&(P	7.497E+00	9.39E+01	2.70E+01 G
			1189.05	1.057E+00	- P	1.334E+01	5.32E+02	1.62E+01 G
Hg-203	F	-6.1857E-01					4.66E+01	
			279.20	-6.186E-01	?(P	1.978E+00	9.06E+01	8.15E+01 G
TL-208	N	1.3741E+01					6.98E+02	
			583.02	1.374E+01	(P	1.386E+00	7.97E+00	8.45E+01 G
			277.28	1.060E+01	-	1.435E+01	5.16E+01	6.31E+00 G
			860.56	7.270E+00	- P	1.657E+01	9.80E+01	1.24E+01 G
pm-146	C	-1.0240E+00					2.02E+03	
			747.16	-1.024E+00	?(P	6.104E+00	1.66E+02	3.40E+01 G
			735.72	-5.228E+00	+	1.095E+01	8.86E+01	2.25E+01 G
			453.88	-5.712E-01	& P	2.384E+00	1.70E+02	6.50E+01 G
y-88	F	2.6726E-01					1.07E+02	
			898.04	-1.543E-01	?(	2.112E+00	5.66E+02	9.37E+01 G
			1836.06	6.655E-01	?(	9.809E-01	4.47E+01	9.92E+01 G
Cd-113m		-9.0732E+03					5.33E+03	
			263.70	-9.073E+03	&(	2.918E+04	9.62E+01	6.00E-03 K
Cd-109	F	3.7566E+00					4.53E+02	
							Derived Ave Activity	
			88.04	3.757E+00	}(	6.474E+01	5.15E+02	3.79E+00 G
Cf-251	T	1.4647E+00					3.28E+05	
			176.60	1.465E+00	?(	5.827E+00	1.47E+02	1.70E+01 G
			227.00	-9.095E+00	+	2.401E+01	9.87E+01	6.30E+00 GA
Cf-249	T	-5.8551E-01					1.28E+05	
			387.95	-8.987E-01	?(	3.614E+00	1.20E+02	6.60E+01 G
			333.44	7.474E-01	&(	8.687E+00	4.40E+02	1.55E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Sn-126		2.9944E+00					3.65E+07	
			87.57	2.994E+00	}	6.469E+00	3.32E+01	3.75E+01 GA
			64.28	2.994E+00	?(	1.957E+01	1.94E+02	9.70E+00 G
			86.94	-5.072E+00	+	2.866E+01	1.70E+02	9.04E+00 GA
PB-210	N	1.6990E+01					8.14E+03	
			46.54	1.699E+01	(P	3.566E+01	7.32E+01	4.25E+00 G
PB-212	N	3.1511E+01					6.98E+02	
			238.63	3.151E+01	(P	3.183E+00	5.11E+00	4.33E+01 G
			300.03	3.151E+01	} P	3.421E+01	5.91E+00	3.28E+00 GA
PB-214	N	1.8728E+01					5.84E+05	
			351.93	1.873E+01	(P	2.864E+00	9.20E+00	3.76E+01 G
			295.09	-3.392E+00	- P	1.168E+01	7.46E+01	1.93E+01 G
			242.00	2.061E+01		1.505E+01	2.44E+01	7.43E+00 GA
BI-207	C	7.5647E-01					1.18E+04	
			569.70	0.000E+00	&(	2.026E+00	1.00E+03	9.77E+01 G
			1063.66	1.749E+00	?(P	1.982E+00	5.15E+01	7.45E+01 G
BI-212	N	4.9749E+01					6.98E+02	
			727.17	4.975E+01	(	1.339E+01	1.60E+01	7.55E+00 G
			785.42	-2.019E+01	-	1.897E+02	4.00E+02	1.28E+00 GA
BI-214	N	1.5747E+01					5.84E+05	
			609.31	1.555E+01	(P	3.193E+00	1.17E+01	4.61E+01 G
			1120.29	7.921E+00	- P	2.394E+01	8.99E+01	1.51E+01 G
			1764.49	1.634E+01	?(P	1.464E+01	3.23E+01	1.54E+01 G
BI-210M	T	9.3352E-01					1.10E+09	
			265.83	9.335E-01	(	3.184E+00	1.02E+02	5.00E+01 G
			304.90	-2.279E-01	%	1.049E+01	1.36E+03	2.80E+01 G
AC-228	N	3.5654E+01					2.10E+03	
			911.07	3.566E+01	(P	5.340E+00	1.03E+01	2.90E+01 G
			968.97	3.385E+01	(P	4.946E+00	1.23E+01	1.75E+01 G
			338.32	3.826E+01	(P	8.416E+00	1.16E+01	1.20E+01 G
			93.35	8.216E+00	-	4.296E+01	1.57E+02	5.56E+00 XA
TH-227	N	2.1060E+00					7.95E+03	
			50.14	1.381E+00	&(	2.141E+01	5.38E+02	8.00E+00 G
			256.24	2.935E+00	&(P	1.591E+01	2.07E+02	7.00E+00 G
TH-229	N	-6.1032E+00					2.68E+06	
			193.51	-6.103E+00	&(	2.932E+01	1.78E+02	4.40E+00 G
			210.85	-1.604E+01	&	5.577E+01	1.04E+02	2.99E+00 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

TH-234   N   2.0078E+01                                      1.63E+12
                          63.29 2.178E+01  (P 3.410E+01 4.82E+01 3.81E+00 G
                          92.59 1.892E+01  (P 2.036E+01 3.38E+01 5.58E+00 G

PA-231   N  -2.0404E+01                                      1.20E+07
                         302.65-2.040E+01 ?(  9.580E+01 1.40E+02 2.88E+00 G
                         300.07-2.366E+01 +   1.193E+02 1.51E+02 2.46E+00 G

PA-233   C   5.2634E-01                                      7.82E+08
                         312.01 5.263E-01 ?(  3.458E+00 2.50E+02 3.60E+01 G
                         300.18-9.392E+00 +   4.630E+01 1.47E+02 6.20E+00 G

PA-234   N   2.8004E+00                                      1.63E+12
                         131.29 1.466E+00  (  9.118E+00 1.85E+02 1.80E+01 G
                         946.02 1.315E+00 ?(  1.288E+01 3.98E+02 1.34E+01 G
                         569.47-1.907E+00 &   2.358E+01 3.54E+02 8.20E+00 G
                         883.24 7.375E+00 ?(  2.699E+01 1.08E+02 9.60E+00 G
                         880.53 1.273E+01 ?   3.872E+01 9.00E+01 6.00E+00 GA

AM-241   T   9.0841E-01                                      1.58E+05
                          59.54 9.084E-01 ?(P 4.549E+00 1.76E+02 3.59E+01 G

Np-237   F   8.0788E+00                                      2.14E+06
                          86.49 8.079E+00  (  8.910E+00 3.45E+01 1.31E+01 G

Ir-192   F   5.0977E-01                                      7.40E+01
                         316.49 5.098E-01 &(  1.544E+00 9.02E+01 8.70E+01 G
                         468.06-6.751E-01 &   4.221E+00 1.83E+02 5.18E+01 G
                         308.44 3.560E-07 &   9.362E+00 7.76E+08 3.18E+01 G

Cs-136   F   6.5925E-01                                      1.30E+01
                         818.50 6.023E-01 ?(  2.608E+00 1.27E+02 1.00E+02 G
                        1048.07 5.145E-01 ?(  2.136E+00 1.18E+02 8.00E+01 G
                         340.57 1.028E+00 ?(  5.566E+00 1.61E+02 4.69E+01 G

Np-239   T  -7.7094E-01                                      2.36E+00
                         103.70 0.000E+00 +   6.180E+00 1.00E+03 2.40E+01 X
                         106.13-7.709E-01 &(  8.415E+00 3.25E+02 2.27E+01 G
                          99.50 2.303E+00 ?   9.076E+00 1.18E+02 1.50E+01 X

Nd-147       3.9415E+00                                      1.11E+01
                         531.00 3.941E+00 ?(  9.806E+00 9.89E+01 1.30E+01 G
                          91.10 0.000E+00 -   8.638E+00 1.00E+03 2.83E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
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! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	162.	4.	0.002	537.94	1.381E+00	
AM-241	59.54	237.	15.	0.008	175.72	9.084E-01	P
BA-133	80.99	321.	-26.	-0.014	111.02	-1.272E+00	P
EU-155	86.54	1176.	-28.	-0.016	171.72	-1.496E+00	
Gd-153	97.50	321.	-18.	-0.010	145.31	-9.145E-01	
Np-239	99.50	335.	22.	0.012	117.82	2.303E+00	
Gd-153	103.20	391.	-14.	-0.008	203.89	-9.761E-01	
EU-155	105.31	647.	-25.	-0.014	142.79	-1.842E+00	
Np-239	106.13	683.	-11.	-0.006	325.41	-7.709E-01	
EU-152	121.78	280.	6.	0.003	419.96	3.074E-01	
EU-154	123.10	231.	18.	0.010	124.61	6.702E-01	P
PA-234	131.29	469.	17.	0.009	185.45	1.466E+00	
CO-57	136.47	502.	-26.	-0.014	124.95	-3.864E+00	
Ba-140	162.66	264.	21.	0.012	112.50	5.975E+00	
U-235	163.38	229.	-4.	-0.002	561.72	-1.348E+00	
CE-139	165.85	268.	13.	0.007	175.68	2.959E-01	
Cf-251	176.60	117.	13.	0.007	146.74	1.465E+00	
TH-229	193.51	173.	-13.	-0.007	177.83	-6.103E+00	
U-235	205.33	158.	-21.	-0.011	107.02	-8.685E+00	P
TH-229	210.85	255.	-22.	-0.012	104.02	-1.604E+01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Cf-251	227.00	183.	-25.	-0.014	98.70	-9.095E+00	
EU-152	244.69	907.	19.	0.011	224.44	6.155E+00	P
TH-227	256.24	78.	8.	0.004	206.82	2.935E+00	P
Cd-113m	263.70	192.	-21.	-0.012	96.18	-9.073E+03	
BI-210M	265.83	155.	18.	0.010	101.69	9.335E-01	
Hg-203	279.20	146.	-18.	-0.010	90.62	-6.186E-01	P
I-131	284.30	103.	-9.	-0.005	221.35	-3.910E+00	
PA-231	300.07	448.	-20.	-0.011	150.56	-2.366E+01	
PA-233	300.18	428.	-20.	-0.011	147.22	-9.392E+00	
PA-231	302.65	389.	-20.	-0.011	140.18	-2.040E+01	
BA-133	302.85	396.	-20.	-0.011	141.46	-3.208E+00	
Ba-140	304.85	416.	-20.	-0.011	144.66	-1.381E+01	
PA-233	312.01	70.	6.	0.004	249.74	5.263E-01	
Ir-192	316.49	80.	15.	0.008	90.17	5.098E-01	
CR-51	320.08	107.	14.	0.008	106.17	4.378E+00	
La-140	328.76	100.	16.	0.009	119.74	2.455E+00	P
Cf-249	333.44	73.	4.	0.002	440.04	7.474E-01	
Cs-136	340.57	283.	15.	0.008	160.98	1.028E+00	
HF-181	345.83	74.	-10.	-0.006	161.22	-2.203E+00	
BA-133	356.00	323.	-15.	-0.008	169.41	-8.166E-01	
I-131	364.48	59.	-8.	-0.005	238.22	-3.432E-01	P
BA-133	383.84	171.	-16.	-0.009	114.84	-6.555E+00	
Cf-249	387.95	187.	-17.	-0.009	119.61	-8.987E-01	
SN-113	391.69	219.	-19.	-0.010	106.13	-1.046E+00	P
SB-125	427.88	60.	5.	0.003	309.61	6.510E-01	P
AG-108M	433.94	52.	-2.	-0.001	765.05	-8.724E-02	P
pm-146	453.88	57.	-9.	-0.005	169.70	-5.712E-01	P
SB-125	463.37	38.	54.	0.030	20.91	2.162E+01	P
Ir-192	468.06	112.	-8.	-0.005	183.17	-6.751E-01	
BE-7	477.59	64.	14.	0.008	85.89	5.627E+00	
HF-181	482.00	119.	-16.	-0.009	97.97	-8.683E-01	
La-140	487.02	64.	-12.	-0.007	92.05	-1.183E+00	P
RU-103	497.05	48.	-11.	-0.006	102.17	-5.439E-01	P
RH-106	511.86	87.	77.	0.043	32.73	1.747E+01	
Nd-147	531.00	28.	11.	0.006	98.89	3.941E+00	
Ba-140	537.26	45.	-3.	-0.002	393.98	-5.655E-01	P
CS-134	563.24	52.	-2.	-0.001	709.46	-1.172E+00	
CS-134	569.32	48.	-7.	-0.004	144.98	-2.247E+00	
PA-234	569.47	61.	-3.	-0.002	353.77	-1.907E+00	
SB-125	600.50	216.	9.	0.005	229.91	2.639E+00	
SB-124	602.73	225.	9.	0.005	245.58	4.600E-01	P
CS-134	604.71	234.	9.	0.005	238.59	4.871E-01	
RU-103	610.30	243.	9.	0.005	242.26	8.363E+00	
AG-108M	614.28	252.	9.	0.005	246.07	5.395E-01	
PM-144	618.06	262.	9.	0.005	249.83	4.929E-01	
RH-106	621.92	309.	-7.	-0.004	227.73	-3.793E+00	P
SB-125	635.89	23.	10.	0.006	72.35	5.001E+00	
I-131	636.97	52.	-11.	-0.006	143.32	-8.535E+00	P

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
AG-110M	657.76	32.	4.	0.002	206.16	2.354E-01		
PM-144	696.54	35.	5.	0.003	229.47	3.148E-01		
NB-94	702.63	26.	12.	0.007	91.96	7.170E-01		
SB-124	722.79	126.	-15.	-0.008	110.71	-8.241E+00		
AG-108M	722.94	112.	-7.	-0.004	225.77	-4.459E-01		
ZR-95	724.20	90.	13.	0.007	106.22	1.784E+00		
pm-146	735.72	65.	-19.	-0.011	88.58	-5.228E+00		
pm-146	747.16	44.	-6.	-0.003	166.12	-1.024E+00		P
AG-110M	763.94	80.	-20.	-0.011	68.58	-5.537E+00		
NB-95	765.79	82.	10.	0.006	129.23	6.470E-01		
PA-234M	766.41	97.	-19.	-0.011	76.12	-4.127E+02		
EU-152	778.92	51.	-16.	-0.009	96.29	-8.100E+00		
CS-134	795.87	28.	27.	0.015	45.81	2.063E+00		
CO-58	810.78	87.	-16.	-0.009	88.65	-1.036E+00		
La-140	815.77	103.	-16.	-0.009	95.39	-4.462E+00		
Cs-136	818.50	61.	9.	0.005	126.74	6.023E-01		
MN-54	834.85	28.	9.	0.005	129.10	6.122E-01		
Co-56	846.77	19.	2.	0.001	434.58	1.475E-01		P
NB-94	871.10	35.	-11.	-0.006	113.87	-7.869E-01		P
EU-154	873.23	54.	-7.	-0.004	149.96	-4.125E+00		
PA-234	880.53	41.	11.	0.006	90.01	1.273E+01		
PA-234	883.24	52.	10.	0.006	107.56	7.375E+00		
Sc-46	889.28	84.	-13.	-0.007	101.73	-9.473E-01		
y-88	898.04	28.	-2.	-0.001	565.69	-1.543E-01		
PA-234	946.02	19.	2.	0.001	398.21	1.315E+00		
EU-152	964.11	85.	5.	0.003	242.81	2.861E+00		P
EU-154	996.33	41.	2.	0.001	392.01	1.737E+00		
EU-154	1004.77	2.	7.	0.004	48.91	3.078E+00		
Co-56	1037.84	30.	-5.	-0.003	178.03	-3.082E+00		P
Cs-136	1048.07	15.	5.	0.003	118.32	5.145E-01		
RH-106	1050.36	25.	2.	0.001	326.83	1.165E+01		P
BI-207	1063.66	10.	16.	0.009	51.49	1.749E+00		P
Ga-68	1077.40	10.	8.	0.005	90.50	2.495E+01		
FE-59	1099.25	25.	-6.	-0.003	187.70	-9.099E-01		
EU-152	1112.07	105.	-15.	-0.008	102.68	-9.269E+00		
ZN-65	1115.55	91.	-6.	-0.003	239.66	-9.786E-01		
Sc-46	1120.55	83.	2.	0.001	686.23	1.646E-01		
CO-60	1173.24	30.	-7.	-0.004	166.17	-6.760E-01		P
Co-56	1238.28	16.	11.	0.006	91.58	1.517E+00		P
NA-22	1274.53	11.	5.	0.003	96.82	5.179E-01		
FE-59	1291.60	27.	-4.	-0.002	324.36	-8.330E-01		
CO-60	1332.50	27.	-5.	-0.003	196.02	-5.001E-01		P
AG-110M	1384.30	21.	-10.	-0.006	93.46	-4.464E+00		P
EU-152	1408.00	5.	7.	0.004	87.98	3.340E+00		
La-140	1596.21	23.	-6.	-0.003	201.47	-6.969E-01		
SB-124	1690.98	11.	-5.	-0.003	154.24	-1.375E+00		
Co-56	1771.35	43.	-10.	-0.005	99.38	-8.137E+00		
y-88	1836.06	0.	5.	0.003	44.72	6.655E-01		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	5.6274E+00	5.6275E+00	8.589E+01%	1.62E+01
NA-22	#A	5.1787E-01	5.1787E-01	9.682E+01%	1.74E+00
K-40		2.5864E+02	2.5864E+02	6.694E+00%	1.66E+01
Sc-46	#A	-9.4731E-01	-9.4732E-01	1.017E+02%	3.25E+00
CR-51	#A	4.3776E+00	4.3777E+00	1.062E+02%	1.57E+01
MN-54	#A	6.1223E-01	6.1223E-01	1.291E+02%	1.86E+00
FE-59	#A	-9.0993E-01	-9.0994E-01	1.877E+02%	3.94E+00
Co-56	#A	6.9249E-01	6.9249E-01	9.158E+01%	1.58E+00
CO-57	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.48E+00
CO-58	#A	-1.0362E+00	-1.0362E+00	8.865E+01%	3.08E+00
CO-60	#A	-5.0007E-01	-5.0007E-01	1.960E+02%	2.71E+00
ZN-65	#A	-9.7859E-01	-9.7859E-01	2.397E+02%	8.07E+00
NB-94	#A	7.1699E-01	7.1699E-01	9.196E+01%	1.59E+00
ZR-95	#A	7.1408E-01	7.1409E-01	1.062E+02%	3.84E+00
NB-95	#A	6.4700E-01	6.4701E-01	1.292E+02%	2.84E+00
RU-103	#A	-5.4390E-01	-5.4391E-01	1.022E+02%	1.70E+00
RH-106	#A	-1.6957E+00	-1.6957E+00	1.992E+02%	4.53E+01
AG-108M	#A	2.2504E-01	2.2504E-01	2.461E+02%	1.58E+00
AG-110M	#A	1.2903E-01	1.2903E-01	2.062E+02%	3.87E+00
SN-113	#A	-1.0460E+00	-1.0460E+00	1.061E+02%	4.05E+00
SB-124	#A	4.6004E-01	4.6004E-01	2.456E+02%	3.83E+00
SB-125	#A	5.0456E+00	5.0456E+00	2.091E+01%	5.10E+00
I-131	#A	-3.4320E-01	-3.4322E-01	2.382E+02%	1.61E+00
Gd-153	#A	-9.1454E-01	-9.1455E-01	1.453E+02%	4.46E+00
Ga-68	#A	2.4675E+01	2.4945E+01	9.050E+01%	5.23E+01
Tc-99m	#A	3.7230E-01	3.7306E-01	1.374E+02%	1.72E+00
BA-133	#A	-8.1660E-01	-8.1660E-01	1.694E+02%	4.65E+00
CS-134	#A	1.2228E+00	1.2228E+00	4.581E+01%	3.94E+00
CS-137	#A	3.2847E-02	3.2847E-02	1.858E+03%	2.17E+00
CE-139	#A	2.9591E-01	2.9591E-01	1.757E+02%	1.75E+00
Ba-140	#A	7.6364E-01	7.6367E-01	1.125E+02%	6.55E+00
La-140	#A	-1.4384E-01	-1.4384E-01	1.172E+02%	3.06E+00
CE-141	A	7.3377E-01	7.3378E-01	1.241E+02%	3.05E+00
CE-144	#A	-9.1629E-02	-9.1629E-02	3.443E+03%	1.52E+01
PM-144	#A	4.0389E-01	4.0389E-01	1.696E+02%	1.78E+00
EU-152	#A	1.2943E+00	1.2943E+00	2.244E+02%	1.02E+01
EU-154	#A	5.6829E-01	5.6829E-01	4.891E+01%	2.13E+01
EU-155	#A	-1.8418E+00	-1.8418E+00	1.428E+02%	8.78E+00
HF-181	#A	-8.6830E-01	-8.6831E-01	9.797E+01%	2.86E+00
Ta-182	#A	3.4471E+00	3.4471E+00	6.365E+01%	9.66E+00
Hg-203	#A	-6.1856E-01	-6.1857E-01	9.062E+01%	1.98E+00

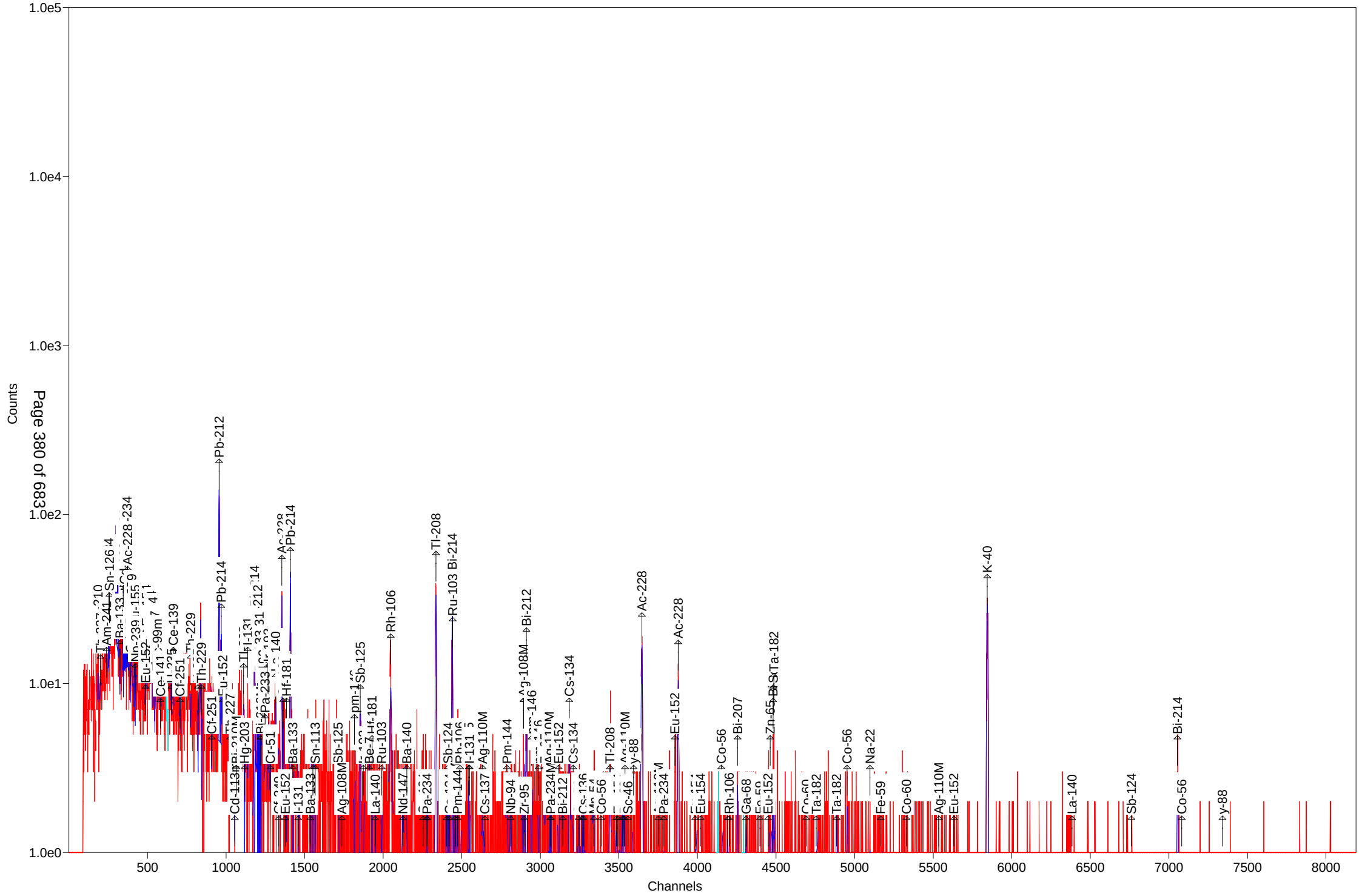
TL-208	1.3741E+01	1.3741E+01	7.975E+00%	1.39E+00
pm-146 #A	-1.0240E+00	-1.0240E+00	1.661E+02%	6.10E+00
y-88 #A	2.6726E-01	2.6726E-01	4.472E+01%	2.11E+00
Cd-113m#A	-9.0732E+03	-9.0732E+03	9.618E+01%	2.92E+04
Cd-109 #A	3.7566E+00	3.7566E+00	5.148E+02%	6.47E+01
Cf-251 #A	1.4647E+00	1.4647E+00	1.467E+02%	5.83E+00
Cf-249 #A	-5.8551E-01	-5.8551E-01	1.196E+02%	3.61E+00
Sn-126 #A	2.9944E+00	2.9944E+00	1.945E+02%	1.96E+01
PB-210 A	1.6990E+01	1.6990E+01	7.323E+01%	3.57E+01
PB-212 #	3.1511E+01	3.1511E+01	5.111E+00%	3.18E+00
PB-214	1.8728E+01	1.8728E+01	9.197E+00%	2.86E+00
BI-207 #A	7.5647E-01	7.5647E-01	5.149E+01%	2.03E+00
BI-212	4.9749E+01	4.9749E+01	1.597E+01%	1.34E+01
BI-214	1.5747E+01	1.5747E+01	1.173E+01%	3.19E+00
BI-210M#A	9.3352E-01	9.3352E-01	1.017E+02%	3.18E+00
AC-228	3.5654E+01	3.5654E+01	6.603E+00%	5.34E+00
TH-227 #A	2.1060E+00	2.1060E+00	2.068E+02%	2.14E+01
TH-229 #A	-6.1032E+00	-6.1032E+00	1.778E+02%	2.93E+01
TH-234 #A	2.0078E+01	2.0078E+01	2.944E+01%	3.41E+01
PA-231 #A	-2.0404E+01	-2.0404E+01	1.402E+02%	9.58E+01
PA-233 #A	5.2634E-01	5.2634E-01	2.497E+02%	3.46E+00
PA-234 #A	2.8004E+00	2.8004E+00	1.076E+02%	9.12E+00
PA-234M#A	0.0000E+00	0.0000E+00	1.000E+03%	3.15E+02
U-235 #A	0.0000E+00	0.0000E+00	1.000E+03%	1.41E+01
AM-241 #A	9.0841E-01	9.0841E-01	1.757E+02%	4.55E+00
Np-237 #A	8.0788E+00	8.0788E+00	3.450E+01%	8.91E+00
Ir-192 #A	5.0976E-01	5.0977E-01	9.017E+01%	1.54E+00
Cs-136 #A	6.5922E-01	6.5925E-01	7.886E+01%	2.61E+00
Np-239 #A	-7.7078E-01	-7.7094E-01	3.254E+02%	8.42E+00
Nd-147 #A	3.9413E+00	3.9415E+00	9.889E+01%	9.81E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 2000.8 keV) 4.689E+02 Bq/Sample
Total Decayed Activity (37.6 to 2000.8 keV) 4.6891644E+02 Bq/Sample

264537_Gamma_160-18552-A-4-B. 5_Gamma_20161667.spc.



Test America St. Louis Spectrum ID: 13_Gamma_20160731

Sample Description: 264537_Gamma_160-18552-A-5-B
Detector: Detector #13
Batch ID: 264537
Work Order Number: Gamma
Lot Number: 160-18552-A-5-B

Decay to Time: 9/1/2016 11:38 Live Time: 1800 sec
Acquisition Time: 9/1/2016 11:38:55 Real Time: 1810 sec
Analysis Time: 9/1/2016 12:09 Dead Time: 0.54 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 13_Soil_TunaCan.Clb
Efficiency Cal Desc: 13_Soil_TunaCan_90099_032712
Efficiency Cal Date: 3/29/2012 07:50
Energy Cal Date: 2/23/2012 09:31
Library: Client_Long_Rev11.lib
Bkgd Correction File: 13_2016-08-07_0547.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-9.492E-01	410.9	3.900E+00	3.900E+00	1.336E+01
NA-22	-1.464E-01	284.8	4.169E-01	4.170E-01	1.477E+00
K-40	2.556E+02	4.5	1.153E+01	1.743E+01	6.545E+00
Sc-46	6.128E-03	7095.0	4.348E-01	4.348E-01	1.531E+00
CR-51	2.276E+00	143.8	3.273E+00	3.275E+00	1.105E+01
MN-54	4.903E-01	96.7	4.740E-01	4.747E-01	1.060E+00
FE-59	1.407E+00	46.7	6.578E-01	6.616E-01	1.376E+00
Co-56	8.860E-01	36.8	3.261E-01	3.293E-01	1.203E+00
CO-57	-1.905E-01	150.6	2.868E-01	2.869E-01	9.638E-01
CO-58	4.534E-01	80.8	3.662E-01	3.670E-01	1.228E+00
CO-60	-4.784E-01	119.5	5.716E-01	5.721E-01	1.415E+00
ZN-65	-1.029E+00	146.8	1.511E+00	1.512E+00	5.115E+00
NB-94	-5.142E-01	102.6	5.275E-01	5.282E-01	1.772E+00
ZR-95	1.252E+00	51.7	6.470E-01	6.502E-01	1.405E+00
NB-95	-1.095E-02	4392.1	4.809E-01	4.809E-01	1.672E+00
RU-103	3.945E-01	96.9	3.823E-01	3.828E-01	9.125E-01
RH-106	-4.389E+00	121.8	5.344E+00	5.349E+00	2.911E+01
AG-108M	-7.865E-02	593.0	4.664E-01	4.664E-01	9.926E-01
AG-110M	1.074E-01	304.1	3.268E-01	3.268E-01	2.087E+00
SN-113	-6.520E-01	93.6	6.104E-01	6.113E-01	2.271E+00
SB-124	0.000E+00	1.#INF	1.671E-01	1.671E-01	2.804E+00
SB-125	3.313E+00	16.9	5.606E-01	5.856E-01	2.804E+00
I-131	4.406E-02	1029.4	4.536E-01	4.536E-01	1.096E+00
Gd-153	-1.320E+00	161.0	2.125E+00	2.126E+00	7.059E+00
Ga-68	1.214E+01	164.6	1.998E+01	1.999E+01	4.412E+01
Tc-99m	0.000E+00	1.#INF	1.655E-01	1.655E-01	1.788E+00
BA-133	-1.421E-01	117.2	1.666E-01	1.667E-01	3.272E+00
CS-134	6.109E-01	66.4	4.055E-01	4.067E-01	2.829E+00
CS-137	2.066E+00	22.4	4.620E-01	4.743E-01	8.794E-01
CE-139	3.397E-01	89.7	3.047E-01	3.064E-01	1.016E+00
Ba-140	3.365E-01	123.9	4.168E-01	4.172E-01	4.309E+00
La-140	4.705E-01	103.7	4.877E-01	4.883E-01	1.187E+00
CE-141	-7.774E-01	32.5	2.524E-01	2.554E-01	3.441E+00

CE-144	0.000E+00	1.#INF	1.411E+00	1.411E+00	1.374E+01
PM-144	-5.680E-01	79.1	4.494E-01	4.504E-01	1.499E+00
EU-152	1.630E+00	73.9	1.205E+00	1.208E+00	6.955E+00
EU-154	3.545E+00	85.0	3.013E+00	3.018E+00	1.014E+01
EU-155	1.780E+00	160.9	2.864E+00	2.866E+00	9.518E+00
HF-181	-5.844E-01	90.2	5.274E-01	5.283E-01	1.763E+00
Ta-182	1.473E-01	1400.1	2.062E+00	2.062E+00	7.122E+00
Hg-203	-1.287E-01	291.6	3.754E-01	3.755E-01	1.278E+00
TL-208	7.657E+00	8.9	6.794E-01	7.870E-01	1.012E+00
pm-146	2.737E-01	91.4	2.502E-01	2.506E-01	3.235E+00
y-88	2.906E-01	40.8	1.187E-01	1.196E-01	1.037E+00
Cd-113m	5.654E+03	76.3	4.314E+03	4.330E+03	1.434E+04
Cd-109	0.000E+00	1.#INF	1.832E+01	1.832E+01	6.086E+01
Cf-251	1.881E+00	100.7	1.894E+00	1.901E+00	4.610E+00
Cf-249	4.931E-01	122.4	6.036E-01	6.041E-01	2.029E+00
Sn-126	-1.873E-02	27261.4	5.105E+00	5.105E+00	1.720E+01
PB-210	3.093E+01	29.9	9.261E+00	9.438E+00	2.279E+01
PB-212	2.563E+01	3.8	9.818E-01	1.927E+00	1.268E+00
PB-214	1.538E+01	6.2	9.564E-01	1.246E+00	2.084E+00
BI-207	-4.615E-01	77.0	3.553E-01	3.561E-01	1.185E+00
BI-212	2.524E+01	14.4	3.627E+00	3.857E+00	6.468E+00
BI-214	1.693E+01	6.6	1.120E+00	1.424E+00	1.282E+00
BI-210M	1.924E-01	195.9	3.769E-01	3.771E-01	2.032E+00
AC-228	2.282E+01	8.2	1.872E+00	2.204E+00	1.909E+00
TH-227	-6.501E+00	104.6	6.798E+00	6.808E+00	2.266E+01
TH-229	4.002E+00	122.1	4.886E+00	4.896E+00	2.036E+01
TH-234	2.996E+00	415.2	1.244E+01	1.244E+01	4.180E+01
PA-231	1.241E+01	131.4	1.631E+01	1.632E+01	7.275E+01
PA-233	7.368E-01	186.0	1.371E+00	1.371E+00	6.253E+00
PA-234	2.278E+00	93.1	2.121E+00	2.125E+00	8.246E+00
PA-234M	-5.680E+00	60.4	3.431E+00	3.443E+00	2.434E+02
U-235	-6.216E-01	75.0	4.659E-01	4.669E-01	1.588E+01
AM-241	-1.486E+00	40.9	6.082E-01	6.130E-01	5.188E+00
Np-237	-2.943E+00	179.7	5.289E+00	5.291E+00	1.757E+01
Ir-192	2.661E-01	222.7	5.925E-01	5.927E-01	1.991E+00
Cs-136	4.460E-01	58.0	2.587E-01	2.600E-01	1.385E+00
Np-239	1.662E+00	159.1	2.645E+00	2.647E+00	8.790E+00
Nd-147	-1.405E+00	212.2	2.981E+00	2.982E+00	7.221E+00
Total	6.115E+03				

Analyst: kody Saulters

Sample description
264537_Gamma_160-18552-A-5-B

Spectrum Filename: C:\User\SPC\Det13\13_Gamma_20160731.An1

Acquisition information
Start time: 9/1/2016 11:38:55 AM
Live time: 1800
Real time: 1810
Dead time: 0.54 %
Detector ID: 13

Detector system
Ge13 SN/10064006

Calibration
Filename: 13_Soil_TunaCan.Clb
13_Soil_TunaCan_90099_032712

Energy Calibration
Created: 2/23/2012 9:31:24 AM
Zero offset: 0.036 keV
Gain: 0.250 keV/channel
Quadratic: -2.347E-08 keV/channel^2

Efficiency Calibration
Created: 3/29/2012 7:50:26 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.91 %
Log(Eff): -5.308398E-01 + (-3.057754E-01*Log(E)) + (-3.437570E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.60 %
Log(Eff): -2.292218E+01 + (8.455931E+00*Log(E)) + (-8.924057E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev11.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.55keV)
Stop channel: 8000 (1999.54keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 11:38:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	13_2016-08-07_0547.PBC 8/7/2016 5:47:55 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 31 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1629

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.70	64.	29.95	1.22	2.705E-02	46.54	4.250	3.093E+01	PB210
63.57	70.	33.14	0.49	4.087E-02	63.29	3.810	PBC<MDA	TH234
					64.28	9.700	9.697E+00	Sn126
74.74	276.	9.96	1.04	4.730E-02				
77.04	455.	6.53	1.05	4.835E-02				
87.03	153.	15.79	1.06	5.195E-02	86.49	13.100	1.256E+01	Np237
					86.54	30.700	5.357E+00	EU155
					86.94	9.040	1.815E+01	Sn126
					87.57	37.500	4.360E+00	Sn126
					88.04	3.790	4.304E+01	Cd109
89.79	94.	22.50	1.06	5.270E-02				
93.13	91.	23.17	1.06	5.353E-02	93.35	5.561	1.702E+01	AC228
97.38	32.	45.99	0.59	5.427E-02	97.50	30.000	1.080E+00	Gd153
105.31	37.	160.88	1.07	5.518E-02	105.31	21.200	PBC<MDA	EU155
106.13	38.	159.11	1.07	5.524E-02	106.13	22.700	PBC<MDA	Np239
121.78	30.	89.55	1.09	5.530E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	3.470E-01	CO57
123.10	27.	92.72	1.09	5.523E-02	123.10	40.790	PBC<MDA	EU154
131.29	28.	154.26	1.10	5.455E-02	131.29	18.000	PBC<MDA	PA234
133.02	14.	323.35	1.10	5.436E-02	133.02	43.300	PBC<MDA	HF181
					133.54	11.090	1.261E+00	CE144
163.38	26.	94.51	1.13	4.950E-02	163.38	5.080	PBC<MDA	U235

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
166.64	25.	89.71	1.13	5.020E-02	165.85	79.900	PBC<MDA	CE139
176.60	28.	100.65	1.14	4.817E-02	176.60	17.000	PBC<MDA	Cf251
210.85	26.	122.07	1.17	4.279E-02	210.85	2.990	PBC<MDA	TH229
238.51	712.	5.41	1.19	3.936E-02	238.63	43.300	2.323E+01	PB212
241.90	122.	14.50	1.20	3.897E-02	242.00	7.430	2.346E+01	PB214
256.24	21.	95.35	1.21	3.747E-02	256.24	7.000	PBC<MDA	TH227
263.70	22.	76.31	1.22	3.674E-02	263.70	0.006	PBC<MDA	Cd113m
277.22	10.	170.29	1.23	3.549E-02	277.28	6.310	PBC<MDA	TL208
295.27	194.	12.53	1.06	3.397E-02	295.09	19.300	1.640E+01	PB214
300.07	20.	183.33	1.25	3.359E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.342E+01	PA231
					300.18	6.200	5.325E+00	PA233
300.16	20.	180.58	1.25	3.360E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.342E+01	PA231
					300.18	6.200	5.325E+00	PA233
300.18	20.	186.05	1.25	3.358E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.342E+01	PA231
					300.18	6.200	5.325E+00	PA233
302.65	20.	188.38	1.26	3.339E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	1.816E+00	BA133
302.85	20.	190.98	1.26	3.338E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	1.816E+00	BA133
304.85	20.	193.31	1.26	3.322E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	1.196E+00	BI210M
304.90	15.	267.27	1.26	3.322E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	8.750E-01	BI210M
316.49	13.	222.67	1.27	3.236E-02	316.49	87.040	PBC<MDA	Ir192
320.08	13.	143.80	1.27	3.211E-02	320.08	9.940	PBC<MDA	CR51
338.06	169.	15.10	1.17	3.090E-02	338.32	12.010	2.530E+01	AC228
344.29	20.	154.68	1.29	3.050E-02	344.29	26.500	PBC<MDA	EU152
351.86	308.	8.03	0.86	3.003E-02	351.93	37.600	1.514E+01	PB214
383.84	20.	97.88	1.33	2.823E-02	383.84	8.940	PBC<MDA	BA133
387.95	16.	122.41	1.33	2.802E-02	387.95	66.000	PBC<MDA	Cf249
453.88	16.	91.40	1.39	2.502E-02	453.88	65.000	PBC<MDA	pm146
463.37	76.	16.92	1.40	2.465E-02	463.37	10.470	1.647E+01	SB125
487.02	18.	103.66	1.42	2.377E-02	487.02	45.500	PBC<MDA	La140
497.05	15.	96.90	1.43	2.341E-02	497.05	90.900	PBC<MDA	RU103
511.86	173.	12.40	2.69	2.292E-02	511.86	20.000	2.097E+01	RH106
569.32	15.	66.38	1.49	2.118E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	4.689E+00	PA234
					569.70	97.740	3.935E-01	BI207
569.47	9.	105.24	1.49	2.118E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.988E+00	PA234
					569.70	97.740	2.508E-01	BI207
583.24	242.	8.87	1.23	2.081E-02	583.02	84.500	7.657E+00	TL208
600.50	8.	386.13	1.52	2.036E-02	600.50	17.860	PBC<MDA	SB125
609.19	286.	6.61	1.34	2.014E-02	609.31	46.090	1.711E+01	BI214
					610.30	5.750	1.373E+02	RU103

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
617.64	12.	60.00	2.44	1.993E-02	618.06	99.100	PBC<MDA	PM144
661.94	60.	22.36	0.47	1.893E-02	661.66	85.210	2.066E+00	CS137
723.36	4.	329.87	1.62	1.770E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	1.523E-01	AG108M
					723.36	20.220	6.845E-01	EU154
724.28	5.	294.28	1.62	1.769E-02	724.20	44.150	PBC<MDA	ZR95
727.25	60.	14.37	1.62	1.763E-02	727.17	7.550	2.524E+01	BI212
755.81	21.	51.65	1.65	1.710E-02	756.73	54.460	PBC<MDA	ZR95
766.41	19.	74.57	1.66	1.694E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	2.132E+02	PA234M
784.81	17.	87.52	1.67	1.663E-02	785.42	1.280	PBC<MDA	BI212
795.87	12.	110.55	1.68	1.646E-02	795.87	85.530	PBC<MDA	CS134
801.95	14.	84.03	1.69	1.636E-02	801.95	8.690	PBC<MDA	CS134
810.78	13.	80.78	1.69	1.623E-02	810.78	99.460	PBC<MDA	CO58
818.50	10.	123.54	1.70	1.611E-02	818.50	100.000	PBC<MDA	Cs136
834.85	14.	96.67	1.71	1.587E-02	834.85	99.980	PBC<MDA	MN54
860.88	45.	19.10	1.39	1.550E-02	860.56	12.420	1.292E+01	TL208
873.23	12.	84.98	1.74	1.533E-02	873.23	12.270	PBC<MDA	EU154
880.53	14.	80.57	1.75	1.523E-02	880.53	6.000	PBC<MDA	PA234
883.24	2.	567.63	1.75	1.519E-02	883.24	9.600	PBC<MDA	PA234
898.04	5.	248.98	1.76	1.500E-02	898.04	93.700	PBC<MDA	y88
911.24	180.	8.20	1.19	1.483E-02	911.07	29.000	2.329E+01	AC228
946.02	13.	93.13	1.80	1.441E-02	946.02	13.400	PBC<MDA	PA234
964.11	12.	131.10	1.82	1.419E-02	964.11	14.605	PBC<MDA	EU152
969.17	90.	17.99	2.20	1.414E-02	968.97	17.460	2.033E+01	AC228
1037.84	9.	125.81	1.88	1.340E-02	1037.84	14.130	PBC<MDA	Co56
1048.07	11.	58.01	1.88	1.330E-02	1048.07	80.000	PBC<MDA	Cs136
1077.40	8.	164.57	1.91	1.301E-02	1077.40	3.300	PBC<MDA	Ga68
1099.25	18.	46.75	1.92	1.281E-02	1099.25	56.500	1.407E+00	FE59
1120.55	81.	14.87	0.83	1.262E-02	1120.29	15.100	2.350E+01	BI214
					1120.55	99.987	PBC<MDA	Sc46
1173.24	5.	277.13	1.98	1.217E-02	1173.24	99.900	PBC<MDA	CO60
1238.28	30.	36.81	2.03	1.166E-02	1238.28	66.070	2.193E+00	Co56
1384.30	2.	304.14	2.14	1.066E-02	1384.30	24.290	PBC<MDA	AG110M
1408.00	14.	49.72	2.16	1.052E-02	1408.00	21.005	PBC<MDA	EU152
1460.72	501.	4.51	2.23	1.021E-02	1460.83	10.670	2.556E+02	K40
1596.21	4.	215.15	2.29	9.505E-03	1596.21	95.400	PBC<MDA	La140
1764.53	40.	20.50	2.40	8.758E-03	1764.49	15.400	1.641E+01	BI214
1836.06	6.	40.82	2.45	8.477E-03	1836.06	99.200	PBC<MDA	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
254.02	63.57	184.	48.	1.162E+03	42.86	1.034	- sD
298.68	74.76	239.	276.	5.830E+03	9.96	1.045	- sD

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Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
307.87	77.05	214.	455.	9.400E+03	6.53	1.047	- sD
357.60	89.70	197.	106.	2.004E+03	21.18	1.059	- sD

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	186.55	46.70	91.	64.	0.036	29.95	1.220s
TH-227	200.32	50.14	427.	-28.	-0.016	104.57	1.021s
AM-241	237.89	59.54	717.	-37.	-0.020	40.92	1.030s
TH-234	252.89	63.29	598.	8.	0.005	415.21	1.034
BA-133	323.66	80.99	1725.	-40.	-0.022	87.57	1.051s
Np-237	345.65	86.49	2070.	-36.	-0.020	179.73	1.056
EU-155	345.86	86.54	2191.	-38.	-0.021	173.54	1.056
Sn-126	347.45	86.94	2152.	-38.	-0.021	171.99	1.056
Sn-126	349.97	87.57	1938.	-38.	-0.021	163.19	1.057s
Cd-109	351.85	88.04	2114.	0.	0.000	170.28	1.057A
Nd-147	364.09	91.10	1900.	-38.	-0.021	161.09	1.060s
TH-234	370.04	92.59	1862.	-39.	-0.021	159.25	1.062
AC-228	373.08	93.35	178.	91.	0.051	23.17	1.062D
Gd-153	389.67	97.50	1920.	-39.	-0.021	161.01	1.066s
Np-239	397.67	99.50	1959.	-11.	-0.006	576.05	1.068
Np-239	414.46	103.70	1970.	0.	0.000	1000.00	1.072s
EU-155	420.91	105.31	1800.	37.	0.021	160.88	1.074s
Np-239	424.18	106.13	1763.	38.	0.021	159.11	1.074s
EU-152	486.74	121.78	336.	30.	0.016	89.55	1.089s
CO-57	487.88	122.06	290.	-16.	-0.009	150.57	1.089s
EU-154	492.03	123.10	292.	27.	0.015	92.72	1.090s
PA-234	524.80	131.29	942.	28.	0.016	154.26	1.098s
HF-181	531.71	133.02	970.	14.	0.008	323.35	1.100s
CE-144	533.77	133.54	984.	0.	0.000	1000.00	1.100s
HF-181	544.81	136.30	984.	0.	0.000	1000.00	1.103s
CO-57	545.50	136.47	984.	0.	0.000	1000.00	1.103s
Tc-99m	561.64	140.51	984.	0.	0.000	1000.00	1.106
U-235	574.74	143.79	1226.	-38.	-0.021	116.36	1.110s
CE-141	581.36	145.44	1100.	-36.	-0.020	32.46	1.111s
Ba-140	650.21	162.66	398.	-29.	-0.016	100.77	1.127s
U-235	653.08	163.38	295.	26.	0.015	94.51	1.128s
CE-139	662.98	165.85	230.	25.	0.014	89.71	1.130s
Cf-251	705.95	176.60	196.	28.	0.015	100.65	1.140s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
TH-229	773.56	193.51	228.	-3.	-0.002	987.14	1.156s
U-235	820.84	205.33	244.	-27.	-0.015	42.39	1.167s
TH-229	842.90	210.85	248.	26.	0.014	122.07	1.172s
Cf-251	907.48	227.00	176.	-27.	-0.015	96.88	1.186s
PB-212	953.99	238.63	60.	786.	0.437	3.83	1.197D
PB-214	967.44	242.00	96.	122.	0.068	14.50	1.200D
EU-152	978.22	244.69	1239.	-25.	-0.014	70.52	1.203s
TH-227	1024.40	256.24	104.	21.	0.012	95.35	1.213s
Cd-113m	1054.23	263.70	135.	22.	0.012	76.31	1.220
BI-210M	1062.75	265.83	189.	-6.	-0.003	286.44	1.222
TL-208	1108.54	277.28	140.	10.	0.006	170.29	1.232s
Hg-203	1116.21	279.20	186.	-7.	-0.004	291.63	1.234s
I-131	1136.60	284.30	136.	-23.	-0.013	101.44	1.239
PB-214	1179.75	295.09	63.	187.	0.104	9.50	1.249D
PB-212	1199.51	300.03	639.	20.	0.011	180.58	1.253
PA-231	1199.67	300.07	659.	20.	0.011	183.33	1.253
PA-233	1200.11	300.18	679.	20.	0.011	186.05	1.253
PA-231	1209.98	302.65	699.	20.	0.011	188.38	1.255s
BA-133	1210.79	302.85	719.	20.	0.011	190.98	1.256s
Ba-140	1218.78	304.85	739.	20.	0.011	193.31	1.257s
BI-210M	1218.97	304.90	759.	15.	0.008	267.27	1.257s
Ir-192	1233.14	308.44	774.	0.	0.000	1000.00	1.261
Ir-192	1265.33	316.49	444.	13.	0.007	222.67	1.268s
CR-51	1279.70	320.08	170.	13.	0.007	143.80	1.271s
La-140	1314.40	328.76	574.	-24.	-0.013	80.04	1.279s
Cf-249	1333.11	333.44	550.	-6.	-0.003	539.18	1.283s
AC-228	1351.61	338.06	83.	169.	0.094	15.10	1.165
Cs-136	1361.62	340.57	544.	0.	0.000	1000.00	1.290s
EU-152	1376.48	344.29	447.	20.	0.011	154.68	1.293s
HF-181	1382.65	345.83	565.	-21.	-0.011	164.68	1.294s
PB-214	1406.77	351.86	72.	308.	0.171	8.03	0.855s
BA-133	1423.33	356.00	519.	-24.	-0.013	135.91	1.303s
BA-133	1534.67	383.84	174.	20.	0.011	97.88	1.328s
Cf-249	1551.10	387.95	194.	16.	0.009	122.41	1.332s
SN-113	1566.06	391.69	226.	-21.	-0.012	93.62	1.335s
AG-108M	1735.01	433.94	70.	-3.	-0.002	593.03	1.373s
pm-146	1814.77	453.88	48.	16.	0.009	91.40	1.390s
SB-125	1852.71	463.37	46.	76.	0.043	16.92	1.399s
Ir-192	1871.48	468.06	157.	-16.	-0.009	112.42	1.403s
BE-7	1909.62	477.60	156.	-4.	-0.002	410.87	1.411s
HF-181	1927.22	482.00	157.	-20.	-0.011	90.25	1.415s
La-140	1947.31	487.02	161.	18.	0.010	103.66	1.419s
RU-103	1987.44	497.05	48.	15.	0.008	96.90	1.428s
RH-106	2046.68	511.86	42.	173.	0.096	12.40	2.691s
Nd-147	2123.21	531.00	56.	-7.	-0.004	212.16	1.458s
Ba-140	2148.25	537.26	70.	-9.	-0.005	154.91	1.463s
CS-134	2276.48	569.32	40.	15.	0.008	66.38	1.491
PA-234	2277.07	569.47	44.	9.	0.005	105.24	1.491

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-207	2278.00	569.70	79.	-17.	-0.010	76.99	1.491s
TL-208	2332.17	583.24	40.	242.	0.135	8.87	1.228
SB-125	2401.19	600.50	434.	8.	0.004	386.13	1.518s
SB-124	2410.11	602.73	442.	0.	0.000	1000.00	1.519s
CS-134	2418.03	604.71	442.	0.	0.000	1000.00	1.521s
BI-214	2435.95	609.19	16.	286.	0.159	6.61	1.344
RU-103	2440.38	610.30	442.	0.	0.000	1000.00	1.526s
AG-108M	2456.31	614.28	442.	0.	0.000	1000.00	1.529s
PM-144	2469.75	617.64	12.	12.	0.007	60.00	2.438s
RH-106	2486.85	621.92	465.	-16.	-0.009	121.76	1.536
SB-125	2542.74	635.89	51.	-2.	-0.001	439.16	1.548s
I-131	2547.08	636.97	66.	-7.	-0.004	177.06	1.549s
AG-110M	2630.23	657.76	135.	-16.	-0.009	117.96	1.566s
CS-137	2646.95	661.94	24.	60.	0.033	22.36	0.469s
PM-144	2785.35	696.54	97.	-18.	-0.010	79.11	1.599s
NB-94	2809.70	702.63	133.	-16.	-0.009	102.59	1.604s
SB-124	2890.33	722.79	148.	-17.	-0.009	104.59	1.621s
AG-108M	2890.93	722.94	131.	-17.	-0.009	98.76	1.621s
EU-154	2892.61	723.36	104.	4.	0.002	329.87	1.622s
ZR-95	2895.98	724.20	103.	5.	0.003	294.28	1.622s
BI-212	2907.86	727.17	8.	60.	0.034	14.37	1.625D
pm-146	2987.83	747.16	46.	-3.	-0.001	721.22	1.641
ZR-95	3026.11	756.73	20.	21.	0.012	51.65	1.649s
AG-110M	3054.97	763.94	86.	-18.	-0.010	75.38	1.655s
PA-234M	3064.84	766.41	92.	19.	0.011	74.57	1.657s
EU-152	3114.88	778.92	130.	-24.	-0.013	70.48	1.668s
BI-212	3140.88	785.42	108.	17.	0.010	87.52	1.673s
CS-134	3182.67	795.87	77.	12.	0.006	110.55	1.682
CS-134	3207.01	801.95	66.	14.	0.008	84.03	1.687s
CO-58	3242.31	810.78	50.	13.	0.007	80.78	1.694s
La-140	3262.29	815.77	80.	-17.	-0.009	79.53	1.698
Cs-136	3273.21	818.50	65.	10.	0.005	123.54	1.700s
MN-54	3338.61	834.85	35.	14.	0.008	96.67	1.714
Co-56	3386.31	846.77	45.	-6.	-0.003	249.17	1.723s
TL-208	3442.75	860.88	7.	45.	0.025	19.10	1.385
NB-94	3483.63	871.10	40.	-8.	-0.004	117.26	1.743s
EU-154	3492.16	873.23	46.	12.	0.007	84.98	1.745s
PA-234	3521.37	880.53	53.	14.	0.008	80.57	1.751s
PA-234	3532.21	883.24	67.	2.	0.001	567.63	1.753s
AG-110M	3537.98	884.68	69.	0.	0.000	1000.00	1.754s
y-88	3591.42	898.04	25.	5.	0.003	248.98	1.765s
AC-228	3644.24	911.24	7.	180.	0.100	8.20	1.191s
AG-110M	3749.25	937.49	37.	-8.	-0.005	170.22	1.797s
PA-234	3783.37	946.02	27.	13.	0.007	93.13	1.803
EU-152	3855.75	964.11	125.	12.	0.007	131.10	1.818s
AC-228	3876.01	969.17	32.	90.	0.050	17.99	2.202s
EU-154	3984.66	996.33	87.	-18.	-0.010	76.31	1.844s
PA-234M	4003.33	1001.00	105.	-17.	-0.010	95.06	1.847s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-154	4018.45	1004.77	132.	-10.	-0.005	168.39	1.850s
Co-56	4150.74	1037.84	21.	9.	0.005	125.81	1.876s
Cs-136	4191.67	1048.07	16.	11.	0.006	58.01	1.884s
RH-106	4200.83	1050.36	52.	-14.	-0.008	76.04	1.886s
Ga-68	4309.03	1077.40	32.	8.	0.004	164.57	1.907s
FE-59	4396.46	1099.25	11.	18.	0.010	46.75	1.924s
EU-152	4447.77	1112.07	164.	-18.	-0.010	104.40	1.934s
ZN-65	4461.66	1115.55	146.	-12.	-0.007	146.78	1.937s
BI-214	4481.67	1120.55	11.	81.	0.045	14.87	0.831s
CO-60	4692.51	1173.24	34.	5.	0.003	277.13	1.981s
Ta-182	4755.78	1189.05	51.	-7.	-0.004	166.77	1.993
Ta-182	4885.27	1221.41	74.	-24.	-0.013	50.50	2.017
Co-56	4952.78	1238.28	18.	30.	0.017	36.81	2.030s
NA-22	5097.85	1274.53	35.	-3.	-0.002	284.80	2.057s
EU-154	5097.90	1274.54	43.	-5.	-0.003	203.29	2.057s
FE-59	5166.14	1291.60	45.	-14.	-0.008	113.29	2.070s
CO-60	5329.84	1332.50	29.	-9.	-0.005	119.48	2.100s
AG-110M	5537.14	1384.30	6.	2.	0.001	304.14	2.138s
EU-152	5632.00	1408.00	7.	14.	0.008	49.72	2.155s
K-40	5842.98	1460.72	5.	501.	0.278	4.51	2.230
La-140	6385.31	1596.21	13.	4.	0.002	215.15	2.288s
SB-124	6764.67	1690.98	0.	0.	0.000	1000.00	2.353s
BI-214	7058.94	1764.49	13.	40.	0.022	20.50	2.402
y-88	7345.46	1836.06	0.	6.	0.003	40.82	2.449s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	-9.4924E-01				5.31E+01	
			477.60	-9.492E-01	?(	1.336E+01 4.11E+02 1.05E+01	G
NA-22	C	-1.4638E-01				9.50E+02	
			1274.53	-1.464E-01	&(	1.477E+00 2.85E+02 9.99E+01	G
K-40	N	2.5558E+02				4.66E+11	
			1460.83	2.556E+02	(P	6.545E+00 4.51E+00 1.07E+01	G
Sc-46	F	6.1280E-03				8.38E+01	
			889.28	6.128E-03	%(	1.531E+00 7.10E+03 1.00E+02	G
			1120.55	1.680E-07	%	2.495E+00 4.29E+08 1.00E+02	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CR-51	F	2.2758E+00					2.77E+01	
			320.08	2.276E+00	?(P	1.105E+01	1.44E+02	9.94E+00 G
MN-54	C	4.9031E-01					3.12E+02	
			834.85	4.903E-01	?(	1.060E+00	9.67E+01	1.00E+02 G
FE-59	F	1.4073E+00					4.45E+01	
			1099.25	1.407E+00	&(	1.376E+00	4.67E+01	5.65E+01 G
			1291.60	-1.635E+00	-	3.889E+00	1.13E+02	4.32E+01 G
Co-56	C	8.8598E-01					7.73E+01	
			846.77	-2.125E-01	?(	1.203E+00	2.49E+02	9.99E+01 G
			1238.28	2.193E+00	(P	1.605E+00	3.68E+01	6.61E+01 G
			1037.84	2.543E+00	?(	7.110E+00	1.26E+02	1.41E+01 G
			1771.35	2.055E-01	%	1.513E+01	2.07E+03	1.55E+01 A
CO-57	C	-1.9045E-01					2.72E+02	
			122.06	-1.905E-01	&(	9.638E-01	1.51E+02	8.56E+01 G
			136.47	0.000E+00	+	1.436E+01	1.00E+03	1.07E+01 G
CO-58	C	4.5335E-01					7.09E+01	
			810.78	4.534E-01	?(	1.228E+00	8.08E+01	9.95E+01 G
CO-60	F	-4.7839E-01					1.93E+03	
			1332.50	-4.784E-01	?(P	1.415E+00	1.19E+02	1.00E+02 G
			1173.24	2.285E-01	+	1.366E+00	2.77E+02	9.99E+01 G
ZN-65	F	-1.0294E+00					2.44E+02	
			1115.55	-1.029E+00	?(	5.115E+00	1.47E+02	5.06E+01 G
NB-94	I	-5.1418E-01					7.41E+06	
			702.63	-5.142E-01	&(	1.772E+00	1.03E+02	9.79E+01 G
			871.10	-2.898E-01	+	1.166E+00	1.17E+02	9.99E+01 G
ZR-95	I	1.2525E+00					6.40E+01	
			756.73	1.252E+00	&(	1.405E+00	5.17E+01	5.45E+01 G
			724.20	3.513E-01	-	3.559E+00	2.94E+02	4.42E+01 G
NB-95	I	-1.0948E-02					6.40E+01	
			765.79	-1.095E-02	%(	1.672E+00	4.39E+03	9.98E+01 G
RU-103	I	3.9450E-01					3.93E+01	
			497.05	3.945E-01	?(P	9.125E-01	9.69E+01	9.09E+01 G
			610.30	0.000E+00	-	4.836E+01	1.00E+03	5.75E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
RH-106	I	-4.3890E+00					3.74E+02	
			621.92	-4.389E+00	(P	2.911E+01	1.22E+02	9.93E+00 G
			1050.36	-3.849E+01	&	9.771E+01	7.60E+01	1.56E+00 G
			511.86	2.097E+01	?	3.989E+00	1.24E+01	2.00E+01 GA
AG-108M	C	-7.8651E-02					1.53E+05	
			433.94	-7.865E-02	?(P	9.926E-01	5.93E+02	9.05E+01 G
			722.94	-5.840E-01	+	1.936E+00	9.88E+01	9.08E+01 G
			614.28	0.000E+00	+	3.110E+00	1.00E+03	8.98E+01 G
AG-110M	F	1.0745E-01					2.50E+02	
			884.68	0.000E+00	?(	2.087E+00	1.00E+03	7.27E+01 G
			657.76	-4.962E-01	+ P	1.755E+00	1.18E+02	9.46E+01 G
			937.49	-9.288E-01	+	3.475E+00	1.70E+02	3.44E+01 G
			1384.30	4.290E-01	?(	3.029E+00	3.04E+02	2.43E+01 G
			763.94	-2.692E+00	&	6.756E+00	7.54E+01	2.23E+01 G
SN-113	F	-6.5198E-01					1.15E+02	
			391.69	-6.520E-01	&(P	2.271E+00	9.36E+01	6.40E+01 G
SB-125	I	3.3135E+00					1.01E+03	
			427.88	-4.792E-02	%(	2.804E+00	2.39E+03	2.96E+01 G
			600.50	1.171E+00	&(	1.525E+01	3.86E+02	1.79E+01 G
			635.89	-5.876E-01	+	9.090E+00	4.39E+02	1.13E+01 G
			463.37	1.647E+01	@(	7.351E+00	1.69E+01	1.05E+01 G
I-131	I	4.4061E-02					8.02E+00	
			364.48	4.406E-02	%(P	1.096E+00	1.03E+03	8.17E+01 G
			284.30	-5.967E+00	+	1.480E+01	1.01E+02	6.14E+00 G
			636.97	-2.652E+00	+	1.617E+01	1.77E+02	7.17E+00 G
Gd-153	F	-1.3197E+00					2.42E+02	
			97.50	-1.320E+00	?(	7.059E+00	1.61E+02	3.00E+01 G
			103.20	9.267E-02	%	9.714E+00	3.14E+03	2.18E+01 G
Ga-68	C	1.2140E+01					4.71E-02	
			1077.40	1.214E+01	?(	4.412E+01	1.65E+02	3.30E+00 G
BA-133	F	-1.4212E-01					3.85E+03	
			356.00	-7.205E-01	(	3.272E+00	1.36E+02	6.20E+01 G
			302.85	1.816E+00	?(	1.160E+01	1.91E+02	1.83E+01 G
			383.84	4.312E+00		1.413E+01	9.79E+01	8.94E+00 GA
			80.99	-1.295E+00	+ P	6.407E+00	8.76E+01	3.41E+01 GA
CS-134	I	6.1092E-01					7.54E+02	
			604.71	0.000E+00	?(	2.829E+00	1.00E+03	9.76E+01 G
			795.87	4.604E-01	&(	1.724E+00	1.11E+02	8.55E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			569.32	2.499E+00	&(	5.488E+00	6.64E+01	1.54E+01 G
			801.95	5.613E+00	*(	1.581E+01	8.40E+01	8.69E+00 G
			563.24	-1.350E-01	% P	1.259E+01	3.40E+03	8.35E+00 G
CS-137	I	2.0661E+00					1.10E+04	
			661.66	2.066E+00	(	8.794E-01	2.24E+01	8.52E+01 G
CE-139	F	3.3966E-01					1.38E+02	
			165.85	3.397E-01	&(	1.016E+00	8.97E+01	7.99E+01 G
Ba-140	I	3.3652E-01					1.28E+01	
			537.26	-9.773E-01	(P	4.309E+00	1.55E+02	2.44E+01 G
			162.66	-5.131E+00	+	1.723E+01	1.01E+02	6.22E+00 G
			304.85	7.806E+00	(	5.045E+01	1.93E+02	4.29E+00 G
La-140	I	4.7046E-01					1.28E+01	
			1596.21	2.589E-01	?(P	1.187E+00	2.15E+02	9.54E+01 G
			487.02	9.140E-01	?(	3.178E+00	1.04E+02	4.55E+01 G
			328.76	-2.048E+00	& P	9.930E+00	8.00E+01	2.03E+01 G
			815.77	-2.468E+00	+	6.553E+00	7.95E+01	2.33E+01 G
CE-141	I	-7.7737E-01					3.25E+01	
			145.44	-7.774E-01	?(P	3.441E+00	3.25E+01	4.82E+01 G
PM-144	C	-5.6805E-01					3.63E+02	
			696.54	-5.680E-01	?(	1.499E+00	7.91E+01	9.90E+01 G
			618.06	3.517E-01	+	5.397E-01	6.00E+01	9.91E+01 G
EU-152	F	1.6305E+00					4.94E+03	
			344.29	1.343E+00	&(P	6.955E+00	1.55E+02	2.65E+01 G
			1112.07	-5.708E+00	+	1.999E+01	1.04E+02	1.36E+01 G
			121.78	1.039E+00	&(	3.096E+00	8.96E+01	2.86E+01 G
			778.92	-6.135E+00	+	1.433E+01	7.05E+01	1.29E+01 G
			964.11	3.310E+00	?(P	1.468E+01	1.31E+02	1.46E+01 G
			244.69	-4.772E+00	+ P	3.160E+01	7.05E+01	7.58E+00 G
			1408.00	3.604E+00	? P	3.706E+00	4.97E+01	2.10E+01 GA
EU-154	I	3.5450E+00					3.14E+03	
			873.23	3.545E+00	&(	1.014E+01	8.50E+01	1.23E+01 G
			123.10	6.577E-01	-	2.032E+00	9.27E+01	4.08E+01 G
			1274.54	-6.467E-01	&	4.594E+00	2.03E+02	3.52E+01 G
			723.36	6.845E-01	-	7.783E+00	3.30E+02	2.02E+01 G
			1004.77	-2.207E+00	-	1.263E+01	1.68E+02	1.80E+01 G
			996.33	-6.869E+00	+	1.746E+01	7.63E+01	1.06E+01 G
EU-155	I	1.7804E+00					1.81E+03	
			105.31	1.780E+00	(	9.518E+00	1.61E+02	2.12E+01 G
			86.54	-1.338E+00	+	7.710E+00	1.74E+02	3.07E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
HF-181	F	-5.8445E-01					4.24E+01	
			482.00	-5.844E-01	?(	1.763E+00	9.02E+01	8.05E+01 G
			133.02	3.227E-01	+	3.490E+00	3.23E+02	4.33E+01 G
			345.83	-2.497E+00	+	1.375E+01	1.65E+02	1.51E+01 G
			136.30	0.000E+00	+	2.620E+01	1.00E+03	5.85E+00 G
Ta-182	F	1.4727E-01					1.14E+02	
			1121.30	1.473E-01	%(	7.122E+00	1.40E+03	3.49E+01 G
			1221.41	-4.163E+00	+ P	7.465E+00	5.05E+01	2.70E+01 G
			1189.05	-2.052E+00	+ P	1.027E+01	1.67E+02	1.62E+01 G
Hg-203	F	-1.2873E-01					4.66E+01	
			279.20	-1.287E-01	&(	1.278E+00	2.92E+02	8.15E+01 G
TL-208	N	7.6572E+00					6.98E+02	
			583.02	7.657E+00	(P	1.012E+00	8.87E+00	8.45E+01 G
			277.28	2.481E+00	-	1.435E+01	1.70E+02	6.31E+00 G
			860.56	1.292E+01	+ P	4.395E+00	1.91E+01	1.24E+01 G
pm-146	C	2.7371E-01					2.02E+03	
			747.16	-2.499E-01	?(P	3.235E+00	7.21E+02	3.40E+01 G
			735.72	-2.242E-01	% P	4.829E+00	1.20E+03	2.25E+01 G
			453.88	5.476E-01	?(	1.192E+00	9.14E+01	6.50E+01 G
y-88	F	2.9063E-01					1.07E+02	
			898.04	1.786E-01	?(P	1.037E+00	2.49E+02	9.37E+01 G
			1836.06	3.964E-01	?(	4.869E-01	4.08E+01	9.92E+01 G
Cd-113m		5.6537E+03					5.33E+03	
			263.70	5.654E+03	&(	1.434E+04	7.63E+01	6.00E-03 K
Cf-251	T	1.8815E+00					3.28E+05	
			176.60	1.881E+00	&(	4.610E+00	1.01E+02	1.70E+01 G
			227.00	-5.924E+00	+	1.398E+01	9.69E+01	6.30E+00 GA
Cf-249	T	4.9308E-01					1.28E+05	
			387.95	4.931E-01	?(	2.029E+00	1.22E+02	6.60E+01 G
			333.44	-7.083E-01	+	1.286E+01	5.39E+02	1.55E+01 G
Sn-126		-1.8728E-02					3.65E+07	
			87.57	-1.090E+00	}	5.908E+00	1.63E+02	3.75E+01 GA
			64.28	-1.873E-02	&(	1.720E+01	2.73E+04	9.70E+00 G
			86.94	-4.533E+00	+	2.590E+01	1.72E+02	9.04E+00 GA
PB-210	N	3.0926E+01					8.14E+03	
			46.54	3.093E+01	(	2.279E+01	2.99E+01	4.25E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-212	N	2.5629E+01					6.98E+02	
			238.63	2.563E+01	(	1.268E+00	3.83E+00	4.33E+01 G
			300.03	1.006E+01	-	6.078E+01	1.81E+02	3.28E+00 GA
PB-214	N	1.5381E+01					5.84E+05	
			351.93	1.514E+01	(P	2.084E+00	8.03E+00	3.76E+01 G
			295.09	1.586E+01	(P	3.356E+00	9.50E+00	1.93E+01 G
			242.00	2.346E+01	+ P	9.268E+00	1.45E+01	7.43E+00 GA
BI-207	C	-4.6153E-01					1.18E+04	
			569.70	-4.615E-01	?(	1.185E+00	7.70E+01	9.77E+01 G
			1063.66	2.681E-02	& P	1.795E+00	2.96E+03	7.45E+01 G
BI-212	N	2.5238E+01					6.98E+02	
			727.17	2.524E+01	(	6.468E+00	1.44E+01	7.55E+00 G
			785.42	4.556E+01	+	1.334E+02	8.75E+01	1.28E+00 GA
BI-214	N	1.6934E+01					5.84E+05	
			609.31	1.711E+01	(P	1.282E+00	6.61E+00	4.61E+01 G
			1120.29	2.350E+01	+ P	5.379E+00	1.49E+01	1.51E+01 G
			1764.49	1.641E+01	?(P	8.081E+00	2.05E+01	1.54E+01 G
BI-210M	T	1.9241E-01					1.10E+09	
			265.83	-1.899E-01	&(P	2.032E+00	2.86E+02	5.00E+01 G
			304.90	8.750E-01	(	7.831E+00	2.67E+02	2.80E+01 G
AC-228	N	2.2819E+01					2.10E+03	
			911.07	2.329E+01	(P	1.909E+00	8.20E+00	2.90E+01 G
			968.97	2.033E+01	(P	6.509E+00	1.80E+01	1.75E+01 G
			338.32	2.530E+01	(P	6.769E+00	1.51E+01	1.20E+01 G
			93.35	1.702E+01	-	1.210E+01	2.32E+01	5.56E+00 XA
TH-227	N	-6.5011E+00					7.95E+03	
			50.14	-6.501E+00	&(	2.266E+01	1.05E+02	8.00E+00 G
			256.24	4.553E+00	+	1.064E+01	9.54E+01	7.00E+00 G
TH-229	N	4.0024E+00					2.68E+06	
			193.51	-8.357E-01	?(	2.036E+01	9.87E+02	4.40E+00 G
			210.85	1.112E+01	?(P	3.307E+01	1.22E+02	2.99E+00 G
TH-234	N	2.9955E+00					1.63E+12	
			63.29	2.996E+00	(P	4.180E+01	4.15E+02	3.81E+00 G
			92.59	-7.179E+00	+	3.798E+01	1.59E+02	5.58E+00 G
PA-231	N	1.2410E+01					1.20E+07	
			302.65	1.155E+01	?(	7.275E+01	1.88E+02	2.88E+00 G
			300.07	1.342E+01	?(	8.227E+01	1.83E+02	2.46E+00 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PA-233   C   7.3681E-01                                      7.82E+08
                         312.01-5.336E-02 %(P 6.253E+00 1.58E+03 3.60E+01 G
                         300.18 5.325E+00 ?(  3.313E+01 1.86E+02 6.20E+00 G

PA-234   N   2.2779E+00                                      1.63E+12
                         131.29 1.604E+00  (P 8.246E+00 1.54E+02 1.80E+01 G
                         946.02 3.819E+00 ?(P 7.803E+00 9.31E+01 1.34E+01 G
                         569.47 2.988E+00 &(  1.072E+01 1.05E+02 8.20E+00 G
                         883.24 7.824E-01 &(  1.556E+01 5.68E+02 9.60E+00 G
                         880.53 8.277E+00 ?   2.234E+01 8.06E+01 6.00E+00 GA

PA-234M  N  -5.6797E+00                                      1.63E+12
                        1001.00-8.256E+01 &(P 2.434E+02 9.51E+01 8.37E-01 G
                         766.41 2.132E+02 &(  5.288E+02 7.46E+01 2.94E-01 G

U-235    N  -6.2156E-01                                      2.57E+11
                         143.79-3.602E+00 ?(P 1.588E+01 1.16E+02 1.10E+01 G
                         205.33-6.973E+00 + P 1.923E+01 4.24E+01 5.01E+00 G
                         163.38 5.808E+00 *(  1.830E+01 9.45E+01 5.08E+00 G

AM-241   T  -1.4864E+00                                      1.58E+05
                          59.54-1.486E+00  (P 5.188E+00 4.09E+01 3.59E+01 G

Np-237   F  -2.9425E+00                                      2.14E+06
                          86.49-2.943E+00 ?(  1.757E+01 1.80E+02 1.31E+01 G

Ir-192   F   2.6608E-01                                      7.40E+01
                         316.49 2.661E-01  (  1.991E+00 2.23E+02 8.70E+01 G
                         468.06-7.096E-01 &   2.682E+00 1.12E+02 5.18E+01 G
                         308.44 0.000E+00 -   7.028E+00 1.00E+03 3.18E+01 G

Cs-136   F   4.4601E-01                                      1.30E+01
                         818.50 3.287E-01 &(  1.385E+00 1.24E+02 1.00E+02 G
                        1048.07 5.927E-01 ?(  1.115E+00 5.80E+01 8.00E+01 G
                         340.57 0.000E+00 -   4.294E+00 1.00E+03 4.69E+01 G

Np-239   T   1.6624E+00                                      2.36E+00
                         103.70 0.000E+00 -   8.813E+00 1.00E+03 2.40E+01 X
                         106.13 1.662E+00 &(  8.790E+00 1.59E+02 2.27E+01 G
                          99.50-7.386E-01 -   1.418E+01 5.76E+02 1.50E+01 X

Nd-147      -1.4051E+00                                      1.11E+01
                         531.00-1.405E+00  (  7.221E+00 2.12E+02 1.30E+01 G
                          91.10-1.424E+00 +   7.619E+00 1.61E+02 2.83E+01 G
   ( - This peak used in the nuclide activity average.
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  * - Peak is too wide, but only one peak in library.
  ! - Peak is part of a multiplet and this area went
      negative during deconvolution.
  ? - Peak is too narrow.
  @ - Peak is too wide at FW25M, but ok at FWHM.
  % - Peak fails sensitivity test.
  $ - Peak identified, but first peak of this nuclide
      failed one or more qualification tests.
  + - Peak activity higher than counting uncertainty range.
  - - Peak activity lower than counting uncertainty range.
  = - Peak outside analysis energy range.
  & - Calculated peak centroid is not close enough to the
      library energy centroid for positive identification.
  P - Peakbackground subtraction
  } - Peak is too close to another for the activity
      to be found directly.

  Nuclide Codes:                        Peak Codes:
  T - Thermal Neutron Activation        G - Gamma Ray
  F - Fast Neutron Activation           X - X-Ray
  I - Fission Product                   P - Positron Decay
  N - Naturally Occurring Isotope       S - Single-Escape
  P - Photon Reaction                   D - Double-Escape
  C - Charged Particle Reaction         K - Key Line
  M - No MDA Calculation                A - Not in Average
  R - Coincidence Corrected             C - Coincidence Peak
  H - Halflife limit exceeded

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	427.	-28.	-0.016	104.57	-6.501E+00	
AM-241	59.54	717.	-37.	-0.020	40.92	-1.486E+00	P
TH-234	63.29	598.	8.	0.005	415.21	2.996E+00	P
BA-133	80.99	1725.	-40.	-0.022	87.57	-1.295E+00	P
Np-237	86.49	2070.	-36.	-0.020	179.73	-2.943E+00	
EU-155	86.54	2191.	-38.	-0.021	173.54	-1.338E+00	
Sn-126	86.94	2152.	-38.	-0.021	171.99	-4.533E+00	
Sn-126	87.57	1938.	-38.	-0.021	163.19	-1.090E+00	
Nd-147	91.10	1900.	-38.	-0.021	161.09	-1.424E+00	
TH-234	92.59	1862.	-39.	-0.021	159.25	-7.179E+00	
Gd-153	97.50	1920.	-39.	-0.021	161.01	-1.320E+00	
Np-239	99.50	1959.	-11.	-0.006	576.05	-7.386E-01	
EU-155	105.31	1800.	37.	0.021	160.88	1.780E+00	
Np-239	106.13	1763.	38.	0.021	159.11	1.662E+00	
EU-152	121.78	336.	30.	0.016	89.55	1.039E+00	
CO-57	122.06	290.	-16.	-0.009	150.57	-1.905E-01	
EU-154	123.10	292.	27.	0.015	92.72	6.577E-01	
PA-234	131.29	942.	28.	0.016	154.26	1.604E+00	P
HF-181	133.02	970.	14.	0.008	323.35	3.227E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
U-235	143.79	1226.	-38.	-0.021	116.36	-3.602E+00	P
CE-141	145.44	1100.	-36.	-0.020	32.46	-7.774E-01	P
Ba-140	162.66	398.	-29.	-0.016	100.77	-5.131E+00	
U-235	163.38	295.	26.	0.015	94.51	5.808E+00	
Cf-251	176.60	196.	28.	0.015	100.65	1.881E+00	
TH-229	193.51	228.	-3.	-0.002	987.14	-8.357E-01	
U-235	205.33	244.	-27.	-0.015	42.39	-6.973E+00	P
TH-229	210.85	248.	26.	0.014	122.07	1.112E+01	P
Cf-251	227.00	176.	-27.	-0.015	96.88	-5.924E+00	
EU-152	244.69	1239.	-25.	-0.014	70.52	-4.772E+00	P
TH-227	256.24	104.	21.	0.012	95.35	4.553E+00	
Cd-113m	263.70	135.	22.	0.012	76.31	5.654E+03	
BI-210M	265.83	189.	-6.	-0.003	286.44	-1.899E-01	P
Hg-203	279.20	186.	-7.	-0.004	291.63	-1.287E-01	
I-131	284.30	136.	-23.	-0.013	101.44	-5.967E+00	
PA-231	300.07	659.	20.	0.011	183.33	1.342E+01	
PA-233	300.18	679.	20.	0.011	186.05	5.325E+00	
PA-231	302.65	699.	20.	0.011	188.38	1.155E+01	
BA-133	302.85	719.	20.	0.011	190.98	1.816E+00	
Ba-140	304.85	739.	20.	0.011	193.31	7.806E+00	
BI-210M	304.90	759.	15.	0.008	267.27	8.750E-01	
Ir-192	316.49	444.	13.	0.007	222.67	2.661E-01	
CR-51	320.08	170.	13.	0.007	143.80	2.276E+00	P
La-140	328.76	574.	-24.	-0.013	80.04	-2.048E+00	P
Cf-249	333.44	550.	-6.	-0.003	539.18	-7.083E-01	
EU-152	344.29	447.	20.	0.011	154.68	1.343E+00	P
HF-181	345.83	565.	-21.	-0.011	164.68	-2.497E+00	
BA-133	356.00	519.	-24.	-0.013	135.91	-7.205E-01	
BA-133	383.84	174.	20.	0.011	97.88	4.312E+00	
Cf-249	387.95	194.	16.	0.009	122.41	4.931E-01	
SN-113	391.69	226.	-21.	-0.012	93.62	-6.520E-01	P
AG-108M	433.94	70.	-3.	-0.002	593.03	-7.865E-02	P
pm-146	453.88	48.	16.	0.009	91.40	5.476E-01	
Ir-192	468.06	157.	-16.	-0.009	112.42	-7.096E-01	
BE-7	477.60	156.	-4.	-0.002	410.87	-9.492E-01	
HF-181	482.00	157.	-20.	-0.011	90.25	-5.844E-01	
La-140	487.02	161.	18.	0.010	103.66	9.140E-01	
RU-103	497.05	48.	15.	0.008	96.90	3.945E-01	P
RH-106	511.86	42.	173.	0.096	12.40	2.097E+01	
Nd-147	531.00	56.	-7.	-0.004	212.16	-1.405E+00	
Ba-140	537.26	70.	-9.	-0.005	154.91	-9.773E-01	P
CS-134	569.32	40.	15.	0.008	66.38	2.499E+00	
PA-234	569.47	44.	9.	0.005	105.24	2.988E+00	
BI-207	569.70	79.	-17.	-0.010	76.99	-4.615E-01	
RH-106	621.92	465.	-16.	-0.009	121.76	-4.389E+00	P
I-131	636.97	66.	-7.	-0.004	177.06	-2.652E+00	
AG-110M	657.76	135.	-16.	-0.009	117.96	-4.962E-01	P
NB-94	702.63	133.	-16.	-0.009	102.59	-5.142E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
SB-124	722.79	148.	-17.	-0.009	104.59	-4.906E+00		
AG-108M	722.94	131.	-17.	-0.009	98.76	-5.840E-01		
EU-154	723.36	104.	4.	0.002	329.87	6.845E-01		
pm-146	747.16	46.	-3.	-0.001	721.22	-2.499E-01		P
AG-110M	763.94	86.	-18.	-0.010	75.38	-2.692E+00		
PA-234M	766.41	92.	19.	0.011	74.57	2.132E+02		
EU-152	778.92	130.	-24.	-0.013	70.48	-6.135E+00		
CS-134	795.87	77.	12.	0.006	110.55	4.604E-01		
CS-134	801.95	66.	14.	0.008	84.03	5.613E+00		
CO-58	810.78	50.	13.	0.007	80.78	4.534E-01		
La-140	815.77	80.	-17.	-0.009	79.53	-2.468E+00		
Cs-136	818.50	65.	10.	0.005	123.54	3.287E-01		
MN-54	834.85	35.	14.	0.008	96.67	4.903E-01		
Co-56	846.77	45.	-6.	-0.003	249.17	-2.125E-01		
NB-94	871.10	40.	-8.	-0.004	117.26	-2.898E-01		
EU-154	873.23	46.	12.	0.007	84.98	3.545E+00		
PA-234	880.53	53.	14.	0.008	80.57	8.277E+00		
PA-234	883.24	67.	2.	0.001	567.63	7.824E-01		
y-88	898.04	25.	5.	0.003	248.98	1.786E-01		P
AG-110M	937.49	37.	-8.	-0.005	170.22	-9.288E-01		
PA-234	946.02	27.	13.	0.007	93.13	3.819E+00		P
EU-152	964.11	125.	12.	0.007	131.10	3.310E+00		P
EU-154	996.33	87.	-18.	-0.010	76.31	-6.869E+00		
PA-234M	1001.00	105.	-17.	-0.010	95.06	-8.256E+01		P
EU-154	1004.77	132.	-10.	-0.005	168.39	-2.207E+00		
Co-56	1037.84	21.	9.	0.005	125.81	2.543E+00		
Cs-136	1048.07	16.	11.	0.006	58.01	5.927E-01		
RH-106	1050.36	52.	-14.	-0.008	76.04	-3.849E+01		
Ga-68	1077.40	32.	8.	0.004	164.57	1.214E+01		
EU-152	1112.07	164.	-18.	-0.010	104.40	-5.708E+00		
ZN-65	1115.55	146.	-12.	-0.007	146.78	-1.029E+00		
CO-60	1173.24	34.	5.	0.003	277.13	2.285E-01		
Ta-182	1189.05	51.	-7.	-0.004	166.77	-2.052E+00		P
Ta-182	1221.41	74.	-24.	-0.013	50.50	-4.163E+00		P
Co-56	1238.28	18.	30.	0.017	36.81	2.193E+00		P
NA-22	1274.53	35.	-3.	-0.002	284.80	-1.464E-01		
EU-154	1274.54	43.	-5.	-0.003	203.29	-6.467E-01		
CO-60	1332.50	29.	-9.	-0.005	119.48	-4.784E-01		P
AG-110M	1384.30	6.	2.	0.001	304.14	4.290E-01		
EU-152	1408.00	7.	14.	0.008	49.72	3.604E+00		P
La-140	1596.21	13.	4.	0.002	215.15	2.589E-01		P
y-88	1836.06	0.	6.	0.003	40.82	3.964E-01		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	-9.4924E-01	-9.4924E-01	4.109E+02%	1.34E+01
NA-22	#A	-1.4638E-01	-1.4638E-01	2.848E+02%	1.48E+00
K-40		2.5558E+02	2.5558E+02	4.511E+00%	6.54E+00
Sc-46	#A	6.1279E-03	6.1280E-03	7.095E+03%	1.53E+00
CR-51	#A	2.2758E+00	2.2758E+00	1.438E+02%	1.10E+01
MN-54	#A	4.9031E-01	4.9031E-01	9.667E+01%	1.06E+00
FE-59	#	1.4073E+00	1.4073E+00	4.675E+01%	1.38E+00
Co-56	#A	8.8598E-01	8.8598E-01	3.681E+01%	1.20E+00
CO-57	#A	-1.9045E-01	-1.9045E-01	1.506E+02%	9.64E-01
CO-58	#A	4.5335E-01	4.5335E-01	8.078E+01%	1.23E+00
CO-60	#A	-4.7839E-01	-4.7839E-01	1.195E+02%	1.42E+00
ZN-65	#A	-1.0294E+00	-1.0294E+00	1.468E+02%	5.12E+00
NB-94	#A	-5.1418E-01	-5.1418E-01	1.026E+02%	1.77E+00
ZR-95	#A	1.2525E+00	1.2525E+00	5.165E+01%	1.40E+00
NB-95	#A	-1.0948E-02	-1.0948E-02	4.392E+03%	1.67E+00
RU-103	#A	3.9449E-01	3.9450E-01	9.690E+01%	9.12E-01
RH-106	#A	-4.3890E+00	-4.3890E+00	1.218E+02%	2.91E+01
AG-108M	#A	-7.8651E-02	-7.8651E-02	5.930E+02%	9.93E-01
AG-110M	#A	1.0745E-01	1.0745E-01	3.041E+02%	2.09E+00
SN-113	#A	-6.5197E-01	-6.5198E-01	9.362E+01%	2.27E+00
SB-124	#A	0.0000E+00	0.0000E+00	7.071E+02%	2.80E+00
SB-125	#C	3.3135E+00	3.3135E+00	1.692E+01%	2.80E+00
I-131	#A	4.4059E-02	4.4061E-02	1.029E+03%	1.10E+00
Gd-153	#A	-1.3197E+00	-1.3197E+00	1.610E+02%	7.06E+00
Ga-68	#A	1.2027E+01	1.2140E+01	1.646E+02%	4.41E+01
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.79E+00
BA-133	#A	-1.4212E-01	-1.4212E-01	1.172E+02%	3.27E+00
CS-134	#A	6.1092E-01	6.1092E-01	6.638E+01%	2.83E+00
CS-137		2.0661E+00	2.0661E+00	2.236E+01%	8.79E-01
CE-139	A	3.3966E-01	3.3966E-01	8.971E+01%	1.02E+00
Ba-140	#A	3.3650E-01	3.3652E-01	1.239E+02%	4.31E+00
La-140	#A	4.7044E-01	4.7046E-01	1.037E+02%	1.19E+00
CE-141	#A	-7.7736E-01	-7.7737E-01	3.246E+01%	3.44E+00
CE-144	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.37E+01
PM-144	A	-5.6805E-01	-5.6805E-01	7.911E+01%	1.50E+00
EU-152	#A	1.6305E+00	1.6305E+00	7.389E+01%	6.95E+00
EU-154	#A	3.5450E+00	3.5450E+00	8.498E+01%	1.01E+01
EU-155	#A	1.7804E+00	1.7804E+00	1.609E+02%	9.52E+00
HF-181	#A	-5.8444E-01	-5.8445E-01	9.025E+01%	1.76E+00
Ta-182	#A	1.4727E-01	1.4727E-01	1.400E+03%	7.12E+00
Hg-203	#A	-1.2873E-01	-1.2873E-01	2.916E+02%	1.28E+00
TL-208		7.6572E+00	7.6572E+00	8.873E+00%	1.01E+00
pm-146	#A	2.7371E-01	2.7371E-01	9.140E+01%	3.23E+00

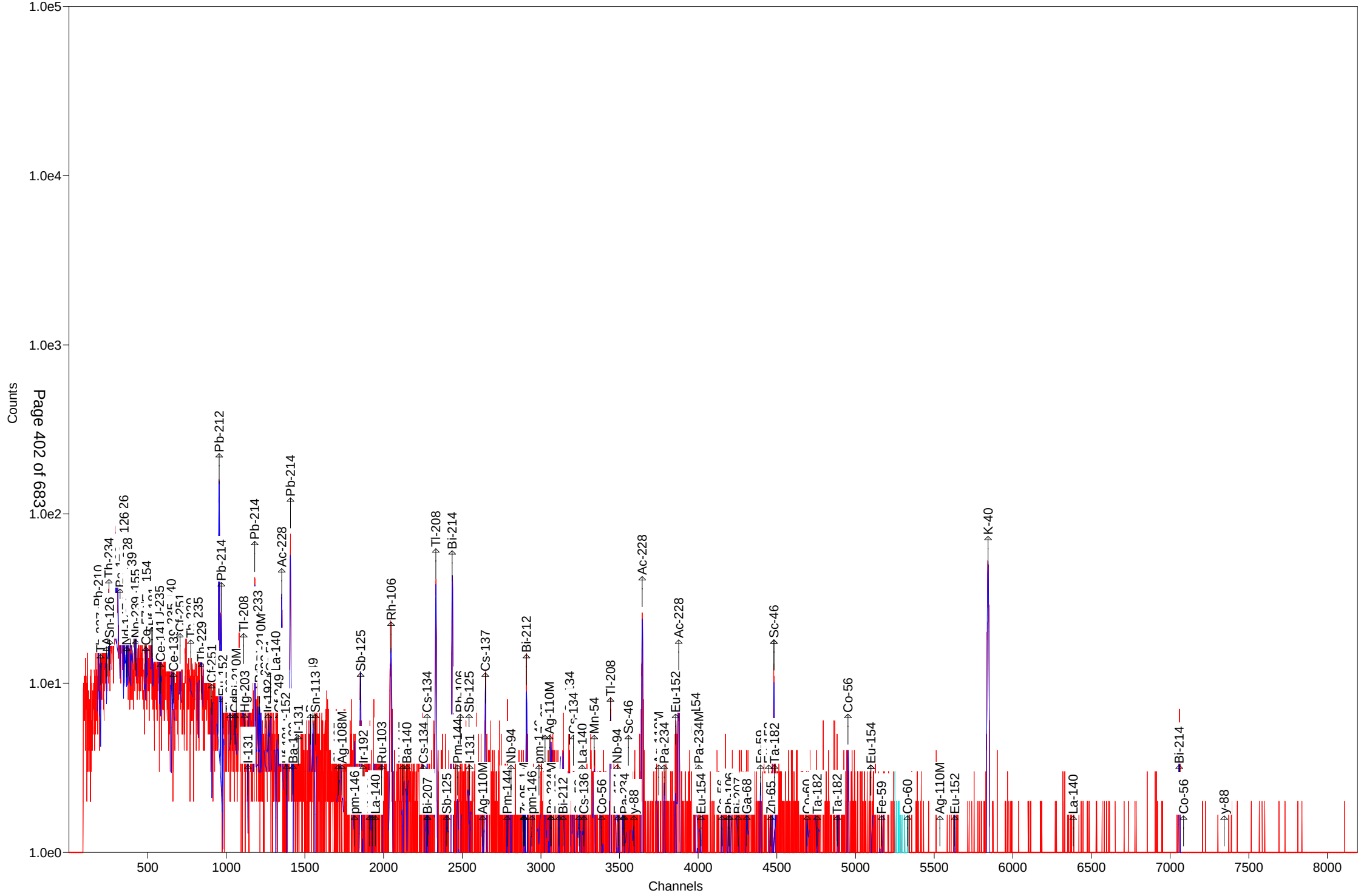
y-88 #A	2.9063E-01	2.9063E-01	4.082E+01%		1.04E+00
Cd-113m#A	5.6537E+03	5.6537E+03	7.631E+01%		1.43E+04
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%		6.09E+01
Cf-251 #A	1.8815E+00	1.8815E+00	1.007E+02%		4.61E+00
Cf-249 #A	4.9308E-01	4.9308E-01	1.224E+02%		2.03E+00
Sn-126 #A	-1.8728E-02	-1.8728E-02	2.726E+04%		1.72E+01
PB-210 #	3.0926E+01	3.0926E+01	2.995E+01%		2.28E+01
PB-212	2.5629E+01	2.5629E+01	3.831E+00%		1.27E+00
PB-214	1.5381E+01	1.5381E+01	6.218E+00%		2.08E+00
BI-207 #A	-4.6153E-01	-4.6153E-01	7.699E+01%		1.18E+00
BI-212 #	2.5238E+01	2.5238E+01	1.437E+01%		6.47E+00
BI-214	1.6934E+01	1.6934E+01	6.614E+00%		1.28E+00
BI-210M#A	1.9241E-01	1.9241E-01	1.959E+02%		2.03E+00
AC-228	2.2819E+01	2.2819E+01	8.203E+00%		1.91E+00
TH-227 #A	-6.5011E+00	-6.5011E+00	1.046E+02%		2.27E+01
TH-229 #A	4.0024E+00	4.0024E+00	1.221E+02%		2.04E+01
TH-234 #A	2.9955E+00	2.9955E+00	4.152E+02%		4.18E+01
PA-231 #A	1.2410E+01	1.2410E+01	1.314E+02%		7.28E+01
PA-233 #A	7.3681E-01	7.3681E-01	1.860E+02%		6.25E+00
PA-234 #A	2.2779E+00	2.2779E+00	9.313E+01%		8.25E+00
PA-234M#A	-5.6797E+00	-5.6797E+00	6.041E+01%		2.43E+02
U-235 #A	-6.2156E-01	-6.2156E-01	7.495E+01%		1.59E+01
AM-241 #A	-1.4864E+00	-1.4864E+00	4.092E+01%		5.19E+00
Np-237 #A	-2.9425E+00	-2.9425E+00	1.797E+02%		1.76E+01
Ir-192 #A	2.6608E-01	2.6608E-01	2.227E+02%		1.99E+00
Cs-136 #A	4.4599E-01	4.4601E-01	5.801E+01%		1.38E+00
Np-239 #A	1.6621E+00	1.6624E+00	1.591E+02%		8.79E+00
Nd-147 #A	-1.4051E+00	-1.4051E+00	2.122E+02%		7.22E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 4.035E+02 Bq/Sample
Total Decayed Activity (37.6 to 1999.5 keV) 4.0348621E+02 Bq/Sample

264537_Gamma_160-18552-A-5-B. 13_Gamma_20160731.spc.



Test America St. Louis Spectrum ID: 14_Gamma_20162249

Sample Description: 264537_Gamma_160-18552-A-6-B
Detector: Detector #14
Batch ID: 264537
Work Order Number: Gamma
Lot Number: 160-18552-A-6-B

Decay to Time: 9/1/2016 11:39 Live Time: 1800 sec
Acquisition Time: 9/1/2016 11:39:27 Real Time: 1809 sec
Analysis Time: 9/1/2016 12:11 Dead Time: 0.47 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 14_Soil_TunaCan.Clb
Efficiency Cal Desc: 14_TunaCan_90099_042312
Efficiency Cal Date: 4/23/2012 11:29
Energy Cal Date: 2/28/2012 10:48
Library: Client_Long_Rev11.lib
Bkgd Correction File: 14_2016-08-07_0544.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-2.583E+00	155.1	4.006E+00	4.008E+00	1.371E+01
NA-22	9.866E-01	36.1	3.561E-01	3.595E-01	9.725E-01
K-40	2.476E+02	5.6	1.390E+01	1.881E+01	9.895E+00
Sc-46	-9.078E-01	94.3	8.557E-01	8.569E-01	2.870E+00
CR-51	3.306E+00	111.7	3.694E+00	3.698E+00	1.246E+01
MN-54	-2.638E-01	191.1	5.040E-01	5.042E-01	1.683E+00
FE-59	-4.630E-01	184.6	8.549E-01	8.552E-01	2.946E+00
Co-56	5.512E-01	92.1	5.074E-01	5.082E-01	1.431E+00
CO-57	1.359E-01	266.7	3.624E-01	3.625E-01	1.225E+00
CO-58	1.971E+00	25.0	4.931E-01	5.035E-01	1.386E+00
CO-60	1.850E-01	190.2	3.520E-01	3.521E-01	1.059E+00
ZN-65	-1.842E+00	101.8	1.875E+00	1.877E+00	6.313E+00
NB-94	5.042E-01	112.4	5.669E-01	5.675E-01	1.371E+00
ZR-95	-2.020E-01	579.6	1.171E+00	1.171E+00	2.890E+00
NB-95	-2.171E-01	235.9	5.122E-01	5.123E-01	2.244E+00
RU-103	4.347E-01	98.7	4.293E-01	4.299E-01	1.076E+00
RH-106	-7.381E+00	101.7	7.507E+00	7.517E+00	1.737E+01
AG-108M	-1.559E-01	310.5	4.841E-01	4.842E-01	1.283E+00
AG-110M	-7.361E-02	1014.9	7.471E-01	7.471E-01	2.649E+00
SN-113	1.302E-01	624.2	8.130E-01	8.131E-01	2.786E+00
SB-124	-1.226E-01	44.7	5.481E-02	5.518E-02	3.840E+00
SB-125	-1.955E-01	70.1	1.371E-01	1.374E-01	4.202E+00
I-131	2.345E-01	201.6	4.729E-01	4.730E-01	1.249E+00
Gd-153	4.973E-01	238.8	1.188E+00	1.188E+00	3.999E+00
Ga-68	1.111E+01	176.1	1.957E+01	1.958E+01	4.614E+01
Tc-99m	-4.076E-02	1170.3	4.770E-01	4.770E-01	1.611E+00
BA-133	-8.130E-01	158.1	1.285E+00	1.286E+00	4.304E+00
CS-134	3.898E-01	63.6	2.478E-01	2.487E-01	3.799E+00
CS-137	2.830E+00	17.6	4.973E-01	5.186E-01	8.662E-01
CE-139	-2.265E-01	210.3	4.764E-01	4.769E-01	1.604E+00
Ba-140	8.822E-01	118.7	1.048E+00	1.049E+00	5.332E+00
La-140	-1.739E+00	96.4	1.676E+00	1.679E+00	2.935E+00
CE-141	-7.009E-01	106.6	7.472E-01	7.480E-01	2.494E+00

CE-144	-3.272E+00	123.4	4.038E+00	4.042E+00	1.347E+01
PM-144	3.566E-01	99.1	3.534E-01	3.539E-01	8.765E-01
EU-152	2.169E+00	141.2	3.062E+00	3.064E+00	8.699E+00
EU-154	1.434E+00	97.6	1.399E+00	1.401E+00	1.495E+01
EU-155	-3.420E-02	7622.9	2.607E+00	2.607E+00	6.471E+00
HF-181	-1.088E-01	550.3	5.988E-01	5.988E-01	2.071E+00
Ta-182	1.926E+00	106.4	2.050E+00	2.052E+00	6.963E+00
Hg-203	-5.168E-01	109.6	5.663E-01	5.671E-01	1.897E+00
TL-208	1.207E+01	6.6	8.020E-01	1.018E+00	8.863E-01
pm-146	1.041E+00	130.5	1.359E+00	1.360E+00	3.894E+00
y-88	-9.601E-01	68.7	6.596E-01	6.614E-01	1.913E+00
Cd-113m	-4.948E+03	130.0	6.434E+03	6.442E+03	2.169E+04
Cd-109	9.702E+00	155.4	1.508E+01	1.509E+01	5.026E+01
Cf-251	1.861E+00	108.2	2.013E+00	2.020E+00	5.403E+00
Cf-249	-7.952E-01	109.1	8.673E-01	8.683E-01	2.907E+00
Sn-126	9.643E-01	553.8	5.340E+00	5.340E+00	1.801E+01
PB-210	2.667E+01	50.1	1.337E+01	1.346E+01	3.742E+01
PB-212	2.833E+01	4.5	1.278E+00	2.234E+00	2.176E+00
PB-214	1.861E+01	7.9	1.464E+00	1.754E+00	2.480E+00
BI-207	2.683E-01	96.1	2.579E-01	2.583E-01	1.390E+00
BI-212	3.911E+01	16.5	6.441E+00	6.754E+00	1.152E+01
BI-214	1.476E+01	10.7	1.585E+00	1.761E+00	2.676E+00
BI-210M	1.226E-02	6286.2	7.709E-01	7.709E-01	2.649E+00
AC-228	3.620E+01	7.5	2.707E+00	3.277E+00	2.608E+00
TH-227	2.485E+00	267.6	6.647E+00	6.649E+00	1.903E+01
TH-229	-9.116E+00	105.0	9.573E+00	9.601E+00	2.503E+01
TH-234	1.445E+01	63.8	9.217E+00	9.248E+00	3.027E+01
PA-231	-1.441E+01	148.5	2.140E+01	2.141E+01	7.177E+01
PA-233	-1.317E+00	139.0	1.831E+00	1.832E+00	6.130E+00
PA-234	-6.642E-01	131.6	8.740E-01	8.746E-01	9.280E+00
PA-234M	6.294E-01	73.5	4.623E-01	4.634E-01	3.344E+02
U-235	3.175E+00	125.2	3.976E+00	3.979E+00	1.258E+01
AM-241	6.058E-01	232.3	1.407E+00	1.408E+00	4.003E+00
Np-237	2.739E+00	162.6	4.454E+00	4.457E+00	1.485E+01
Ir-192	5.810E-01	65.4	3.799E-01	3.815E-01	1.288E+00
Cs-136	5.100E-01	83.9	4.278E-01	4.288E-01	1.937E+00
Np-239	1.327E+00	120.3	1.596E+00	1.598E+00	5.334E+00
Nd-147	-4.350E+00	95.3	4.144E+00	4.152E+00	1.026E+01
Total	4.937E+02				

Analyst: kody Saulters

Sample description
264537_Gamma_160-18552-A-6-B

Spectrum Filename: C:\User\SPC\Det14\14_Gamma_20162249.An1

Acquisition information
Start time: 9/1/2016 11:39:27 AM
Live time: 1800
Real time: 1809
Dead time: 0.47 %
Detector ID: 14

Detector system
Ge14 SN/11080670

Calibration
Filename: 14_Soil_TunaCan.Clb
14_TunaCan_90099_042312

Energy Calibration
Created: 2/28/2012 10:48:23 AM
Zero offset: 0.130 keV
Gain: 0.250 keV/channel
Quadratic: -2.050E-08 keV/channel^2

Efficiency Calibration
Created: 4/23/2012 11:29:47 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.02 %
Log(Eff): 2.101260E-01 + (-5.951973E-01*Log(E)) + (-1.605331E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.28 %
Log(Eff): -2.391492E+01 + (8.828985E+00*Log(E)) + (-9.371496E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev11.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.64keV)
Stop channel: 8000 (1999.51keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 11:39:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	14_2016-08-07_0544.PBC 8/7/2016 5:44:13 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 30 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1800

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.54	44.	50.12	0.75	2.171E-02	46.54	4.250	PBC<MDA	PB210
50.14	9.	267.55	0.75	2.439E-02	50.14	8.000	PBC<MDA	TH227
59.54	12.	232.29	0.76	3.065E-02	59.54	35.900	PBC<MDA	AM241
63.20	33.	63.80	0.77	3.281E-02	63.29	3.810	PBC<MDA	TH234
64.19	6.	553.79	0.77	3.334E-02	64.28	9.700	PBC<MDA	Sn126
74.95	272.	9.79	0.78	3.818E-02				
77.27	415.	7.14	0.78	3.901E-02				
80.99	21.	135.08	0.78	4.020E-02	80.99	34.060	PBC<MDA	BA133
86.43	27.	162.64	0.79	4.163E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	1.168E+00	EU155
87.29	141.	20.27	1.19	4.180E-02	86.54	30.700	6.114E+00	EU155
					86.94	9.040	2.072E+01	Sn126
					87.57	37.500	4.978E+00	Sn126
					88.04	3.790	4.914E+01	Cd109
91.10	28.	157.09	0.79	4.255E-02	91.10	28.300	PBC<MDA	Nd147
93.43	28.	149.04	0.80	4.291E-02	93.35	5.561	PBC<MDA	AC228
97.50	12.	238.82	0.80	4.345E-02	97.50	30.000	PBC<MDA	Gd153
99.50	22.	109.85	0.80	4.365E-02	99.50	15.000	PBC<MDA	Np239
106.13	24.	120.32	0.81	4.406E-02	106.13	22.700	PBC<MDA	Np239
122.06	9.	266.67	0.83	4.378E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	PBC<MDA	CO57
143.69	22.	137.42	0.85	4.148E-02	143.79	10.960	PBC<MDA	U235

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
162.66	21.	118.74	0.87	3.853E-02	162.66	6.220	PBC<MDA	Ba140
163.38	21.	125.21	0.87	3.841E-02	163.38	5.080	PBC<MDA	U235
176.60	21.	108.15	0.88	3.692E-02	176.60	17.000	PBC<MDA	Cf251
206.24	4.	541.86	0.91	3.290E-02	205.33	5.010	PBC<MDA	U235
238.23	659.	5.07	1.00	2.935E-02	238.63	43.300	2.846E+01	PB212
241.62	22.	209.51	0.95	2.900E-02	242.00	7.430	PBC<MDA	PB214
244.69	22.	211.10	0.95	2.875E-02	244.69	7.580	PBC<MDA	EU152
276.99	46.	36.16	1.42	2.610E-02	277.28	6.310	1.569E+01	TL208
294.84	176.	12.99	1.10	2.488E-02	295.09	19.300	1.996E+01	PB214
300.12	74.	20.92	1.64	2.455E-02	300.03	3.280	5.071E+01	PB212
					300.07	2.460	6.762E+01	PA231
					300.18	6.200	2.684E+01	PA233
316.49	20.	73.06	1.02	2.355E-02	316.49	87.040	PBC<MDA	Ir192
320.08	14.	111.72	1.03	2.334E-02	320.08	9.940	PBC<MDA	CR51
337.90	158.	12.81	0.71	2.237E-02	338.32	12.010	3.266E+01	AC228
351.58	270.	8.08	1.22	2.169E-02	351.93	37.600	1.792E+01	PB214
364.48	7.	201.60	1.07	2.109E-02	364.48	81.700	PBC<MDA	I131
383.84	14.	116.57	1.09	2.025E-02	383.84	8.940	PBC<MDA	BA133
391.02	3.	624.24	1.09	1.993E-02	391.69	64.000	PBC<MDA	SN113
463.39	13.	101.40	1.16	1.745E-02	463.37	10.470	PBC<MDA	SB125
468.06	11.	108.47	1.17	1.731E-02	468.06	51.750	PBC<MDA	Ir192
487.02	9.	134.72	1.18	1.677E-02	487.02	45.500	PBC<MDA	La140
497.05	12.	98.75	1.19	1.650E-02	497.05	90.900	PBC<MDA	RU103
511.86	57.	37.45	2.46	1.612E-02	511.86	20.000	9.773E+00	RH106
569.32	7.	133.25	1.26	1.481E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	3.202E+00	PA234
					569.70	97.740	2.687E-01	BI207
569.47	1.	744.98	1.26	1.481E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	6.100E-01	PA234
					569.70	97.740	5.119E-02	BI207
582.96	267.	6.64	0.78	1.454E-02	583.02	84.500	1.207E+01	TL208
609.18	172.	10.74	1.51	1.403E-02	609.31	46.090	1.476E+01	BI214
					610.30	5.750	1.184E+02	RU103
661.37	57.	17.57	1.11	1.313E-02	661.66	85.210	2.830E+00	CS137
696.54	8.	99.10	1.37	1.260E-02	696.54	99.000	PBC<MDA	PM144
702.63	11.	112.44	1.38	1.251E-02	702.63	97.900	PBC<MDA	NB94
727.14	65.	16.47	0.83	1.217E-02	727.17	7.550	3.911E+01	BI212
735.72	5.	212.92	1.41	1.206E-02	735.72	22.500	PBC<MDA	pm146
747.16	8.	151.02	1.42	1.191E-02	747.16	34.000	PBC<MDA	pm146
766.41	12.	87.00	1.43	1.167E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	1.978E+02	PA234M
785.84	23.	40.32	4.17	1.144E-02	785.42	1.280	8.729E+01	BI212
795.87	15.	87.60	1.46	1.131E-02	795.87	85.530	PBC<MDA	CS134
801.95	9.	96.12	1.46	1.124E-02	801.95	8.690	PBC<MDA	CS134
810.78	39.	25.02	1.47	1.115E-02	810.78	99.460	1.971E+00	CO58
818.50	7.	154.22	1.48	1.106E-02	818.50	100.000	PBC<MDA	Cs136
846.77	1.	904.47	1.50	1.076E-02	846.77	99.935	PBC<MDA	Co56
861.01	25.	46.16	1.51	1.062E-02	860.56	12.420	PBC<MDA	TL208

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
880.53	11.	90.17	1.53	1.042E-02	880.53	6.000	PBC<MDA	PA234
883.24	4.	278.78	1.53	1.040E-02	883.24	9.600	PBC<MDA	PA234
910.98	199.	7.72	1.49	1.014E-02	911.07	29.000	3.766E+01	AC228
964.11	11.	141.15	1.60	9.682E-03	964.11	14.605	PBC<MDA	EU152
968.72	87.	12.77	0.79	9.642E-03	968.97	17.460	2.882E+01	AC228
1004.77	13.	101.50	1.63	9.360E-03	1004.77	18.010	PBC<MDA	EU154
1048.07	9.	83.89	1.66	9.043E-03	1048.07	80.000	PBC<MDA	Cs136
1063.66	8.	96.11	1.67	8.934E-03	1063.66	74.500	PBC<MDA	BI207
1077.40	5.	176.07	1.69	8.841E-03	1077.40	3.300	PBC<MDA	Ga68
1120.58	50.	14.38	0.37	8.562E-03	1120.29	15.100	2.156E+01	BI214
					1120.55	99.987	3.256E+00	Sc46
1121.35	10.	106.40	1.72	8.556E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	6.720E-01	Sc46
					1121.30	34.900	1.926E+00	Ta182
1173.24	2.	459.34	1.76	8.244E-03	1173.24	99.900	PBC<MDA	CO60
1238.28	12.	92.05	1.80	7.886E-03	1238.28	66.070	PBC<MDA	Co56
1274.53	14.	36.09	1.83	7.700E-03	1274.53	99.940	9.866E-01	NA22
					1274.54	35.190	2.802E+00	EU154
1332.50	3.	190.23	1.87	7.423E-03	1332.50	99.980	PBC<MDA	CO60
1408.00	7.	87.49	1.92	7.092E-03	1408.00	21.005	PBC<MDA	EU152
1460.77	327.	5.62	1.24	6.879E-03	1460.83	10.670	2.476E+02	K40
1690.98	5.	44.72	2.10	6.091E-03	1690.98	47.790	PBC<MDA	SB124
1764.74	34.	17.15	1.50	5.878E-03	1764.49	15.400	2.087E+01	BI214
1836.06	2.	304.14	2.19	5.686E-03	1836.06	99.200	PBC<MDA	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
299.20	74.95	217.	272.	7.125E+03	9.79	0.777	-	D
308.45	77.27	231.	415.	1.064E+04	7.14	0.780	-	sD

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.58	46.54	163.	44.	0.025	50.12	0.750s
TH-227	199.98	50.14	189.	9.	0.005	267.55	0.751s
AM-241	237.55	59.54	270.	12.	0.007	232.29	0.761s
TH-234	252.55	63.29	197.	33.	0.018	63.80	0.765D
Sn-126	256.52	64.28	480.	6.	0.003	553.79	0.766s
BA-133	323.33	80.99	271.	21.	0.012	135.08	0.784s
Np-237	345.33	86.49	942.	27.	0.015	162.64	0.789A
EU-155	345.54	86.54	653.	-32.	-0.018	116.00	0.790s
Sn-126	347.13	86.94	567.	7.	0.004	370.21	0.790D
Sn-126	349.65	87.57	616.	27.	0.015	88.44	0.791D
Cd-109	351.53	88.04	918.	28.	0.015	155.41	0.791A
Nd-147	363.77	91.10	945.	28.	0.015	157.09	0.794s
AC-228	372.76	93.35	880.	28.	0.016	149.04	0.797s
Gd-153	389.36	97.50	382.	12.	0.006	238.82	0.801s
Np-239	397.36	99.50	280.	22.	0.012	109.85	0.803s
Gd-153	412.15	103.20	476.	-26.	-0.014	121.66	0.807
Np-239	414.15	103.70	502.	-15.	-0.008	208.61	0.807
Np-239	423.87	106.13	401.	24.	0.013	120.32	0.810s
EU-152	486.43	121.78	374.	-27.	-0.015	163.85	0.826s
CO-57	487.58	122.06	294.	9.	0.005	266.67	0.826s
EU-154	491.73	123.10	324.	-5.	-0.003	479.26	0.828
PA-234	524.50	131.29	738.	-29.	-0.016	131.58	0.836s
HF-181	531.42	133.02	768.	-30.	-0.016	133.89	0.838s
CE-144	533.47	133.54	580.	-28.	-0.016	123.40	0.838s
HF-181	544.52	136.30	720.	-28.	-0.016	134.50	0.841s
CO-57	545.21	136.47	749.	-28.	-0.016	137.09	0.841s
U-235	574.45	143.79	463.	22.	0.012	137.42	0.849s
CE-141	581.07	145.44	345.	-25.	-0.014	106.61	0.850s
Ba-140	649.93	162.66	306.	21.	0.012	118.74	0.868s
U-235	652.81	163.38	328.	21.	0.012	125.21	0.869
CE-139	662.70	165.85	346.	-13.	-0.007	210.31	0.871
Cf-251	705.68	176.60	157.	21.	0.012	108.15	0.882
TH-229	773.30	193.51	198.	-25.	-0.014	105.01	0.899s
U-235	820.58	205.33	147.	4.	0.002	541.86	0.912s
TH-229	842.65	210.85	247.	-27.	-0.015	103.70	0.917s
Cf-251	907.23	227.00	160.	-3.	-0.002	752.53	0.933s
PB-212	953.75	238.63	102.	647.	0.360	4.51	0.945D
PB-214	967.21	242.00	1014.	22.	0.012	209.51	0.948s
EU-152	977.99	244.69	1036.	22.	0.012	211.10	0.951s
TH-227	1024.17	256.24	123.	-5.	-0.003	373.07	0.962s
Cd-113m	1054.01	263.70	170.	-14.	-0.008	130.03	0.970s
TL-208	1107.17	276.99	68.	46.	0.026	36.16	1.419s
Hg-203	1115.99	279.20	222.	-20.	-0.011	109.57	0.985s
I-131	1136.39	284.30	110.	-2.	-0.001	932.62	0.990s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-214	1178.54	294.84	81.	172.	0.096	13.33	1.100s
PB-212	1199.65	300.12	42.	74.	0.041	20.92	1.644s
PA-231	1199.46	300.07	393.	-18.	-0.010	156.11	1.006s
PA-233	1199.90	300.18	375.	-18.	-0.010	152.50	1.006s
PA-231	1209.78	302.65	357.	-18.	-0.010	148.49	1.008s
Ba-140	1218.57	304.85	336.	0.	0.000	1000.00	1.011s
BI-210M	1218.76	304.90	336.	0.	0.000	1000.00	1.011s
Ir-192	1232.94	308.44	374.	-20.	-0.011	136.88	1.014s
PA-233	1247.22	312.01	389.	-20.	-0.011	139.02	1.018s
Ir-192	1265.13	316.49	92.	20.	0.011	73.06	1.022
CR-51	1279.51	320.08	112.	14.	0.008	111.72	1.026s
Cf-249	1332.92	333.44	117.	-20.	-0.011	101.67	1.039s
AC-228	1350.74	337.90	60.	158.	0.088	12.81	0.707s
Cs-136	1361.44	340.57	380.	-17.	-0.010	162.43	1.045s
EU-152	1376.30	344.29	363.	0.	0.000	1000.00	1.049s
HF-181	1382.47	345.83	363.	0.	0.000	1000.00	1.050s
PB-214	1405.47	351.58	52.	263.	0.146	8.36	1.224s
BA-133	1423.15	356.00	466.	-20.	-0.011	158.07	1.060
I-131	1457.08	364.48	60.	7.	0.004	201.60	1.069s
BA-133	1534.50	383.84	129.	14.	0.008	116.57	1.087s
Cf-249	1550.94	387.95	204.	-19.	-0.011	109.07	1.091s
SN-113	1565.90	391.69	173.	3.	0.002	624.24	1.095s
SB-125	1710.63	427.88	70.	-17.	-0.009	96.84	1.129s
AG-108M	1734.87	433.94	59.	-5.	-0.003	310.53	1.135s
pm-146	1814.64	453.88	85.	-13.	-0.007	112.98	1.154s
SB-125	1852.59	463.37	83.	13.	0.007	101.40	1.163s
Ir-192	1871.36	468.06	62.	11.	0.006	108.47	1.167
BE-7	1909.50	477.60	79.	-8.	-0.005	155.07	1.176s
HF-181	1927.10	482.00	106.	-3.	-0.001	550.28	1.180s
La-140	1947.19	487.02	36.	9.	0.005	134.72	1.185s
RU-103	1987.33	497.05	32.	12.	0.007	98.75	1.194s
RH-106	2046.57	511.86	61.	57.	0.032	37.45	2.458s
Nd-147	2123.11	531.00	56.	-16.	-0.009	95.27	1.225s
CS-134	2252.06	563.24	45.	-3.	-0.002	686.36	1.255
CS-134	2276.40	569.32	40.	7.	0.004	133.25	1.260s
PA-234	2276.99	569.47	49.	1.	0.001	744.98	1.261s
TL-208	2330.96	582.96	13.	267.	0.148	6.64	0.784s
SB-125	2401.12	600.50	497.	-18.	-0.010	172.30	1.289
SB-124	2410.04	602.73	402.	-16.	-0.009	177.00	1.291
CS-134	2417.96	604.71	386.	-16.	-0.009	173.23	1.292s
BI-214	2435.85	609.18	37.	172.	0.095	10.74	1.514
RU-103	2440.31	610.30	369.	-13.	-0.007	203.42	1.297s
AG-108M	2456.25	614.28	356.	0.	0.000	1000.00	1.301s
RH-106	2486.79	621.92	74.	-18.	-0.010	101.71	1.308s
SB-125	2542.69	635.89	48.	-2.	-0.001	590.93	1.320s
AG-110M	2630.18	657.76	117.	-14.	-0.008	112.71	1.339s
CS-137	2644.60	661.37	10.	57.	0.032	17.57	1.106s
PM-144	2785.32	696.54	13.	8.	0.004	99.10	1.374s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
NB-94	2809.67	702.63	35.	11.	0.006	112.44	1.379s
SB-124	2890.31	722.79	130.	-15.	-0.008	113.56	1.396s
EU-154	2892.59	723.36	114.	0.	0.000	1000.00	1.397
ZR-95	2895.96	724.20	114.	0.	0.000	1000.00	1.398
BI-212	2907.74	727.14	12.	65.	0.036	16.47	0.833s
pm-146	2942.05	735.72	26.	5.	0.003	212.92	1.408s
pm-146	2987.81	747.16	30.	8.	0.004	151.02	1.417s
ZR-95	3026.09	756.73	43.	-2.	-0.001	579.58	1.426s
AG-110M	3054.96	763.94	72.	-10.	-0.006	118.00	1.432s
NB-95	3062.34	765.79	91.	-5.	-0.003	235.88	1.433s
PA-234M	3064.83	766.41	50.	12.	0.007	87.00	1.434s
EU-152	3114.87	778.92	48.	-17.	-0.009	88.08	1.444s
BI-212	3142.57	785.84	14.	23.	0.013	40.32	4.166s
CS-134	3182.67	795.87	39.	15.	0.008	87.60	1.459s
CS-134	3207.01	801.95	14.	9.	0.005	96.12	1.464s
CO-58	3242.31	810.77	29.	39.	0.022	25.02	1.471s
La-140	3262.30	815.77	68.	0.	0.000	1000.00	1.475s
Cs-136	3273.22	818.50	59.	7.	0.004	154.22	1.478s
MN-54	3338.63	834.85	42.	-5.	-0.003	191.08	1.492s
Co-56	3386.32	846.77	29.	1.	0.001	904.47	1.501s
TL-208	3441.51	860.56	23.	25.	0.014	46.16	1.513s
NB-94	3483.65	871.10	34.	-5.	-0.003	170.88	1.522s
EU-154	3492.19	873.23	47.	-6.	-0.003	166.67	1.523s
PA-234	3521.39	880.53	41.	11.	0.006	90.17	1.529s
PA-234	3532.24	883.24	51.	4.	0.002	278.78	1.531s
Sc-46	3556.40	889.28	118.	-17.	-0.009	94.25	1.536s
y-88	3591.45	898.04	43.	-17.	-0.009	68.70	1.543s
AC-228	3643.24	910.98	6.	199.	0.111	7.72	1.495
AG-110M	3749.30	937.49	33.	-14.	-0.008	87.67	1.576s
PA-234	3783.42	946.02	23.	-3.	-0.002	312.25	1.582s
EU-152	3855.80	964.11	117.	11.	0.006	141.15	1.597s
AC-228	3874.23	968.72	8.	87.	0.049	12.77	0.794s
EU-154	3984.71	996.33	76.	-15.	-0.008	86.46	1.622s
PA-234M	4003.39	1001.00	92.	-10.	-0.005	118.38	1.626
EU-154	4018.51	1004.77	76.	13.	0.007	101.50	1.629s
Cs-136	4191.74	1048.07	24.	9.	0.005	83.89	1.663s
RH-106	4200.91	1050.36	68.	-17.	-0.010	71.08	1.665s
BI-207	4254.12	1063.66	10.	8.	0.004	96.11	1.675s
Ga-68	4309.10	1077.40	15.	5.	0.003	176.07	1.685s
FE-59	4396.54	1099.25	25.	-4.	-0.002	184.65	1.702s
EU-152	4447.85	1112.07	115.	-15.	-0.008	107.25	1.712s
ZN-65	4461.74	1115.55	100.	-14.	-0.008	101.76	1.714s
BI-214	4481.88	1120.58	1.	50.	0.028	14.38	0.368s
Sc-46	4481.77	1120.55	86.	0.	0.000	1000.00	1.718s
Ta-182	4484.77	1121.30	56.	10.	0.006	106.40	1.719
CO-60	4692.60	1173.24	21.	2.	0.001	459.34	1.757s
Ta-182	4885.38	1221.41	70.	-23.	-0.013	43.94	1.792
Co-56	4952.89	1238.28	22.	12.	0.007	92.05	1.805s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
NA-22	5097.96	1274.53	5.	14.	0.008	36.09	1.831s
EU-154	5098.01	1274.54	19.	0.	0.000	1000.00	1.831s
FE-59	5166.25	1291.60	27.	-10.	-0.005	113.22	1.843s
CO-60	5329.96	1332.50	6.	3.	0.002	190.23	1.871s
AG-110M	5537.26	1384.30	27.	-8.	-0.004	157.30	1.907s
EU-152	5632.13	1408.00	5.	7.	0.004	87.49	1.923s
K-40	5843.31	1460.77	5.	327.	0.182	5.62	1.243s
La-140	6385.44	1596.21	40.	-19.	-0.011	96.41	2.044s
SB-124	6764.81	1690.98	0.	5.	0.003	44.72	2.102s
BI-214	7060.06	1764.74	0.	34.	0.019	17.15	1.499s
Co-56	7086.53	1771.35	34.	0.	0.000	1000.00	2.149s
y-88	7345.59	1836.06	6.	2.	0.001	304.14	2.185s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	-2.5832E+00				5.31E+01	
			477.60	-2.583E+00	?(	1.371E+01 1.55E+02 1.05E+01	G
NA-22	C	9.8660E-01				9.50E+02	
			1274.53	9.866E-01	?(	9.725E-01 3.61E+01 9.99E+01	G
K-40	N	2.4756E+02				4.66E+11	
			1460.83	2.476E+02	(P	9.895E+00 5.62E+00 1.07E+01	G
Sc-46	F	-9.0784E-01				8.38E+01	
			889.28	-9.078E-01	?(	2.870E+00 9.43E+01 1.00E+02	G
			1120.55	0.000E+00	+	2.981E+00 1.00E+03 1.00E+02	G
CR-51	F	3.3061E+00				2.77E+01	
			320.08	3.306E+00	?(	1.246E+01 1.12E+02 9.94E+00	G
MN-54	C	-2.6377E-01				3.12E+02	
			834.85	-2.638E-01	?(P	1.683E+00 1.91E+02 1.00E+02	G
FE-59	F	-4.6297E-01				4.45E+01	
			1099.25	-4.630E-01	&(P	2.946E+00 1.85E+02 5.65E+01	G
			1291.60	-1.661E+00	+ P	4.534E+00 1.13E+02 4.32E+01	G
Co-56	C	5.5124E-01				7.73E+01	
			846.77	6.486E-02	?(P	1.431E+00 9.04E+02 9.99E+01	G
			1238.28	1.287E+00	&(P	2.610E+00 9.21E+01 6.61E+01	G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments
                         1037.84-1.942E-01 % P 1.131E+01 2.56E+03 1.41E+01 G
                         1771.35 0.000E+00 -   1.830E+01 1.00E+03 1.55E+01  A

CO-57    C   1.3591E-01                                     2.72E+02
                          122.06 1.359E-01 ?(P 1.225E+00 2.67E+02 8.56E+01 G
                          136.47-3.493E+00 +   1.596E+01 1.37E+02 1.07E+01 G

CO-58    C   1.9708E+00                                     7.09E+01
                          810.78 1.971E+00 ?(P 1.386E+00 2.50E+01 9.95E+01 G

CO-60    F   1.8502E-01                                     1.93E+03
                         1332.50 2.227E-01 ?(P 1.059E+00 1.90E+02 1.00E+02 G
                         1173.24 1.473E-01 ?(P 1.617E+00 4.59E+02 9.99E+01 G

ZN-65    F  -1.8424E+00                                     2.44E+02
                         1115.55-1.842E+00 ?(  6.313E+00 1.02E+02 5.06E+01 G

NB-94    I   5.0417E-01                                     7.41E+06
                          702.63 5.042E-01 ?(P 1.371E+00 1.12E+02 9.79E+01 G
                          871.10-2.645E-01 -   1.581E+00 1.71E+02 9.99E+01 G

ZR-95    I  -2.0197E-01                                     6.40E+01
                          756.73-2.020E-01 ?(  2.890E+00 5.80E+02 5.45E+01 G
                          724.20 0.000E+00 +   5.406E+00 1.00E+03 4.42E+01 G

NB-95    I  -2.1715E-01                                     6.40E+01
                          765.79-2.171E-01 ?(P 2.244E+00 2.36E+02 9.98E+01 G

RU-103   I   4.3475E-01                                     3.93E+01
                          497.05 4.347E-01 &(  1.076E+00 9.87E+01 9.09E+01 G
                          610.30-9.298E+00 +   6.363E+01 2.03E+02 5.75E+00 GA

RH-106   I  -7.3810E+00                                     3.74E+02
                          621.92-7.381E+00 &(P 1.737E+01 1.02E+02 9.93E+00 G
                         1050.36-6.851E+01 +   1.617E+02 7.11E+01 1.56E+00 G
                          511.86 9.773E+00 ? P 6.728E+00 3.74E+01 2.00E+01 GA

AG-108M  C  -1.5590E-01                                     1.53E+05
                          433.94-1.559E-01  (  1.283E+00 3.11E+02 9.05E+01 G
                          722.94-4.677E-02 %   2.634E+00 1.62E+03 9.08E+01 G
                          614.28 0.000E+00 +   4.020E+00 1.00E+03 8.98E+01 G

AG-110M  F  -7.3613E-02                                     2.50E+02
                          884.68-7.361E-02 %(  2.649E+00 1.01E+03 7.27E+01 G
                          657.76-6.216E-01 &   2.363E+00 1.13E+02 9.46E+01 G
                          937.49-2.366E+00 +   4.790E+00 8.77E+01 3.44E+01 G
                         1384.30-2.438E+00 +   8.514E+00 1.57E+02 2.43E+01 G
                          763.94-2.239E+00 &   8.979E+00 1.18E+02 2.23E+01 G
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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SN-113	F	1.3024E-01					1.15E+02	
			391.69	1.302E-01	&(	2.786E+00	6.24E+02	6.40E+01 G
SB-124	F	-1.2255E-01					6.02E+01	
			602.73	-6.463E-01	?(	3.840E+00	1.77E+02	9.83E+01 G
			1690.98	9.543E-01	?(	1.407E+00	4.47E+01	4.78E+01 G
			722.79	-6.120E+00	+	2.342E+01	1.14E+02	1.08E+01 G
SB-125	I	-1.9551E-01					1.01E+03	
			427.88	-1.683E+00	&(	4.202E+00	9.68E+01	2.96E+01 G
			600.50	-4.048E+00	+	2.336E+01	1.72E+02	1.79E+01 G
			635.89	-6.038E-01	&	1.264E+01	5.91E+02	1.13E+01 G
			463.37	4.010E+00	?(P	1.371E+01	1.01E+02	1.05E+01 G
I-131	I	2.3455E-01					8.02E+00	
			364.48	2.345E-01	?(P	1.249E+00	2.02E+02	8.17E+01 G
			284.30	-7.098E-01	& P	1.823E+01	9.33E+02	6.14E+00 G
			636.97	-1.908E-01	%	2.072E+01	3.05E+03	7.17E+00 G
Gd-153	F	4.9728E-01					2.42E+02	
			97.50	4.973E-01	*(	3.999E+00	2.39E+02	3.00E+01 G
			103.20	-1.491E+00	+	6.056E+00	1.22E+02	2.18E+01 G
Ga-68	C	1.1114E+01					4.71E-02	
			1077.40	1.111E+01	?(	4.614E+01	1.76E+02	3.30E+00 G
Tc-99m	I	-4.0761E-02					2.51E-01	
			140.51	-4.076E-02	%(	1.611E+00	1.17E+03	8.93E+01 G
BA-133	F	-8.1303E-01					3.85E+03	
			356.00	-8.130E-01	(	4.304E+00	1.58E+02	6.20E+01 G
			302.85	-3.047E-01	%	1.100E+01	1.06E+03	1.83E+01 G
			383.84	4.341E+00	?	1.707E+01	1.17E+02	8.94E+00 GA
			80.99	8.436E-01	& P	3.224E+00	1.35E+02	3.41E+01 GA
CS-134	I	3.8980E-01					7.54E+02	
			604.71	-6.531E-01	?(	3.799E+00	1.73E+02	9.76E+01 G
			795.87	8.736E-01	?(	1.826E+00	8.76E+01	8.55E+01 G
			569.32	1.707E+00	?(	7.848E+00	1.33E+02	1.54E+01 G
			801.95	5.013E+00	&(	1.145E+01	9.61E+01	8.69E+00 G
			563.24	-1.382E+00	+ P	1.514E+01	6.86E+02	8.35E+00 G
CS-137	I	2.8299E+00					1.10E+04	
			661.66	2.830E+00	@(	8.662E-01	1.76E+01	8.52E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CE-139	F	-2.2652E-01					1.38E+02	
			165.85	-2.265E-01	?(	1.604E+00	2.10E+02	7.99E+01 G
Ba-140	I	8.8224E-01					1.28E+01	
			537.26	-1.468E-01	%(	5.332E+00	1.42E+03	2.44E+01 G
			162.66	4.917E+00	?(P	1.954E+01	1.19E+02	6.22E+00 G
			304.85	0.000E+00	&	4.707E+01	1.00E+03	4.29E+00 G
La-140	I	-1.7388E+00					1.28E+01	
			1596.21	-1.739E+00	?(P	2.935E+00	9.64E+01	9.54E+01 G
			487.02	6.551E-01	+	2.232E+00	1.35E+02	4.55E+01 G
			328.76	-7.981E-02	%	6.823E+00	3.27E+03	2.03E+01 G
			815.77	0.000E+00	+	8.852E+00	1.00E+03	2.33E+01 G
CE-141	I	-7.0085E-01					3.25E+01	
			145.44	-7.009E-01	?(	2.494E+00	1.07E+02	4.82E+01 G
CE-144	I	-3.2724E+00					2.85E+02	
			133.54	-3.272E+00	(	1.347E+01	1.23E+02	1.11E+01 G
PM-144	C	3.5660E-01					3.63E+02	
			696.54	3.566E-01	?(P	8.765E-01	9.91E+01	9.90E+01 G
			618.06	-1.141E-02	% P	3.665E+00	6.55E+03	9.91E+01 G
EU-152	F	2.1693E+00					4.94E+03	
			344.29	0.000E+00	&(	8.699E+00	1.00E+03	2.65E+01 G
			1112.07	-6.893E+00	+	2.490E+01	1.07E+02	1.36E+01 G
			121.78	-1.187E+00	+ P	4.122E+00	1.64E+02	2.86E+01 G
			778.92	-6.212E+00	+	1.301E+01	8.81E+01	1.29E+01 G
			964.11	4.364E+00	?(	2.090E+01	1.41E+02	1.46E+01 G
			244.69	5.525E+00	?(	3.893E+01	2.11E+02	7.58E+00 G
			1408.00	2.495E+00	?	5.024E+00	8.75E+01	2.10E+01 GA
EU-154	I	1.4341E+00					3.14E+03	
			873.23	-2.589E+00	?(	1.495E+01	1.67E+02	1.23E+01 G
			123.10	-1.662E-01	+	2.698E+00	4.79E+02	4.08E+01 G
			1274.54	0.000E+00	+	4.720E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	+	1.179E+01	1.00E+03	2.02E+01 G
			1004.77	4.175E+00	?(	1.431E+01	1.01E+02	1.80E+01 G
			996.33	-8.301E+00	+	2.407E+01	8.65E+01	1.06E+01 G
EU-155	I	-3.4203E-02					1.81E+03	
			105.31	-3.420E-02	%(P	6.471E+00	7.62E+03	2.12E+01 G
			86.54	-1.370E+00	+	5.294E+00	1.16E+02	3.07E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
HF-181	F	-1.0881E-01					4.24E+01	
			482.00	-1.088E-01	?(	2.071E+00	5.50E+02	8.05E+01 G
			133.02	-8.851E-01	+	3.949E+00	1.34E+02	4.33E+01 G
			345.83	0.000E+00	+	1.535E+01	1.00E+03	1.51E+01 G
			136.30	-6.375E+00	+	2.858E+01	1.35E+02	5.85E+00 G
Ta-182	F	1.9262E+00					1.14E+02	
			1121.30	1.926E+00	(	6.963E+00	1.06E+02	3.49E+01 G
			1221.41	-5.925E+00	+ P	1.075E+01	4.39E+01	2.70E+01 G
			1189.05	-4.206E-01	%	1.188E+01	1.21E+03	1.62E+01 G
Hg-203	F	-5.1684E-01					4.66E+01	
			279.20	-5.168E-01	?(	1.897E+00	1.10E+02	8.15E+01 G
TL-208	N	1.2072E+01					6.98E+02	
			583.02	1.207E+01	(P	8.863E-01	6.64E+00	8.45E+01 G
			277.28	1.569E+01	+	1.383E+01	3.62E+01	6.31E+00 G
			860.56	1.039E+01	-	1.062E+01	4.62E+01	1.24E+01 G
pm-146	C	1.0409E+00					2.02E+03	
			747.16	1.052E+00	?(	3.894E+00	1.51E+02	3.40E+01 G
			735.72	1.024E+00	?(	5.421E+00	2.13E+02	2.25E+01 G
			453.88	-6.290E-01	+ P	2.201E+00	1.13E+02	6.50E+01 G
y-88	F	-9.6013E-01					1.07E+02	
			898.04	-9.601E-01	?(P	1.913E+00	6.87E+01	9.37E+01 G
			1836.06	1.970E-01	+	1.391E+00	3.04E+02	9.92E+01 G
Cd-113m		-4.9477E+03					5.33E+03	
			263.70	-4.948E+03	?(	2.169E+04	1.30E+02	6.00E-03 K
Cd-109	F	9.7015E+00					4.53E+02	
							Derived Ave Activity	
			88.04	9.702E+00	}(	5.026E+01	1.55E+02	3.79E+00 G
Cf-251	T	1.8613E+00					3.28E+05	
			176.60	1.861E+00	&(	5.403E+00	1.08E+02	1.70E+01 G
			227.00	-8.684E-01	&	1.785E+01	7.53E+02	6.30E+00 GA
Cf-249	T	-7.9516E-01					1.28E+05	
			387.95	-7.952E-01	?(	2.907E+00	1.09E+02	6.60E+01 G
			333.44	-3.235E+00	+	8.427E+00	1.02E+02	1.55E+01 G
Sn-126		9.6425E-01					3.65E+07	
			87.57	9.643E-01	}	4.190E+00	8.84E+01	3.75E+01 GA
			64.28	9.643E-01	?(	1.801E+01	5.54E+02	9.70E+00 G
			86.94	9.643E-01	}	1.674E+01	3.70E+02	9.04E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-210	N	2.6668E+01					8.14E+03	
			46.54	2.667E+01	*(P	3.742E+01	5.01E+01	4.25E+00 G
PB-212	N	2.8331E+01					6.98E+02	
			238.63	2.833E+01	(P	2.176E+00	4.51E+00	4.33E+01 G
			300.03	5.071E+01	+	2.283E+01	2.09E+01	3.28E+00 GA
PB-214	N	1.8608E+01					5.84E+05	
			351.93	1.792E+01	@(P	2.480E+00	8.36E+00	3.76E+01 G
			295.09	1.996E+01	(P	5.156E+00	1.33E+01	1.93E+01 G
			242.00	5.573E+00	&	3.897E+01	2.10E+02	7.43E+00 GA
BI-207	C	2.6835E-01					1.18E+04	
			569.70	-2.559E-02	%(	1.390E+00	1.53E+03	9.77E+01 G
			1063.66	6.540E-01	?(P	1.466E+00	9.61E+01	7.45E+01 G
BI-212	N	3.9112E+01					6.98E+02	
			727.17	3.911E+01	(P	1.152E+01	1.65E+01	7.55E+00 G
			785.42	8.729E+01	+	7.646E+01	4.03E+01	1.28E+00 GA
BI-214	N	1.4757E+01					5.84E+05	
			609.31	1.476E+01	(P	2.676E+00	1.07E+01	4.61E+01 G
			1120.29	2.156E+01	+ P	3.167E+00	1.44E+01	1.51E+01 G
			1764.49	2.087E+01	+	4.523E+00	1.71E+01	1.54E+01 G
BI-210M	T	1.2263E-02					1.10E+09	
			265.83	1.226E-02	%(P	2.649E+00	6.29E+03	5.00E+01 G
			304.90	0.000E+00	&	7.213E+00	1.00E+03	2.80E+01 G
AC-228	N	3.6200E+01					2.10E+03	
			911.07	3.766E+01	(	2.608E+00	7.72E+00	2.90E+01 G
			968.97	2.882E+01	-	5.152E+00	1.28E+01	1.75E+01 G
			338.32	3.266E+01	(	8.041E+00	1.28E+01	1.20E+01 G
			93.35	6.606E+00	-	3.281E+01	1.49E+02	5.56E+00 XA
TH-227	N	2.4845E+00					7.95E+03	
			50.14	2.485E+00	&(P	1.903E+01	2.68E+02	8.00E+00 G
			256.24	-1.526E+00	+	1.558E+01	3.73E+02	7.00E+00 G
TH-229	N	-9.1158E+00					2.68E+06	
			193.51	-9.116E+00	&(P	2.503E+01	1.05E+02	4.40E+00 G
			210.85	-1.580E+01	+	4.374E+01	1.04E+02	2.99E+00 G
TH-234	N	1.4447E+01					1.63E+12	
			63.29	1.445E+01	(P	3.027E+01	6.38E+01	3.81E+00 G
			92.59	7.894E-01	& P	3.409E+01	1.29E+03	5.58E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PA-231	N	-1.4410E+01					1.20E+07	
			302.65	-1.441E+01	?(	7.177E+01	1.48E+02	2.88E+00 G
			300.07	-1.671E+01	+	8.749E+01	1.56E+02	2.46E+00 G
PA-233	C	-1.3168E+00					7.82E+08	
			312.01	-1.317E+00	?(	6.130E+00	1.39E+02	3.60E+01 G
			300.18	-6.635E+00	+	3.393E+01	1.53E+02	6.20E+00 G
PA-234	N	-6.6419E-01					1.63E+12	
			131.29	-2.116E+00	?(	9.280E+00	1.32E+02	1.80E+01 G
			946.02	-1.406E+00	+	1.063E+01	3.12E+02	1.34E+01 G
			569.47	6.100E-01	&	1.611E+01	7.45E+02	8.20E+00 G
			883.24	2.058E+00	?(	2.009E+01	2.79E+02	9.60E+00 G
			880.53	9.447E+00	&	2.880E+01	9.02E+01	6.00E+00 GA
PA-234M	N	6.2937E-01					1.63E+12	
			1001.00	-6.864E+01	?(P	3.344E+02	1.18E+02	8.37E-01 G
			766.41	1.978E+02	&(	5.795E+02	8.70E+01	2.94E-01 G
U-235	N	3.1755E+00					2.57E+11	
			143.79	2.738E+00	?(P	1.258E+01	1.37E+02	1.10E+01 G
			205.33	1.348E+00	&(P	1.996E+01	5.42E+02	5.01E+00 G
			163.38	5.921E+00	(P	2.481E+01	1.25E+02	5.08E+00 G
AM-241	T	6.0585E-01					1.58E+05	
			59.54	6.058E-01	?(	4.003E+00	2.32E+02	3.59E+01 G
Np-237	F	2.7386E+00					2.14E+06	
							Derived Ave Activity	
			86.49	2.739E+00	}(	1.485E+01	1.63E+02	1.31E+01 G
Ir-192	F	5.8098E-01					7.40E+01	
			316.49	5.307E-01	?(	1.288E+00	7.31E+01	8.70E+01 G
			468.06	6.656E-01	&(	2.451E+00	1.08E+02	5.18E+01 G
			308.44	-1.475E+00	+	6.761E+00	1.37E+02	3.18E+01 G
Cs-136	F	5.0997E-01					1.30E+01	
			818.50	3.650E-01	(	1.937E+00	1.54E+02	1.00E+02 G
			1048.07	6.912E-01	?(	1.961E+00	8.39E+01	8.00E+01 G
			340.57	-9.145E-01	+	4.984E+00	1.62E+02	4.69E+01 G
Np-239	T	1.3269E+00					2.36E+00	
			103.70	-8.059E-01	&	5.641E+00	2.09E+02	2.40E+01 X
			106.13	1.327E+00	?(	5.334E+00	1.20E+02	2.27E+01 G
			99.50	1.865E+00	&	6.851E+00	1.10E+02	1.50E+01 X

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

Nd-147      -4.3500E+00                                        1.11E+01
                          531.00-4.350E+00  (  1.026E+01 9.53E+01 1.30E+01 G
                           91.10 1.287E+00 +   6.736E+00 1.57E+02 2.83E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
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Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
PB-210	46.54	163.	44.	0.025	50.12	2.667E+01	P
TH-227	50.14	189.	9.	0.005	267.55	2.485E+00	P
AM-241	59.54	270.	12.	0.007	232.29	6.058E-01	
BA-133	80.99	271.	21.	0.012	135.08	8.436E-01	P
EU-155	86.54	653.	-32.	-0.018	116.00	-1.370E+00	
Nd-147	91.10	945.	28.	0.015	157.09	1.287E+00	
Gd-153	97.50	382.	12.	0.006	238.82	4.973E-01	
Np-239	99.50	280.	22.	0.012	109.85	1.865E+00	
Gd-153	103.20	476.	-26.	-0.014	121.66	-1.491E+00	
Np-239	103.70	502.	-15.	-0.008	208.61	-8.059E-01	
Np-239	106.13	401.	24.	0.013	120.32	1.327E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	121.78	374.	-27.	-0.015	163.85	-1.187E+00	P
CO-57	122.06	294.	9.	0.005	266.67	1.359E-01	P
EU-154	123.10	324.	-5.	-0.003	479.26	-1.662E-01	
PA-234	131.29	738.	-29.	-0.016	131.58	-2.116E+00	
HF-181	133.02	768.	-30.	-0.016	133.89	-8.851E-01	
CE-144	133.54	580.	-28.	-0.016	123.40	-3.272E+00	
HF-181	136.30	720.	-28.	-0.016	134.50	-6.375E+00	
CO-57	136.47	749.	-28.	-0.016	137.09	-3.493E+00	
CE-141	145.44	345.	-25.	-0.014	106.61	-7.009E-01	
Ba-140	162.66	306.	21.	0.012	118.74	4.917E+00	P
CE-139	165.85	346.	-13.	-0.007	210.31	-2.265E-01	
Cf-251	176.60	157.	21.	0.012	108.15	1.861E+00	
TH-229	193.51	198.	-25.	-0.014	105.01	-9.116E+00	P
TH-229	210.85	247.	-27.	-0.015	103.70	-1.580E+01	
Cf-251	227.00	160.	-3.	-0.002	752.53	-8.684E-01	
EU-152	244.69	1036.	22.	0.012	211.10	5.525E+00	
TH-227	256.24	123.	-5.	-0.003	373.07	-1.526E+00	
Cd-113m	263.70	170.	-14.	-0.008	130.03	-4.948E+03	
Hg-203	279.20	222.	-20.	-0.011	109.57	-5.168E-01	
I-131	284.30	110.	-2.	-0.001	932.62	-7.098E-01	P
PA-231	300.07	393.	-18.	-0.010	156.11	-1.671E+01	
PA-233	300.18	375.	-18.	-0.010	152.50	-6.635E+00	
PA-231	302.65	357.	-18.	-0.010	148.49	-1.441E+01	
Ir-192	308.44	374.	-20.	-0.011	136.88	-1.475E+00	
PA-233	312.01	389.	-20.	-0.011	139.02	-1.317E+00	
Ir-192	316.49	92.	20.	0.011	73.06	5.307E-01	
CR-51	320.08	112.	14.	0.008	111.72	3.306E+00	
Cf-249	333.44	117.	-20.	-0.011	101.67	-3.235E+00	
Cs-136	340.57	380.	-17.	-0.010	162.43	-9.145E-01	
BA-133	356.00	466.	-20.	-0.011	158.07	-8.130E-01	
I-131	364.48	60.	7.	0.004	201.60	2.345E-01	P
BA-133	383.84	129.	14.	0.008	116.57	4.341E+00	
Cf-249	387.95	204.	-19.	-0.011	109.07	-7.952E-01	
AG-108M	433.94	59.	-5.	-0.003	310.53	-1.559E-01	
pm-146	453.88	85.	-13.	-0.007	112.98	-6.290E-01	P
Ir-192	468.06	62.	11.	0.006	108.47	6.656E-01	
BE-7	477.60	79.	-8.	-0.005	155.07	-2.583E+00	
HF-181	482.00	106.	-3.	-0.001	550.28	-1.088E-01	
La-140	487.02	36.	9.	0.005	134.72	6.551E-01	
RU-103	497.05	32.	12.	0.007	98.75	4.347E-01	
RH-106	511.86	61.	57.	0.032	37.45	9.773E+00	P
Nd-147	531.00	56.	-16.	-0.009	95.27	-4.350E+00	
CS-134	563.24	45.	-3.	-0.002	686.36	-1.382E+00	P
CS-134	569.32	40.	7.	0.004	133.25	1.707E+00	
PA-234	569.47	49.	1.	0.001	744.98	6.100E-01	
SB-124	602.73	402.	-16.	-0.009	177.00	-6.463E-01	
CS-134	604.71	386.	-16.	-0.009	173.23	-6.531E-01	
RU-103	610.30	369.	-13.	-0.007	203.42	-9.298E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RH-106	621.92	74.	-18.	-0.010	101.71	-7.381E+00	P
AG-110M	657.76	117.	-14.	-0.008	112.71	-6.216E-01	
PM-144	696.54	13.	8.	0.004	99.10	3.566E-01	P
NB-94	702.63	35.	11.	0.006	112.44	5.042E-01	P
SB-124	722.79	130.	-15.	-0.008	113.56	-6.120E+00	
pm-146	735.72	26.	5.	0.003	212.92	1.024E+00	
pm-146	747.16	30.	8.	0.004	151.02	1.052E+00	
ZR-95	756.73	43.	-2.	-0.001	579.58	-2.020E-01	
AG-110M	763.94	72.	-10.	-0.006	118.00	-2.239E+00	
NB-95	765.79	91.	-5.	-0.003	235.88	-2.171E-01	P
PA-234M	766.41	50.	12.	0.007	87.00	1.978E+02	
EU-152	778.92	48.	-17.	-0.009	88.08	-6.212E+00	
CS-134	795.87	39.	15.	0.008	87.60	8.736E-01	
CS-134	801.95	14.	9.	0.005	96.12	5.013E+00	
Cs-136	818.50	59.	7.	0.004	154.22	3.650E-01	
MN-54	834.85	42.	-5.	-0.003	191.08	-2.638E-01	P
Co-56	846.77	29.	1.	0.001	904.47	6.486E-02	P
NB-94	871.10	34.	-5.	-0.003	170.88	-2.645E-01	
EU-154	873.23	47.	-6.	-0.003	166.67	-2.589E+00	
PA-234	880.53	41.	11.	0.006	90.17	9.447E+00	
PA-234	883.24	51.	4.	0.002	278.78	2.058E+00	
Sc-46	889.28	118.	-17.	-0.009	94.25	-9.078E-01	
y-88	898.04	43.	-17.	-0.009	68.70	-9.601E-01	P
AG-110M	937.49	33.	-14.	-0.008	87.67	-2.366E+00	
PA-234	946.02	23.	-3.	-0.002	312.25	-1.406E+00	
EU-152	964.11	117.	11.	0.006	141.15	4.364E+00	
EU-154	996.33	76.	-15.	-0.008	86.46	-8.301E+00	
PA-234M	1001.00	92.	-10.	-0.005	118.38	-6.864E+01	P
EU-154	1004.77	76.	13.	0.007	101.50	4.175E+00	
Cs-136	1048.07	24.	9.	0.005	83.89	6.912E-01	
RH-106	1050.36	68.	-17.	-0.010	71.08	-6.851E+01	
BI-207	1063.66	10.	8.	0.004	96.11	6.540E-01	P
Ga-68	1077.40	15.	5.	0.003	176.07	1.111E+01	
FE-59	1099.25	25.	-4.	-0.002	184.65	-4.630E-01	P
EU-152	1112.07	115.	-15.	-0.008	107.25	-6.893E+00	
ZN-65	1115.55	100.	-14.	-0.008	101.76	-1.842E+00	
Ta-182	1121.30	56.	10.	0.006	106.40	1.926E+00	
CO-60	1173.24	21.	2.	0.001	459.34	1.473E-01	P
Ta-182	1221.41	70.	-23.	-0.013	43.94	-5.925E+00	P
Co-56	1238.28	22.	12.	0.007	92.05	1.287E+00	P
FE-59	1291.60	27.	-10.	-0.005	113.22	-1.661E+00	P
CO-60	1332.50	6.	3.	0.002	190.23	2.227E-01	P
AG-110M	1384.30	27.	-8.	-0.004	157.30	-2.438E+00	
EU-152	1408.00	5.	7.	0.004	87.49	2.495E+00	
La-140	1596.21	40.	-19.	-0.011	96.41	-1.739E+00	P
SB-124	1690.98	0.	5.	0.003	44.72	9.543E-01	
y-88	1836.06	6.	2.	0.001	304.14	1.970E-01	

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	-2.5831E+00	-2.5832E+00	1.551E+02%	1.37E+01
NA-22	#	9.8660E-01	9.8660E-01	3.609E+01%	9.73E-01
K-40		2.4756E+02	2.4756E+02	5.617E+00%	9.89E+00
Sc-46	#A	-9.0784E-01	-9.0784E-01	9.425E+01%	2.87E+00
CR-51	#A	3.3061E+00	3.3061E+00	1.117E+02%	1.25E+01
MN-54	#A	-2.6377E-01	-2.6377E-01	1.911E+02%	1.68E+00
FE-59	#A	-4.6296E-01	-4.6297E-01	1.846E+02%	2.95E+00
Co-56	#A	5.5124E-01	5.5124E-01	9.205E+01%	1.43E+00
CO-57	#A	1.3591E-01	1.3591E-01	2.667E+02%	1.22E+00
CO-58	#	1.9708E+00	1.9708E+00	2.502E+01%	1.39E+00
CO-60	#A	1.8502E-01	1.8502E-01	1.902E+02%	1.06E+00
ZN-65	#A	-1.8424E+00	-1.8424E+00	1.018E+02%	6.31E+00
NB-94	#A	5.0417E-01	5.0417E-01	1.124E+02%	1.37E+00
ZR-95	#A	-2.0197E-01	-2.0197E-01	5.796E+02%	2.89E+00
NB-95	#A	-2.1714E-01	-2.1715E-01	2.359E+02%	2.24E+00
RU-103	#A	4.3474E-01	4.3475E-01	9.875E+01%	1.08E+00
RH-106	#A	-7.3810E+00	-7.3810E+00	1.017E+02%	1.74E+01
AG-108M	#A	-1.5590E-01	-1.5590E-01	3.105E+02%	1.28E+00
AG-110M	#A	-7.3613E-02	-7.3613E-02	1.015E+03%	2.65E+00
SN-113	#A	1.3024E-01	1.3024E-01	6.242E+02%	2.79E+00
SB-124	#A	-1.2255E-01	-1.2255E-01	4.472E+01%	3.84E+00
SB-125	#A	-1.9551E-01	-1.9551E-01	7.011E+01%	4.20E+00
I-131	#A	2.3454E-01	2.3455E-01	2.016E+02%	1.25E+00
Gd-153	#A	4.9728E-01	4.9728E-01	2.388E+02%	4.00E+00
Ga-68	#A	1.1063E+01	1.1114E+01	1.761E+02%	4.61E+01
Tc-99m	#A	-4.0725E-02	-4.0761E-02	1.170E+03%	1.61E+00
BA-133	#A	-8.1303E-01	-8.1303E-01	1.581E+02%	4.30E+00
CS-134	#A	3.8980E-01	3.8980E-01	6.358E+01%	3.80E+00
CS-137	#	2.8299E+00	2.8299E+00	1.757E+01%	8.66E-01
CE-139	#A	-2.2652E-01	-2.2652E-01	2.103E+02%	1.60E+00
Ba-140	#A	8.8223E-01	8.8224E-01	1.187E+02%	5.33E+00
La-140	#A	-1.7387E+00	-1.7388E+00	9.641E+01%	2.94E+00
CE-141	#A	-7.0085E-01	-7.0085E-01	1.066E+02%	2.49E+00
CE-144	#A	-3.2724E+00	-3.2724E+00	1.234E+02%	1.35E+01
PM-144	#A	3.5660E-01	3.5660E-01	9.910E+01%	8.77E-01
EU-152	#A	2.1693E+00	2.1693E+00	1.412E+02%	8.70E+00
EU-154	#A	1.4341E+00	1.4341E+00	9.757E+01%	1.50E+01
EU-155	#A	-3.4203E-02	-3.4203E-02	7.623E+03%	6.47E+00
HF-181	#A	-1.0881E-01	-1.0881E-01	5.503E+02%	2.07E+00
Ta-182	#A	1.9262E+00	1.9262E+00	1.064E+02%	6.96E+00
Hg-203	#A	-5.1684E-01	-5.1684E-01	1.096E+02%	1.90E+00
TL-208		1.2072E+01	1.2072E+01	6.643E+00%	8.86E-01
pm-146	#A	1.0409E+00	1.0409E+00	1.305E+02%	3.89E+00

y-88	#A	-9.6012E-01	-9.6013E-01	6.870E+01%	1.91E+00
Cd-113m	#A	-4.9477E+03	-4.9477E+03	1.300E+02%	2.17E+04
Cd-109	#A	9.7015E+00	9.7015E+00	1.554E+02%	5.03E+01
Cf-251	#A	1.8613E+00	1.8613E+00	1.082E+02%	5.40E+00
Cf-249	#A	-7.9516E-01	-7.9516E-01	1.091E+02%	2.91E+00
Sn-126	#A	9.6425E-01	9.6425E-01	5.538E+02%	1.80E+01
PB-210	#A	2.6668E+01	2.6668E+01	5.012E+01%	3.74E+01
PB-212		2.8331E+01	2.8331E+01	4.511E+00%	2.18E+00
PB-214	#	1.8608E+01	1.8608E+01	7.865E+00%	2.48E+00
BI-207	#A	2.6835E-01	2.6835E-01	9.611E+01%	1.39E+00
BI-212	#	3.9112E+01	3.9112E+01	1.647E+01%	1.15E+01
BI-214		1.4757E+01	1.4757E+01	1.074E+01%	2.68E+00
BI-210M	#A	1.2263E-02	1.2263E-02	6.286E+03%	2.65E+00
AC-228		3.6200E+01	3.6200E+01	7.478E+00%	2.61E+00
TH-227	#A	2.4845E+00	2.4845E+00	2.676E+02%	1.90E+01
TH-229	#A	-9.1158E+00	-9.1158E+00	1.050E+02%	2.50E+01
TH-234	#A	1.4447E+01	1.4447E+01	6.380E+01%	3.03E+01
PA-231	#A	-1.4410E+01	-1.4410E+01	1.485E+02%	7.18E+01
PA-233	#A	-1.3168E+00	-1.3168E+00	1.390E+02%	6.13E+00
PA-234	#A	-6.6419E-01	-6.6419E-01	1.316E+02%	9.28E+00
PA-234M	#A	6.2937E-01	6.2937E-01	7.345E+01%	3.34E+02
U-235	A	3.1755E+00	3.1755E+00	1.252E+02%	1.26E+01
AM-241	#A	6.0585E-01	6.0585E-01	2.323E+02%	4.00E+00
Np-237	#A	2.7386E+00	2.7386E+00	1.626E+02%	1.48E+01
Ir-192	#A	5.8098E-01	5.8098E-01	6.539E+01%	1.29E+00
Cs-136	#A	5.0996E-01	5.0997E-01	8.389E+01%	1.94E+00
Np-239	#A	1.3268E+00	1.3269E+00	1.203E+02%	5.33E+00
Nd-147	#A	-4.3499E+00	-4.3500E+00	9.527E+01%	1.03E+01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 3.995E+02 Bq/Sample
Total Decayed Activity (37.6 to 1999.5 keV) 3.9946716E+02 Bq/Sample

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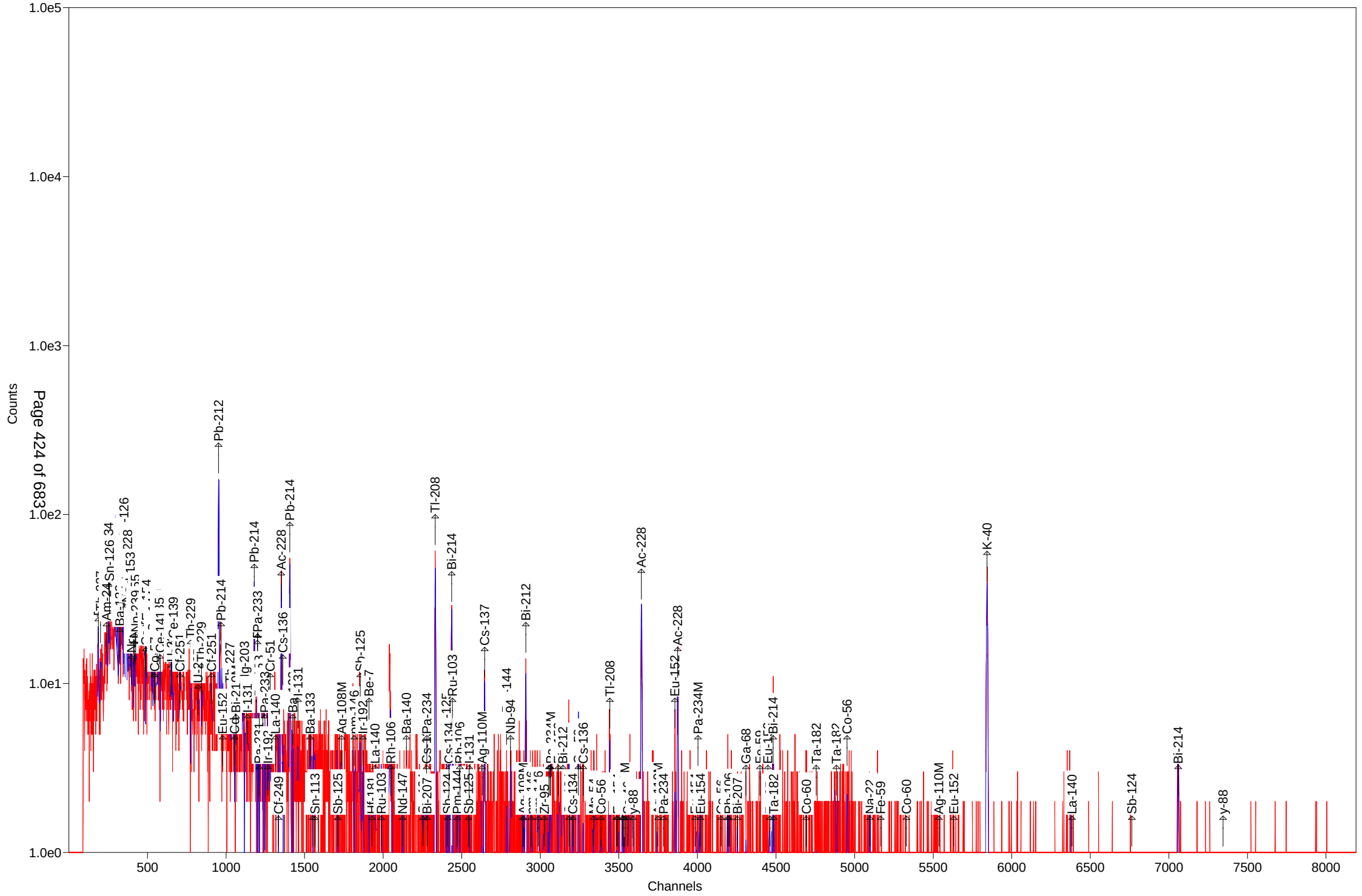
264537_Gamma_160-18552-A-6-B. 14_Gamma_20162249.spc.



Test America St. Louis Spectrum ID: 15_Gamma_20161064

Sample Description: 264537_Gamma_160-18552-A-7-B
Detector: Detector #15
Batch ID: 264537
Work Order Number: Gamma
Lot Number: 160-18552-A-7-B

Decay to Time: 9/1/2016 11:39 Live Time: 1800 sec
Acquisition Time: 9/1/2016 11:40:12 Real Time: 1803 sec
Analysis Time: 9/1/2016 12:11 Dead Time: 0.15 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 15_Soil_TunaCan.Clb
Efficiency Cal Desc: 15_TunaCan_90099_032212
Efficiency Cal Date: 3/22/2012 13:03
Energy Cal Date: 2/28/2012 16:29
Library: Client_Long_Rev11.lib
Bkgd Correction File: 15_2016-08-07_0540.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	1.663E+00	354.5	5.895E+00	5.896E+00	2.020E+01
NA-22	-8.450E-02	574.5	4.854E-01	4.854E-01	1.804E+00
K-40	2.818E+02	5.7	1.606E+01	2.158E+01	1.033E+01
Sc-46	6.110E-01	95.7	5.845E-01	5.854E-01	1.984E+00
CR-51	-4.924E+00	81.1	3.993E+00	4.001E+00	2.610E+01
MN-54	-5.853E-02	1126.9	6.596E-01	6.596E-01	1.602E+00
FE-59	-2.662E+00	38.0	1.011E+00	1.019E+00	4.848E+00
Co-56	5.315E-01	101.5	5.396E-01	5.403E-01	1.622E+00
CO-57	-1.580E-01	268.7	4.244E-01	4.245E-01	1.434E+00
CO-58	-8.945E-01	85.0	7.605E-01	7.619E-01	2.548E+00
CO-60	5.375E-01	87.7	4.717E-01	4.724E-01	1.184E+00
ZN-65	-7.775E-02	2615.2	2.033E+00	2.033E+00	7.093E+00
NB-94	-1.011E+00	90.6	9.151E-01	9.166E-01	2.087E+00
ZR-95	3.516E-01	368.7	1.297E+00	1.297E+00	3.087E+00
NB-95	-4.673E-01	163.1	7.620E-01	7.623E-01	2.603E+00
RU-103	-3.348E-01	187.4	6.273E-01	6.276E-01	1.520E+00
RH-106	8.171E+00	122.0	9.965E+00	9.974E+00	3.808E+01
AG-108M	9.070E-01	42.9	3.894E-01	3.921E-01	1.032E+00
AG-110M	3.751E-01	149.7	5.615E-01	5.619E-01	3.017E+00
SN-113	4.148E-02	2374.8	9.850E-01	9.850E-01	3.374E+00
SB-124	5.272E-01	82.9	4.369E-01	4.377E-01	3.847E+00
SB-125	1.224E+00	90.0	1.102E+00	1.104E+00	4.592E+00
I-131	-2.656E-01	143.4	3.808E-01	3.810E-01	1.656E+00
Gd-153	-1.575E+00	172.1	2.710E+00	2.712E+00	9.014E+00
Ga-68	1.818E+01	106.3	1.932E+01	1.934E+01	4.530E+01
Tc-99m	0.000E+00	1.#INF	3.227E-01	3.227E-01	2.667E+00
BA-133	7.462E-01	173.6	1.296E+00	1.296E+00	4.016E+00
CS-134	4.877E-01	113.8	5.549E-01	5.555E-01	3.865E+00
CS-137	2.432E+00	24.4	5.930E-01	6.064E-01	1.267E+00
CE-139	-8.987E-02	601.6	5.407E-01	5.407E-01	1.832E+00
Ba-140	2.638E+00	108.8	2.871E+00	2.874E+00	4.744E+00
La-140	3.001E-01	107.9	3.236E-01	3.240E-01	2.377E+00
CE-141	4.779E-01	177.4	8.477E-01	8.481E-01	2.175E+00

CE-144	3.651E+00	56.9	2.079E+00	2.087E+00	6.814E+00
PM-144	-7.441E-01	102.2	7.605E-01	7.614E-01	1.753E+00
EU-152	2.712E+00	87.4	2.371E+00	2.375E+00	9.411E+00
EU-154	1.354E+00	82.2	1.112E+00	1.115E+00	1.839E+01
EU-155	3.942E-01	240.9	9.496E-01	9.499E-01	1.268E+01
HF-181	0.000E+00	1.#INF	2.608E-01	2.608E-01	2.703E+00
Ta-182	-4.498E+00	71.9	3.232E+00	3.239E+00	1.073E+01
Hg-203	-6.187E-01	95.6	5.913E-01	5.924E-01	1.977E+00
TL-208	8.707E+00	9.2	8.001E-01	9.188E-01	1.131E+00
pm-146	1.931E+00	76.5	1.478E+00	1.481E+00	3.952E+00
y-88	1.667E-01	46.7	7.784E-02	7.831E-02	1.565E+00
Cd-113m	-1.541E+03	452.8	6.978E+03	6.979E+03	2.390E+04
Cd-109	1.858E+00	696.9	1.295E+01	1.295E+01	4.364E+01
Cf-251	-2.691E+00	98.7	2.657E+00	2.668E+00	6.763E+00
Cf-249	-1.321E-01	722.5	9.546E-01	9.546E-01	3.263E+00
Sn-126	6.187E+00	114.4	7.081E+00	7.088E+00	2.358E+01
PB-210	2.338E+01	51.1	1.196E+01	1.203E+01	3.278E+01
PB-212	2.422E+01	5.2	1.267E+00	2.015E+00	2.232E+00
PB-214	1.787E+01	6.7	1.206E+00	1.522E+00	2.400E+00
BI-207	1.405E-01	83.5	1.174E-01	1.176E-01	1.648E+00
BI-212	7.293E+00	134.5	9.809E+00	9.817E+00	3.332E+01
BI-214	1.781E+01	8.3	1.475E+00	1.741E+00	1.796E+00
BI-210M	-8.529E-01	103.1	8.790E-01	8.805E-01	2.947E+00
AC-228	1.102E+01	17.1	1.888E+00	1.970E+00	1.206E+01
TH-227	-7.681E+00	113.6	8.725E+00	8.735E+00	2.914E+01
TH-229	8.685E+00	102.4	8.892E+00	8.919E+00	2.405E+01
TH-234	-2.194E+01	43.4	9.523E+00	9.592E+00	6.116E+01
PA-231	1.412E+01	117.2	1.656E+01	1.658E+01	7.507E+01
PA-233	-1.677E-01	117.0	1.962E-01	1.964E-01	6.862E+00
PA-234	5.311E-01	90.1	4.787E-01	4.795E-01	1.224E+01
PA-234M	6.752E+01	91.2	6.158E+01	6.167E+01	2.669E+02
U-235	-1.374E-02	36452.3	5.008E+00	5.008E+00	2.130E+01
AM-241	-1.844E+00	111.3	2.052E+00	2.055E+00	6.832E+00
Np-237	-3.610E+00	180.3	6.508E+00	6.511E+00	2.165E+01
Ir-192	1.840E-02	98.4	1.811E-02	1.814E-02	2.807E+00
Cs-136	-9.002E-01	88.3	7.952E-01	7.969E-01	2.667E+00
Np-239	-2.129E+00	170.8	3.636E+00	3.638E+00	1.209E+01
Nd-147	9.264E-01	428.8	3.973E+00	3.973E+00	9.823E+00
Total	5.425E+02				

Analyst: kody Saulters

Sample description
264537_Gamma_160-18552-A-7-B

Spectrum Filename: C:\User\SPC\Det15\15_Gamma_20161064.An1

Acquisition information
Start time: 9/1/2016 11:40:12 AM
Live time: 1800
Real time: 1803
Dead time: 0.15 %
Detector ID: 15

Detector system
Ge15 SN/11012216

Calibration
Filename: 15_Soil_TunaCan.Clb
15_TunaCan_90099_032212

Energy Calibration
Created: 2/28/2012 4:29:17 PM
Zero offset: 0.044 keV
Gain: 0.250 keV/channel
Quadratic: -3.267E-08 keV/channel^2

Efficiency Calibration
Created: 3/22/2012 1:03:01 PM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.00 %
Log(Eff): -6.894897E-01 + (-3.290613E-01*Log(E)) + (-3.875629E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.13 %
Log(Eff): -2.362677E+01 + (8.666669E+00*Log(E)) + (-9.214638E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev11.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.57keV)
Stop channel: 8000 (1999.52keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	9/1/2016 11:39:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	15_2016-08-07_0540.PBC 8/7/2016 5:40:08 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 29 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1430

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.37	35.	51.13	1.23	1.957E-02	46.54	4.250	PBC<MDA	PB210
65.23	32.	114.45	0.96	2.970E-02	64.28	9.700	PBC<MDA	Sn126
74.82	207.	11.60	0.97	3.382E-02				
77.25	296.	9.22	0.97	3.457E-02				
87.30	115.	19.89	0.83	3.693E-02	86.49	13.100	1.326E+01	Np237
					86.54	30.700	5.657E+00	EU155
					86.94	9.040	1.917E+01	Sn126
					87.57	37.500	4.607E+00	Sn126
					88.04	3.790	4.548E+01	Cd109
92.59	7.	518.31	0.99	3.776E-02	92.59	5.584	PBC<MDA	TH234
99.77	25.	53.09	0.59	3.848E-02	99.50	15.000	2.440E+00	Np239
113.54	18.	81.41	0.43	3.880E-02				
133.54	27.	56.94	1.03	3.754E-02	133.54	11.090	PBC<MDA	CE144
145.44	15.	177.39	1.04	3.618E-02	145.44	48.200	PBC<MDA	CE141
193.51	19.	120.55	1.08	3.030E-02	193.51	4.400	PBC<MDA	TH229
210.85	15.	165.52	1.10	2.844E-02	210.85	2.990	PBC<MDA	TH229
227.00	19.	95.69	1.11	2.691E-02	227.00	6.300	PBC<MDA	Cf251
238.72	489.	5.23	1.12	2.592E-02	238.63	43.300	2.422E+01	PB212
241.89	77.	21.15	1.12	2.566E-02	242.00	7.430	2.252E+01	PB214
244.69	17.	237.42	1.13	2.543E-02	244.69	7.580	PBC<MDA	EU152
256.24	11.	183.43	1.14	2.456E-02	256.24	7.000	PBC<MDA	TH227
277.75	59.	33.58	0.34	2.310E-02	277.28	6.310	2.245E+01	TL208

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
295.17	140.	10.52	1.43	2.205E-02	295.09	19.300	1.832E+01	PB214
300.07	15.	161.84	1.17	2.177E-02				
300.18	15.	165.96	1.17	2.176E-02				
300.81	44.	51.06	1.17	2.177E-02	300.03	3.280	PBC<MDA	PB212
302.65	15.	169.69	1.18	2.162E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	2.067E+00	BA133
302.85	15.	173.64	1.18	2.161E-02	302.65	2.880	1.315E+01	PA231
					302.85	18.330	2.067E+00	BA133
304.85	15.	177.25	1.18	2.150E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	1.362E+00	BI210M
338.34	107.	16.00	1.07	1.983E-02	338.32	12.010	2.488E+01	AC228
351.85	230.	8.46	1.21	1.923E-02	351.93	37.600	1.764E+01	PB214
356.00	8.	333.53	1.22	1.906E-02	356.00	62.050	PBC<MDA	BA133
433.94	27.	42.93	1.29	1.629E-02	433.94	90.480	PBC<MDA	AG108M
463.37	16.	90.04	1.31	1.545E-02	463.37	10.470	PBC<MDA	SB125
468.06	13.	113.59	1.32	1.533E-02	468.06	51.750	PBC<MDA	Ir192
477.60	5.	354.50	1.32	1.508E-02	477.60	10.520	PBC<MDA	BE7
487.02	14.	107.86	1.33	1.485E-02	487.02	45.500	PBC<MDA	La140
511.86	107.	17.39	2.60	1.426E-02	511.86	20.000	2.084E+01	RH106
529.82	3.	428.82	1.37	1.384E-02	531.00	13.000	PBC<MDA	Nd147
537.26	9.	126.29	1.37	1.371E-02	537.26	24.390	PBC<MDA	Ba140
563.24	4.	322.59	1.39	1.319E-02	563.24	8.350	PBC<MDA	CS134
569.32	6.	137.35	1.40	1.307E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	3.283E+00	PA234
					569.70	97.740	2.755E-01	BI207
583.30	170.	9.19	0.95	1.281E-02	583.02	84.500	8.707E+00	TL208
600.50	11.	219.61	1.42	1.251E-02	600.50	17.860	PBC<MDA	SB125
609.35	183.	8.28	0.93	1.236E-02	609.31	46.090	1.781E+01	BI214
					610.30	5.750	1.429E+02	RU103
621.92	12.	200.03	1.44	1.215E-02	621.92	9.930	PBC<MDA	RH106
635.89	2.	648.07	1.45	1.193E-02	635.89	11.310	PBC<MDA	SB125
636.97	4.	227.47	1.45	1.192E-02	636.97	7.170	PBC<MDA	I131
661.69	43.	24.38	1.01	1.155E-02	661.66	85.210	2.432E+00	CS137
722.79	14.	82.87	1.52	1.072E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	PBC<MDA	AG108M
					723.36	20.220	PBC<MDA	EU154
722.94	14.	88.91	1.52	1.072E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	7.968E-01	AG108M
					723.36	20.220	3.582E+00	EU154
727.17	11.	134.51	1.52	1.067E-02	727.17	7.550	PBC<MDA	BI212
735.72	9.	123.35	1.53	1.056E-02	735.72	22.500	PBC<MDA	pm146
747.16	12.	90.62	1.54	1.043E-02	747.16	34.000	PBC<MDA	pm146
757.02	4.	368.74	1.54	1.032E-02	756.73	54.460	PBC<MDA	ZR95
766.41	13.	91.19	1.55	1.021E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	2.446E+02	PA234M
785.42	5.	224.40	1.57	9.998E-03	785.42	1.280	PBC<MDA	BI212
795.87	10.	113.79	1.57	9.887E-03	795.87	85.530	PBC<MDA	CS134
815.77	7.	176.91	1.59	9.682E-03	815.77	23.280	PBC<MDA	La140

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
858.14	12.	89.52	1.62	9.252E-03	860.56	12.420	PBC<MDA	TL208
880.53	7.	131.27	1.64	9.072E-03	880.53	6.000	PBC<MDA	PA234
889.28	10.	95.67	1.64	8.996E-03	889.28	99.984	PBC<MDA	Sc46
911.49	116.	10.57	1.06	8.808E-03	911.07	29.000	2.483E+01	AC228
946.02	9.	98.47	1.68	8.531E-03	946.02	13.400	PBC<MDA	PA234
964.11	14.	87.42	1.70	8.393E-03	964.11	14.605	PBC<MDA	EU152
968.97	77.	17.14	1.70	8.357E-03	968.97	17.460	2.939E+01	AC228
996.33	10.	82.19	1.72	8.158E-03	996.33	10.600	PBC<MDA	EU154
1037.84	9.	101.52	1.75	7.875E-03	1037.84	14.130	PBC<MDA	Co56
1048.07	5.	159.40	1.75	7.808E-03	1048.07	80.000	PBC<MDA	Cs136
1050.36	5.	139.58	1.76	7.793E-03	1050.36	1.560	PBC<MDA	RH106
1063.66	8.	94.08	1.76	7.709E-03	1063.66	74.500	PBC<MDA	BI207
1077.40	7.	106.27	1.77	7.623E-03	1077.40	3.300	PBC<MDA	Ga68
1120.36	51.	15.96	1.16	7.368E-03	1120.29	15.100	2.558E+01	BI214
					1120.55	99.987	PBC<MDA	Sc46
1173.24	6.	174.06	1.84	7.076E-03	1173.24	99.900	PBC<MDA	CO60
1189.05	13.	87.52	1.85	6.994E-03	1189.05	16.200	PBC<MDA	Ta182
1238.28	4.	325.32	1.88	6.748E-03	1238.28	66.070	PBC<MDA	Co56
1291.60	8.	95.58	1.91	6.502E-03	1291.60	43.200	PBC<MDA	FE59
1332.50	7.	87.75	1.94	6.325E-03	1332.50	99.980	PBC<MDA	CO60
1384.30	4.	149.69	1.97	6.114E-03	1384.30	24.290	PBC<MDA	AG110M
1408.00	7.	89.39	1.98	6.023E-03	1408.00	21.005	PBC<MDA	EU152
1461.13	315.	5.70	1.93	5.828E-03	1460.83	10.670	2.818E+02	K40
1764.71	8.	91.83	2.18	4.916E-03	1764.49	15.400	PBC<MDA	BI214
1771.35	8.	93.10	2.18	4.898E-03	1771.35	15.480	PBC<MDA	Co56
1836.06	5.	46.69	2.22	4.741E-03	1836.06	99.200	PBC<MDA	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
298.87	74.85	183.	207.	6.106E+03	11.60	0.972	- sD
308.60	77.28	224.	296.	8.561E+03	9.22	0.975	- D
398.62	99.77	67.	25.	6.584E+02	53.09	0.592	- s
453.65	113.54	77.	18.	4.725E+02	81.41	0.425	- sc
1352.35	338.34	44.	107.	5.379E+03	16.00	1.068	- M
3645.70	911.49	38.	82.	9.356E+03	15.28	1.659	- sD

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: Client_Long_Rev11.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.17	46.37	99.	35.	0.019	51.13	1.233s
TH-227	200.23	50.14	367.	-24.	-0.013	113.60	0.950s
AM-241	237.79	59.54	642.	-33.	-0.018	111.28	0.958s
TH-234	252.78	63.29	662.	-44.	-0.024	43.40	0.962s
Sn-126	256.75	64.28	658.	32.	0.018	114.45	0.963s
BA-133	323.54	80.99	1276.	-35.	-0.020	54.47	0.978s
Np-237	345.53	86.49	1577.	-31.	-0.017	180.26	0.983
EU-155	345.74	86.54	534.	14.	0.008	240.88	0.983s
Sn-126	347.33	86.94	118.	107.	0.059	17.40	0.984D
Sn-126	349.84	87.57	666.	2.	0.001	984.15	0.984D
Cd-109	351.72	88.04	534.	5.	0.003	696.94	0.985A
Nd-147	363.95	91.10	1563.	-32.	-0.018	173.67	0.987
TH-234	369.91	92.59	638.	7.	0.004	518.31	0.989s
AC-228	372.95	93.35	1586.	-32.	-0.018	174.56	0.990
Gd-153	389.54	97.50	1554.	-33.	-0.018	172.11	0.993s
Np-239	397.53	99.50	1521.	-33.	-0.018	170.00	0.995s
Gd-153	412.32	103.20	1508.	-33.	-0.018	168.71	0.998
Np-239	414.32	103.70	1540.	-33.	-0.018	170.44	0.999s
Np-239	424.03	106.13	1642.	-34.	-0.019	170.79	1.001s
EU-152	486.57	121.78	286.	-27.	-0.015	133.81	1.016s
CO-57	487.72	122.06	312.	-9.	-0.005	268.70	1.016s
PA-234	524.63	131.29	996.	-30.	-0.017	151.01	1.024s
HF-181	531.54	133.02	966.	-30.	-0.017	148.54	1.026s
CE-144	533.60	133.54	108.	27.	0.015	56.94	1.026D
HF-181	544.63	136.30	977.	-30.	-0.017	148.95	1.029s
CO-57	545.33	136.47	1019.	-20.	-0.011	232.28	1.029s
Tc-99m	561.46	140.51	1038.	0.	0.000	1000.00	1.032s
CE-141	581.17	145.44	198.	15.	0.008	177.39	1.037s
Ba-140	650.01	162.66	308.	0.	0.000	1000.00	1.053
U-235	652.88	163.38	359.	-31.	-0.017	89.37	1.053
CE-139	662.77	165.85	346.	-4.	-0.002	601.62	1.055s
Cf-251	705.73	176.60	191.	-27.	-0.015	98.72	1.065s
TH-229	773.33	193.51	139.	19.	0.010	120.55	1.080s
U-235	820.60	205.33	154.	-3.	-0.002	776.03	1.091
TH-229	842.65	210.85	180.	15.	0.009	165.52	1.096s
Cf-251	907.22	227.00	88.	19.	0.010	95.69	1.110s
PB-212	953.72	238.63	83.	489.	0.272	5.23	1.120D
PB-214	967.17	242.00	104.	75.	0.042	22.29	1.123D
EU-152	977.95	244.69	837.	17.	0.010	237.42	1.126s
TH-227	1024.12	256.24	106.	11.	0.006	183.43	1.136s
Cd-113m	1053.94	263.70	162.	-4.	-0.002	452.77	1.142s
BI-210M	1062.46	265.83	169.	-18.	-0.010	103.06	1.144s
TL-208	1108.25	277.28	57.	44.	0.025	28.27	1.154D
Hg-203	1115.91	279.20	188.	-21.	-0.012	95.57	1.156s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
I-131	1136.30	284.30	100.	-3.	-0.002	655.18	1.160s
PB-214	1179.75	295.17	25.	140.	0.078	10.52	1.425s
PB-212	1199.19	300.03	232.	44.	0.025	51.06	1.174
PA-231	1199.35	300.07	276.	15.	0.008	161.84	1.174
PA-233	1199.79	300.18	291.	15.	0.008	165.96	1.174
PA-231	1209.66	302.65	305.	15.	0.008	169.69	1.176s
BA-133	1210.47	302.85	320.	15.	0.008	173.64	1.176s
Ba-140	1218.46	304.85	335.	15.	0.008	177.25	1.178s
BI-210M	1218.64	304.90	363.	-7.	-0.004	398.47	1.178s
Ir-192	1232.81	308.44	356.	0.	0.000	1000.00	1.181s
PA-233	1247.09	312.01	383.	-17.	-0.009	164.90	1.184
Ir-192	1265.00	316.49	366.	-17.	-0.009	160.76	1.188s
CR-51	1279.37	320.08	407.	-18.	-0.010	81.09	1.191s
Cf-249	1332.77	333.44	357.	-19.	-0.010	144.76	1.203s
AC-228	1352.28	338.32	338.	-5.	-0.003	507.94	1.207
Cs-136	1361.28	340.57	333.	0.	0.000	1000.00	1.209s
HF-181	1382.30	345.83	105.	-22.	-0.012	129.85	1.213s
PB-214	1406.39	351.85	37.	230.	0.128	8.46	1.213
BA-133	1422.97	356.00	315.	8.	0.004	333.53	1.222s
I-131	1456.89	364.48	84.	-14.	-0.008	174.63	1.229
BA-133	1534.29	383.84	184.	-19.	-0.010	104.14	1.246s
Cf-249	1550.72	387.95	203.	-3.	-0.002	722.47	1.249s
SB-125	1710.36	427.88	65.	-8.	-0.004	248.76	1.283s
AG-108M	1734.60	433.94	28.	27.	0.015	42.93	1.288s
pm-146	1814.35	453.88	87.	-20.	-0.011	96.32	1.304s
SB-125	1852.29	463.37	92.	16.	0.009	90.04	1.312s
Ir-192	1871.05	468.06	106.	13.	0.007	113.59	1.316s
BE-7	1909.18	477.60	139.	5.	0.003	354.50	1.324s
HF-181	1926.79	482.00	144.	0.	0.000	1000.00	1.328s
La-140	1946.87	487.02	112.	14.	0.008	107.86	1.332s
RU-103	1987.00	497.05	52.	-8.	-0.004	187.36	1.340s
RH-106	2046.22	511.86	35.	107.	0.059	17.39	2.602s
Nd-147	2122.75	531.00	39.	3.	0.002	428.82	1.368s
Ba-140	2147.78	537.26	31.	9.	0.005	126.29	1.373s
CS-134	2251.67	563.24	39.	4.	0.002	322.59	1.394s
CS-134	2276.00	569.32	35.	6.	0.004	137.35	1.399
PA-234	2276.59	569.47	51.	-7.	-0.004	143.02	1.399
BI-207	2277.52	569.70	57.	-8.	-0.004	138.07	1.399
TL-208	2331.91	583.30	17.	170.	0.094	9.19	0.953s
SB-125	2400.69	600.50	283.	11.	0.006	219.61	1.424s
SB-124	2409.62	602.73	311.	-3.	-0.002	862.38	1.425s
CS-134	2417.53	604.71	308.	0.	0.000	1000.00	1.427s
BI-214	2436.07	609.35	11.	183.	0.101	8.28	0.934s
RU-103	2439.88	610.30	308.	0.	0.000	1000.00	1.431s
AG-108M	2455.81	614.28	308.	0.	0.000	1000.00	1.435s
PM-144	2470.93	618.06	323.	-13.	-0.007	113.66	1.437
RH-106	2486.35	621.92	295.	12.	0.007	200.03	1.440s
SB-125	2542.23	635.89	46.	2.	0.001	648.07	1.451s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
I-131	2546.57	636.97	43.	4.	0.002	227.47	1.452s
AG-110M	2629.71	657.76	97.	-5.	-0.003	265.17	1.469s
CS-137	2645.41	661.69	18.	43.	0.024	24.38	1.007s
PM-144	2784.82	696.54	47.	-15.	-0.008	102.20	1.499s
NB-94	2809.17	702.63	65.	-20.	-0.011	90.56	1.503s
SB-124	2889.79	722.79	57.	14.	0.008	82.87	1.519s
AG-108M	2890.40	722.94	70.	14.	0.008	88.91	1.519s
EU-154	2892.07	723.36	125.	-20.	-0.011	83.10	1.519s
ZR-95	2895.44	724.20	104.	-14.	-0.008	18.41	1.520s
BI-212	2907.33	727.17	96.	11.	0.006	134.51	1.522s
pm-146	2941.53	735.72	23.	9.	0.005	123.35	1.529s
pm-146	2987.29	747.16	23.	12.	0.007	90.62	1.537s
ZR-95	3025.56	756.73	37.	4.	0.002	368.74	1.544s
AG-110M	3054.42	763.94	78.	-19.	-0.011	68.18	1.550s
NB-95	3061.80	765.79	93.	-9.	-0.005	163.07	1.551s
PA-234M	3064.30	766.41	66.	13.	0.007	91.19	1.552s
EU-152	3114.33	778.92	56.	-19.	-0.010	87.53	1.561s
BI-212	3140.33	785.42	23.	5.	0.003	224.40	1.566s
CS-134	3182.12	795.87	62.	10.	0.006	113.79	1.574s
CS-134	3206.46	801.95	88.	-16.	-0.009	84.35	1.578s
CO-58	3241.75	810.78	80.	-16.	-0.009	85.02	1.585s
La-140	3261.74	815.77	65.	7.	0.004	176.91	1.589s
Cs-136	3272.66	818.50	88.	-16.	-0.009	88.34	1.591s
Co-56	3385.75	846.77	28.	0.	0.000	1000.00	1.612s
TL-208	3440.93	860.56	24.	12.	0.007	89.52	1.622s
NB-94	3483.06	871.10	37.	-9.	-0.005	101.23	1.629s
EU-154	3491.60	873.23	54.	-6.	-0.004	165.34	1.631s
PA-234	3520.80	880.53	43.	7.	0.004	131.27	1.636s
PA-234	3531.64	883.24	50.	0.	0.000	1000.00	1.638s
AG-110M	3537.42	884.68	50.	0.	0.000	1000.00	1.639s
Sc-46	3555.81	889.28	40.	10.	0.005	95.67	1.642s
y-88	3590.85	898.04	20.	-4.	-0.002	250.83	1.649s
AG-110M	3748.69	937.49	30.	-3.	-0.002	405.52	1.677s
PA-234	3782.81	946.02	16.	9.	0.005	98.47	1.683s
EU-152	3855.18	964.11	30.	14.	0.008	87.42	1.696s
AC-228	3874.63	968.97	49.	77.	0.043	17.14	1.699
EU-154	3984.09	996.33	31.	10.	0.006	82.19	1.718s
EU-154	4017.88	1004.77	31.	-9.	-0.005	144.75	1.724s
Co-56	4150.18	1037.84	15.	9.	0.005	101.52	1.747s
Cs-136	4191.11	1048.07	25.	5.	0.003	159.40	1.754s
RH-106	4200.27	1050.36	25.	5.	0.003	139.58	1.755s
BI-207	4253.49	1063.66	11.	8.	0.004	94.08	1.765s
Ga-68	4308.47	1077.40	10.	7.	0.004	106.27	1.774s
FE-59	4395.90	1099.25	54.	-20.	-0.011	37.97	1.789s
EU-152	4447.22	1112.07	108.	-14.	-0.008	108.27	1.797s
BI-214	4480.37	1120.36	4.	51.	0.028	15.96	1.156s
Sc-46	4481.13	1120.55	106.	-14.	-0.008	107.30	1.803s
Ta-182	4484.13	1121.30	101.	-21.	-0.012	71.85	1.803

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-60	4691.97	1173.24	22.	6.	0.003	174.06	1.838s
Ta-182	4755.25	1189.05	21.	13.	0.007	87.52	1.848
Ta-182	4884.75	1221.41	49.	-17.	-0.009	65.69	1.869
Co-56	4952.26	1238.28	32.	4.	0.002	325.32	1.879s
NA-22	5097.34	1274.53	16.	-1.	-0.001	574.46	1.902s
EU-154	5097.40	1274.54	17.	0.	0.000	1000.00	1.902s
FE-59	5165.64	1291.60	11.	8.	0.005	95.58	1.913s
CO-60	5329.36	1332.50	5.	7.	0.004	87.75	1.938s
AG-110M	5536.68	1384.30	6.	4.	0.002	149.69	1.970s
EU-152	5631.56	1408.00	6.	7.	0.004	89.39	1.984s
K-40	5844.23	1461.13	4.	315.	0.175	5.70	1.927s
La-140	6384.98	1596.21	17.	-4.	-0.002	439.92	2.092s
SB-124	6764.43	1690.98	6.	-4.	-0.002	156.12	2.142s
BI-214	7058.76	1764.49	23.	8.	0.004	91.83	2.181s
Co-56	7086.23	1771.35	21.	8.	0.004	93.10	2.184s
y-88	7345.35	1836.06	0.	5.	0.003	46.69	2.216s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	1.6630E+00				5.31E+01	
			477.60	1.663E+00	&(P	2.020E+01 3.55E+02 1.05E+01	G
NA-22	C	-8.4496E-02				9.50E+02	
			1274.53	-8.450E-02	?(	1.804E+00 5.74E+02 9.99E+01	G
K-40	N	2.8178E+02				4.66E+11	
			1460.83	2.818E+02	@(P	1.033E+01 5.70E+00 1.07E+01	G
Sc-46	F	6.1097E-01				8.38E+01	
			889.28	6.110E-01	?(	1.984E+00 9.57E+01 1.00E+02	G
			1120.55	-1.058E+00	+	3.826E+00 1.07E+02 1.00E+02	G
CR-51	F	-4.9237E+00				2.77E+01	
			320.08	-4.924E+00	?(P	2.610E+01 8.11E+01 9.94E+00	G
MN-54	C	-5.8530E-02				3.12E+02	
			834.85	-5.853E-02	%(	1.602E+00 1.13E+03 1.00E+02	G
FE-59	F	-2.6615E+00				4.45E+01	
			1099.25	-2.662E+00	?(P	4.848E+00 3.80E+01 5.65E+01	G
			1291.60	1.648E+00	+	3.546E+00 9.56E+01 4.32E+01	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Co-56	C 5.3153E-01					7.73E+01	
		846.77	0.000E+00	?(	1.622E+00	1.00E+03	9.99E+01 G
		1238.28	4.984E-01	(	3.622E+00	3.25E+02	6.61E+01 G
		1037.84	4.446E+00	?(P	1.039E+01	1.02E+02	1.41E+01 G
		1771.35	5.569E+00	?	1.772E+01	9.31E+01	1.55E+01 A
CO-57	C -1.5796E-01					2.72E+02	
		122.06	-1.580E-01	?(	1.434E+00	2.69E+02	8.56E+01 G
		136.47	-2.728E+00	+	2.116E+01	2.32E+02	1.07E+01 G
CO-58	C -8.9452E-01					7.09E+01	
		810.78	-8.945E-01	?(	2.548E+00	8.50E+01	9.95E+01 G
CO-60	F 5.3750E-01					1.93E+03	
		1332.50	5.857E-01	?(	1.184E+00	8.77E+01	1.00E+02 G
		1173.24	4.893E-01	?(P	1.922E+00	1.74E+02	9.99E+01 G
ZN-65	F -7.7747E-02					2.44E+02	
		1115.55	-7.775E-02	%(	7.093E+00	2.62E+03	5.06E+01 G
NB-94	I -1.0105E+00					7.41E+06	
		702.63	-1.011E+00	&(	2.087E+00	9.06E+01	9.79E+01 G
		871.10	-5.467E-01	+	1.886E+00	1.01E+02	9.99E+01 G
ZR-95	I 3.5163E-01					6.40E+01	
		756.73	3.516E-01	?(P	3.087E+00	3.69E+02	5.45E+01 G
		724.20	-1.675E+00	+ P	5.911E+00	1.84E+01	4.42E+01 G
NB-95	I -4.6726E-01					6.40E+01	
		765.79	-4.673E-01	?(	2.603E+00	1.63E+02	9.98E+01 G
RU-103	I -3.3482E-01					3.93E+01	
		497.05	-3.348E-01	?(	1.520E+00	1.87E+02	9.09E+01 G
		610.30	0.000E+00	+	6.613E+01	1.00E+03	5.75E+00 GA
RH-106	I 8.1705E+00					3.74E+02	
		621.92	5.645E+00	&(	3.808E+01	2.00E+02	9.93E+00 G
		1050.36	2.424E+01	?(P	1.182E+02	1.40E+02	1.56E+00 G
		511.86	2.084E+01	?	5.898E+00	1.74E+01	2.00E+01 GA
AG-108M	C 9.0704E-01					1.53E+05	
		433.94	1.018E+00	?(	1.032E+00	4.29E+01	9.05E+01 G
		722.94	7.968E-01	?(	2.381E+00	8.89E+01	9.08E+01 G
		614.28	0.000E+00	&	4.255E+00	1.00E+03	8.98E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AG-110M	F 3.7513E-01					2.50E+02	
		884.68	0.000E+00	?(	3.017E+00	1.00E+03	7.27E+01 G
		657.76	-2.698E-01	+	2.463E+00	2.65E+02	9.46E+01 G
		937.49	-5.642E-01	+	5.310E+00	4.06E+02	3.44E+01 G
		1384.30	1.498E+00	?(P	5.282E+00	1.50E+02	2.43E+01 G
		763.94	-4.733E+00	&	1.069E+01	6.82E+01	2.23E+01 G
SN-113	F 4.1475E-02					1.15E+02	
		391.69	4.148E-02	%(P	3.374E+00	2.37E+03	6.40E+01 G
SB-124	F 5.2720E-01					6.02E+01	
		602.73	-1.314E-01	?(	3.847E+00	8.62E+02	9.83E+01 G
		1690.98	-9.101E-01	+	3.214E+00	1.56E+02	4.78E+01 G
		722.79	6.513E+00	?(P	1.809E+01	8.29E+01	1.08E+01 G
SB-125	I 1.2244E+00					1.01E+03	
		427.88	-9.217E-01	?(P	4.592E+00	2.49E+02	2.96E+01 G
		600.50	2.721E+00	&(P	2.017E+01	2.20E+02	1.79E+01 G
		635.89	6.175E-01	?(	1.420E+01	6.48E+02	1.13E+01 G
		463.37	5.395E+00	(P	1.628E+01	9.00E+01	1.05E+01 G
I-131	I -2.6557E-01					8.02E+00	
		364.48	-5.267E-01	&(P	1.656E+00	1.75E+02	8.17E+01 G
		284.30	-1.196E+00	&	1.967E+01	6.55E+02	6.14E+00 G
		636.97	2.710E+00	&(	2.160E+01	2.27E+02	7.17E+00 G
Gd-153	F -1.5745E+00					2.42E+02	
		97.50	-1.575E+00	?(	9.014E+00	1.72E+02	3.00E+01 G
		103.20	-2.156E+00	&	1.210E+01	1.69E+02	2.18E+01 G
Ga-68	C 1.8176E+01					4.71E-02	
		1077.40	1.818E+01	?(	4.530E+01	1.06E+02	3.30E+00 G
BA-133	F 7.4618E-01					3.85E+03	
		356.00	3.560E-01	?(P	4.016E+00	3.34E+02	6.20E+01 G
		302.85	2.067E+00	?(	1.207E+01	1.74E+02	1.83E+01 G
		383.84	-6.530E+00	&	2.279E+01	1.04E+02	8.94E+00 GA
		80.99	-1.614E+00	& P	7.756E+00	5.45E+01	3.41E+01 GA
CS-134	I 4.8768E-01					7.54E+02	
		604.71	0.000E+00	?(	3.865E+00	1.00E+03	9.76E+01 G
		795.87	6.679E-01	?(	2.585E+00	1.14E+02	8.55E+01 G
		569.32	1.750E+00	(	8.330E+00	1.37E+02	1.54E+01 G
		801.95	-1.071E+01	+	3.024E+01	8.43E+01	8.69E+00 G
		563.24	2.018E+00	?(	1.605E+01	3.23E+02	8.35E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CS-137	I	2.4324E+00					1.10E+04	
			661.66	2.432E+00	(P	1.267E+00	2.44E+01	8.52E+01 G
CE-139	F	-8.9870E-02					1.38E+02	
			165.85	-8.987E-02	?(	1.832E+00	6.02E+02	7.99E+01 G
Ba-140	I	2.6381E+00					1.28E+01	
			537.26	1.538E+00	?(P	4.744E+00	1.26E+02	2.44E+01 G
			162.66	0.000E+00	-	2.234E+01	1.00E+03	6.22E+00 G
			304.85	8.890E+00	&(	5.299E+01	1.77E+02	4.29E+00 G
La-140	I	3.0005E-01					1.28E+01	
			1596.21	-4.422E-01	?(P	2.377E+00	4.40E+02	9.54E+01 G
			487.02	1.179E+00	?(P	4.284E+00	1.08E+02	4.55E+01 G
			328.76	3.139E-01	% P	1.308E+01	1.23E+03	2.03E+01 G
			815.77	1.623E+00	?(	9.899E+00	1.77E+02	2.33E+01 G
CE-141	I	4.7790E-01					3.25E+01	
			145.44	4.779E-01	?(	2.175E+00	1.77E+02	4.82E+01 G
CE-144	I	3.6509E+00					2.85E+02	
			133.54	3.651E+00	(	6.814E+00	5.69E+01	1.11E+01 G
PM-144	C	-7.4411E-01					3.63E+02	
			696.54	-7.441E-01	?(	1.753E+00	1.02E+02	9.90E+01 G
			618.06	-6.115E-01	+ P	3.968E+00	1.14E+02	9.91E+01 G
EU-152	F	2.7116E+00					4.94E+03	
			344.29	-5.374E-02	%(P	9.411E+00	5.72E+03	2.65E+01 G
			1112.07	-7.674E+00	+	2.802E+01	1.08E+02	1.36E+01 G
			121.78	-1.356E+00	+ P	4.120E+00	1.34E+02	2.86E+01 G
			778.92	-8.017E+00	+	1.603E+01	8.75E+01	1.29E+01 G
			964.11	6.546E+00	&(	1.280E+01	8.74E+01	1.46E+01 G
			244.69	4.991E+00	?(	3.963E+01	2.37E+02	7.58E+00 G
			1408.00	3.031E+00	?	6.062E+00	8.94E+01	2.10E+01 GA
EU-154	I	1.3535E+00					3.14E+03	
			873.23	-3.221E+00	&(	1.839E+01	1.65E+02	1.23E+01 G
			123.10	3.547E-02	%	2.901E+00	2.40E+03	4.08E+01 G
			1274.54	0.000E+00	+	5.261E+00	1.00E+03	3.52E+01 G
			723.36	-5.066E+00	&	1.405E+01	8.31E+01	2.02E+01 G
			1004.77	-3.295E+00	+	1.086E+01	1.45E+02	1.80E+01 G
			996.33	6.649E+00	?(	1.841E+01	8.22E+01	1.06E+01 G
EU-155	I	3.9423E-01					1.81E+03	
			105.31	-7.739E-03	%(	1.268E+01	4.90E+04	2.12E+01 G
			86.54	6.718E-01	?(	5.432E+00	2.41E+02	3.07E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ta-182	F	-4.4977E+00					1.14E+02	
			1121.30	-4.498E+00	(	1.073E+01	7.19E+01	3.49E+01 G
			1221.41	-4.998E+00	+ P	1.060E+01	6.57E+01	2.70E+01 G
			1189.05	6.211E+00	+	1.188E+01	8.75E+01	1.62E+01 G
Hg-203	F	-6.1873E-01					4.66E+01	
			279.20	-6.187E-01	?(	1.977E+00	9.56E+01	8.15E+01 G
TL-208	N	8.7072E+00					6.98E+02	
			583.02	8.707E+00	(P	1.131E+00	9.19E+00	8.45E+01 G
			277.28	1.692E+01	+ P	1.437E+01	2.83E+01	6.31E+00 G
			860.56	5.872E+00	& P	1.230E+01	8.95E+01	1.24E+01 G
pm-146	C	1.9310E+00					2.02E+03	
			747.16	1.871E+00	?(P	3.952E+00	9.06E+01	3.40E+01 G
			735.72	2.022E+00	?(P	5.896E+00	1.23E+02	2.25E+01 G
			453.88	-1.103E+00	-	2.507E+00	9.63E+01	6.50E+01 G
y-88	F	1.6671E-01					1.07E+02	
			898.04	-2.659E-01	?(	1.565E+00	2.51E+02	9.37E+01 G
			1836.06	5.753E-01	?(P	8.706E-01	4.67E+01	9.92E+01 G
Cd-113m		-1.5413E+03					5.33E+03	
			263.70	-1.541E+03	?(	2.390E+04	4.53E+02	6.00E-03 K
Cd-109	F	1.8578E+00					4.53E+02	
								Derived Ave Activity
			88.04	1.858E+00	}(	4.364E+01	6.97E+02	3.79E+00 G
Cf-251	T	-2.6914E+00					3.28E+05	
			176.60	-2.691E+00	?(	6.763E+00	9.87E+01	1.70E+01 G
			227.00	6.191E+00	&	1.521E+01	9.57E+01	6.30E+00 GA
Cf-249	T	-1.3213E-01					1.28E+05	
			387.95	-1.321E-01	?(	3.263E+00	7.22E+02	6.60E+01 G
			333.44	-3.339E+00	+	1.620E+01	1.45E+02	1.55E+01 G
Sn-126		6.1869E+00					3.65E+07	
			87.57	9.280E-02	}	4.926E+00	9.84E+02	3.75E+01 GA
			64.28	6.187E+00	&(	2.358E+01	1.14E+02	9.70E+00 G
			86.94	1.776E+01		8.908E+00	1.74E+01	9.04E+00 GA
PB-210	N	2.3380E+01					8.14E+03	
			46.54	2.338E+01	(P	3.278E+01	5.11E+01	4.25E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-212	N	2.4219E+01					6.98E+02	
			238.63	2.422E+01	(	2.232E+00	5.23E+00	4.33E+01 G
			300.03	3.434E+01	&	5.732E+01	5.11E+01	3.28E+00 GA
PB-214	N	1.7869E+01					5.84E+05	
			351.93	1.764E+01	(P	2.400E+00	8.46E+00	3.76E+01 G
			295.09	1.832E+01	(P	3.375E+00	1.05E+01	1.93E+01 G
			242.00	2.199E+01	+	1.462E+01	2.23E+01	7.43E+00 GA
BI-207	C	1.4048E-01					1.18E+04	
			569.70	-3.480E-01	(	1.648E+00	1.38E+02	9.77E+01 G
			1063.66	7.814E-01	?(P	1.730E+00	9.41E+01	7.45E+01 G
BI-212	N	7.2928E+00					6.98E+02	
			727.17	7.293E+00	?(P	3.332E+01	1.35E+02	7.55E+00 G
			785.42	2.026E+01	?	1.095E+02	2.24E+02	1.28E+00 GA
BI-214	N	1.7808E+01					5.84E+05	
			609.31	1.781E+01	@(P	1.796E+00	8.28E+00	4.61E+01 G
			1120.29	2.558E+01	+ P	5.872E+00	1.60E+01	1.51E+01 G
			1764.49	5.858E+00	- P	1.830E+01	9.18E+01	1.54E+01 G
BI-210M	T	-8.5290E-01					1.10E+09	
			265.83	-8.529E-01	?(	2.947E+00	1.03E+02	5.00E+01 G
			304.90	-6.268E-01	&	8.442E+00	3.98E+02	2.80E+01 G
AC-228	N	1.1018E+01					2.10E+03	
			911.07	-4.184E-02	%(P	1.206E+01	8.32E+03	2.90E+01 G
			968.97	2.939E+01	(P	1.343E+01	1.71E+01	1.75E+01 G
			338.32	-1.199E+00	+	2.062E+01	5.08E+02	1.20E+01 G
			93.35	-8.559E+00	+	4.970E+01	1.75E+02	5.56E+00 XA
TH-227	N	-7.6806E+00					7.95E+03	
			50.14	-7.681E+00	(	2.914E+01	1.14E+02	8.00E+00 G
			256.24	3.447E+00	&	1.640E+01	1.83E+02	7.00E+00 G
TH-229	N	8.6850E+00					2.68E+06	
			193.51	7.778E+00	(	2.405E+01	1.21E+02	4.40E+00 G
			210.85	1.002E+01	&(	4.259E+01	1.66E+02	2.99E+00 G
TH-234	N	-2.1940E+01					1.63E+12	
			63.29	-2.194E+01	(P	6.116E+01	4.34E+01	3.81E+00 G
			92.59	1.825E+00	+ P	3.174E+01	5.18E+02	5.58E+00 G
PA-231	N	1.4122E+01					1.20E+07	
			302.65	1.315E+01	?(	7.507E+01	1.70E+02	2.88E+00 G
			300.07	1.526E+01	&(	8.313E+01	1.62E+02	2.46E+00 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
PA-233	C	-1.6773E-01						7.82E+08	
			312.01	-1.240E+00	&(	6.862E+00	1.65E+02	3.60E+01	G
			300.18	6.058E+00	&(	3.383E+01	1.66E+02	6.20E+00	G
PA-234	N	5.3107E-01						1.63E+12	
			131.29	-2.434E+00	?(	1.224E+01	1.51E+02	1.80E+01	G
			946.02	4.514E+00	?(P	1.033E+01	9.85E+01	1.34E+01	G
			569.47	-3.801E+00	+	1.871E+01	1.43E+02	8.20E+00	G
			883.24	0.000E+00	-	2.281E+01	1.00E+03	9.60E+00	G
			880.53	7.485E+00	?	3.383E+01	1.31E+02	6.00E+00	GA
PA-234M	N	6.7524E+01						1.63E+12	
			1001.00	5.314E+00	%(	2.669E+02	1.40E+03	8.37E-01	G
			766.41	2.446E+02	?(	7.510E+02	9.12E+01	2.94E-01	G
U-235	N	-1.3738E-02						2.57E+11	
			143.79	-1.374E-02	%(P	2.130E+01	3.65E+04	1.10E+01	G
			205.33	-1.147E+00	+	2.315E+01	7.76E+02	5.01E+00	G
			163.38	-9.944E+00	+	2.956E+01	8.94E+01	5.08E+00	G
AM-241	T	-1.8444E+00						1.58E+05	
			59.54	-1.844E+00	?(	6.832E+00	1.11E+02	3.59E+01	G
Np-237	F	-3.6101E+00						2.14E+06	
			86.49	-3.610E+00	(	2.165E+01	1.80E+02	1.31E+01	G
Ir-192	F	1.8399E-02						7.40E+01	
			316.49	-5.203E-01	@(	2.807E+00	1.61E+02	8.70E+01	G
			468.06	9.244E-01	?(	3.546E+00	1.14E+02	5.18E+01	G
			308.44	0.000E+00	&	7.443E+00	1.00E+03	3.18E+01	G
Cs-136	F	-9.0017E-01						1.30E+01	
			818.50	-9.002E-01	?(	2.667E+00	8.83E+01	1.00E+02	G
			1048.07	4.151E-01	&	2.327E+00	1.59E+02	8.00E+01	G
			340.57	0.000E+00	+	5.269E+00	1.00E+03	4.69E+01	G
Np-239	T	-2.1289E+00						2.36E+00	
			103.70	-1.959E+00	+	1.111E+01	1.70E+02	2.40E+01	X
			106.13	-2.129E+00	&(	1.209E+01	1.71E+02	2.27E+01	G
			99.50	-3.142E+00	+	1.777E+01	1.70E+02	1.50E+01	X
Nd-147		9.2640E-01						1.11E+01	
			531.00	9.264E-01	&(	9.823E+00	4.29E+02	1.30E+01	G
			91.10	-1.692E+00	+	9.774E+00	1.74E+02	2.83E+01	G

(- This peak used in the nuclide activity average.

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  * - Peak is too wide, but only one peak in library.
  ! - Peak is part of a multiplet and this area went
      negative during deconvolution.
  ? - Peak is too narrow.
  @ - Peak is too wide at FW25M, but ok at FWHM.
  % - Peak fails sensitivity test.
  $ - Peak identified, but first peak of this nuclide
      failed one or more qualification tests.
  + - Peak activity higher than counting uncertainty range.
  - - Peak activity lower than counting uncertainty range.
  = - Peak outside analysis energy range.
  & - Calculated peak centroid is not close enough to the
      library energy centroid for positive identification.
  P - Peakbackground subtraction
  } - Peak is too close to another for the activity
      to be found directly.

  Nuclide Codes:                      Peak Codes:
  T - Thermal Neutron Activation      G - Gamma Ray
  F - Fast Neutron Activation         X - X-Ray
  I - Fission Product                 P - Positron Decay
  N - Naturally Occurring Isotope     S - Single-Escape
  P - Photon Reaction                 D - Double-Escape
  C - Charged Particle Reaction       K - Key Line
  M - No MDA Calculation              A - Not in Average
  R - Coincidence Corrected           C - Coincidence Peak
  H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	367.	-24.	-0.013	113.60	-7.681E+00	
AM-241	59.54	642.	-33.	-0.018	111.28	-1.844E+00	
TH-234	63.29	662.	-44.	-0.024	43.40	-2.194E+01	P
BA-133	80.99	1276.	-35.	-0.020	54.47	-1.614E+00	P
Np-237	86.49	1577.	-31.	-0.017	180.26	-3.610E+00	
EU-155	86.54	534.	14.	0.008	240.88	6.718E-01	
TH-234	92.59	638.	7.	0.004	518.31	1.825E+00	P
Gd-153	97.50	1554.	-33.	-0.018	172.11	-1.575E+00	
Np-239	99.50	1521.	-33.	-0.018	170.00	-3.142E+00	
Gd-153	103.20	1508.	-33.	-0.018	168.71	-2.156E+00	
Np-239	103.70	1540.	-33.	-0.018	170.44	-1.959E+00	
Np-239	106.13	1642.	-34.	-0.019	170.79	-2.129E+00	
EU-152	121.78	286.	-27.	-0.015	133.81	-1.356E+00	P
CO-57	122.06	312.	-9.	-0.005	268.70	-1.580E-01	
PA-234	131.29	996.	-30.	-0.017	151.01	-2.434E+00	
HF-181	133.02	966.	-30.	-0.017	148.54	-1.018E+00	
HF-181	136.30	977.	-30.	-0.017	148.95	-7.624E+00	
CO-57	136.47	1019.	-20.	-0.011	232.28	-2.728E+00	
CE-141	145.44	198.	15.	0.008	177.39	4.779E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
U-235	163.38	359.	-31.	-0.017	89.37	-9.944E+00	
CE-139	165.85	346.	-4.	-0.002	601.62	-8.987E-02	
Cf-251	176.60	191.	-27.	-0.015	98.72	-2.691E+00	
TH-229	193.51	139.	19.	0.010	120.55	7.778E+00	
U-235	205.33	154.	-3.	-0.002	776.03	-1.147E+00	
TH-229	210.85	180.	15.	0.009	165.52	1.002E+01	
Cf-251	227.00	88.	19.	0.010	95.69	6.191E+00	
EU-152	244.69	837.	17.	0.010	237.42	4.991E+00	
TH-227	256.24	106.	11.	0.006	183.43	3.447E+00	
Cd-113m	263.70	162.	-4.	-0.002	452.77	-1.541E+03	
BI-210M	265.83	169.	-18.	-0.010	103.06	-8.529E-01	
Hg-203	279.20	188.	-21.	-0.012	95.57	-6.187E-01	
I-131	284.30	100.	-3.	-0.002	655.18	-1.196E+00	
PA-231	300.07	276.	15.	0.008	161.84	1.526E+01	
PA-233	300.18	291.	15.	0.008	165.96	6.058E+00	
PA-231	302.65	305.	15.	0.008	169.69	1.315E+01	
BA-133	302.85	320.	15.	0.008	173.64	2.067E+00	
Ba-140	304.85	335.	15.	0.008	177.25	8.890E+00	
BI-210M	304.90	363.	-7.	-0.004	398.47	-6.268E-01	
PA-233	312.01	383.	-17.	-0.009	164.90	-1.240E+00	
Ir-192	316.49	366.	-17.	-0.009	160.76	-5.203E-01	
CR-51	320.08	407.	-18.	-0.010	81.09	-4.924E+00	P
Cf-249	333.44	357.	-19.	-0.010	144.76	-3.339E+00	
HF-181	345.83	105.	-22.	-0.012	129.85	-4.178E+00	P
BA-133	356.00	315.	8.	0.004	333.53	3.560E-01	P
I-131	364.48	84.	-14.	-0.008	174.63	-5.267E-01	P
BA-133	383.84	184.	-19.	-0.010	104.14	-6.530E+00	
Cf-249	387.95	203.	-3.	-0.002	722.47	-1.321E-01	
SB-125	427.88	65.	-8.	-0.004	248.76	-9.217E-01	P
AG-108M	433.94	28.	27.	0.015	42.93	1.018E+00	
pm-146	453.88	87.	-20.	-0.011	96.32	-1.103E+00	
SB-125	463.37	92.	16.	0.009	90.04	5.395E+00	P
Ir-192	468.06	106.	13.	0.007	113.59	9.244E-01	
BE-7	477.60	139.	5.	0.003	354.50	1.663E+00	P
La-140	487.02	112.	14.	0.008	107.86	1.179E+00	P
RU-103	497.05	52.	-8.	-0.004	187.36	-3.348E-01	
RH-106	511.86	35.	107.	0.059	17.39	2.084E+01	
Ba-140	537.26	31.	9.	0.005	126.29	1.538E+00	P
CS-134	563.24	39.	4.	0.002	322.59	2.018E+00	
CS-134	569.32	35.	6.	0.004	137.35	1.750E+00	
PA-234	569.47	51.	-7.	-0.004	143.02	-3.801E+00	
BI-207	569.70	57.	-8.	-0.004	138.07	-3.480E-01	
SB-125	600.50	283.	11.	0.006	219.61	2.721E+00	P
SB-124	602.73	311.	-3.	-0.002	862.38	-1.314E-01	
PM-144	618.06	323.	-13.	-0.007	113.66	-6.115E-01	P
RH-106	621.92	295.	12.	0.007	200.03	5.645E+00	
SB-125	635.89	46.	2.	0.001	648.07	6.175E-01	
I-131	636.97	43.	4.	0.002	227.47	2.710E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AG-110M	657.76	97.	-5.	-0.003	265.17	-2.698E-01	
PM-144	696.54	47.	-15.	-0.008	102.20	-7.441E-01	
NB-94	702.63	65.	-20.	-0.011	90.56	-1.011E+00	
SB-124	722.79	57.	14.	0.008	82.87	6.513E+00	P
AG-108M	722.94	70.	14.	0.008	88.91	7.968E-01	
EU-154	723.36	125.	-20.	-0.011	83.10	-5.066E+00	
BI-212	727.17	96.	11.	0.006	134.51	7.293E+00	P
pm-146	735.72	23.	9.	0.005	123.35	2.022E+00	P
pm-146	747.16	23.	12.	0.007	90.62	1.871E+00	P
AG-110M	763.94	78.	-19.	-0.011	68.18	-4.733E+00	
NB-95	765.79	93.	-9.	-0.005	163.07	-4.673E-01	
PA-234M	766.41	66.	13.	0.007	91.19	2.446E+02	
EU-152	778.92	56.	-19.	-0.010	87.53	-8.017E+00	
BI-212	785.42	23.	5.	0.003	224.40	2.026E+01	
CS-134	795.87	62.	10.	0.006	113.79	6.679E-01	
CS-134	801.95	88.	-16.	-0.009	84.35	-1.071E+01	
CO-58	810.78	80.	-16.	-0.009	85.02	-8.945E-01	
La-140	815.77	65.	7.	0.004	176.91	1.623E+00	
Cs-136	818.50	88.	-16.	-0.009	88.34	-9.002E-01	
NB-94	871.10	37.	-9.	-0.005	101.23	-5.467E-01	
EU-154	873.23	54.	-6.	-0.004	165.34	-3.221E+00	
PA-234	880.53	43.	7.	0.004	131.27	7.485E+00	
Sc-46	889.28	40.	10.	0.005	95.67	6.110E-01	
y-88	898.04	20.	-4.	-0.002	250.83	-2.659E-01	
AG-110M	937.49	30.	-3.	-0.002	405.52	-5.642E-01	
PA-234	946.02	16.	9.	0.005	98.47	4.514E+00	P
EU-152	964.11	30.	14.	0.008	87.42	6.546E+00	
EU-154	996.33	31.	10.	0.006	82.19	6.649E+00	
EU-154	1004.77	31.	-9.	-0.005	144.75	-3.295E+00	
Co-56	1037.84	15.	9.	0.005	101.52	4.446E+00	P
Cs-136	1048.07	25.	5.	0.003	159.40	4.151E-01	
RH-106	1050.36	25.	5.	0.003	139.58	2.424E+01	P
BI-207	1063.66	11.	8.	0.004	94.08	7.814E-01	P
Ga-68	1077.40	10.	7.	0.004	106.27	1.818E+01	
FE-59	1099.25	54.	-20.	-0.011	37.97	-2.662E+00	P
EU-152	1112.07	108.	-14.	-0.008	108.27	-7.674E+00	
Sc-46	1120.55	106.	-14.	-0.008	107.30	-1.058E+00	
Ta-182	1121.30	101.	-21.	-0.012	71.85	-4.498E+00	
CO-60	1173.24	22.	6.	0.003	174.06	4.893E-01	P
Ta-182	1189.05	21.	13.	0.007	87.52	6.211E+00	
Ta-182	1221.41	49.	-17.	-0.009	65.69	-4.998E+00	P
Co-56	1238.28	32.	4.	0.002	325.32	4.984E-01	
NA-22	1274.53	16.	-1.	-0.001	574.46	-8.450E-02	
FE-59	1291.60	11.	8.	0.005	95.58	1.648E+00	
CO-60	1332.50	5.	7.	0.004	87.75	5.857E-01	
AG-110M	1384.30	6.	4.	0.002	149.69	1.498E+00	P
EU-152	1408.00	6.	7.	0.004	89.39	3.031E+00	
La-140	1596.21	17.	-4.	-0.002	439.92	-4.422E-01	P

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
SB-124	1690.98	6.	-4.	-0.002	156.12	-9.101E-01		
Co-56	1771.35	21.	8.	0.004	93.10	5.569E+00		
y-88	1836.06	0.	5.	0.003	46.69	5.753E-01		P

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting	1 Sigma	MDA Bq/Sample
BE-7	#A	1.6630E+00	1.6630E+00	3.545E+02%		2.02E+01
NA-22	#A	-8.4496E-02	-8.4496E-02	5.745E+02%		1.80E+00
K-40	#	2.8178E+02	2.8178E+02	5.698E+00%		1.03E+01
Sc-46	#A	6.1096E-01	6.1097E-01	9.567E+01%		1.98E+00
CR-51	#A	-4.9236E+00	-4.9237E+00	8.109E+01%		2.61E+01
MN-54	#A	-5.8530E-02	-5.8530E-02	1.127E+03%		1.60E+00
FE-59	#A	-2.6615E+00	-2.6615E+00	3.797E+01%		4.85E+00
Co-56	#A	5.3152E-01	5.3153E-01	1.015E+02%		1.62E+00
CO-57	#A	-1.5796E-01	-1.5796E-01	2.687E+02%		1.43E+00
CO-58	#A	-8.9452E-01	-8.9452E-01	8.502E+01%		2.55E+00
CO-60	#A	5.3750E-01	5.3750E-01	8.775E+01%		1.18E+00
ZN-65	#A	-7.7747E-02	-7.7747E-02	2.615E+03%		7.09E+00
NB-94	#A	-1.0105E+00	-1.0105E+00	9.056E+01%		2.09E+00
ZR-95	#A	3.5163E-01	3.5163E-01	3.687E+02%		3.09E+00
NB-95	#A	-4.6725E-01	-4.6726E-01	1.631E+02%		2.60E+00
RU-103	#A	-3.3481E-01	-3.3482E-01	1.874E+02%		1.52E+00
RH-106	#A	8.1705E+00	8.1705E+00	1.220E+02%		3.81E+01
AG-108M	#A	9.0704E-01	9.0704E-01	4.293E+01%		1.03E+00
AG-110M	#A	3.7513E-01	3.7513E-01	1.497E+02%		3.02E+00
SN-113	#A	4.1475E-02	4.1475E-02	2.375E+03%		3.37E+00
SB-124	#A	5.2719E-01	5.2720E-01	8.287E+01%		3.85E+00
SB-125	#A	1.2244E+00	1.2244E+00	9.004E+01%		4.59E+00
I-131	#A	-2.6555E-01	-2.6557E-01	1.434E+02%		1.66E+00
Gd-153	#A	-1.5745E+00	-1.5745E+00	1.721E+02%		9.01E+00
Ga-68	#A	1.7954E+01	1.8176E+01	1.063E+02%		4.53E+01
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%		2.67E+00
BA-133	#A	7.4618E-01	7.4618E-01	1.736E+02%		4.02E+00
CS-134	#A	4.8768E-01	4.8768E-01	1.138E+02%		3.87E+00
CS-137		2.4324E+00	2.4324E+00	2.438E+01%		1.27E+00
CE-139	#A	-8.9869E-02	-8.9870E-02	6.016E+02%		1.83E+00
Ba-140	#A	2.6380E+00	2.6381E+00	1.088E+02%		4.74E+00
La-140	#A	3.0004E-01	3.0005E-01	1.079E+02%		2.38E+00
CE-141	#A	4.7789E-01	4.7790E-01	1.774E+02%		2.18E+00
CE-144	#A	3.6509E+00	3.6509E+00	5.694E+01%		6.81E+00
PM-144	#A	-7.4411E-01	-7.4411E-01	1.022E+02%		1.75E+00
EU-152	#A	2.7116E+00	2.7116E+00	8.742E+01%		9.41E+00
EU-154	#A	1.3535E+00	1.3535E+00	8.219E+01%		1.84E+01

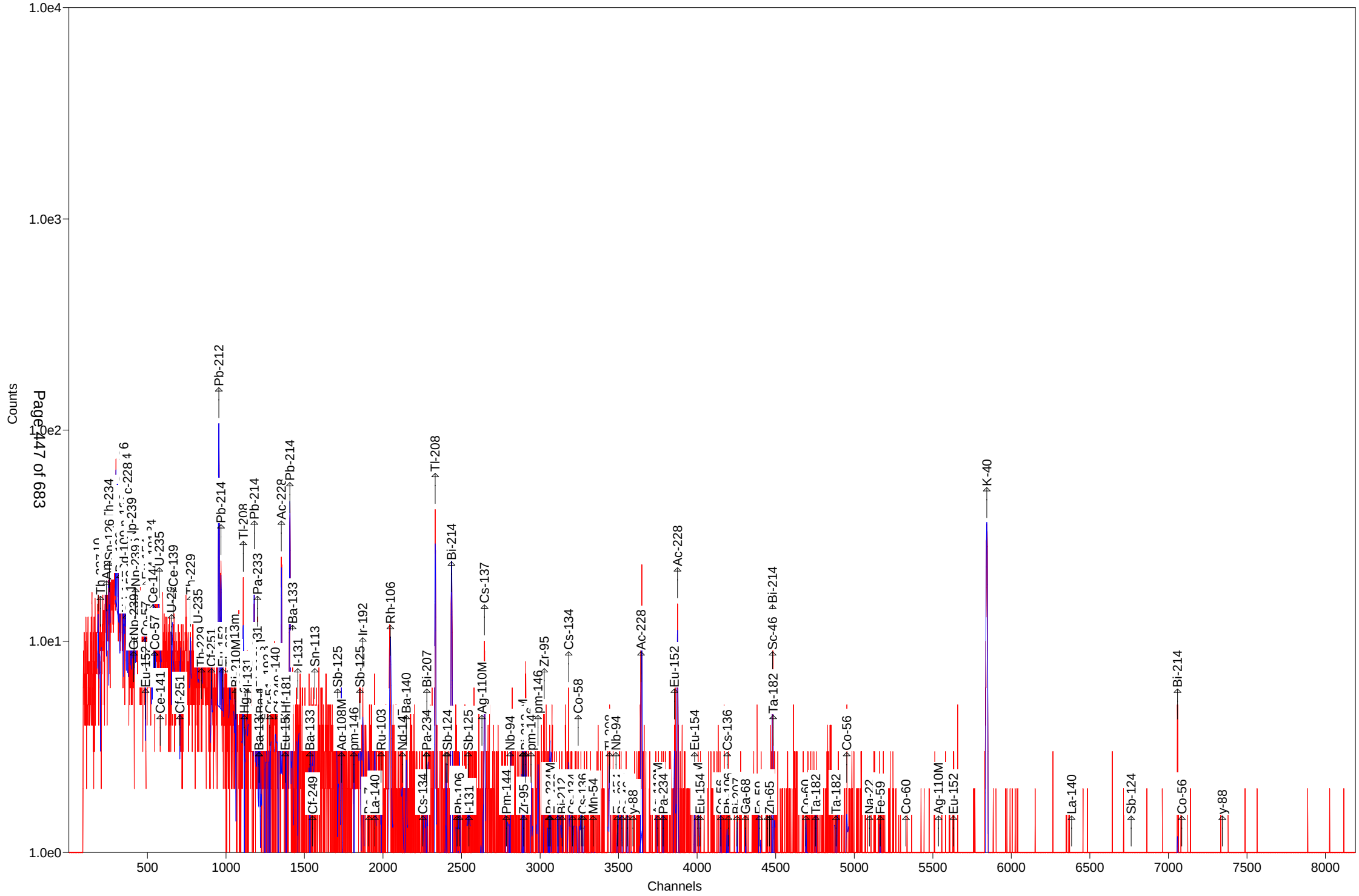
EU-155 #A	3.9423E-01	3.9423E-01	2.409E+02%	1.27E+01
HF-181 #A	0.0000E+00	0.0000E+00	1.000E+03%	2.70E+00
Ta-182 #A	-4.4976E+00	-4.4977E+00	7.185E+01%	1.07E+01
Hg-203 #A	-6.1873E-01	-6.1873E-01	9.557E+01%	1.98E+00
TL-208	8.7072E+00	8.7072E+00	9.189E+00%	1.13E+00
pm-146 #A	1.9310E+00	1.9310E+00	7.653E+01%	3.95E+00
y-88 #A	1.6671E-01	1.6671E-01	4.669E+01%	1.57E+00
Cd-113m#A	-1.5413E+03	-1.5413E+03	4.528E+02%	2.39E+04
Cd-109 #A	1.8578E+00	1.8578E+00	6.969E+02%	4.36E+01
Cf-251 #A	-2.6914E+00	-2.6914E+00	9.872E+01%	6.76E+00
Cf-249 #A	-1.3213E-01	-1.3213E-01	7.225E+02%	3.26E+00
Sn-126 A	6.1869E+00	6.1869E+00	1.144E+02%	2.36E+01
PB-210 A	2.3380E+01	2.3380E+01	5.113E+01%	3.28E+01
PB-212	2.4219E+01	2.4219E+01	5.230E+00%	2.23E+00
PB-214	1.7869E+01	1.7869E+01	6.748E+00%	2.40E+00
BI-207 #A	1.4048E-01	1.4048E-01	8.354E+01%	1.65E+00
BI-212 #A	7.2928E+00	7.2928E+00	1.345E+02%	3.33E+01
BI-214	1.7808E+01	1.7808E+01	8.282E+00%	1.80E+00
BI-210M#A	-8.5290E-01	-8.5290E-01	1.031E+02%	2.95E+00
AC-228 A	1.1018E+01	1.1018E+01	1.714E+01%	1.21E+01
TH-227 #A	-7.6806E+00	-7.6806E+00	1.136E+02%	2.91E+01
TH-229 #A	8.6850E+00	8.6850E+00	1.024E+02%	2.41E+01
TH-234 #A	-2.1940E+01	-2.1940E+01	4.340E+01%	6.12E+01
PA-231 #A	1.4122E+01	1.4122E+01	1.172E+02%	7.51E+01
PA-233 #A	-1.6773E-01	-1.6773E-01	1.170E+02%	6.86E+00
PA-234 #A	5.3107E-01	5.3107E-01	9.014E+01%	1.22E+01
PA-234M#A	6.7524E+01	6.7524E+01	9.119E+01%	2.67E+02
U-235 #A	-1.3738E-02	-1.3738E-02	3.645E+04%	2.13E+01
AM-241 #A	-1.8444E+00	-1.8444E+00	1.113E+02%	6.83E+00
Np-237 #A	-3.6101E+00	-3.6101E+00	1.803E+02%	2.17E+01
Ir-192 #A	1.8399E-02	1.8399E-02	9.842E+01%	2.81E+00
Cs-136 #A	-9.0013E-01	-9.0017E-01	8.834E+01%	2.67E+00
Np-239 #A	-2.1284E+00	-2.1289E+00	1.708E+02%	1.21E+01
Nd-147 #A	9.2635E-01	9.2640E-01	4.288E+02%	9.82E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 3.799E+02 Bq/Sample
Total Decayed Activity (37.6 to 1999.5 keV) 3.7985147E+02 Bq/Sample

264537_Gamma_160-18552-A-7-B. 15_Gamma_20161064.spc.



Daily Checks

Test America
St. Louis
Background Check

Spectrum: 5_20160901001_BG
Description: Background Contamination Check
Acquired: 9/1/2016 12:22:56 AM
Detector: Detector # 5
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.45	1.30	1.35	1.48	1.55	1.60	PASS

Analyst: Aaron Schroder Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 5_20160901002_QCAsLeft
Description: Quality control Check (QC Source 'A') Post Stabilization
Acquired: 9/1/2016 5:54:21 AM
Detector: Detector # 5
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.00	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.62	59.79	60.04	PASS
FWHM	0.74	0.00	0.00	0.91	1.84	1.94	PASS
ActivityDiff	636.60	-5.00	-4.00	-1.60	4.00	5.00	PASS
QA-662							
FWHM	1.36	0.00	0.00	1.43	3.06	3.16	PASS
ActivityDiff	596.80	-5.00	-4.00	-0.81	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5331.40	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.90	1333.01	1333.26	PASS
FWHM	1.90	0.00	0.00	1.98	4.10	4.20	PASS
ActivityDiff	1164.20	-5.00	-4.00	-1.74	4.00	5.00	PASS

Analyst: kody Saulters Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 7_20160901001_BG
Description: Background Contamination Check
Acquired: 9/1/2016 12:23:40 AM
Detector: Detector # 7
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.30	1.16	1.21	1.28	1.40	1.45	PASS

Analyst: Aaron Schroder Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 7_20160901002_QCAsLeft
Description: Quality control Check (QC Source 'C') Post Stabilization
Acquired: 9/1/2016 5:58:21 AM
Detector: Detector # 7
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.58	59.04	59.29	59.60	59.79	60.04	PASS
FWHM	0.84	0.00	0.00	0.88	1.94	2.04	PASS
ActivityDiff	647.00	-5.00	-4.00	1.17	4.00	5.00	PASS
QA-662							
FWHM	1.45	0.00	0.00	1.46	3.15	3.25	PASS
ActivityDiff	606.50	-5.00	-4.00	0.19	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.10	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.60	1333.01	1333.26	PASS
FWHM	1.98	0.00	0.00	1.97	4.18	4.28	PASS
ActivityDiff	1183.00	-5.00	-4.00	-0.74	4.00	5.00	PASS

Analyst: kody Saulters Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 8_20160901001_BG
Description: Background Contamination Check
Acquired: 9/1/2016 12:24:53 AM
Detector: Detector # 8
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.56	1.39	1.45	1.55	1.68	1.74	PASS

Analyst: Aaron Schroder Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 8_20160901002_QCAsLeft
Description: Quality control Check (QC Source 'D') Post Stabilization
Acquired: 9/1/2016 6:01:22 AM
Detector: Detector # 8
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.80	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.51	59.79	60.04	PASS
FWHM	1.10	0.00	0.00	0.84	2.20	2.30	PASS
ActivityDiff	650.60	-5.00	-4.00	-0.36	4.00	5.00	PASS
QA-662							
FWHM	1.53	0.00	0.00	1.34	3.23	3.33	PASS
ActivityDiff	609.90	-5.00	-4.00	0.95	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.50	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.62	1333.01	1333.26	PASS
FWHM	1.90	0.00	0.00	1.81	4.10	4.20	PASS
ActivityDiff	1189.70	-5.00	-4.00	-1.50	4.00	5.00	PASS

Analyst: kody Saulters Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 12_20160901001_QCAsLeft
Description: Quality control Check (QC Source 'H') Post Stabilization
Acquired: 9/1/2016 12:48:28 AM
Detector: Detector #12
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.00	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.62	59.79	60.04	PASS
FWHM	0.90	0.00	0.00	0.87	2.00	2.10	PASS
ActivityDiff	691.00	-5.00	-4.00	0.76	4.00	5.00	PASS
QA-662							
FWHM	1.48	0.00	0.00	1.47	3.18	3.28	PASS
ActivityDiff	659.00	-5.00	-4.00	0.39	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.10	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.68	1333.01	1333.26	PASS
FWHM	2.00	0.00	0.00	1.98	4.20	4.30	PASS
ActivityDiff	1274.00	-5.00	-4.00	1.44	4.00	5.00	PASS

Analyst: Aaron Schroder Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 12_20160901002_BG
Description: Background Contamination Check
Acquired: 9/1/2016 5:20:52 AM
Detector: Detector #12
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.08	1.93	1.98	2.08	2.18	2.23	PASS

Analyst: kody Saulters Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 13_20160901001_QCAsLeft
Description: Quality control Check (QC Source 'I') Post Stabilization
Acquired: 9/1/2016 12:50:31 AM
Detector: Detector #13
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.56	59.79	60.04	PASS
FWHM	1.02	0.00	0.00	0.85	2.12	2.22	PASS
ActivityDiff	638.00	-5.00	-4.00	1.83	4.00	5.00	PASS
QA-662							
FWHM	1.57	0.00	0.00	1.49	3.27	3.37	PASS
ActivityDiff	609.00	-5.00	-4.00	2.24	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.90	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.53	1333.01	1333.26	PASS
FWHM	2.08	0.00	0.00	2.11	4.28	4.38	PASS
ActivityDiff	1176.00	-5.00	-4.00	0.96	4.00	5.00	PASS

Analyst: Aaron Schroder Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 13_20160901002_BG
Description: Background Contamination Check
Acquired: 9/1/2016 5:21:34 AM
Detector: Detector #13
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.91	1.71	1.77	1.74	2.04	2.10	Low OOT

Analyst: kody Saulters Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 14_20160901001_BG
Description: Background Contamination Check
Acquired: 9/1/2016 12:23:58 AM
Detector: Detector #14
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.80	1.66	1.71	1.78	1.90	1.94	PASS

Analyst: Aaron Schroder Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 14_20160901002_QCAsLeft
Description: Quality control Check (QC Source 'E') Post Stabilization
Acquired: 9/1/2016 5:48:04 AM
Detector: Detector #14
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.10	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.68	59.79	60.04	PASS
FWHM	0.76	0.00	0.00	0.88	1.86	1.96	PASS
ActivityDiff	671.90	-5.00	-4.00	0.95	4.00	5.00	PASS
QA-662							
FWHM	1.35	0.00	0.00	1.43	3.05	3.15	PASS
ActivityDiff	628.85	-5.00	-4.00	0.34	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.60	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.43	1333.01	1333.26	PASS
FWHM	1.91	0.00	0.00	1.89	4.11	4.21	PASS
ActivityDiff	1224.59	-5.00	-4.00	1.28	4.00	5.00	PASS

Analyst: kody Saulters Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 15_20160901001_BG
Description: Background Contamination Check
Acquired: 9/1/2016 12:24:43 AM
Detector: Detector #15
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.68	1.59	1.62	1.68	1.74	1.77	PASS

Analyst: Aaron Schroder Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 15_20160901002_QCAsLeft
Description: Quality control Check (QC Source 'F') Post Stabilization
Acquired: 9/1/2016 5:48:11 AM
Detector: Detector #15
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.10	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.64	59.79	60.04	PASS
FWHM	0.95	0.00	0.00	0.92	2.05	2.15	PASS
ActivityDiff	670.56	-5.00	-4.00	1.30	4.00	5.00	PASS
QA-662							
FWHM	1.51	0.00	0.00	1.48	3.21	3.31	PASS
ActivityDiff	668.76	-5.00	-4.00	0.49	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.30	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.75	1333.01	1333.26	PASS
FWHM	1.99	0.00	0.00	1.94	4.19	4.29	PASS
ActivityDiff	1277.79	-5.00	-4.00	1.69	4.00	5.00	PASS

Analyst: kody Saulters Reviewer: kody Saulters

Test America
St. Louis
Background Check

Spectrum: 17_20160901001_BG
Description: Background Contamination Check
Acquired: 9/1/2016 12:28:05 AM
Detector: Detector #17
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.32	2.18	2.23	2.26	2.42	2.46	PASS

Analyst: Aaron Schroder Reviewer: kody Saulters

Test America
St. Louis
Quality Control Check

Spectrum: 17_20160901002_QCAsLeft
Description: Quality control Check (QC Source 'H') Post Stabilization
Acquired: 9/1/2016 5:57:33 AM
Detector: Detector #17
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.61	59.79	60.04	PASS
FWHM	0.77	0.00	0.00	0.79	1.87	1.97	PASS
ActivityDiff	691.00	-5.00	-4.00	2.73	4.00	5.00	PASS
QA-662							
FWHM	1.37	0.00	0.00	1.37	3.07	3.17	PASS
ActivityDiff	659.00	-5.00	-4.00	0.40	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.80	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.57	1333.01	1333.26	PASS
FWHM	1.88	0.00	0.00	1.88	4.08	4.18	PASS
ActivityDiff	1274.00	-5.00	-4.00	-0.26	4.00	5.00	PASS

Analyst: kody Saulters Reviewer: kody Saulters

Initial Calibrations

Gamma Verification per Geometry

Detector: Ge5

Geometry: Tunacan

Reference date 1/1/2012

Calibration Standard: 90099

Standard volume g / vial 1550

Standard volume transferred in g / geometry 317.8

lab ID# of cal standard Rad12-0007

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14353	96.2
Am-241	2037	418	0.3590	1163	1230.2	105.7
Cd-109	2881	591	0.0361	16363	16101	98.4
Co-57	1511	310	0.8560	362	347.72	96.1
Ce-139	2139	439	0.7990	549	538.4	98.1
Hg-203	4651	954	0.8146	1171	1208.4	103.2
Sn-113	3015	618	0.6400	966	972.07	100.6
Cs-137	1938	397	0.8510	467	462.35	99.0
Y-88	7264	1489	0.9370	1589	1559.3	98.1
Co-60	3580	734	0.9997	734	722.51	98.4
Co-60	3581	734	0.9999	734	739.67	100.7
Y-88	7690	1577	0.9920	1589	1613.8	101.5

Reviewed By: Jody Watson

Date: 3/27/2012

Calibration Data from file: 5_Soil_TunaCan.Clb
Energy Calibration Date: 3/27/2012 Time: 5:20:02 PM
Efficiency Calibration Date: 3/27/2012 Time: 5:20:37 PM

Calibration Description:
5_Soil_TunaCan_90099_032612

Energy Calibration Fit
Energy = 0.1351 +0.249831*Channel +2.72022e-008*Channel**2
FWHM (ch) = 2.8138 +0.001050*Channel -2.57606e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
186.01	46.54	46.61	-0.15%	0.74	0.75	-1.17%
237.86	59.54	59.56	-0.04%	0.74	0.77	-4.07%
351.46	88.03	87.95	0.10%	0.80	0.79	1.28%
487.52	122.06	121.94	0.10%	0.85	0.83	2.66%
663.26	165.85	165.85	0.00%	0.88	0.87	0.98%
1116.90	279.17	279.20	-0.01%	0.97	0.99	-2.35%
1567.36	391.69	391.78	-0.02%	1.12	1.10	1.78%
2647.45	661.66	661.74	-0.01%	1.38	1.35	1.91%
3592.51	898.02	898.01	0.00%	1.55	1.56	-1.11%
4692.96	1173.24	1173.18	0.00%	1.77	1.79	-1.18%
5329.72	1332.50	1332.44	0.00%	1.93	1.92	0.31%
7342.77	1836.01	1836.05	-0.00%	2.29	2.29	0.24%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.8682 %
Ln(Eff) = 0.6466 -0.783045*Ln(Eng) -0.0041175*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.4296 %
Ln(Eff) = -24.6225 +9.075211*Ln(Eng) -0.966442*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	1.7205E-002	1.7882E-002	-3.93%
59.54	2.6619E-002	2.5335E-002	4.82%
88.03	3.4045E-002	3.4617E-002	-1.68%
122.06	3.4394E-002	3.5819E-002	-4.15%
165.85	========== Knee ==========		
165.85	3.0704E-002	3.1331E-002	-2.04%
279.17	2.1030E-002	2.0365E-002	3.17%
391.69	1.5475E-002	1.5370E-002	0.68%
661.66	9.8486E-003	9.9244E-003	-0.77%
898.02	7.5404E-003	7.6837E-003	-1.90%
1173.24	6.0360E-003	6.1381E-003	-1.69%
1332.50	5.5560E-003	5.5144E-003	0.75%
1836.01	4.2722E-003	4.2078E-003	1.51%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

```
     ORTEC g v - i (1087) Env32  G53W4.25  3/27/2012 5:22:03 PM
TestAmerica                      Spectrum name: 5_TunaCan_20120810.An1

Sample description
     5_TunaCan_90099_032612


Spectrum Filename: C:\User\SPC\Det5\5_TunaCan_20120810.An1

Acquisition information
       Start time:                 3/26/2012 3:05:42 PM
       Live time:               3600
       Real time:               3652
       Dead time:                  1.44 %
       Detector ID:                   5

Detector system
     Ge 5 SN/157


Calibration
       Filename:                   5_Soil_TunaCan.Clb
     5_Soil_TunaCan_90099_032612


       Energy Calibration
            Created:               3/27/2012 5:20:02 PM
            Zero offset:           0.135 keV
            Gain:                  0.250 keV/channel
            Quadratic:             2.720E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/27/2012 5:20:37 PM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.87 %
            Log(Eff):              6.466115E-01 + (-7.830454E-01*Log(E) ) +
                                   ( -4.117504E-03*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.43 %
            Log(Eff):             -2.462251E+01 + ( 9.075211E+00*Log(E) ) +
                                   ( -9.664422E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.61keV )
       Stop channel:            8000 (  2000.53keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method
```

ORTEC g v - i (1087) Env32 G53W4.25 3/27/2012 5:22:03 PM
TestAmerica Spectrum name: 5_TunaCan_20120810.An1

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2012 11:00:00 AM
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0527

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.61	38986.	0.74	0.74	1.793E-02	46.54	4.250	1.435E+04	Pb210
59.56	40041.	0.74	0.74	2.535E-02	59.54	35.700	1.230E+03	AM241
70.85	1493.	9.22	0.78	3.019E-02				
72.87	2354.	5.96	0.78	3.089E-02				
87.95	63754.	0.53	0.80	3.460E-02	88.03	3.610	1.610E+04	CD109
121.94	30888.	0.76	0.85	3.583E-02	122.06	85.600	3.477E+02	CO57
136.41	3768.	3.80	0.89	3.457E-02				
165.85	31597.	0.74	0.88	3.066E-02	165.85	79.900	5.384E+02	Ce139
279.20	20358.	0.87	0.97	2.036E-02	279.17	81.500	1.208E+03	Hg203
391.78	20611.	0.93	1.12	1.537E-02	391.69	64.000	9.721E+02	SN113
661.74	14000.	1.10	1.38	9.923E-03	661.66	85.210	4.623E+02	CS137
898.01	23228.	0.82	1.55	7.684E-03	898.02	93.700	1.559E+03	Y898
1173.18	15468.	0.93	1.77	6.138E-03	1173.24	99.900	7.225E+02	Co1173
1332.44	14238.	0.98	1.93	5.515E-03	1332.50	99.982	7.397E+02	Co1332
1836.04	13938.	0.87	2.30	4.208E-03	1836.01	99.200	1.614E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
291.16	72.88	8722.	2253.	7.295E+04	7.09	0.801	-
545.44	136.41	5274.	3768.	1.090E+05	3.80	0.888	-

ORTEC g v - i (1087) Env32 G53W4.25 3/27/2012 5:22:03 PM
TestAmerica Spectrum name: 5_TunaCan_20120810.An1

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	186.01	46.61	12895.	38986.	10.829	0.74	0.743
AM-241	237.86	59.56	13293.	40041.	11.122	0.74	0.735
CD-109	351.46	87.95	12894.	63754.	17.710	0.53	0.805
CO-57	487.52	121.94	6935.	30888.	8.580	0.76	0.852
Ce-139	663.26	165.85	5616.	31597.	8.777	0.74	0.883
Hg-203	1116.90	279.20	2848.	20358.	5.655	0.87	0.966
SN-113	1567.36	391.78	3046.	20611.	5.725	0.93	1.119
CS-137	2647.45	661.74	1982.	14000.	3.889	1.10	1.380
Y-898	3592.51	898.01	1944.	23228.	6.452	0.82	1.547
Co-1173	4692.96	1173.18	847.	15468.	4.297	0.93	1.774
Co-1332	5329.75	1332.44	693.	14238.	3.955	0.98	1.927
Y-1836	7342.72	1836.04	102.	13938.	3.872	0.87	2.295

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq			COMMENTS
Pb-210	N	1.4353E+04						8.15E+03	
			46.54	1.435E+04	(	1.958E+02	7.44E-01	4.25E+00	G
AM-241		1.2302E+03						1.58E+05	
			59.54	1.230E+03	(	1.659E+01	7.44E-01	3.57E+01	G
CD-109		1.6101E+04						4.63E+02	
			88.03	1.610E+04	(	1.343E+02	5.28E-01	3.61E+00	G
CO-57		3.4772E+02						2.72E+02	
			122.06	3.477E+02	(	4.399E+00	7.60E-01	8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 3/27/2012 5:22:03 PM
TestAmerica Spectrum name: 5_TunaCan_20120810.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ce-139	5.3840E+02					1.38E+02	
		165.85	5.384E+02	(	5.997E+00	7.36E-01	7.99E+01 G
Hg-203	1.2084E+03					4.66E+01	
		279.17	1.208E+03	(	1.492E+01	8.69E-01	8.15E+01 G
SN-113	9.7207E+02					1.15E+02	
		391.69	9.721E+02	(	1.226E+01	9.31E-01	6.40E+01 G
CS-137	4.6235E+02					1.10E+04	
		661.66	4.623E+02	(	6.941E+00	1.10E+00	8.52E+01 G
Y-898	1.5593E+03					1.07E+02	
		898.02	1.559E+03	(	1.397E+01	8.19E-01	9.37E+01 G
Co-1173	7.2251E+02					1.93E+03	
		1173.24	7.225E+02	(	6.463E+00	9.30E-01	9.99E+01 G
Co-1332	7.3967E+02					1.93E+03	
		1332.50	7.397E+02	(	6.515E+00	9.82E-01	1.00E+02 G
Y-1836	1.6138E+03					1.07E+02	
		1836.01	1.614E+03	(	5.776E+00	8.71E-01	9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape

ORTEC g v - i (1087) Env32 G53W4.25 3/27/2012 5:22:03 PM
TestAmerica Spectrum name: 5_TunaCan_20120810.An1

P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq	Time Corrected Activity Bq	Uncertainty 1 Sigma Counting	MDA
Pb-210	1.4250E+04	1.4353E+04	7.439E-01%	1.96E+02
AM-241	1.2297E+03	1.2302E+03	7.442E-01%	1.66E+01
CD-109	1.4172E+04	1.6101E+04	5.277E-01%	1.34E+02
CO-57	2.7983E+02	3.4772E+02	7.604E-01%	4.40E+00
Ce-139	3.5061E+02	5.3840E+02	7.359E-01%	6.00E+00
Hg-203	3.4071E+02	1.2084E+03	8.687E-01%	1.49E+01
SN-113	5.8200E+02	9.7207E+02	9.315E-01%	1.23E+01
CS-137	4.5987E+02	4.6235E+02	1.097E+00%	6.94E+00
Y-898	8.9620E+02	1.5593E+03	8.189E-01%	1.40E+01
Co-1173	7.0069E+02	7.2251E+02	9.300E-01%	6.46E+00
Co-1332	7.1733E+02	7.3967E+02	9.821E-01%	6.52E+00
Y-1836	9.2756E+02	1.6138E+03	8.711E-01%	5.78E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 2000.5 keV) 3.491E+04 Bq
Total Decayed Activity (37.6 to 2000.5 keV) 3.9848164E+04 Bq

Analyzed by: _____
Admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica

Gamma Verification per Geometry

Detector:	Ge7
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14726	98.7
Am-241	2037	418	0.3590	1163	1241.6	106.7
Cd-109	2881	591	0.0361	16363	15976	97.6
Co-57	1511	310	0.8560	362	346.77	95.8
Ce-139	2139	439	0.7990	549	539.48	98.3
Hg-203	4651	954	0.8146	1171	1199.2	102.4
Sn-113	3015	618	0.6400	966	976.76	101.1
Cs-137	1938	397	0.8510	467	467.66	100.2
Y-88	7264	1489	0.9370	1589	1567.3	98.6
Co-60	3580	734	0.9997	734	726.23	98.9
Co-60	3581	734	0.9999	734	719.64	98.0
Y-88	7690	1577	0.9920	1589	1635.7	102.9

Reviewed By: Jody Watson

Date: 3/16/2012

Calibration Data from file: 7_Soil_TunaCan.Clb
Energy Calibration Date: 3/16/2012 Time: 11:44:50 AM
Efficiency Calibration Date: 3/16/2012 Time: 11:45:14 AM

Calibration Description:
7_TunaCan_90099_030512

Energy Calibration Fit
Energy = 0.1533 +0.249954*Channel +6.71576e-009*Channel**2
FWHM (ch) = 3.2969 +0.001030*Channel -2.25091e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.73	46.54	46.58	-0.08%	0.86	0.87	-1.80%
237.72	59.54	59.57	-0.06%	0.86	0.88	-3.29%
351.56	88.03	88.03	0.00%	0.91	0.91	-0.17%
487.42	122.06	121.99	0.06%	0.97	0.95	2.36%
662.55	165.85	165.76	0.05%	1.00	0.99	1.26%
1116.52	279.17	279.24	-0.03%	1.13	1.10	1.85%
1566.54	391.69	391.73	-0.01%	1.21	1.21	-0.23%
2646.25	661.66	661.64	0.00%	1.47	1.47	0.54%
3591.85	898.02	898.04	-0.00%	1.66	1.68	-1.15%
4692.53	1173.24	1173.22	0.00%	1.92	1.91	0.69%
5329.58	1332.50	1332.49	0.00%	2.02	2.04	-0.87%
7343.37	1836.01	1836.02	-0.00%	2.42	2.41	0.28%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.8690 %
Ln(Eff) = 0.6717 -0.616654*Ln(Eng) -0.0206592*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.4845 %
Ln(Eff) = -26.8969 +10.195443*Ln(Eng) -1.08167*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.3732E-002	2.4829E-002	-4.62%
59.54	3.9252E-002	3.7016E-002	5.70%
88.03	5.1999E-002	5.3285E-002	-2.47%
122.06	5.3679E-002	5.6057E-002	-4.43%
165.85	==========	Knee	==========
165.85	4.7932E-002	4.8811E-002	-1.83%
279.17	3.2322E-002	3.1541E-002	2.42%
391.69	2.3837E-002	2.3601E-002	0.99%
661.66	1.4947E-002	1.4924E-002	0.15%
898.02	1.1205E-002	1.1367E-002	-1.45%
1173.24	8.8255E-003	8.9287E-003	-1.17%
1332.50	7.7833E-003	7.9508E-003	-2.15%
1836.01	6.0876E-003	5.9192E-003	2.77%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14941.00	635.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	967.19	619.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	467.08	398.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1590.20	1490.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	735.15	735.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1590.70	1578.00	4.00%	1/1/2012 11:00:00 AM

```
     ORTEC g v - i (1087) Env32  G53W4.25  2/28/2014 11:43:43 AM
TestAmerica                      Spectrum name: 7_TunaCan_20120388.An1

Sample description
     7_TunaCan_90099_030512


Spectrum Filename: C:\User\SPC\Det7\7_TunaCan_20120388.An1

Acquisition information
       Start time:                 3/5/2012 2:07:36 PM
       Live time:               3600
       Real time:               3721
       Dead time:                  3.25 %
       Detector ID:                    7

Detector system
     Ge 7 SN/154


Calibration
       Filename:                   7_Soil_TunaCan.Clb
     7_TunaCan_90099_032712


       Energy Calibration
            Created:               3/16/2012 11:44:50 AM
            Zero offset:           0.153 keV
            Gain:                  0.250 keV/channel
            Quadratic:             6.716E-09 keV/channel^2

       Efficiency Calibration
            Created:               3/16/2012 11:45:14 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.87 %
            Log(Eff):              6.716580E-01 + (-6.166540E-01*Log(E) ) +
                                   ( -2.065917E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.48 %
            Log(Eff):             -2.689695E+01 + ( 1.019544E+01*Log(E) ) +
                                   ( -1.081671E+00*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.65keV )
       Stop channel:            8000 (  2000.21keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method
```

ORTEC g v - i (1087) Env32 G53W4.25 2/28/2014 11:43:43 AM
TestAmerica Spectrum name: 7_TunaCan_20120388.An1

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2012 11:00:00 AM
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0324

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.63	53946.	0.53	0.87	2.487E-02	46.54	4.250	1.428E+04	Pb210
59.57	59050.	0.65	0.86	3.704E-02	59.54	35.700	1.242E+03	AM241
70.74	2770.	6.58	0.90	4.527E-02				
72.95	4536.	4.27	0.90	4.661E-02				
88.03	100494.	0.43	0.91	5.328E-02	88.03	3.610	1.598E+04	CD109
121.99	50865.	0.71	0.97	5.606E-02	122.06	85.600	3.468E+02	CO57
136.41	6524.	3.77	0.93	5.411E-02				
165.76	54838.	0.57	1.00	4.767E-02	165.85	79.900	5.395E+02	Ce139
255.13	1772.	7.37	1.21	3.404E-02				
279.24	42776.	0.59	1.13	3.153E-02	279.17	81.500	1.199E+03	Hg203
391.73	36096.	0.66	1.21	2.360E-02	391.69	64.000	9.768E+02	SN113
661.68	21323.	0.77	1.47	1.492E-02	661.66	85.210	4.677E+02	CS137
898.03	39603.	0.63	1.66	1.137E-02	898.02	93.700	1.567E+03	Y898
1173.21	22788.	0.85	1.92	8.929E-03	1173.24	99.900	7.262E+02	Co1173
1332.49	20124.	0.85	2.02	7.951E-03	1332.50	99.982	7.196E+02	Co1332
1836.00	22787.	0.70	2.43	5.919E-03	1836.01	99.200	1.636E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
282.41	70.73	15146.	2828.	6.248E+04	6.43	0.896	-	D
291.25	72.94	16305.	4682.	1.005E+05	4.12	0.899	-	D
545.11	136.41	12980.	6524.	1.206E+05	3.77	0.932	-	
1020.07	255.13	4580.	1772.	5.204E+04	7.37	1.209	-	

ORTEC g v - i (1087) Env32 G53W4.25 2/28/2014 11:43:43 AM
TestAmerica Spectrum name: 7_TunaCan_20120388.An1

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.73	46.58	19825.	55636.	15.454	0.65	0.856
AM-241	237.72	59.57	21942.	59050.	16.403	0.65	0.857
CD-109	351.56	88.03	21396.	100494.	27.915	0.43	0.912
CO-57	487.42	121.99	16859.	50865.	14.129	0.71	0.971
Ce-139	662.55	165.76	9893.	54838.	15.233	0.57	1.005
Hg-203	1116.52	279.24	5111.	42776.	11.882	0.59	1.126
SN-113	1566.54	391.73	4106.	36096.	10.027	0.66	1.211
CS-137	2646.33	661.66	2922.	21323.	5.923	0.77	1.466D
Y-898	3591.84	898.03	3210.	39603.	11.001	0.63	1.659
Co-1173	4692.50	1173.21	1804.	22788.	6.330	0.85	1.924
Co-1332	5329.58	1332.49	1286.	20124.	5.590	0.85	2.020
Y-1836	7343.30	1836.00	283.	22787.	6.330	0.70	2.426

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Peak Code	MDA Value Bq	COMMENTS
Pb-210	N	1.4726E+04					8.15E+03
			46.54	1.473E+04	(	1.744E+02	6.52E-01 4.25E+00 G
AM-241		1.2416E+03					1.58E+05
			59.54	1.242E+03	(	1.457E+01	6.49E-01 3.57E+01 G
CD-109		1.5976E+04					4.63E+02
			88.03	1.598E+04	(	1.088E+02	4.29E-01 3.61E+00 G
CO-57		3.4677E+02					2.72E+02
			122.06	3.468E+02	(	4.144E+00	7.08E-01 8.56E+01 G

ORTEC g v - i (1087) Env32 G53W4.25 2/28/2014 11:43:43 AM
TestAmerica Spectrum name: 7_TunaCan_20120388.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ce-139	5.3948E+02					1.38E+02	
		165.85	5.395E+02	(	4.586E+00	5.65E-01	7.99E+01 G
Hg-203	1.1992E+03					4.66E+01	
		279.17	1.199E+03	(	9.415E+00	5.92E-01	8.15E+01 G
SN-113	9.7676E+02					1.15E+02	
		391.69	9.768E+02	(	8.153E+00	6.55E-01	6.40E+01 G
CS-137	4.6766E+02					1.10E+04	
		661.66	4.677E+02	(	5.584E+00	7.73E-01	8.52E+01 G
Y-898	1.5673E+03					1.07E+02	
		898.02	1.567E+03	(	1.056E+01	6.29E-01	9.37E+01 G
Co-1173	7.2623E+02					1.93E+03	
		1173.24	7.262E+02	(	6.394E+00	8.53E-01	9.99E+01 G
Co-1332	7.1964E+02					1.93E+03	
		1332.50	7.196E+02	(	6.072E+00	8.54E-01	1.00E+02 G
Y-1836	1.6357E+03					1.07E+02	
		1836.01	1.636E+03	(	5.819E+00	7.02E-01	9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape

ORTEC g v - i (1087) Env32 G53W4.25 2/28/2014 11:43:43 AM
TestAmerica Spectrum name: 7_TunaCan_20120388.An1

P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq	Time Corrected Activity Bq	Uncertainty 1 Sigma Counting	MDA
Pb-210	1.4646E+04	1.4726E+04	6.521E-01%	1.74E+02
AM-241	1.2413E+03	1.2416E+03	6.489E-01%	1.46E+01
CD-109	1.4512E+04	1.5976E+04	4.292E-01%	1.09E+02
CO-57	2.9445E+02	3.4677E+02	7.076E-01%	4.14E+00
Ce-139	3.9059E+02	5.3948E+02	5.652E-01%	4.59E+00
Hg-203	4.6224E+02	1.1992E+03	5.917E-01%	9.42E+00
SN-113	6.6381E+02	9.7676E+02	6.552E-01%	8.15E+00
CS-137	4.6577E+02	4.6766E+02	7.730E-01%	5.58E+00
Y-898	1.0329E+03	1.5673E+03	6.291E-01%	1.06E+01
Co-1173	7.0966E+02	7.2623E+02	8.534E-01%	6.39E+00
Co-1332	7.0321E+02	7.1964E+02	8.542E-01%	6.07E+00
Y-1836	1.0780E+03	1.6357E+03	7.017E-01%	5.82E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (701.8 to 2000.2 keV) 3.620E+04 Bq
Total Decayed Activity (701.8 to 2000.2 keV) 4.0121711E+04 Bq

Analyzed by: _____
Admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica

Gamma Verification per Geometry

Detector:	Ge8
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14960	100.2
Am-241	2037	418	0.3590	1163	1240.5	106.6
Cd-109	2881	591	0.0361	16363	16066	98.2
Co-57	1511	310	0.8560	362	345.12	95.4
Ce-139	2139	439	0.7990	549	536.34	97.7
Hg-203	4651	954	0.8146	1171	1218.2	104.1
Sn-113	3015	618	0.6400	966	967.15	100.1
Cs-137	1938	397	0.8510	467	465.86	99.8
Y-88	7264	1489	0.9370	1589	1552.1	97.6
Co-60	3580	734	0.9997	734	724.48	98.7
Co-60	3581	734	0.9999	734	729.98	99.4
Y-88	7690	1577	0.9920	1589	1627.2	102.4

Reviewed By: Jody Watson

Date: 3/28/2012

Calibration Data from file: 8_Soil_TunaCan.Clb
Energy Calibration Date: 3/28/2012 Time: 10:35:07 AM
Efficiency Calibration Date: 3/28/2012 Time: 10:35:20 AM

Calibration Description:
8_Soil_TunaCan_90099_032712

Energy Calibration Fit
Energy = 0.0505 +0.250025*Channel +8.06699e-010*Channel**2
FWHM (ch) = 3.6351 +0.000832*Channel -2.49195e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.74	46.54	46.49	0.11%	0.94	0.95	-0.61%
237.86	59.54	59.52	0.03%	0.95	0.96	-1.36%
351.89	88.03	88.03	-0.00%	0.97	0.98	-1.63%
488.04	122.06	122.07	-0.01%	1.01	1.01	0.12%
663.26	165.85	165.88	-0.02%	1.07	1.04	2.17%
1116.59	279.17	279.23	-0.02%	1.15	1.13	1.73%
1566.40	391.69	391.69	-0.00%	1.22	1.22	0.24%
2645.92	661.66	661.60	0.01%	1.39	1.42	-1.95%
3591.62	898.02	898.05	-0.00%	1.61	1.58	2.16%
4692.17	1173.24	1173.23	0.00%	1.74	1.75	-0.61%
5329.14	1332.50	1332.49	0.00%	1.82	1.84	-1.05%
7342.97	1836.01	1836.02	-0.00%	2.11	2.10	0.42%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.3942 %
Ln(Eff) = -0.1099 -0.495854*Ln(Eng) -0.0257227*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.7131 %
Ln(Eff) = -25.2530 +9.398253*Ln(Eng) -1.00003*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	1.9170E-002	2.0055E-002	-4.62%
59.54	3.0526E-002	2.8813E-002	5.61%
88.03	3.9175E-002	3.9918E-002	-1.90%
122.06	3.9509E-002	4.1457E-002	-4.93%
165.85	========== Knee ==========		
165.85	3.5429E-002	3.6291E-002	-2.43%
279.17	2.5270E-002	2.4275E-002	3.94%
391.69	1.8582E-002	1.8550E-002	0.17%
661.66	1.2089E-002	1.2090E-002	-0.01%
898.02	9.1435E-003	9.3604E-003	-2.37%
1173.24	7.3487E-003	7.4527E-003	-1.42%
1332.50	6.6398E-003	6.6776E-003	-0.57%
1836.01	5.1654E-003	5.0457E-003	2.32%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

```
     ORTEC g v - i (1087) Env32  G53W4.25  3/28/2012 10:36:01 AM
TestAmerica                      Spectrum name: 8_TunaCan_20120676.An1

Sample description
     8_TunaCan_90099_032712


Spectrum Filename: C:\User\SPC\Det8\8_TunaCan_20120676.An1

Acquisition information
       Start time:                 3/27/2012 10:58:29 AM
       Live time:               3600
       Real time:               3655
       Dead time:                  1.49 %
       Detector ID:                   8

Detector system
     Ge 8 SN/174


Calibration
       Filename:                   8_Soil_TunaCan.Clb
     8_Soil_TunaCan_90099_032712


       Energy Calibration
            Created:               3/28/2012 10:35:07 AM
            Zero offset:           0.050 keV
            Gain:                  0.250 keV/channel
            Quadratic:             8.067E-10 keV/channel^2

       Efficiency Calibration
            Created:               3/28/2012 10:35:20 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.39 %
            Log(Eff):             -1.098764E-01 + (-4.958544E-01*Log(E) ) +
                                   ( -2.572270E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.71 %
            Log(Eff):             -2.525301E+01 + ( 9.398253E+00*Log(E) ) +
                                   ( -1.000034E+00*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.55keV )
       Stop channel:            8000 (  2000.30keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method
```

ORTEC g v - i (1087) Env32 G53W4.25 3/28/2012 10:36:01 AM
TestAmerica Spectrum name: 8_TunaCan_20120676.An1

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2012 11:00:00 AM
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0205

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.54	43426.	0.60	0.95	2.002E-02	46.54	4.250	1.426E+04	Pb210
59.52	45918.	0.77	0.95	2.880E-02	59.54	35.700	1.240E+03	AM241
72.86	2434.	6.68	0.97	3.542E-02				
88.03	73269.	0.53	0.97	3.992E-02	88.03	3.610	1.607E+04	CD109
122.07	35407.	0.77	1.01	4.146E-02	122.06	85.600	3.451E+02	CO57
136.51	4312.	4.44	1.06	3.999E-02				
165.88	36308.	0.76	1.07	3.629E-02	165.85	79.900	5.363E+02	Ce139
279.23	24162.	0.88	1.15	2.427E-02	279.17	81.500	1.218E+03	Hg203
391.69	24625.	0.77	1.22	1.855E-02	391.69	64.000	9.671E+02	SN113
661.60	17184.	1.10	1.39	1.209E-02	661.66	85.210	4.659E+02	CS137
898.05	28015.	0.71	1.61	9.360E-03	898.02	93.700	1.552E+03	Y898
1173.23	18826.	0.79	1.74	7.453E-03	1173.24	99.900	7.245E+02	Co1173
1332.49	17010.	0.84	1.82	6.678E-03	1332.50	99.982	7.300E+02	Co1332
1836.02	16762.	0.79	2.11	5.046E-03	1836.01	99.200	1.627E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
291.19	72.85	12003.	2434.	6.872E+04	6.68	0.969	-	D
545.78	136.51	8432.	4312.	1.078E+05	4.44	1.059	-	

ORTEC g v - i (1087) Env32 G53W4.25 3/28/2012 10:36:01 AM
TestAmerica Spectrum name: 8_TunaCan_20120676.An1

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.74	46.49	17505.	45568.	12.658	0.76	0.942
AM-241	237.86	59.52	18397.	45918.	12.755	0.77	0.945
CD-109	351.89	88.03	17370.	73269.	20.353	0.53	0.966
CO-57	488.04	122.07	9639.	35407.	9.835	0.77	1.010
Ce-139	663.26	165.88	8356.	36308.	10.085	0.76	1.067
Hg-203	1116.59	279.23	4382.	24162.	6.712	0.88	1.153
SN-113	1566.40	391.69	2677.	24625.	6.840	0.77	1.223
CS-137	2645.92	661.60	3145.	17184.	4.773	1.10	1.389
Y-898	3591.62	898.05	1881.	28015.	7.782	0.71	1.611
Co-1173	4692.17	1173.23	650.	18826.	5.229	0.79	1.738
Co-1332	5329.14	1332.49	576.	17010.	4.725	0.84	1.822
Y-1836	7342.97	1836.02	111.	16762.	4.656	0.79	2.110

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Peak Code	MDA Value Bq	COMMENTS
Pb-210	N	1.4960E+04				8.15E+03	
			46.54	1.496E+04	(	2.033E+02 7.55E-01 4.25E+00	G
AM-241		1.2405E+03				1.58E+05	
			59.54	1.240E+03	(	1.715E+01 7.72E-01 3.57E+01	G
CD-109		1.6066E+04				4.63E+02	
			88.03	1.607E+04	(	1.353E+02 5.26E-01 3.61E+00	G
CO-57		3.4512E+02				2.72E+02	
			122.06	3.451E+02	(	4.486E+00 7.68E-01 8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 3/28/2012 10:36:01 AM
TestAmerica Spectrum name: 8_TunaCan_20120676.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ce-139	5.3634E+02					1.38E+02	
		165.85	5.363E+02	(	6.333E+00	7.56E-01	7.99E+01 G
Hg-203	1.2182E+03					4.66E+01	
		279.17	1.218E+03	(	1.569E+01	8.81E-01	8.15E+01 G
SN-113	9.6715E+02					1.15E+02	
		391.69	9.671E+02	(	9.575E+00	7.73E-01	6.40E+01 G
CS-137	4.6586E+02					1.10E+04	
		661.66	4.659E+02	(	7.158E+00	1.10E+00	8.52E+01 G
Y-898	1.5521E+03					1.07E+02	
		898.02	1.552E+03	(	1.135E+01	7.10E-01	9.37E+01 G
Co-1173	7.2448E+02					1.93E+03	
		1173.24	7.245E+02	(	4.676E+00	7.93E-01	9.99E+01 G
Co-1332	7.2998E+02					1.93E+03	
		1332.50	7.300E+02	(	4.916E+00	8.45E-01	1.00E+02 G
Y-1836	1.6272E+03					1.07E+02	
		1836.01	1.627E+03	(	5.029E+00	7.91E-01	9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape

ORTEC g v - i (1087) Env32 G53W4.25 3/28/2012 10:36:01 AM
TestAmerica Spectrum name: 8_TunaCan_20120676.An1

P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq	Time Corrected Activity Bq	Uncertainty 1 Sigma Counting	MDA
Pb-210	1.4851E+04	1.4960E+04	7.555E-01%	2.03E+02
AM-241	1.2400E+03	1.2405E+03	7.719E-01%	1.71E+01
CD-109	1.4124E+04	1.6066E+04	5.260E-01%	1.35E+02
CO-57	2.7715E+02	3.4512E+02	7.681E-01%	4.49E+00
Ce-139	3.4782E+02	5.3634E+02	7.558E-01%	6.33E+00
Hg-203	3.3925E+02	1.2182E+03	8.812E-01%	1.57E+01
SN-113	5.7617E+02	9.6715E+02	7.729E-01%	9.58E+00
CS-137	4.6334E+02	4.6586E+02	1.105E+00%	7.16E+00
Y-898	8.8728E+02	1.5521E+03	7.104E-01%	1.13E+01
Co-1173	7.0239E+02	7.2448E+02	7.931E-01%	4.68E+00
Co-1332	7.0772E+02	7.2998E+02	8.450E-01%	4.92E+00
Y-1836	9.3024E+02	1.6272E+03	7.905E-01%	5.03E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (82.3 to 2000.3 keV) 3.545E+04 Bq
Total Decayed Activity (82.3 to 2000.3 keV) 4.0432598E+04 Bq

Analyzed by: _____
Admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica

Gamma Verification per Geometry

Detector:	Ge12
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14446	96.8
Am-241	2037	418	0.3590	1163	1221.2	105.0
Cd-109	2881	591	0.0361	16363	16047	98.1
Co-57	1511	310	0.8560	362	351.89	97.2
Ce-139	2139	439	0.7990	549	541.18	98.6
Hg-203	4651	954	0.8146	1171	1185.4	101.3
Sn-113	3015	618	0.6400	966	985.86	102.1
Cs-137	1938	397	0.8510	467	464.95	99.6
Y-88	7264	1489	0.9370	1589	1567.8	98.6
Co-60	3580	734	0.9997	734	723.38	98.5
Co-60	3581	734	0.9999	734	722.83	98.4
Y-88	7690	1577	0.9920	1589	1631.1	102.6

Reviewed By: Jody Watson

Date: 10/4/2012

Calibration Data from file: 12_Soil_TunaCan.Clb
Energy Calibration Date: 10/4/2012 Time: 8:58:25 AM
Efficiency Calibration Date: 10/4/2012 Time: 9:05:44 AM

Calibration Description:
12_TunaCanCal_90099_100212

Energy Calibration Fit
Energy = 0.0090 +0.250225*Channel -3.66218e-008*Channel**2
FWHM (ch) = 3.4167 +0.000958*Channel -2.51787e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
186.06	46.54	46.56	-0.05%	0.90	0.90	0.39%
237.95	59.54	59.55	-0.01%	0.89	0.91	-2.27%
351.83	88.03	88.04	-0.01%	0.93	0.94	-1.36%
487.89	122.06	122.08	-0.02%	0.97	0.97	0.15%
663.08	165.85	165.91	-0.04%	1.00	1.01	-0.90%
1115.49	279.17	279.09	0.03%	1.15	1.11	3.32%
1565.26	391.69	391.59	0.03%	1.21	1.21	-0.06%
2645.31	661.66	661.67	-0.00%	1.46	1.44	1.36%
3590.75	898.02	898.03	-0.00%	1.65	1.63	0.91%
4692.00	1173.24	1173.26	-0.00%	1.80	1.84	-2.15%
5329.54	1332.50	1332.55	-0.00%	1.94	1.95	-0.63%
7345.18	1836.01	1835.98	0.00%	2.29	2.27	0.67%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.6978 %
Ln(Eff) = -0.7827 -0.300127*Ln(Eng) -0.0336956*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 0.9642 %
Ln(Eff) = -22.8841 +8.352717*Ln(Eng) -0.881237*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.1587E-002	2.2292E-002	-3.26%
59.54	3.2562E-002	3.1219E-002	4.12%
88.03	4.1933E-002	4.2777E-002	-2.01%
122.06	4.3987E-002	4.5264E-002	-2.90%
165.85	==========	Knee	==========
165.85	4.0281E-002	4.0886E-002	-1.50%
279.17	2.9349E-002	2.8963E-002	1.31%
391.69	2.3406E-002	2.2919E-002	2.08%
661.66	1.5679E-002	1.5712E-002	-0.21%
898.02	1.2338E-002	1.2502E-002	-1.33%
1173.24	1.0026E-002	1.0183E-002	-1.57%
1332.50	9.0782E-003	9.2201E-003	-1.56%
1836.01	7.3324E-003	7.1442E-003	2.57%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

```
     ORTEC g v - i (1087) Env32  G53W4.25  10/4/2012 9:11:35 AM
TestAmerica, Inc                Spectrum name: 12_TunaCan_20122189.An1

Sample description
     12_TunaCan_90099


Spectrum Filename: C:\User\SPC\Det12\12_TunaCan_20122189.An1

Acquisition information
       Start time:                 10/2/2012 10:17:00 AM
       Live time:               7200
       Real time:               7302
       Dead time:                  1.40 %
       Detector ID:                   12

Detector system
     Ge12 S/N10034336


Calibration
       Filename:                   12_Soil_TunaCan.Clb
     12_TunaCanCal_90099_100212


       Energy Calibration
            Created:               10/4/2012 8:58:25 AM
            Zero offset:           0.009 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.662E-08 keV/channel^2

       Efficiency Calibration
            Created:               10/4/2012 9:05:44 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.70 %
            Log(Eff):             -7.827468E-01 + (-3.001271E-01*Log(E) ) +
                                   ( -3.369562E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.96 %
            Log(Eff):             -2.288409E+01 + ( 8.352717E+00*Log(E) ) +
                                   ( -8.812368E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.54keV )
       Stop channel:            8000 (  1999.46keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method
```

ORTEC g v - i (1087) Env32 G53W4.25 10/4/2012 9:11:35 AM
TestAmerica, Inc Spectrum name: 12_TunaCan_20122189.An1

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2012 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0301

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.56	96262.	0.47	0.90	2.231E-02	46.54	4.250	1.445E+04	Pb210
59.55	97880.	0.49	0.89	3.122E-02	59.54	35.700	1.221E+03	AM241
88.04	118171.	0.40	0.93	4.278E-02	88.03	3.610	1.605E+04	CD109
122.08	48689.	0.66	0.97	4.526E-02	122.06	85.600	3.519E+02	CO57
136.52	6070.	3.34	0.99	4.419E-02				
165.91	31873.	0.80	1.00	4.088E-02	165.85	79.900	5.412E+02	Ce139
279.09	3381.	4.68	1.15	2.897E-02	279.17	81.500	1.185E+03	Hg203
391.58	19876.	1.11	1.21	2.292E-02	391.69	64.000	9.859E+02	SN113
661.67	44047.	0.60	1.46	1.571E-02	661.66	85.210	4.649E+02	CS137
898.03	22124.	1.09	1.65	1.250E-02	898.02	93.700	1.568E+03	Y898
1173.25	47992.	0.54	1.80	1.018E-02	1173.24	99.900	7.234E+02	Co1173
1332.54	43454.	0.53	1.94	9.220E-03	1332.50	99.982	7.228E+02	Co1332
1835.96	13783.	0.98	2.29	7.144E-03	1836.01	99.200	1.614E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
545.60	136.52	8754.	6070.	1.374E+05	3.34	0.989	-

ORTEC g v - i (1087) Env32 G53W4.25 10/4/2012 9:11:35 AM
TestAmerica, Inc Spectrum name: 12_TunaCan_20122189.An1

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	186.06	46.56	27968.	96262.	13.370	0.47	0.903
AM-241	237.95	59.55	29903.	97880.	13.594	0.49	0.891
CD-109	351.83	88.04	24170.	118171.	16.413	0.40	0.926
CO-57	487.89	122.08	12523.	48689.	6.762	0.66	0.972
Ce-139	663.08	165.91	7948.	31873.	4.427	0.80	1.002
Hg-203	1115.49	279.09	5203.	3381.	0.470	4.68	1.152
SN-113	1565.25	391.58	5206.	19876.	2.760	1.11	1.214
CS-137	2645.31	661.67	4245.	44047.	6.118	0.60	1.464
Y-898	3590.75	898.03	4771.	22124.	3.073	1.09	1.649
Co-1173	4691.96	1173.25	2353.	47992.	6.666	0.54	1.802
Co-1332	5329.49	1332.54	1369.	43454.	6.035	0.53	1.941
Y-1836	7345.05	1835.95	424.	13925.	1.934	0.97	2.293

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

√

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq	COMMENTS
Pb-210	N	1.4446E+04				8.15E+03	
			46.54	1.445E+04	(	1.174E+02 4.69E-01 4.25E+00	G
AM-241		1.2212E+03				1.58E+05	
			59.54	1.221E+03	(	1.009E+01 4.87E-01 3.57E+01	G
CD-109		1.6047E+04				4.63E+02	
			88.03	1.605E+04	(	9.875E+01 4.00E-01 3.61E+00	G
CO-57		3.5189E+02				2.72E+02	
			122.06	3.519E+02	(	3.789E+00 6.59E-01 8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 10/4/2012 9:11:35 AM
TestAmerica, Inc Spectrum name: 12_TunaCan_20122189.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ce-139	5.4118E+02					1.38E+02	
		165.85	5.412E+02	(	7.100E+00	8.00E-01	7.99E+01 G
Hg-203	1.1854E+03					4.66E+01	
		279.17	1.185E+03	(	1.188E+02	4.68E+00	8.15E+01 G
SN-113	9.8586E+02					1.15E+02	
		391.69	9.859E+02	(	1.681E+01	1.11E+00	6.40E+01 G
CS-137	4.6495E+02					1.10E+04	
		661.66	4.649E+02	(	3.233E+00	5.99E-01	8.52E+01 G
Y-898	1.5678E+03					1.07E+02	
		898.02	1.568E+03	(	2.300E+01	1.09E+00	9.37E+01 G
Co-1173	7.2338E+02					1.93E+03	
		1173.24	7.234E+02	(	3.448E+00	5.35E-01	9.99E+01 G
Co-1332	7.2283E+02					1.93E+03	
		1332.50	7.228E+02	(	2.913E+00	5.31E-01	1.00E+02 G
Y-1836	1.6311E+03					1.07E+02	
		1836.01	1.631E+03	(	1.156E+01	9.66E-01	9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape

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TestAmerica, Inc Spectrum name: 12_TunaCan_20122189.An1

P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq	Time Corrected Activity Bq	Uncertainty 1 Sigma Counting	MDA
Pb-210	1.4112E+04	1.4446E+04	4.686E-01%	1.17E+02
AM-241	1.2198E+03	1.2212E+03	4.873E-01%	1.01E+01
CD-109	1.0628E+04	1.6047E+04	3.995E-01%	9.87E+01
CO-57	1.7453E+02	3.5189E+02	6.590E-01%	3.79E+00
Ce-139	1.3551E+02	5.4118E+02	7.998E-01%	7.10E+00
Hg-203	1.9895E+01	1.1854E+03	4.682E+00%	1.19E+02
SN-113	1.8819E+02	9.8586E+02	1.108E+00%	1.68E+01
CS-137	4.5695E+02	4.6495E+02	5.986E-01%	3.23E+00
Y-898	2.6230E+02	1.5678E+03	1.088E+00%	2.30E+01
Co-1173	6.5520E+02	7.2338E+02	5.354E-01%	3.45E+00
Co-1332	6.5470E+02	7.2283E+02	5.311E-01%	2.91E+00
Y-1836	2.7290E+02	1.6311E+03	9.660E-01%	1.16E+01

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.5 to 1999.5 keV) 2.878E+04 Bq
Total Decayed Activity (37.5 to 1999.5 keV) 3.9888684E+04 Bq

Analyzed by: _____
admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica, Inc

Gamma Verification per Geometry

Detector:	Ge13
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14299	95.8
Am-241	2037	418	0.3590	1163	1236	106.2
Cd-109	2881	591	0.0361	16363	16083	98.3
Co-57	1511	310	0.8560	362	346.19	95.7
Ce-139	2139	439	0.7990	549	539.42	98.3
Hg-203	4651	954	0.8146	1171	1201.9	102.7
Sn-113	3015	618	0.6400	966	968.01	100.2
Cs-137	1938	397	0.8510	467	474.76	101.7
Y-88	7264	1489	0.9370	1589	1545.1	97.2
Co-60	3580	734	0.9997	734	719.78	98.0
Co-60	3581	734	0.9999	734	727.89	99.1
Y-88	7690	1577	0.9920	1589	1632.3	102.7

Reviewed By: Jody Watson

Date: 3/29/2012

Calibration Data from file: 13_Soil_TunaCan.Clb
Energy Calibration Date: 3/29/2012 Time: 7:50:00 AM
Efficiency Calibration Date: 3/29/2012 Time: 7:50:26 AM

Calibration Description:
13_Soil_TunaCan_90099_032712

Energy Calibration Fit
Energy = 0.0722 +0.250086*Channel -2.12895e-008*Channel**2
FWHM (ch) = 3.9604 +0.000908*Channel -1.76283e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.95	46.54	46.58	-0.08%	1.03	1.03	-0.55%
237.92	59.54	59.57	-0.05%	1.03	1.04	-1.74%
351.94	88.03	88.09	-0.06%	1.05	1.07	-1.59%
488.07	122.06	122.13	-0.05%	1.10	1.10	0.25%
663.06	165.85	165.88	-0.02%	1.17	1.14	2.38%
1115.49	279.17	279.01	0.06%	1.24	1.24	0.44%
1565.36	391.69	391.49	0.05%	1.36	1.33	1.77%
2646.08	661.66	661.67	-0.00%	1.55	1.56	-0.89%
3591.99	898.02	898.10	-0.01%	1.75	1.75	-0.09%
4693.06	1173.24	1173.27	-0.00%	1.96	1.96	-0.07%
5330.52	1332.50	1332.56	-0.00%	2.06	2.07	-0.45%
7345.62	1836.01	1835.96	0.00%	2.42	2.42	0.26%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.9134 %
Ln(Eff) = -0.5308 -0.305775*Ln(Eng) -0.0343757*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.5969 %
Ln(Eff) = -22.9222 +8.455931*Ln(Eng) -0.892406*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.5932E-002	2.7053E-002	-4.32%
59.54	4.0139E-002	3.8023E-002	5.27%
88.03	5.1336E-002	5.2255E-002	-1.79%
122.06	5.2852E-002	5.5285E-002	-4.60%
165.85	==========	Knee	==========
165.85	4.9293E-002	5.0203E-002	-1.85%
279.17	3.6281E-002	3.5323E-002	2.64%
391.69	2.7897E-002	2.7825E-002	0.26%
661.66	1.9294E-002	1.8934E-002	1.86%
898.02	1.4585E-002	1.4999E-002	-2.84%
1173.24	1.1920E-002	1.2168E-002	-2.08%
1332.50	1.0902E-002	1.0995E-002	-0.86%
1836.01	8.7053E-003	8.4769E-003	2.62%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

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     ORTEC g v - i (1087) Env32  G53W4.25  3/29/2012 12:11:47 PM   Page  1
TestAmerica, Inc                Spectrum name: 13_TunaCan_20120186.An1

Sample description
     13_TunaCan_90099_032712


Spectrum Filename: C:\User\Cal\Spectra\Det13\13_TunaCan_20120186.An1

Acquisition information
       Start time:                 3/27/2012 3:23:25 PM
       Live time:               3600
       Real time:               3670
       Dead time:                  1.92 %
       Detector ID:                   13

Detector system
     Ge13 SN/10064006


Calibration
       Filename:                   13_Soil_TunaCan.Clb
     13_Soil_TunaCan_90099_032712


       Energy Calibration
            Created:               3/29/2012 7:50:00 AM
            Zero offset:           0.072 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -2.129E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/29/2012 7:50:26 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.91 %
            Log(Eff):             -5.308398E-01 + (-3.057754E-01*Log(E) ) +
                                   ( -3.437570E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.60 %
            Log(Eff):             -2.292218E+01 + ( 8.455931E+00*Log(E) ) +
                                   ( -8.924057E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.58keV )
       Stop channel:            8000 (  1999.40keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (1087) Env32  G53W4.25  3/29/2012 12:11:47 PM   Page  2
TestAmerica, Inc                Spectrum name: 13_TunaCan_20120186.An1
                                      Page 1
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```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                          Status          Comments
       Decay correct to date:         YES       1/1/2012 11:00:00 AM
       Decay during acquisition:      NO
       Decay during collection:       NO
       True coincidence correction:   NO
       Peaked background correction:  NO
       Absorption (Internal):         NO
       Geometry correction:           NO
       Random summing:                NO


total peaks alloc.   12 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0495
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.58	58754.	0.66	1.03	2.709E-02	46.54	4.250	1.430E+04	Pb210
59.57	60379.	0.66	1.03	3.805E-02	59.54	35.700	1.236E+03	AM241
70.81	1954.	9.69	1.05	4.529E-02				
72.99	3363.	5.52	1.06	4.644E-02				
88.09	95988.	0.44	1.05	5.227E-02	88.03	3.610	1.608E+04	CD109
122.13	47342.	0.70	1.10	5.528E-02	122.06	85.600	3.462E+02	CO57
136.50	6079.	3.90	1.17	5.395E-02				
165.88	50468.	0.66	1.17	5.020E-02	165.85	79.900	5.394E+02	Ce139
254.99	1887.	8.59	1.10	3.760E-02				
279.01	34595.	0.73	1.24	3.534E-02	279.17	81.500	1.202E+03	Hg203
391.49	36929.	0.70	1.36	2.783E-02	391.69	64.000	9.680E+02	SN113
661.67	27425.	0.90	1.55	1.893E-02	661.66	85.210	4.748E+02	CS137
898.10	44634.	0.61	1.75	1.500E-02	898.02	93.700	1.545E+03	Y898
1173.26	30535.	0.69	1.96	1.217E-02	1173.24	99.900	7.198E+02	Co1173
1332.55	27926.	0.70	2.06	1.099E-02	1332.50	99.982	7.279E+02	Co1332
1835.94	28215.	0.64	2.43	8.477E-03	1836.01	99.200	1.632E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
282.85	70.83	16957.	1954.	4.315E+04	9.69	1.054	-	D
291.58	73.01	15573.	3363.	7.242E+04	5.52	1.056	-	D
545.57	136.50	11563.	6079.	1.127E+05	3.90	1.173	-	
1019.41	254.99	5852.	1887.	5.018E+04	8.59	1.098	-	

s - Peak fails shape tests.

D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.95	46.58	20947.	58754.	16.321	0.66	1.027
AM-241	237.92	59.57	22064.	60379.	16.772	0.66	1.026
CD-109	351.94	88.09	20029.	95988.	26.663	0.44	1.053
CO-57	488.07	122.13	14046.	47342.	13.151	0.70	1.103
Ce-139	663.06	165.88	11600.	50468.	14.019	0.66	1.167
Hg-203	1115.49	279.01	5938.	34595.	9.610	0.73	1.243
SN-113	1565.36	391.49	4998.	36929.	10.258	0.70	1.359
CS-137	2646.08	661.67	4975.	27425.	7.618	0.90	1.546
Y-898	3591.97	898.10	3847.	44634.	12.398	0.61	1.747
Co-1173	4693.01	1173.26	1833.	30535.	8.482	0.69	1.958
Co-1332	5330.51	1332.55	1457.	27926.	7.757	0.70	2.064
Y-1836	7345.55	1835.94	482.	28215.	7.838	0.64	2.427

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Activity Bq	Code	MDA Value Bq	COMMENTS
Pb-210	N	1.4299E+04				8.15E+03	
			46.54	1.430E+04	(	1.648E+02 6.58E-01 4.25E+00	G
AM-241		1.2360E+03				1.58E+05	
			59.54	1.236E+03	(	1.423E+01 6.62E-01 3.57E+01	G
CD-109		1.6083E+04				4.63E+02	
			88.03	1.608E+04	(	1.110E+02 4.41E-01 3.61E+00	G
CO-57		3.4619E+02				2.72E+02	
			122.06	3.462E+02	(	4.058E+00 7.02E-01 8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 3/29/2012 12:11:47 PM Page 4
TestAmerica, Inc Spectrum name: 13_TunaCan_20120186.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ce-139	5.3942E+02				1.38E+02	
		165.85	5.394E+02	(	5.393E+00 6.58E-01 7.99E+01	G
Hg-203	1.2019E+03				4.66E+01	
		279.17	1.202E+03	(	1.257E+01 7.27E-01 8.15E+01	G
SN-113	9.6801E+02				1.15E+02	
		391.69	9.680E+02	(	8.706E+00 6.96E-01 6.40E+01	G

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CS-137       4.7476E+02                                      1.10E+04
                          661.66 4.748E+02  (  5.737E+00 8.98E-01 8.52E+01 G

Y-898        1.5451E+03                                      1.07E+02
                          898.02 1.545E+03  (  1.010E+01 6.13E-01 9.37E+01 G

Co-1173      7.1978E+02                                      1.93E+03
                         1173.24 7.198E+02  (  4.767E+00 6.89E-01 9.99E+01 G

Co-1332      7.2789E+02                                      1.93E+03
                         1332.50 7.279E+02  (  4.706E+00 7.04E-01 1.00E+02 G

Y-1836       1.6323E+03                                      1.07E+02
                         1836.01 1.632E+03  (  6.075E+00 6.40E-01 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
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      ORTEC g v - i (1087) Env32  G53W4.25  3/29/2012 12:11:47 PM   Page  5
 TestAmerica, Inc                Spectrum name: 13_TunaCan_20120186.An1

   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  1 Sigma %
 ____________________________________________________________________________
   P - Peakbackground subtraction

 *****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
         Time of Count  Time Corrected  Uncertainty  1 Sigma
 Nuclide     Activity       Activity       Counting                   MDA
                Bq             Bq
```

Pb-210	1.4195E+04	1.4299E+04	6.581E-01%	1.65E+02
AM-241	1.2356E+03	1.2360E+03	6.618E-01%	1.42E+01
CD-109	1.4134E+04	1.6083E+04	4.413E-01%	1.11E+02
CO-57	2.7789E+02	3.4619E+02	7.023E-01%	4.06E+00
Ce-139	3.4949E+02	5.3942E+02	6.584E-01%	5.39E+00
Hg-203	3.3381E+02	1.2019E+03	7.272E-01%	1.26E+01
SN-113	5.7605E+02	9.6801E+02	6.961E-01%	8.71E+00
CS-137	4.7218E+02	4.7476E+02	8.976E-01%	5.74E+00
Y-898	8.8221E+02	1.5451E+03	6.126E-01%	1.01E+01
Co-1173	6.9779E+02	7.1978E+02	6.892E-01%	4.77E+00
Co-1332	7.0565E+02	7.2789E+02	7.036E-01%	4.71E+00
Y-1836	9.3203E+02	1.6323E+03	6.402E-01%	6.07E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (82.3 to 1999.4 keV) 3.479E+04 Bq
Total Decayed Activity (82.3 to 1999.4 keV) 3.9773562E+04 Bq

Gamma Verification per Geometry

Detector:	Ge14
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14422	96.6
Am-241	2037	418	0.3590	1163	1222.5	105.1
Cd-109	2881	591	0.0361	16363	16145	98.7
Co-57	1511	310	0.8560	362	349.28	96.5
Ce-139	2139	439	0.7990	549	538.52	98.1
Hg-203	4651	954	0.8146	1171	1205.9	103.0
Sn-113	3015	618	0.6400	966	971.36	100.6
Cs-137	1938	397	0.8510	467	465.65	99.7
Y-88	7264	1489	0.9370	1589	1570	98.8
Co-60	3580	734	0.9997	734	724.16	98.6
Co-60	3581	734	0.9999	734	720.6	98.1
Y-88	7690	1577	0.9920	1589	1634	102.8

Reviewed By: Jody Watson

Date: 4/23/2012

Calibration Data from file: 14_Soil_TunaCan.Clb
Energy Calibration Date: 4/23/2012 Time: 11:29:29 AM
Efficiency Calibration Date: 4/23/2012 Time: 11:29:47 AM

Calibration Description:
14_TunaCan_90099_042312

Energy Calibration Fit
Energy = 0.1578 +0.250077*Channel -1.95882e-008*Channel**2
FWHM (ch) = 2.7879 +0.000947*Channel -1.45727e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
186.01	46.54	46.67	-0.29%	0.73	0.74	-2.18%
237.82	59.54	59.63	-0.15%	0.74	0.75	-1.99%
351.26	88.03	88.00	0.04%	0.78	0.78	-0.25%
487.04	122.06	121.95	0.09%	0.82	0.81	0.58%
662.28	165.85	165.77	0.05%	0.86	0.85	1.23%
1115.71	279.17	279.15	0.01%	0.98	0.96	2.15%
1565.69	391.69	391.65	0.01%	1.09	1.06	2.42%
2645.83	661.66	661.68	-0.00%	1.30	1.30	0.28%
3591.53	898.02	898.06	-0.00%	1.42	1.50	-5.87%
4692.63	1173.24	1173.24	-0.00%	1.76	1.73	2.11%
5329.97	1332.50	1332.50	-0.00%	1.88	1.86	1.08%
7345.32	1836.01	1836.00	0.00%	2.23	2.24	-0.37%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.0212 %
Ln(Eff) = 0.2101 -0.595197*Ln(Eng) -0.0160533*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.2797 %
Ln(Eff) = -23.9149 +8.828985*Ln(Eng) -0.93715*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.0990E-002	2.1711E-002	-3.44%
59.54	3.2006E-002	3.0654E-002	4.23%
88.03	4.1381E-002	4.1960E-002	-1.40%
122.06	4.2230E-002	4.3784E-002	-3.68%
165.85	========== Knee ==========		
165.85	3.7957E-002	3.8722E-002	-2.02%
279.17	2.6754E-002	2.5963E-002	2.96%
391.69	2.0047E-002	1.9926E-002	0.60%
661.66	1.3125E-002	1.3132E-002	-0.05%
898.02	1.0136E-002	1.0258E-002	-1.20%
1173.24	8.1251E-003	8.2437E-003	-1.46%
1332.50	7.2859E-003	7.4227E-003	-1.88%
1836.01	5.8454E-003	5.6863E-003	2.72%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

```
     ORTEC g v - i (1087) Env32  G53W4.25  7/6/2012 11:13:09 AM    Page  1
TestAmerica, Inc.               Spectrum name: 14_TunaCan_20120385.An1

Sample description
     17_TunaCan_90099_032612


Spectrum Filename: C:\User\Cal\Spectra\Det14\14_TunaCan_20120385.An1

Acquisition information
       Start time:                 4/23/2012 9:56:44 AM
       Live time:               3600
       Real time:               3665
       Dead time:                  1.77 %
       Detector ID:                   14

Detector system
     Ge17 SN/11080671


Calibration
       Filename:                   14_Soil_TunaCan.Clb
     14_TunaCan_90099_042312


       Energy Calibration
            Created:               4/23/2012 11:29:29 AM
            Zero offset:           0.158 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -1.959E-08 keV/channel^2

       Efficiency Calibration
            Created:               4/23/2012 11:29:47 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.02 %
            Log(Eff):              2.101260E-01 + (-5.951973E-01*Log(E) ) +
                                   ( -1.605331E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.28 %
            Log(Eff):             -2.391492E+01 + ( 8.828985E+00*Log(E) ) +
                                   ( -9.371496E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.67keV )
       Stop channel:            8000 (  1999.52keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (1087) Env32  G53W4.25  7/6/2012 11:13:09 AM    Page  2
TestAmerica, Inc.               Spectrum name: 14_TunaCan_20120385.An1
                                      Page 1
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```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       1/1/2012 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.   12 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0575
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.67	47449.	0.64	0.73	2.181E-02	46.54	4.250	1.442E+04	Pb210
59.63	48139.	0.67	0.74	3.071E-02	59.54	35.700	1.223E+03	AM241
72.88	1815.	8.13	0.77	3.737E-02				
88.00	74331.	0.47	0.79	4.195E-02	88.03	3.610	1.614E+04	CD109
121.95	35331.	0.76	0.82	4.379E-02	122.06	85.600	3.493E+02	CO57
136.39	4314.	3.84	0.82	4.244E-02				
165.77	33960.	0.70	0.89	3.800E-02	165.85	79.900	5.385E+02	Ce139
279.15	17136.	1.05	1.00	2.596E-02	279.17	81.500	1.206E+03	Hg203
391.65	22586.	0.85	1.13	1.993E-02	391.69	64.000	9.714E+02	SN113
661.68	18625.	0.92	1.36	1.313E-02	661.66	85.210	4.657E+02	CS137
898.06	26064.	0.74	1.56	1.026E-02	898.02	93.700	1.570E+03	Y898
1173.24	20614.	0.80	1.76	8.244E-03	1173.24	99.900	7.242E+02	Co1173
1332.50	18485.	0.81	1.88	7.423E-03	1332.50	99.982	7.206E+02	Co1332
1835.98	15919.	0.83	2.23	5.686E-03	1836.01	99.200	1.634E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
290.81	72.88	9094.	1708.	4.569E+04	9.16	0.857	-
544.77	136.39	6618.	4314.	1.017E+05	3.84	0.819	-

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	186.01	46.67	13580.	47449.	13.180	0.64	0.728
AM-241	237.82	59.63	14856.	48139.	13.372	0.67	0.736
CD-109	351.26	88.00	13424.	74331.	20.647	0.47	0.793
CO-57	487.04	121.95	9138.	35331.	9.814	0.76	0.820
Ce-139	662.28	165.77	5743.	33960.	9.433	0.70	0.887
Hg-203	1115.71	279.15	3658.	17136.	4.760	1.05	0.998
SN-113	1565.69	391.65	3032.	22586.	6.274	0.85	1.125
CS-137	2645.83	661.68	2231.	18625.	5.174	0.92	1.364
Y-898	3591.53	898.06	1967.	26064.	7.240	0.74	1.562
Co-1173	4692.63	1173.24	1001.	20614.	5.726	0.80	1.765
Co-1332	5329.97	1332.50	650.	18485.	5.135	0.81	1.875
Y-1836	7345.28	1835.98	147.	15919.	4.422	0.83	2.232

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq	Peak Energy keV	Activity Bq	Code	MDA Value Bq		COMMENTS
Pb-210	N	1.4422E+04					8.15E+03	
			46.54	1.442E+04	(	1.659E+02	6.42E-01 4.25E+00	G
AM-241		1.2225E+03					1.58E+05	
			59.54	1.223E+03	(	1.449E+01	6.65E-01 3.57E+01	G
CD-109		1.6145E+04					4.63E+02	
			88.03	1.614E+04	(	1.179E+02	4.73E-01 3.61E+00	G
CO-57		3.4928E+02					2.72E+02	
			122.06	3.493E+02	(	4.431E+00	7.59E-01 8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 7/6/2012 11:13:09 AM Page 4
TestAmerica, Inc. Spectrum name: 14_TunaCan_20120385.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA		Comments
Ce-139	5.3852E+02					1.38E+02	
		165.85	5.385E+02	(	5.643E+00	6.97E-01 7.99E+01	G
Hg-203	1.2059E+03					4.66E+01	
		279.17	1.206E+03	(	2.002E+01	1.05E+00 8.15E+01	G
SN-113	9.7136E+02					1.15E+02	
		391.69	9.714E+02	(	1.115E+01	8.54E-01 6.40E+01	G
CS-137	4.6565E+02					1.10E+04	
		661.66	4.657E+02	(	5.571E+00	9.21E-01 8.52E+01	G
Y-898	1.5700E+03					1.07E+02	

```
                          898.02 1.570E+03  (  1.261E+01 7.43E-01 9.37E+01 G

Co-1173      7.2416E+02                                        1.93E+03
                         1173.24 7.242E+02  (  5.275E+00 7.99E-01 9.99E+01 G

Co-1332      7.2060E+02                                        1.93E+03
                         1332.50 7.206E+02  (  4.737E+00 8.09E-01 1.00E+02 G

Y-1836       1.6340E+03                                        1.07E+02
                         1836.01 1.634E+03  (  6.084E+00 8.27E-01 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
```



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   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  1 Sigma %
 ____________________________________________________________________________
   P - Peakbackground subtraction

 *****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
         Time of Count  Time Corrected  Uncertainty  1 Sigma
 Nuclide     Activity       Activity       Counting                   MDA
               Bq             Bq

 ____________________________________________________________________________
 Pb-210       1.4284E+04    1.4422E+04    6.417E-01%                1.66E+02
 AM-241       1.2219E+03    1.2225E+03    6.654E-01%                1.45E+01
 CD-109       1.3631E+04    1.6145E+04    4.729E-01%                1.18E+02
```

CO-57	2.6186E+02	3.4928E+02	7.589E-01%	4.43E+00
Ce-139	3.0490E+02	5.3852E+02	6.967E-01%	5.64E+00
Hg-203	2.2495E+02	1.2059E+03	1.050E+00%	2.00E+01
SN-113	4.9196E+02	9.7136E+02	8.544E-01%	1.12E+01
CS-137	4.6235E+02	4.6565E+02	9.207E-01%	5.57E+00
Y-898	7.5323E+02	1.5700E+03	7.434E-01%	1.26E+01
Co-1173	6.9530E+02	7.2416E+02	7.989E-01%	5.27E+00
Co-1332	6.9188E+02	7.2060E+02	8.094E-01%	4.74E+00
Y-1836	7.8390E+02	1.6340E+03	8.273E-01%	6.08E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.7 to 1999.5 keV) 3.381E+04 Bq
Total Decayed Activity (37.7 to 1999.5 keV) 3.9968746E+04 Bq

Gamma Verification per Geometry

Detector:	Ge15
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14410	96.5
Am-241	2037	418	0.3590	1163	1206.9	103.7
Cd-109	2881	591	0.0361	16363	16069	98.2
Co-57	1511	310	0.8560	362	356.06	98.4
Ce-139	2139	439	0.7990	549	538.81	98.2
Hg-203	4651	954	0.8146	1171	1202.4	102.7
Sn-113	3015	618	0.6400	966	974.62	100.9
Cs-137	1938	397	0.8510	467	465.43	99.7
Y-88	7264	1489	0.9370	1589	1573.7	99.0
Co-60	3580	734	0.9997	734	716.44	97.6
Co-60	3581	734	0.9999	734	726.55	98.9
Y-88	7690	1577	0.9920	1589	1633.2	102.8

Reviewed By: Jody Watson

Date: 3/22/2012

Calibration Data from file: 15_Soil_TunaCan.Clb
Energy Calibration Date: 3/22/2012 Time: 1:02:46 PM
Efficiency Calibration Date: 3/22/2012 Time: 1:03:01 PM

Calibration Description:
15_TunaCan_90099_032212

Energy Calibration Fit
Energy = 0.0042 +0.250192*Channel -3.10425e-008*Channel**2
FWHM (ch) = 3.5032 +0.001000*Channel -3.73783e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.91	46.54	46.52	0.05%	0.90	0.92	-2.54%
237.99	59.54	59.55	-0.01%	0.91	0.94	-2.43%
352.01	88.03	88.07	-0.05%	0.95	0.96	-1.92%
487.92	122.06	122.07	-0.01%	1.00	1.00	0.30%
663.08	165.85	165.89	-0.02%	1.05	1.04	1.34%
1115.99	279.17	279.18	-0.00%	1.18	1.14	3.23%
1565.41	391.69	391.58	0.03%	1.26	1.24	1.14%
2645.35	661.66	661.63	0.00%	1.50	1.47	2.11%
3590.98	898.02	898.04	-0.00%	1.67	1.65	0.79%
4692.06	1173.24	1173.24	-0.00%	1.80	1.84	-2.06%
5329.66	1332.50	1332.56	-0.00%	1.90	1.94	-2.28%
7344.95	1836.01	1835.98	0.00%	2.23	2.21	1.30%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.9975 %
Ln(Eff) = -0.6895 -0.329061*Ln(Eng) -0.0387563*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.1273 %
Ln(Eff) = -23.6268 +8.666669*Ln(Eng) -0.921464*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	1.8904E-002	1.9569E-002	-3.52%
59.54	2.8630E-002	2.7372E-002	4.39%
88.03	3.6378E-002	3.7061E-002	-1.88%
122.06	3.7201E-002	3.8461E-002	-3.39%
165.85	========== Knee ==========		
165.85	3.3266E-002	3.3919E-002	-1.96%
279.17	2.3641E-002	2.3007E-002	2.68%
391.69	1.7841E-002	1.7674E-002	0.94%
661.66	1.1534E-002	1.1545E-002	-0.10%
898.02	8.8355E-003	8.9209E-003	-0.97%
1173.24	6.9001E-003	7.0763E-003	-2.55%
1332.50	6.2597E-003	6.3249E-003	-1.04%
1836.01	4.8716E-003	4.7412E-003	2.68%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

```
     ORTEC g v - i (1087) Env32  G53W4.25  3/22/2012 1:04:51 PM    Page  1
TestAmerica, Inc.               Spectrum name: 15_TunaCan_20120283.An1

Sample description
     15_TunaCan_90099_032212


Spectrum Filename: C:\User\SPC\Det15\15_TunaCan_20120283.An1

Acquisition information
       Start time:                 3/22/2012 11:06:02 AM
       Live time:               3600
       Real time:               3653
       Dead time:                  1.44 %
       Detector ID:                   15

Detector system
     Ge15 SN/1102216


Calibration
       Filename:                   15_TunaCan.Clb
     15_TunaCan_90099_032212


       Energy Calibration
            Created:               3/22/2012 1:02:46 PM
            Zero offset:           0.004 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.104E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/22/2012 1:03:01 PM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.00 %
            Log(Eff):             -6.894897E-01 + (-3.290613E-01*Log(E) ) +
                                   ( -3.875629E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.13 %
            Log(Eff):             -2.362677E+01 + ( 8.666669E+00*Log(E) ) +
                                   ( -9.214638E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.53keV )
       Stop channel:            8000 (  1999.56keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (1087) Env32  G53W4.25  3/22/2012 1:04:51 PM    Page  2
TestAmerica, Inc.               Spectrum name: 15_TunaCan_20120283.An1
                                      Page 1
```

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                          Status          Comments
       Decay correct to date:         YES       1/1/2012 11:00:00 AM
       Decay during acquisition:      NO
       Decay during collection:       NO
       True coincidence correction:   NO
       Peaked background correction:  NO
       Absorption (Internal):         NO
       Geometry correction:           NO
       Random summing:                NO


total peaks alloc.   12 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0249
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.52	42849.	0.75	0.90	1.955E-02	46.54	4.250	1.441E+04	Pb210
59.55	42443.	0.72	0.91	2.738E-02	59.54	35.700	1.207E+03	AM241
72.95	2606.	6.34	0.95	3.318E-02				
88.07	68550.	0.54	0.95	3.707E-02	88.03	3.610	1.607E+04	CD109
122.10	33756.	0.64	1.00	3.846E-02	122.06	85.600	3.502E+02	CO57
136.52	4295.	2.96	1.01	3.724E-02				
165.89	34959.	0.78	1.05	3.391E-02	165.85	79.900	5.388E+02	Ce139
279.18	24347.	0.88	1.18	2.301E-02	279.17	81.500	1.202E+03	Hg203
391.58	24366.	0.82	1.26	1.768E-02	391.69	64.000	9.746E+02	SN113
661.63	16400.	1.16	1.50	1.155E-02	661.66	85.210	4.654E+02	CS137
898.03	27965.	0.74	1.67	8.921E-03	898.02	93.700	1.574E+03	Y898
1173.23	17709.	0.94	1.81	7.076E-03	1173.24	99.900	7.164E+02	Co1173
1332.55	16065.	0.98	1.90	6.325E-03	1332.50	99.982	7.266E+02	Co1332
1835.95	16330.	0.85	2.24	4.741E-03	1836.01	99.200	1.633E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
291.58	72.93	12341.	2606.	7.854E+04	6.34	0.949	- D
545.42	136.45	8010.	4524.	1.215E+05	4.23	1.054	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.91	46.52	15447.	42849.	11.903	0.75	0.900
AM-241	237.99	59.55	14029.	42443.	11.790	0.72	0.913
CD-109	352.01	88.07	16260.	68550.	19.042	0.54	0.945
CO-57	487.92	122.07	9130.	34324.	9.535	0.78	0.999
Ce-139	663.08	165.89	8215.	34959.	9.711	0.78	1.052
Hg-203	1115.99	279.18	4252.	24347.	6.763	0.88	1.182
SN-113	1565.41	391.58	3012.	24366.	6.768	0.82	1.259
CS-137	2645.35	661.63	3077.	16400.	4.555	1.16	1.503
Y-898	3590.94	898.03	2252.	27965.	7.768	0.74	1.667
Co-1173	4692.02	1173.23	1355.	17709.	4.919	0.94	1.807
Co-1332	5329.60	1332.55	1160.	16065.	4.463	0.98	1.900
Y-1836	7344.81	1835.95	345.	16330.	4.536	0.85	2.240

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq		COMMENTS
Pb-210	N	1.4410E+04					8.15E+03	
			46.54	1.441E+04	(	1.957E+02	7.55E-01 4.25E+00	G
AM-241		1.2069E+03					1.58E+05	
			59.54	1.207E+03	(	1.577E+01	7.22E-01 3.57E+01	G
CD-109		1.6069E+04					4.63E+02	
			88.03	1.607E+04	(	1.399E+02	5.44E-01 3.61E+00	G
CO-57		3.5606E+02					2.72E+02	
			122.06	3.561E+02	(	4.647E+00	7.84E-01 8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 3/22/2012 1:04:51 PM Page 4
TestAmerica, Inc. Spectrum name: 15_TunaCan_20120283.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA		Comments
Ce-139	5.3881E+02					1.38E+02	
		165.85	5.388E+02	(	6.551E+00	7.82E-01 7.99E+01	G
Hg-203	1.2024E+03					4.66E+01	
		279.17	1.202E+03	(	1.514E+01	8.77E-01 8.15E+01	G
SN-113	9.7462E+02					1.15E+02	
		391.69	9.746E+02	(	1.034E+01	8.20E-01 6.40E+01	G
CS-137	4.6543E+02					1.10E+04	
		661.66	4.654E+02	(	7.413E+00	1.16E+00 8.52E+01	G
Y-898	1.5737E+03					1.07E+02	

```
                          898.02 1.574E+03  (  1.260E+01 7.45E-01 9.37E+01 G

Co-1173      7.1644E+02                                        1.93E+03
                         1173.24 7.164E+02  (  7.050E+00 9.39E-01 9.99E+01 G

Co-1332      7.2655E+02                                        1.93E+03
                         1332.50 7.266E+02  (  7.301E+00 9.83E-01 1.00E+02 G

Y-1836       1.6332E+03                                        1.07E+02
                         1836.01 1.633E+03  (  8.923E+00 8.49E-01 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
```



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   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  1 Sigma %
 ____________________________________________________________________________
   P - Peakbackground subtraction

 *****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
         Time of Count  Time Corrected  Uncertainty  1 Sigma
 Nuclide     Activity       Activity       Counting                   MDA
               Bq             Bq

 ____________________________________________________________________________
 Pb-210       1.4311E+04    1.4410E+04    7.549E-01%                1.96E+02
 AM-241       1.2065E+03    1.2069E+03    7.219E-01%                1.58E+01
 CD-109       1.4233E+04    1.6069E+04    5.439E-01%                1.40E+02
```

CO-57	2.8961E+02	3.5606E+02	7.837E-01%	4.65E+00
Ce-139	3.5832E+02	5.3881E+02	7.816E-01%	6.55E+00
Hg-203	3.6068E+02	1.2024E+03	8.771E-01%	1.51E+01
SN-113	5.9836E+02	9.7462E+02	8.201E-01%	1.03E+01
CS-137	4.6306E+02	4.6543E+02	1.155E+00%	7.41E+00
Y-898	9.2933E+02	1.5737E+03	7.445E-01%	1.26E+01
Co-1173	6.9585E+02	7.1644E+02	9.390E-01%	7.05E+00
Co-1332	7.0567E+02	7.2655E+02	9.834E-01%	7.30E+00
Y-1836	9.6449E+02	1.6332E+03	8.486E-01%	8.92E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (82.3 to 1999.6 keV) 3.512E+04 Bq
Total Decayed Activity (82.3 to 1999.6 keV) 3.9873703E+04 Bq

Gamma Verification per Geometry

Detector:	Ge17
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14476	97.0
Am-241	2037	418	0.3590	1163	1217.3	104.6
Cd-109	2881	591	0.0361	16363	16121	98.5
Co-57	1511	310	0.8560	362	351.58	97.1
Ce-139	2139	439	0.7990	549	540.43	98.5
Hg-203	4651	954	0.8146	1171	1200.7	102.6
Sn-113	3015	618	0.6400	966	969.38	100.4
Cs-137	1938	397	0.8510	467	466.08	99.8
Y-88	7264	1489	0.9370	1589	1562.4	98.3
Co-60	3580	734	0.9997	734	724.88	98.7
Co-60	3581	734	0.9999	734	733.12	99.8
Y-88	7690	1577	0.9920	1589	1616.3	101.7

Reviewed By: Megan McAfee

Date: 4/13/2012

Calibration Data from file: 17_Soil_TunaCan.Clb
Energy Calibration Date: 4/12/2012 Time: 9:28:30 AM
Efficiency Calibration Date: 4/12/2012 Time: 9:28:42 AM

Calibration Description:
17_TunaCan_90099_032612

Energy Calibration Fit
Energy = 0.1178 +0.250077*Channel -2.37566e-008*Channel**2
FWHM (ch) = 2.9772 +0.000994*Channel -3.22638e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.96	46.54	46.62	-0.17%	0.77	0.79	-3.16%
237.92	59.54	59.61	-0.12%	0.78	0.80	-3.33%
351.79	88.03	88.09	-0.07%	0.82	0.83	-1.16%
487.44	122.06	122.01	0.04%	0.89	0.86	3.09%
662.32	165.85	165.74	0.07%	0.93	0.91	2.22%
1115.65	279.17	279.09	0.03%	1.03	1.01	2.15%
1565.90	391.69	391.66	0.01%	1.10	1.11	-0.78%
2646.02	661.66	661.66	-0.00%	1.37	1.35	1.74%
3591.93	898.02	898.07	-0.01%	1.52	1.53	-0.67%
4693.19	1173.24	1173.25	-0.00%	1.72	1.73	-0.81%
5330.69	1332.50	1332.53	-0.00%	1.82	1.84	-0.74%
7346.32	1836.01	1835.98	0.00%	2.14	2.13	0.55%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.9072 %
Ln(Eff) = -0.5264 -0.402416*Ln(Eng) -0.0260446*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.0020 %
Ln(Eff) = -23.4389 +8.582715*Ln(Eng) -0.907543*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.0383E-002	2.1004E-002	-3.05%
59.54	3.0743E-002	2.9571E-002	3.81%
88.03	3.9976E-002	4.0594E-002	-1.55%
122.06	4.1510E-002	4.2756E-002	-3.00%
165.85	========== Knee ==========		
165.85	3.7629E-002	3.8252E-002	-1.65%
279.17	2.7514E-002	2.6814E-002	2.54%
391.69	2.1207E-002	2.1122E-002	0.40%
661.66	1.4433E-002	1.4427E-002	0.04%
898.02	1.1287E-002	1.1478E-002	-1.69%
1173.24	9.2333E-003	9.3589E-003	-1.36%
1332.50	8.4692E-003	8.4809E-003	-0.14%
1836.01	6.7041E-003	6.5931E-003	1.66%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

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     ORTEC g v - i (1087) Env32  G53W4.25  7/6/2012 10:31:21 AM    Page  1
TestAmerica, Inc.               Spectrum name: 17_TunaCan_20120263.An1

Sample description
     17_TunaCan_90099_032612


Spectrum Filename: C:\User\SPC\Det17\17_TunaCan_20120263.An1

Acquisition information
       Start time:                 3/26/2012 6:29:58 AM
       Live time:               3600
       Real time:               3672
       Dead time:                  1.95 %
       Detector ID:                   17

Detector system
     Ge17 SN/11080671


Calibration
       Filename:                   17_Soil_TunaCan.Clb
     17_TunaCan_90099_032612


       Energy Calibration
            Created:               4/12/2012 9:28:30 AM
            Zero offset:           0.118 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -2.376E-08 keV/channel^2

       Efficiency Calibration
            Created:               4/12/2012 9:28:42 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.91 %
            Log(Eff):             -5.264190E-01 + (-4.024164E-01*Log(E) ) +
                                   ( -2.604461E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.00 %
            Log(Eff):             -2.343889E+01 + ( 8.582715E+00*Log(E) ) +
                                   ( -9.075430E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.63keV )
       Stop channel:            8000 (  1999.21keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (1087) Env32  G53W4.25  7/6/2012 10:31:21 AM    Page  2
TestAmerica, Inc.               Spectrum name: 17_TunaCan_20120263.An1
                                      Page 1
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```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       1/1/2012 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.   12 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0522
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.62	46187.	0.69	0.77	2.106E-02	46.54	4.250	1.448E+04	Pb210
59.61	46245.	0.74	0.78	2.961E-02	59.54	35.700	1.217E+03	AM241
72.97	2852.	5.64	0.82	3.610E-02				
88.09	74900.	0.46	0.82	4.061E-02	88.03	3.610	1.612E+04	CD109
122.01	37313.	0.73	0.89	4.276E-02	122.06	85.600	3.516E+02	CO57
136.40	4536.	4.09	0.81	4.164E-02				
165.74	38793.	0.66	0.93	3.765E-02	165.85	79.900	5.404E+02	Ce139
255.04	1259.	9.59	1.07	2.855E-02				
279.09	26776.	0.82	1.03	2.682E-02	279.17	81.500	1.201E+03	Hg203
391.66	28306.	0.76	1.11	2.112E-02	391.69	64.000	9.694E+02	SN113
661.66	20517.	0.91	1.37	1.443E-02	661.66	85.210	4.661E+02	CS137
898.07	34851.	0.63	1.52	1.148E-02	898.02	93.700	1.562E+03	Y898
1173.25	23664.	0.80	1.72	9.359E-03	1173.24	99.900	7.249E+02	Co1173
1332.52	21706.	0.78	1.83	8.481E-03	1332.50	99.982	7.331E+02	Co1332
1835.97	21924.	0.70	2.15	6.593E-03	1836.01	99.200	1.616E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
291.30	72.97	10374.	2884.	7.989E+04	5.33	0.816	-	D
544.98	136.40	8136.	4536.	1.089E+05	4.09	0.813	-	
1019.46	255.04	3805.	1259.	4.410E+04	9.59	1.072	-	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.

C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.96	46.62	15035.	46187.	12.830	0.69	0.766
AM-241	237.92	59.61	17361.	46245.	12.846	0.74	0.777
CD-109	351.79	88.09	12661.	74900.	20.806	0.46	0.821
CO-57	487.44	122.01	9755.	37313.	10.365	0.73	0.891
Ce-139	662.32	165.74	6828.	38793.	10.776	0.66	0.926
Hg-203	1115.65	279.09	4528.	26776.	7.438	0.82	1.034
SN-113	1565.90	391.66	3496.	28306.	7.863	0.76	1.105
CS-137	2646.02	661.66	2816.	20517.	5.699	0.91	1.369
Y-898	3591.91	898.07	2257.	34851.	9.681	0.63	1.523
Co-1173	4693.17	1173.25	1531.	23664.	6.573	0.80	1.720
Co-1332	5330.69	1332.52	1002.	21706.	6.029	0.78	1.825
Y-1836	7346.26	1835.97	205.	21924.	6.090	0.70	2.146

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq	COMMENTS
Pb-210	N	1.4476E+04				8.15E+03	
			46.54	1.448E+04	(	1.799E+02 6.89E-01 4.25E+00	G
AM-241		1.2173E+03				1.58E+05	
			59.54	1.217E+03	(	1.623E+01 7.35E-01 3.57E+01	G
CD-109		1.6121E+04				4.63E+02	
			88.03	1.612E+04	(	1.134E+02 4.57E-01 3.61E+00	G
CO-57		3.5158E+02				2.72E+02	
			122.06	3.516E+02	(	4.362E+00 7.33E-01 8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 7/6/2012 10:31:21 AM Page 4
TestAmerica, Inc. Spectrum name: 17_TunaCan_20120263.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ce-139	5.4043E+02				1.38E+02	
		165.85	5.404E+02	(	5.402E+00 6.57E-01 7.99E+01	G
Hg-203	1.2007E+03				4.66E+01	
		279.17	1.201E+03	(	1.418E+01 8.17E-01 8.15E+01	G
SN-113	9.6938E+02				1.15E+02	
		391.69	9.694E+02	(	9.529E+00 7.56E-01 6.40E+01	G
CS-137	4.6608E+02				1.10E+04	
		661.66	4.661E+02	(	5.679E+00 9.07E-01 8.52E+01	G

```
Y-898        1.5624E+03                                        1.07E+02
                          898.02 1.562E+03  (  1.005E+01 6.29E-01 9.37E+01 G

Co-1173      7.2488E+02                                        1.93E+03
                         1173.24 7.249E+02  (  5.668E+00 7.98E-01 9.99E+01 G

Co-1332      7.3312E+02                                        1.93E+03
                         1332.50 7.331E+02  (  5.074E+00 7.81E-01 1.00E+02 G

Y-1836       1.6163E+03                                        1.07E+02
                         1836.01 1.616E+03  (  5.123E+00 7.01E-01 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
```



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   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  1 Sigma %
 ____________________________________________________________________________
   P - Peakbackground subtraction

 *****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
         Time of Count  Time Corrected  Uncertainty  1 Sigma
 Nuclide     Activity       Activity       Counting                   MDA
                Bq             Bq

 ____________________________________________________________________________
 Pb-210       1.4372E+04    1.4476E+04    6.891E-01%                1.80E+02
```

AM-241	1.2168E+03	1.2173E+03	7.355E-01%	1.62E+01
CD-109	1.4197E+04	1.6121E+04	4.569E-01%	1.13E+02
CO-57	2.8320E+02	3.5158E+02	7.325E-01%	4.36E+00
Ce-139	3.5257E+02	5.4043E+02	6.571E-01%	5.40E+00
Hg-203	3.4034E+02	1.2007E+03	8.175E-01%	1.42E+01
SN-113	5.8164E+02	9.6938E+02	7.559E-01%	9.53E+00
CS-137	4.6359E+02	4.6608E+02	9.066E-01%	5.68E+00
Y-898	9.0011E+02	1.5624E+03	6.288E-01%	1.00E+01
Co-1173	7.0308E+02	7.2488E+02	7.979E-01%	5.67E+00
Co-1332	7.1107E+02	7.3312E+02	7.808E-01%	5.07E+00
Y-1836	9.3113E+02	1.6163E+03	7.012E-01%	5.12E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (77.1 to 1999.2 keV) 3.505E+04 Bq
Total Decayed Activity (77.1 to 1999.2 keV) 3.9979633E+04 Bq

Initial Calibration Verifications

2nd Source Verification

Detector:	Ge5
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1160.9	99.7
Cs-137	1926	396	0.851	465	442.36	95.1
Co-60	3611	742	0.99974	742	700.21	94.3
Co-60	3612	742	0.999856	742	701.86	94.6

Reviewed By: Jody Watson

Date: 3/27/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  3/28/2012 7:35:49 AM    Page  1
TestAmerica                     Spectrum name: 5_TunaCan2nd_20120813.An1

Sample description
     5_TunaCan2nd_Rad10_032712


Spectrum Filename: C:\User\SPC\Det5\5_TunaCan2nd_20120813.An1

Acquisition information
       Start time:                 3/27/2012 10:12:05 AM
       Live time:               7200
       Real time:               7250
       Dead time:                  0.69 %
       Detector ID:                    5

Detector system
     Ge 5 SN/157


Calibration
       Filename:                   5_Soil_TunaCan.Clb
     5_Soil_TunaCan_90099_032612


       Energy Calibration
            Created:               3/27/2012 5:20:02 PM
            Zero offset:           0.135 keV
            Gain:                  0.250 keV/channel
            Quadratic:             2.720E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/27/2012 5:20:37 PM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.87 %
            Log(Eff):              6.466115E-01 + (-7.830454E-01*Log(E) ) +
                                   ( -4.117504E-03*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.43 %
            Log(Eff):             -2.462251E+01 + ( 9.075211E+00*Log(E) ) +
                                   ( -9.664422E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.61keV )
       Stop channel:            8000 (  2000.53keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (3263) Env32  G53W4.25  3/28/2012 7:35:49 AM    Page  2
TestAmerica                     Spectrum name: 5_TunaCan2nd_20120813.An1
                                      Page 1
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Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	5_2012-02-26_0305.PBC 2/26/2012 3:05:30 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 33.1557

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.81	1005.	12.08	0.62	1.151E-02				
46.61	72616.	0.49	0.73	1.792E-02	46.54	4.250	1.421E+04	Pb210
49.73	1326.	15.18	0.68	1.987E-02				
59.57	75329.	0.49	0.74	2.535E-02	59.54	35.700	1.161E+03	AM241
87.94	40851.	0.68	0.80	3.460E-02	88.03	3.610	1.542E+04	CD109
96.44	148.	47.31	0.80	3.568E-02				
99.01	160.	48.52	0.81	3.589E-02				
105.59	109.	69.79	0.52	3.619E-02				
121.94	9225.	1.66	0.84	3.583E-02	122.06	85.600	3.348E+02	CO57
129.89	126.	62.97	0.30	3.522E-02				
136.43	1263.	7.42	0.90	3.457E-02				
165.86	1574.	6.14	0.84	3.133E-02	165.85	79.900	5.319E+02	Ce139
238.72	327.	27.04	0.86	2.319E-02				
247.25	57.	84.47	0.31	2.252E-02				
259.02	93.	60.17	0.97	2.167E-02				
260.46	98.	58.62	0.97	2.157E-02				
322.65	45.	91.14	0.46	1.806E-02				
351.63	256.	27.79	1.06	1.681E-02				
391.95	494.	16.33	1.15	1.536E-02	391.69	64.000	9.501E+02	SN113
407.02	43.	90.43	0.56	1.489E-02				
412.80	202.	35.90	0.77	1.471E-02				
420.83	123.	52.91	0.72	1.448E-02				
510.72	188.	44.32	0.50	1.232E-02				
542.81	148.	28.69	0.36	1.171E-02				
583.30	161.	33.50	0.69	1.103E-02				
661.70	25605.	0.71	1.39	9.924E-03	661.66	85.210	4.424E+02	CS137
762.61	129.	36.06	0.79	8.812E-03				
796.90	151.	38.71	0.30	8.493E-03				
886.67	129.	46.77	0.30	7.766E-03				
897.77	428.	19.21	1.38	7.686E-03	898.02	93.700	1.665E+03	Y898
932.49	230.	35.52	0.82	7.445E-03				

1008.65	104.	56.29	0.28	6.970E-03				
1173.15	23044.	0.73	1.79	6.138E-03	1173.24	99.900	7.002E+02	Co1173
1332.39	20769.	0.71	1.87	5.515E-03	1332.50	99.982	7.019E+02	Co1332
1836.05	245.	7.47	1.56	4.208E-03	1836.01	99.200	1.642E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
146.78	36.81	4847.	1005.	8.731E+04	12.08	0.625	-
198.52	49.73	12365.	1326.	6.673E+04	15.18	0.681	- s
385.40	96.42	1874.	90.	2.532E+03	71.31	0.588	- sc
395.68	98.99	2103.	121.	3.381E+03	58.44	0.394	- s

ORTEC g v - i (3263) Env32 G53W4.25 3/28/2012 7:35:49 AM Page 3
TestAmerica Spectrum name: 5_TunaCan2nd_20120813.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
422.09	105.59	2271.	109.	3.012E+03	69.79	0.518	- sc
519.32	129.89	2194.	126.	3.592E+03	62.97	0.298	- s
545.51	136.43	2377.	1263.	3.654E+04	7.42	0.900	- s
954.90	238.72	2247.	327.	1.410E+04	27.04	0.863	- sM
989.00	247.25	1031.	57.	2.516E+03	84.47	0.312	- sc
1036.13	259.01	1532.	93.	4.309E+03	60.17	0.968	- D
1041.90	260.46	1588.	98.	4.525E+03	58.62	0.970	- D
1290.76	322.65	744.	45.	2.473E+03	91.14	0.455	- c
1406.70	351.63	1442.	256.	1.523E+04	27.79	1.058	- s
1628.36	407.02	667.	43.	2.866E+03	90.43	0.562	- sc
1651.47	412.80	1438.	202.	1.370E+04	35.90	0.775	- s
1683.60	420.83	1291.	123.	8.472E+03	52.91	0.720	- s
2043.25	510.72	1553.	188.	1.523E+04	44.32	0.503	- s
2171.67	542.81	587.	148.	1.267E+04	28.69	0.362	- s
2333.63	583.30	785.	161.	1.460E+04	33.50	0.694	- s
3050.97	762.61	614.	129.	1.468E+04	36.06	0.794	- s
3188.11	796.90	856.	151.	1.782E+04	38.71	0.295	- s
3547.15	886.67	963.	129.	1.665E+04	46.77	0.296	- s
3730.41	932.49	1438.	230.	3.096E+04	35.52	0.818	- s
4035.01	1008.65	864.	104.	1.490E+04	56.29	0.275	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	186.01	46.61	16470.	72552.	10.077	0.49	0.733
AM-241	237.88	59.57	15419.	75329.	10.462	0.49	0.735
CD-109	351.46	87.94	8772.	40851.	5.674	0.68	0.804
CO-57	487.54	121.94	3880.	9225.	1.281	1.66	0.838
Ce-139	663.30	165.86	2329.	1574.	0.219	6.14	0.840
SN-113	1568.04	391.95	1640.	494.	0.069	16.33	1.153
CS-137	2647.28	661.70	1362.	25582.	3.553	0.71	1.394
Y-898	3591.55	897.77	1410.	428.	0.060	19.21	1.376

Co-1173	4692.83	1173.15	788.	23044.	3.201	0.73	1.786
Co-1332	5329.55	1332.39	98.	20769.	2.885	0.71	1.870
Y-1836	7342.76	1836.05	15.	245.	0.034	7.47	1.556s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

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TestAmerica Spectrum name: 5_TunaCan2nd_20120813.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
Pb-210	N	1.4212E+04				8.15E+03	
			46.54	1.421E+04	(P	1.177E+02 4.91E-01 4.25E+00	G
AM-241		1.1609E+03				1.58E+05	
			59.54	1.161E+03	(	8.959E+00 4.87E-01 3.57E+01	G
CD-109		1.5419E+04				4.63E+02	
			88.03	1.542E+04	(	1.658E+02 6.81E-01 3.61E+00	G
CO-57		3.3478E+02				2.72E+02	
			122.06	3.348E+02	(	1.063E+01 1.66E+00 8.56E+01	G
Ce-139		5.3191E+02				1.38E+02	
			165.85	5.319E+02	(	7.689E+01 6.14E+00 7.99E+01	G
Hg-203		-6.5193E-03				4.66E+01	
			279.17	-6.519E-03	%(	1.788E+00 8.22E+03 8.15E+01	G
SN-113		9.5011E+02				1.15E+02	
			391.69	9.501E+02	(	3.682E+02 1.63E+01 6.40E+01	G
CS-137		4.4236E+02				1.10E+04	
			661.66	4.424E+02	(P	3.020E+00 7.12E-01 8.52E+01	G
Y-898		1.6655E+03				1.07E+02	
			898.02	1.665E+03	(	6.908E+02 1.92E+01 9.37E+01	G
Co-1173		7.0021E+02				1.93E+03	
			1173.24	7.002E+02	(	4.056E+00 7.32E-01 9.99E+01	G
Co-1332		7.0186E+02				1.93E+03	
			1332.50	7.019E+02	(	1.651E+00 7.07E-01 1.00E+02	G
Y-1836		1.6424E+03				1.07E+02	
			1836.01	1.642E+03	(	1.392E+02 7.47E+00 9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
Pb-210	1.3259E+04	1.4212E+04	4.918E-01%	1.18E+02
AM-241	1.1568E+03	1.1609E+03	4.867E-01%	8.96E+00
CD-109	4.5403E+03	1.5419E+04	6.810E-01%	1.66E+02
CO-57	4.1787E+01	3.3478E+02	1.660E+00%	1.06E+01
Ce-139	8.7347E+00	5.3191E+02	6.138E+00%	7.69E+01
Hg-203 #A	-6.5193E-03	>12 Halflives	8.2197E+03%	1.7882E+00
SN-113	6.9747E+00	9.5011E+02	1.633E+01%	3.68E+02
CS-137	4.2015E+02	4.4236E+02	7.122E-01%	3.02E+00
Y-898	8.2662E+00	1.6655E+03	1.921E+01%	6.91E+02
Co-1173	5.2196E+02	7.0021E+02	7.316E-01%	4.06E+00
Co-1332	5.2320E+02	7.0186E+02	7.069E-01%	1.65E+00
Y-1836	8.1520E+00	1.6424E+03	7.471E+00%	1.39E+02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

```
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded
-----------------------------   S U M M A R Y   ----------------------------
Total Activity (  279.0 to  2000.5 keV)     2.050E+04  Bq/Sample
Total Decayed Activity (  279.0 to  2000.5 keV) 3.7761527E+04  Bq/Sample
```

2nd Source Verification

Detector:	Ge7
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1150.4	98.8
Cs-137	1926	396	0.851	465	440.47	94.7
Co-60	3611	742	0.99974	742	681.72	91.9
Co-60	3612	742	0.999856	742	692.1	93.2

Reviewed By: Jody Watson

Date: 3/27/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  3/28/2012 8:52:25 AM
TestAmerica                      Spectrum name: 7_TunaCan2ndSource_20120479.An1

Sample description
     7_TunaCan2ndSource_81427-334_032712


Spectrum Filename: C:\User\SPC\Det7\7_TunaCan2ndSource_20120479.An1

Acquisition information
       Start time:                 3/27/2012 3:25:25 PM
       Live time:               3600
       Real time:               3684
       Dead time:                  2.28 %
       Detector ID:                   7

Detector system
     Ge 7 SN/154


Calibration
       Filename:                   7_Soil_TunaCan.Clb
     7_TunaCan_90099_032712


       Energy Calibration
            Created:               3/16/2012 11:44:50 AM
            Zero offset:           0.153 keV
            Gain:                  0.250 keV/channel
            Quadratic:             6.716E-09 keV/channel^2

       Efficiency Calibration
            Created:               3/16/2012 11:45:14 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.87 %
            Log(Eff):              6.716580E-01 + (-6.166540E-01*Log(E) ) +
                                   ( -2.065917E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.48 %
            Log(Eff):             -2.689695E+01 + ( 1.019544E+01*Log(E) ) +
                                   ( -1.081671E+00*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.65keV )
       Stop channel:            8000 (  2000.21keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method
```

ORTEC g v - i (3263) Env32 G53W4.25 3/28/2012 8:52:25 AM
TestAmerica Spectrum name: 7_TunaCan2ndSource_20120479.An1

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	7_2012-02-26_0327.PBC 2/26/2012 3:27:47 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0270

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.65	788.	12.78	0.82	1.487E-02				
40.49	109.	96.90	0.59	1.869E-02				
46.62	49142.	0.63	0.84	2.491E-02	46.54	4.250	1.386E+04	Pb210
49.64	876.	18.72	0.86	2.792E-02				
59.61	54530.	0.58	0.87	3.707E-02	59.54	35.700	1.150E+03	AM241
76.99	260.	38.90	1.03	4.881E-02				
88.06	31019.	0.77	0.89	5.329E-02	88.03	3.610	1.522E+04	CD109
122.04	6834.	2.04	0.94	5.606E-02	122.06	85.600	3.171E+02	CO57
136.41	810.	9.51	1.00	5.411E-02				
165.84	1193.	6.45	0.96	4.765E-02	165.85	79.900	5.180E+02	Ce139
185.66	92.	57.01	0.73	4.445E-02				
213.19	122.	50.56	0.75	3.960E-02				
272.80	146.	47.29	0.28	3.217E-02				
391.67	372.	19.60	1.11	2.360E-02	391.69	64.000	9.332E+02	SN113
442.91	47.	93.72	0.45	2.122E-02				
483.77	95.	38.10	0.62	1.965E-02				
524.63	67.	65.12	0.73	1.831E-02				
604.78	31.	59.37	0.27	1.616E-02				
628.99	32.	94.37	0.58	1.561E-02				
661.67	19152.	0.86	1.47	1.492E-02	661.66	85.210	4.405E+02	CS137
898.03	322.	23.53	1.90	1.137E-02	898.02	93.700	1.694E+03	Y898
910.18	180.	33.99	0.85	1.123E-02				
963.79	49.	71.39	0.69	1.067E-02				
1173.23	16317.	0.86	1.89	8.929E-03	1173.24	99.900	6.817E+02	Co1173
1332.49	14763.	0.85	2.04	7.951E-03	1332.50	99.982	6.921E+02	Co1332
1836.09	186.	9.19	1.40	5.919E-03	1836.01	99.200	1.780E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
146.00	36.65	3116.	788.	5.300E+04	12.78	0.819	-	
161.37	40.49	4419.	109.	5.831E+03	96.90	0.587	-	c
197.99	49.64	8222.	876.	[illegible]	18.72	0.855	-	sM

307.39	76.99	3728.	260.	5.319E+03	38.90	1.033	-

ORTEC g v - i (3263) Env32 G53W4.25 3/28/2012 8:52:25 AM
TestAmerica Spectrum name: 7_TunaCan2ndSource_20120479.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected	
545.11	136.41	1706.	810.	1.497E+04	9.51	1.002	-	
742.15	185.66	1076.	92.	2.081E+03	57.01	0.725	-	s
852.30	213.19	1296.	122.	3.077E+03	50.56	0.748	-	s
1090.74	272.80	1320.	146.	4.539E+03	47.29	0.283	-	s
1771.26	442.91	710.	47.	2.215E+03	93.72	0.453	-	sc
1934.71	483.77	486.	95.	4.835E+03	38.10	0.616	-	s
2098.18	524.63	583.	67.	3.669E+03	65.12	0.732	-	s
2418.80	604.78	172.	31.	1.939E+03	59.37	0.268	-	s
2515.62	628.99	330.	32.	2.050E+03	94.37	0.581	-	sc
3640.41	910.18	855.	180.	1.603E+04	33.99	0.852	-	s
3854.87	963.79	447.	49.	4.625E+03	71.39	0.695	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.90	46.62	12530.	49107.	13.641	0.63	0.840
AM-241	237.87	59.61	10985.	54530.	15.147	0.58	0.871
CD-109	351.70	88.06	6100.	31019.	8.616	0.77	0.892
CO-57	487.62	122.04	3040.	6834.	1.898	2.04	0.937
Ce-139	662.88	165.84	1495.	1193.	0.331	6.45	0.956
Hg-203	1114.79	278.81	2119.	-42.	-0.012	155.58	1.105s
SN-113	1566.31	391.67	1236.	372.	0.103	19.60	1.107
CS-137	2646.35	661.67	1156.	19152.	5.320	0.86	1.474
Y-898	3591.81	898.03	1084.	322.	0.089	23.53	1.897
Co-1173	4692.59	1173.23	493.	16317.	4.532	0.86	1.893
Co-1332	5329.55	1332.49	127.	14763.	4.101	0.85	2.038
Y-1836	7343.66	1836.09	16.	186.	0.052	9.19	1.399s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (3263) Env32 G53W4.25 3/28/2012 8:52:25 AM
TestAmerica Spectrum name: 7_TunaCan2ndSource_20120479.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
Pb-210	N	1.3857E+04					8.15E+03
			46.54	1.386E+04	(P	1.480E+02	6.34E-01 4.25E+00 G
AM-241		1.1504E+03					1.58E+05
			59.54	1.150E+03	(	1.036E+01	5.81E-01 3.57E+01 G
CD-109		1.5217E+04					4.63E+02
			88.03	1.522E+04	(	1.799E+02	7.73E-01 3.61E+00 G
CO-57		3.1712E+02					2.72E+02
			122.06	3.171E+02	(	1.205E+01	2.04E+00 8.56E+01 G
Ce-139		5.1801E+02					1.38E+02
			165.85	5.180E+02	(	7.941E+01	6.45E+00 7.99E+01 G
Hg-203		-4.5441E-01					4.66E+01
			279.17	-4.544E-01	?(	2.347E+00	1.56E+02 8.15E+01 G
SN-113		9.3315E+02					1.15E+02
			391.69	9.332E+02	(	4.178E+02	1.96E+01 6.40E+01 G
CS-137		4.4047E+02					1.10E+04
			661.66	4.405E+02	(	3.706E+00	8.56E-01 8.52E+01 G
Y-898		1.6944E+03					1.07E+02
			898.02	1.694E+03	(	8.216E+02	2.35E+01 9.37E+01 G
Co-1173		6.8172E+02					1.93E+03
			1173.24	6.817E+02	(	4.436E+00	8.58E-01 9.99E+01 G
Co-1332		6.9210E+02					1.93E+03
			1332.50	6.921E+02	(	2.586E+00	8.49E-01 1.00E+02 G
Y-1836		1.7801E+03					1.07E+02
			1836.01	1.780E+03	(	2.065E+02	9.19E+00 9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

ORTEC g v - i (3263) Env32 G53W4.25 3/28/2012 8:52:25 AM
TestAmerica Spectrum name: 7_TunaCan2ndSource_20120479.An1

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
Hg-203	278.81	2119.	-42.	-0.012	155.58	0.000E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting	1 Sigma	MDA Bq/Sample
Pb-210	1.2927E+04	1.3857E+04	6.344E-01%		1.48E+02
AM-241	1.1462E+03	1.1504E+03	5.808E-01%		1.04E+01
CD-109	4.4794E+03	1.5217E+04	7.727E-01%		1.80E+02
CO-57	3.9561E+01	3.1712E+02	2.043E+00%		1.20E+01
Ce-139	8.4971E+00	5.1801E+02	6.453E+00%		7.94E+01
Hg-203 #A	-4.5441E-01	>12 Halflives	1.5558E+02%	2.3474E+00	
SN-113	6.8413E+00	9.3315E+02	1.960E+01%		4.18E+02
CS-137	4.1835E+02	4.4047E+02	8.557E-01%		3.71E+00
Y-898	8.3979E+00	1.6944E+03	2.353E+01%		8.22E+02
Co-1173	5.0814E+02	6.8172E+02	8.581E-01%		4.44E+00
Co-1332	5.1588E+02	6.9210E+02	8.485E-01%		2.59E+00
Y-1836	8.8227E+00	1.7801E+03	9.190E+00%		2.07E+02

ORTEC g v - i (3263) Env32 G53W4.25 3/28/2012 8:52:25 AM
TestAmerica Spectrum name: 7_TunaCan2ndSource_20120479.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 2000.2 keV) 2.007E+04 Bq/Sample
Total Decayed Activity (37.6 to 2000.2 keV) 3.7281199E+04 Bq/Sample

Analyzed by: _____
Admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica

2nd Source Verification

Detector:	Ge8
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1175.4	101.0
Cs-137	1926	396	0.851	465	446.61	96.0
Co-60	3611	742	0.99974	742	697.22	93.9
Co-60	3612	742	0.999856	742	691.92	93.2

Reviewed By: Jody Watson

Date: 3/29/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  3/29/2012 7:45:38 AM    Page  1
TestAmerica                     Spectrum name: 8_TunaCan2nd_20120697.An1

Sample description
     8_TunaCan_81427-334_2ndsource_032912


Spectrum Filename: C:\User\SPC\Det8\8_TunaCan2nd_20120697.An1

Acquisition information
       Start time:                 3/29/2012 1:58:04 AM
       Live time:               3600
       Real time:               3622
       Dead time:                  0.61 %
       Detector ID:                    8

Detector system
     Ge 8 SN/174


Calibration
       Filename:                   8_Soil_TunaCan.Clb
     8_Soil_TunaCan_90099_032712


       Energy Calibration
            Created:               3/28/2012 10:35:07 AM
            Zero offset:           0.050 keV
            Gain:                  0.250 keV/channel
            Quadratic:             8.067E-10 keV/channel^2

       Efficiency Calibration
            Created:               3/28/2012 10:35:20 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.39 %
            Log(Eff):             -1.098764E-01 + (-4.958544E-01*Log(E) ) +
                                   ( -2.572270E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.71 %
            Log(Eff):             -2.525301E+01 + ( 9.398253E+00*Log(E) ) +
                                   ( -1.000034E+00*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.55keV )
       Stop channel:            8000 (  2000.30keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (3263) Env32  G53W4.25  3/29/2012 7:45:38 AM    Page  2
TestAmerica                     Spectrum name: 8_TunaCan2nd_20120697.An1
                                      Page 1
```

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	8_2012-03-02_0402.PBC 3/2/2012 4:02:11 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 27.9595

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.61	594.	17.47	1.15	1.254E-02				
46.53	38495.	0.62	0.95	2.001E-02	46.54	4.250	1.345E+04	Pb210
49.81	542.	25.92	1.04	2.243E-02				
59.48	43371.	0.71	0.98	2.878E-02	59.54	35.700	1.175E+03	AM241
84.86	327.	26.82	0.98	3.922E-02				
88.03	22911.	0.76	0.98	3.992E-02	88.03	3.610	1.504E+04	CD109
122.06	5318.	2.55	1.03	4.146E-02	122.06	85.600	3.349E+02	CO57
136.54	691.	14.03	0.89	3.998E-02				
165.93	1033.	8.62	1.19	3.628E-02	165.85	79.900	6.077E+02	Ce139
177.05	71.	70.08	0.69	3.453E-02				
185.74	128.	40.98	0.85	3.329E-02				
227.93	52.	65.04	0.45	2.844E-02				
270.79	87.	50.41	0.41	2.486E-02				
278.94	44.	131.33	1.13	2.428E-02	279.17	81.500	HL>Cutoff	Hg203
302.52	63.	54.81	0.69	2.279E-02				
370.09	35.	84.23	0.41	1.941E-02				
391.61	316.	17.91	0.81	1.855E-02	391.69	64.000	1.016E+03	SN113
409.22	93.	50.95	0.41	1.791E-02				
428.24	88.	46.51	0.39	1.726E-02				
564.57	72.	45.26	0.57	1.378E-02				
591.73	73.	42.60	0.61	1.326E-02				
661.62	15734.	0.88	1.38	1.209E-02	661.66	85.210	4.466E+02	CS137
720.39	41.	72.89	0.46	1.126E-02				
831.73	36.	50.61	0.44	9.986E-03				
897.91	396.	17.93	1.52	9.360E-03	898.02	93.700	2.554E+03	Y898
1092.31	69.	44.41	0.50	7.924E-03				
1173.30	13922.	0.92	1.73	7.452E-03	1173.24	99.900	6.972E+02	Co1173
1332.56	12390.	0.92	1.75	6.677E-03	1332.50	99.982	6.919E+02	Co1332
1836.18	152.	9.00	1.63	5.046E-03	1836.01	99.200	1.724E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
146.23	36.61	3218.	594.	4.742E+04	17.47	1.147	- s
199.01	49.81	6400.	542.	2.416E+04	25.92	1.039	- sM
339.16	84.85	3491.	236.	6.026E+03	42.58	0.697	- sM

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:45:38 AM Page 3
TestAmerica Spectrum name: 8_TunaCan2nd_20120697.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
545.91	136.54	2178.	691.	1.728E+04	14.03	0.888	-
707.94	177.05	893.	71.	2.046E+03	70.08	0.693	- sM
742.68	185.74	978.	128.	3.835E+03	40.98	0.847	- sM
911.43	227.93	546.	52.	1.829E+03	65.04	0.445	- sc
1082.86	270.79	683.	87.	3.486E+03	50.41	0.413	- sM
1209.76	302.52	484.	63.	2.765E+03	54.81	0.692	- s
1480.00	370.09	385.	35.	1.803E+03	84.23	0.412	- sc
1636.49	409.22	685.	93.	5.212E+03	50.95	0.407	- s
1712.56	428.24	565.	88.	5.117E+03	46.51	0.393	- s
2257.86	564.57	330.	72.	5.224E+03	45.26	0.565	- s
2366.45	591.73	298.	73.	5.505E+03	42.60	0.613	- s
2881.06	720.39	284.	41.	3.640E+03	72.89	0.464	- s
3326.37	831.73	148.	36.	3.605E+03	50.61	0.439	- s
4368.55	1092.31	290.	69.	8.708E+03	44.41	0.495	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.71	46.48	12173.	40702.	11.306	0.74	0.992
AM-241	237.70	59.48	10649.	43371.	12.047	0.71	0.984
CD-109	351.85	88.02	4506.	23196.	6.443	0.88	1.056
CO-57	487.99	122.06	2908.	5318.	1.477	2.55	1.026
Ce-139	663.47	165.93	1722.	1033.	0.287	8.62	1.189s
Hg-203	1115.46	278.94	1642.	44.	0.012	131.33	1.133
SN-113	1566.07	391.61	822.	316.	0.088	17.91	0.806s
CS-137	2646.01	661.62	665.	15731.	4.370	0.88	1.379
Y-898	3591.03	897.91	871.	396.	0.110	17.93	1.524
Co-1173	4692.46	1173.30	374.	13922.	3.867	0.92	1.726
Co-1332	5329.42	1332.56	82.	12390.	3.442	0.92	1.753
Y-1836	7343.62	1836.18	6.	152.	0.042	9.00	1.626s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

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TestAmerica Spectrum name: 8_TunaCan2nd_20120697.An1
Page 3

```
 *****   S U M M A R Y   O F   L I B R A R Y   P E A K   U S A G E   *****
- Nuclide -  Average     ------------- Peak --------------
Name   Code  Activity     Energy   Activity Code MDA Value
             Bq/Sample     keV     Bq/Sample     Bq/Sample      COMMENTS
 ____________________________________________________________________________

Pb-210   N   1.4221E+04                                      8.15E+03
                            46.54 1.422E+04  (  1.806E+02 7.43E-01 4.25E+00 G

AM-241       1.1754E+03                                      1.58E+05
                            59.54 1.175E+03  (  1.311E+01 7.10E-01 3.57E+01 G

CD-109       1.5223E+04                                      4.63E+02
                            88.03 1.522E+04  (  2.071E+02 8.83E-01 3.61E+00 G

CO-57        3.3494E+02                                      2.72E+02
                           122.06 3.349E+02  (  1.600E+01 2.55E+00 8.56E+01 G

Ce-139       6.0766E+02                                      1.38E+02
                           165.85 6.077E+02 *(  1.153E+02 8.62E+00 7.99E+01 G

Hg-203       6.1671E-01                                      4.66E+01
                           279.17 6.167E-01  (  2.689E+00 1.31E+02 8.15E+01 G

SN-113       1.0157E+03                                      1.15E+02
                           391.69 1.016E+03  (  4.390E+02 1.79E+01 6.40E+01 G

CS-137       4.4661E+02                                      1.10E+04
                           661.66 4.466E+02  (P 3.489E+00 8.85E-01 8.52E+01 G

Y-898        2.5543E+03                                      1.07E+02
                           898.02 2.554E+03  (  9.046E+02 1.79E+01 9.37E+01 G

Co-1173      6.9722E+02                                      1.93E+03
                          1173.24 6.972E+02  (  4.649E+00 9.19E-01 9.99E+01 G

Co-1332      6.9192E+02                                      1.93E+03
                          1332.50 6.919E+02  (  2.515E+00 9.18E-01 1.00E+02 G

Y-1836       1.7236E+03                                      1.07E+02
                          1836.01 1.724E+03  (  1.542E+02 9.00E+00 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
```



```
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
```

P - Peakbackground subtraction
} - Peak is too close to another for the activity
to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting	1 Sigma	MDA Bq/Sample
Pb-210	1.3265E+04	1.4221E+04	7.429E-01%		1.81E+02
AM-241	1.1712E+03	1.1754E+03	7.101E-01%		1.31E+01
CD-109	4.4713E+03	1.5223E+04	8.832E-01%		2.07E+02
CO-57	4.1631E+01	3.3494E+02	2.551E+00%		1.60E+01
Ce-139 #	9.8959E+00	6.0766E+02	8.616E+00%		1.15E+02
Hg-203 A	6.1671E-01	>12 Halflives	1.3133E+02%	2.6892E+00	
SN-113	7.3819E+00	1.0157E+03	1.791E+01%		4.39E+02
CS-137	4.2415E+02	4.4661E+02	8.848E-01%		3.49E+00
Y-898	1.2542E+01	2.5543E+03	1.793E+01%		9.05E+02
Co-1173	5.1942E+02	6.9722E+02	9.185E-01%		4.65E+00
Co-1332	5.1548E+02	6.9192E+02	9.176E-01%		2.52E+00
Y-1836	8.4633E+00	1.7236E+03	8.997E+00%		1.54E+02

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:45:38 AM Page 6
TestAmerica Spectrum name: 8_TunaCan2nd_20120697.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 2000.3 keV) 2.045E+04 Bq/Sample
Total Decayed Activity (37.6 to 2000.3 keV) 3.8690848E+04 Bq/Sample

2nd Source Verification

Detector:	Ge12
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1143.6	98.2
Cs-137	1926	396	0.851	465	442.3	95.1
Co-60	3611	742	0.99974	742	688.36	92.7
Co-60	3612	742	0.999856	742	696.49	93.8

Reviewed By: Jody Watson

Date: 10/4/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  10/4/2012 1:47:48 PM
TestAmerica, Inc                Spectrum name: 12_TunaCan2nd_20122201.An1

Sample description
     12_TunaCan2nd_81427_104012


Spectrum Filename: C:\User\SPC\Det12\12_TunaCan2nd_20122201.An1

Acquisition information
       Start time:                 10/4/2012 9:10:35 AM
       Live time:               7200
       Real time:               7274
       Dead time:                  1.02 %
       Detector ID:                   12

Detector system
     Ge12 S/N10034336


Calibration
       Filename:                   12_Soil_TunaCan.Clb
     12_TunaCanCal_90099_100212


       Energy Calibration
            Created:               10/4/2012 8:58:25 AM
            Zero offset:           0.009 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.662E-08 keV/channel^2

       Efficiency Calibration
            Created:               10/4/2012 9:05:44 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.70 %
            Log(Eff):             -7.827468E-01 + (-3.001271E-01*Log(E) ) +
                                   ( -3.369562E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.96 %
            Log(Eff):             -2.288409E+01 + ( 8.352717E+00*Log(E) ) +
                                   ( -8.812368E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.54keV )
       Stop channel:            8000 (  1999.46keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method
```

ORTEC g v - i (3263) Env32 G53W4.25 10/4/2012 1:47:48 PM
TestAmerica, Inc Spectrum name: 12_TunaCan2nd_20122201.An1

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2012-09-01_2017.PBC 9/1/2012 8:17:39 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0602

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.51	1416.	10.10	0.96	1.441E-02				
46.55	84361.	0.42	0.90	2.227E-02	46.54	4.250	1.345E+04	Pb210
49.64	1661.	13.12	1.17	2.460E-02				
59.51	91361.	0.43	0.89	3.120E-02	59.54	35.700	1.144E+03	AM241
74.70	192.	60.04	0.37	3.873E-02				
87.98	38152.	0.76	0.95	4.277E-02	88.03	3.610	1.551E+04	CD109
122.02	7369.	2.14	0.99	4.527E-02	122.06	85.600	3.444E+02	CO57
136.48	773.	12.58	1.02	4.420E-02				
165.75	856.	13.18	0.97	4.024E-02	165.85	79.900	5.800E+02	Ce139
238.46	426.	21.37	0.80	3.221E-02				
270.42	104.	53.05	0.50	2.960E-02				
277.12	37.	187.22	1.11	2.896E-02	279.17	81.500	HL>Cutoff	Hg203
294.88	216.	34.45	0.89	2.790E-02				
351.76	281.	28.30	0.91	2.471E-02				
385.62	79.	49.11	0.42	2.317E-02				
391.36	361.	28.92	0.71	2.293E-02	391.69	64.000	1.472E+03	SN113
469.80	98.	76.63	0.28	2.015E-02				
506.86	66.	63.64	1.31	1.908E-02				
510.13	151.	39.24	1.32	1.899E-02				
517.01	68.	58.29	0.42	1.881E-02				
661.58	40010.	0.58	1.44	1.571E-02	661.66	85.210	4.423E+02	CS137
897.91	201.	34.47	0.69	1.250E-02	898.02	93.700	1.665E+03	Y898
1072.91	53.	57.37	0.45	1.091E-02				
1090.45	58.	68.49	0.42	1.078E-02				
1173.14	35088.	0.63	1.82	1.018E-02	1173.24	99.900	6.884E+02	Co1173
1332.41	32170.	0.59	1.94	9.221E-03	1332.50	99.982	6.965E+02	Co1332
1835.69	150.	11.35	3.27	7.144E-03	1836.01	99.200	2.050E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
145.90	36.51	6010.	1416.	9.823E+04	10.10	0.958	-	s
198.34	49.64	14478.	1661.	8.754E+04	13.12	1.174	-	sM

298.51	74.70	5238.	192.	4.958E+03	60.04	0.372	-	s

ORTEC g v - i (3263) Env32 G53W4.25 10/4/2012 1:47:48 PM
TestAmerica, Inc Spectrum name: 12_TunaCan2nd_20122201.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected	
545.45	136.48	2894.	773.	1.749E+04	12.58	1.017	-	
953.09	238.46	2483.	426.	1.323E+04	21.37	0.799	-	s
1080.86	270.42	1260.	104.	3.514E+03	53.05	0.496	-	s
1178.62	294.88	1774.	216.	7.741E+03	34.45	0.889	-	s
1406.03	351.76	1808.	281.	1.136E+04	28.30	0.914	-	s
1541.40	385.62	713.	79.	3.409E+03	49.11	0.419	-	s
1877.98	469.80	1744.	98.	4.856E+03	76.63	0.281	-	s
2026.19	506.79	849.	66.	3.459E+03	63.64	1.314	-	sc
2039.28	510.06	1671.	151.	7.930E+03	39.24	1.317	-	D
2066.76	517.01	651.	68.	3.633E+03	58.29	0.422	-	s
4290.46	1072.91	405.	53.	4.872E+03	57.37	0.452	-	s
4360.63	1090.45	570.	58.	5.382E+03	68.49	0.425	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.85	46.51	23444.	86492.	12.013	0.48	0.868
AM-241	237.80	59.51	16320.	91361.	12.689	0.43	0.894
CD-109	351.60	87.98	9992.	38152.	5.299	0.76	0.948
CO-57	487.64	122.02	4562.	7369.	1.024	2.14	0.992
Ce-139	662.45	165.75	3243.	856.	0.119	13.18	0.970
Hg-203	1107.62	277.12	2320.	37.	0.005	187.22	1.114s
SN-113	1565.46	391.64	1973.	296.	0.041	29.35	0.690s
CS-137	2644.92	661.58	2210.	40010.	5.557	0.58	1.443
Y-898	3590.25	897.91	1259.	201.	0.028	34.47	0.688s
Co-1173	4691.52	1173.14	1694.	35088.	4.873	0.63	1.818
Co-1332	5328.99	1332.41	521.	32170.	4.468	0.59	1.937
Y-1836	7344.02	1835.69	28.	150.	0.021	11.35	3.274s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (3263) Env32 G53W4.25 10/4/2012 1:47:48 PM
TestAmerica, Inc Spectrum name: 12_TunaCan2nd_20122201.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample			COMMENTS
Pb-210	N	1.3814E+04						8.15E+03	
			46.54	1.381E+04	(P	1.144E+02	4.84E-01	4.25E+00	G
AM-241		1.1436E+03						1.58E+05	
			59.54	1.144E+03	(	7.486E+00	4.26E-01	3.57E+01	G
CD-109		1.5513E+04						4.63E+02	
			88.03	1.551E+04	(	1.905E+02	7.56E-01	3.61E+00	G
CO-57		3.4441E+02						2.72E+02	
			122.06	3.444E+02	(	1.484E+01	2.14E+00	8.56E+01	G
Ce-139		5.7998E+02						1.38E+02	
			165.85	5.800E+02	(	1.816E+02	1.32E+01	7.99E+01	G
Hg-203		2.1493E-01						4.66E+01	
			279.17	2.149E-01	?(	1.337E+00	1.87E+02	8.15E+01	G
SN-113		1.2045E+03						1.15E+02	
			391.69	1.204E+03	(	8.544E+02	2.94E+01	6.40E+01	G
CS-137		4.4230E+02						1.10E+04	
			661.66	4.423E+02	(	2.452E+00	5.77E-01	8.52E+01	G
Y-898		1.6647E+03						1.07E+02	
			898.02	1.665E+03	(	1.389E+03	3.45E+01	9.37E+01	G
Co-1173		6.8836E+02						1.93E+03	
			1173.24	6.884E+02	(	3.816E+00	6.32E-01	9.99E+01	G
Co-1332		6.9649E+02						1.93E+03	
			1332.50	6.965E+02	(	2.361E+00	5.94E-01	1.00E+02	G
Y-1836		2.0501E+03						1.07E+02	
			1836.01	2.050E+03	(	3.740E+02	1.14E+01	9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

ORTEC g v - i (3263) Env32 G53W4.25 10/4/2012 1:47:48 PM
TestAmerica, Inc Spectrum name: 12_TunaCan2nd_20122201.An1

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
Hg-203	277.12	2320.	37.	0.005	187.22	0.000E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting	1 Sigma	MDA Bq/Sample
Pb-210	1.2680E+04	1.3814E+04	4.851E-01%		1.14E+02
AM-241	1.1385E+03	1.1436E+03	4.256E-01%		7.49E+00
CD-109	3.4313E+03	1.5513E+04	7.557E-01%		1.91E+02
CO-57	2.6416E+01	3.4441E+02	2.139E+00%		1.48E+01
Ce-139	3.6407E+00	5.7998E+02	1.318E+01%		1.82E+02
Hg-203 #A	2.1493E-01	>12 Halflives	1.8722E+02%	1.3367E+00	
SN-113	2.7995E+00	1.2045E+03	2.935E+01%		8.54E+02
CS-137	4.1507E+02	4.4230E+02	5.769E-01%		2.45E+00
Y-898	2.3870E+00	1.6647E+03	3.447E+01%		1.39E+03
Co-1173	4.7903E+02	6.8836E+02	6.322E-01%		3.82E+00
Co-1332	4.8469E+02	6.9649E+02	5.939E-01%		2.36E+00
Y-1836	2.9396E+00	2.0501E+03	1.135E+01%		3.74E+02

ORTEC g v - i (3263) Env32 G53W4.25 10/4/2012 1:47:48 PM
TestAmerica, Inc Spectrum name: 12_TunaCan2nd_20122201.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (516.8 to 1999.5 keV) 1.867E+04 Bq/Sample
Total Decayed Activity (516.8 to 1999.5 keV) 3.8141477E+04 Bq/Sample

Analyzed by: _____
admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica, Inc

2nd Source Verification

Detector:	Ge13
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1139.6	97.9
Cs-137	1926	396	0.851	465	445.47	95.8
Co-60	3611	742	0.99974	742	679.75	91.6
Co-60	3612	742	0.999856	742	691.64	93.2

Reviewed By: Jody Watson

Date: 3/27/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  3/29/2012 7:52:27 AM
TestAmerica, Inc                Spectrum name: 13_TunaCan2nd_20120188.An1

Sample description
     13_TunaCan2nd_Rad10_32712


Spectrum Filename: C:\User\SPC\Det13\13_TunaCan2nd_20120188.An1

Acquisition information
       Start time:                 3/27/2012 6:51:58 PM
       Live time:               3600
       Real time:               3628
       Dead time:                  0.78 %
       Detector ID:                   13

Detector system
     Ge13 SN/10064006


Calibration
       Filename:                   13_Soil_TunaCan.Clb
     13_Soil_TunaCan_90099_032712


       Energy Calibration
            Created:               3/29/2012 7:50:00 AM
            Zero offset:           0.072 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -2.129E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/29/2012 7:50:26 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.91 %
            Log(Eff):             -5.308398E-01 + (-3.057754E-01*Log(E) ) +
                                   ( -3.437570E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.60 %
            Log(Eff):             -2.292218E+01 + ( 8.455931E+00*Log(E) ) +
                                   ( -8.924057E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.58keV )
       Stop channel:            8000 (  1999.40keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method
```

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 12:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	13_2012-02-26_0417.PBC 2/26/2012 4:17:38 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 28.2216

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.63	804.	13.85	1.08	1.752E-02				
40.21	60.	185.44	0.67	2.100E-02				
46.59	52644.	0.64	1.03	2.710E-02	46.54	4.250	1.363E+04	Pb210
59.58	55490.	0.64	1.04	3.805E-02	59.54	35.700	1.140E+03	AM241
88.11	30251.	0.82	1.05	5.228E-02	88.03	3.610	1.515E+04	CD109
122.15	7057.	2.19	1.12	5.528E-02	122.06	85.600	3.326E+02	CO57
136.58	848.	11.42	1.04	5.394E-02				
165.89	1296.	7.65	1.22	5.020E-02	165.85	79.900	5.488E+02	Ce139
172.07	64.	73.90	0.46	4.900E-02				
256.08	52.	107.49	0.43	3.749E-02				
391.55	506.	16.69	1.67	2.782E-02	391.69	64.000	1.081E+03	SN113
505.51	54.	53.76	0.71	2.313E-02				
606.29	68.	54.54	1.51	2.022E-02				
609.47	156.	25.34	1.52	2.014E-02				
661.70	24573.	0.73	1.57	1.893E-02	661.66	85.210	4.455E+02	CS137
712.45	48.	87.48	0.52	1.791E-02				
788.55	57.	45.24	0.72	1.658E-02				
865.90	201.	31.02	0.76	1.543E-02				
875.22	53.	53.16	0.57	1.530E-02				
892.03	70.	57.17	0.30	1.508E-02				
898.14	349.	18.02	1.75	1.500E-02	898.02	93.700	1.399E+03	Y898
936.66	183.	26.42	0.66	1.452E-02				
1000.19	143.	40.81	0.58	1.379E-02				
1173.33	22167.	0.77	1.99	1.217E-02	1173.24	99.900	6.798E+02	Co1173
1332.59	20398.	0.72	2.09	1.099E-02	1332.50	99.982	6.916E+02	Co1332
1836.09	255.	7.25	1.84	8.477E-03	1836.01	99.200	1.707E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
146.20	36.63	3474.	804.	4.587E+04	13.85	1.080	-	
160.50	40.21	4620.	60.	2.857E+03	185.44	0.671	-	c
545.87	136.58	2328.	848.	1.572E+04	11.42	1.036	-	s

687.79	172.07	921.	64.	1.299E+03	73.90	0.462	-	sc

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
1023.76	256.08	1106.	52.	1.400E+03	107.49	0.433 -	sc
2021.40	505.51	369.	54.	2.349E+03	53.76	0.707 -	s
2424.54	605.96	659.	68.	3.375E+03	54.54	1.514 -	D
2437.27	609.15	707.	156.	7.762E+03	25.34	1.517 -	D
2849.24	712.45	490.	48.	2.681E+03	87.48	0.517 -	c
3153.66	788.55	257.	57.	3.419E+03	45.24	0.717 -	s
3463.13	865.90	819.	201.	1.303E+04	31.02	0.758 -	s
3500.42	875.22	313.	53.	3.442E+03	53.16	0.568 -	s
3567.71	892.03	535.	70.	4.621E+03	57.17	0.300 -	sM
3746.27	936.66	649.	183.	1.263E+04	26.42	0.655 -	s
4000.44	1000.19	757.	143.	1.039E+04	40.81	0.580 -	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	186.01	46.59	14100.	52644.	14.623	0.64	1.035
AM-241	237.95	59.58	13492.	55490.	15.414	0.64	1.040
CD-109	352.05	88.11	6670.	30251.	8.403	0.82	1.051
CO-57	488.16	122.15	3586.	7057.	1.960	2.19	1.121
Ce-139	663.07	165.89	2133.	1296.	0.360	7.65	1.221
SN-113	1565.60	391.55	1530.	506.	0.141	16.69	1.674s
CS-137	2646.19	661.70	1216.	24573.	6.826	0.73	1.574
Y-898	3592.12	898.14	1808.	349.	0.097	18.02	1.748
Co-1173	4693.29	1173.33	884.	22167.	6.157	0.77	1.991
Co-1332	5330.68	1332.59	172.	20398.	5.666	0.72	2.087
Y-1836	7346.16	1836.09	9.	255.	0.071	7.25	1.837s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Activity Bq/Sample	Code	MDA Value Bq/Sample			COMMENTS
Pb-210	N	1.3634E+04						8.15E+03	
			46.54	1.363E+04	(	1.440E+02	6.41E-01	4.25E+00	G
AM-241		1.1396E+03						1.58E+05	
			59.54	1.140E+03	(	1.117E+01	6.38E-01	3.57E+01	G
CD-109		1.5147E+04						4.63E+02	
			88.03	1.515E+04	(	1.919E+02	8.19E-01	3.61E+00	G
CO-57		3.3255E+02						2.72E+02	
			122.06	3.326E+02	(	1.328E+01	2.19E+00	8.56E+01	G
Ce-139		5.4879E+02						1.38E+02	
			165.85	5.488E+02	(	9.228E+01	7.65E+00	7.99E+01	G
Hg-203		-4.5053E-03						4.66E+01	
			279.17	-4.505E-03	%(	2.170E+00	1.44E+04	8.15E+01	G
SN-113		1.0805E+03						1.15E+02	
			391.69	1.081E+03	(	3.950E+02	1.67E+01	6.40E+01	G
CS-137		4.4547E+02						1.10E+04	
			661.66	4.455E+02	(	2.995E+00	7.31E-01	8.52E+01	G
Y-898		1.3989E+03						1.07E+02	
			898.02	1.399E+03	?(	8.041E+02	1.80E+01	9.37E+01	G
Co-1173		6.7975E+02						1.93E+03	
			1173.24	6.798E+02	(	4.332E+00	7.66E-01	9.99E+01	G
Co-1332		6.9164E+02						1.93E+03	
			1332.50	6.916E+02	(	2.164E+00	7.24E-01	1.00E+02	G
Y-1836		1.7073E+03						1.07E+02	
			1836.01	1.707E+03	(	1.108E+02	7.25E+00	9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting	1 Sigma	MDA Bq/Sample
Pb-210	1.2719E+04	1.3634E+04	6.406E-01%		1.44E+02
AM-241	1.1355E+03	1.1396E+03	6.376E-01%		1.12E+01
CD-109	4.4546E+03	1.5147E+04	8.189E-01%		1.92E+02
CO-57	4.1423E+01	3.3255E+02	2.186E+00%		1.33E+01
Ce-139	8.9749E+00	5.4879E+02	7.649E+00%		9.23E+01
Hg-203 #A	-4.5053E-03	>12 Halflives	1.4441E+04%	2.1699E+00	
SN-113 #	7.8929E+00	1.0805E+03	1.669E+01%		3.95E+02
CS-137	4.2308E+02	4.4547E+02	7.311E-01%		2.99E+00
Y-898 #	6.9065E+00	1.3989E+03	1.802E+01%		8.04E+02
Co-1173	5.0656E+02	6.7975E+02	7.655E-01%		4.33E+00
Co-1332	5.1542E+02	6.9164E+02	7.239E-01%		2.16E+00
Y-1836	8.4289E+00	1.7073E+03	7.248E+00%		1.11E+02

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (661.7 to 1999.4 keV) 1.983E+04 Bq/Sample
Total Decayed Activity (661.7 to 1999.4 keV) 3.6805410E+04 Bq/Sample

Analyzed by: _____
admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica, Inc

2nd Source Verification

Detector:	Ge14
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1140.8	98.0
Cs-137	1926	396	0.851	465	447.55	96.2
Co-60	3611	742	0.99974	742	690.01	93.0
Co-60	3612	742	0.999856	742	699.61	94.2

Reviewed By: Jody Watson

Date: 4/24/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  7/6/2012 9:20:28 AM     Page  1
TestAmerica, Inc.               Spectrum name: 14_TunaCan2nd_20120390.An1

Sample description
     14_TunaCan2nd_rad10_042412


Spectrum Filename: C:\User\SPC\Det14\14_TunaCan2nd_20120390.An1

Acquisition information
       Start time:                 4/24/2012 8:12:45 AM
       Live time:               3600
       Real time:               3635
       Dead time:                  0.95 %
       Detector ID:                   14

Detector system
     Ge14 SN/11080670


Calibration
       Filename:                   14_Soil_TunaCan.Clb
     14_TunaCan_90099_042312


       Energy Calibration
            Created:               4/23/2012 11:29:29 AM
            Zero offset:           0.158 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -1.959E-08 keV/channel^2

       Efficiency Calibration
            Created:               4/23/2012 11:29:47 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.02 %
            Log(Eff):              2.101260E-01 + (-5.951973E-01*Log(E) ) +
                                   ( -1.605331E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.28 %
            Log(Eff):             -2.391492E+01 + ( 8.828985E+00*Log(E) ) +
                                   ( -9.371496E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.67keV )
       Stop channel:            8000 (  1999.52keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (3263) Env32  G53W4.25  7/6/2012 9:20:28 AM     Page  2
TestAmerica, Inc.               Spectrum name: 14_TunaCan2nd_20120390.An1
                                      Page 1
```

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       1/1/2010 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   YES       14_2012-04-01_0328.PBC
                                                 4/1/2012 3:28:19 AM

       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.   11 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0804
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.65	636.	14.35	0.68	1.394E-02				
46.70	42844.	0.65	0.73	2.183E-02	46.54	4.250	1.384E+04	Pb210
49.57	579.	23.20	1.08	2.397E-02				
59.66	44776.	0.62	0.73	3.072E-02	59.54	35.700	1.141E+03	AM241
88.02	24143.	0.88	0.79	4.196E-02	88.03	3.610	1.568E+04	CD109
121.97	5150.	2.07	0.81	4.379E-02	122.06	85.600	3.284E+02	CO57
136.39	594.	12.74	0.84	4.244E-02				
165.76	922.	8.50	0.93	3.800E-02	165.85	79.900	5.802E+02	Ce139
238.43	269.	23.37	0.71	2.933E-02				
315.48	114.	42.70	0.42	2.361E-02				
327.51	51.	61.93	0.45	2.293E-02				
351.90	216.	23.90	0.91	2.167E-02				
364.95	52.	64.29	0.48	2.106E-02				
374.52	129.	45.68	0.49	2.064E-02				
391.67	297.	17.91	1.16	1.993E-02	391.69	64.000	1.044E+03	SN113
510.55	153.	33.44	0.60	1.616E-02				
661.74	16713.	0.81	1.30	1.313E-02	661.66	85.210	4.376E+02	CS137
665.93	55.	47.01	1.30	1.306E-02				
682.98	51.	73.33	0.31	1.280E-02				
802.77	123.	33.88	0.65	1.124E-02				
897.96	328.	20.32	1.77	1.026E-02	898.02	93.700	2.290E+03	Y898
978.13	53.	59.31	0.31	9.568E-03				
1173.32	15097.	0.91	1.81	8.243E-03	1173.24	99.900	6.900E+02	Co1173
1332.58	13794.	0.88	1.91	7.422E-03	1332.50	99.982	6.996E+02	Co1332
1836.21	153.	8.94	1.16	5.686E-03	1836.01	99.200	1.816E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide

145.93	36.65	2712.	636.	4.559E+04	14.35	0.681	-	s
197.59	49.57	6158.	579.	2.414E+04	23.20	1.078	-	s
544.79	136.39	1623.	594.	1.400E+04	12.74	0.836	-	
952.87	238.43	1166.	269.	9.182E+03	23.37	0.709	-	

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected	
1261.02	315.48	752.	114.	4.829E+03	42.70	0.415	-	s
1309.15	327.51	440.	51.	2.232E+03	61.93	0.449	-	s
1406.69	351.90	776.	216.	9.981E+03	23.90	0.914	-	
1458.89	364.95	463.	52.	2.484E+03	64.29	0.475	-	s
1497.18	374.52	912.	129.	6.250E+03	45.68	0.487	-	s
2041.26	510.55	669.	153.	9.449E+03	33.44	0.603	-	s
2662.75	665.91	160.	40.	3.074E+03	48.94	0.586	-	sM
2731.03	682.98	385.	51.	3.984E+03	73.33	0.306	-	s
3210.25	802.77	443.	123.	1.098E+04	33.88	0.654	-	s
3911.87	978.13	330.	53.	5.539E+03	59.31	0.307	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	186.10	46.70	10276.	42803.	11.890	0.65	0.733
AM-241	237.93	59.66	8589.	44776.	12.438	0.62	0.733
CD-109	351.36	88.02	4956.	24143.	6.706	0.88	0.785
CO-57	487.12	121.97	1860.	5150.	1.431	2.07	0.805
Ce-139	662.24	165.76	1490.	922.	0.256	8.50	0.930s
Hg-203	1114.33	278.80	1377.	-40.	-0.011	133.76	0.957s
SN-113	1565.78	391.67	802.	297.	0.083	17.91	1.165
CS-137	2645.99	661.72	749.	17094.	4.748	0.86	1.367
Y-898	3591.10	897.96	851.	328.	0.091	20.32	1.769s
Co-1173	4692.93	1173.32	513.	15097.	4.194	0.91	1.810
Co-1332	5330.26	1332.58	105.	13794.	3.832	0.88	1.907
Y-1836	7346.17	1836.21	5.	153.	0.042	8.94	1.165s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS

```
Pb-210   N   1.3845E+04                                        8.15E+03
                            46.54 1.384E+04  (P 1.537E+02 6.55E-01 4.25E+00 G

AM-241       1.1408E+03                                        1.58E+05
                            59.54 1.141E+03  (  1.107E+01 6.17E-01 3.57E+01 G

CD-109       1.5678E+04                                        4.63E+02
                            88.03 1.568E+04  (  2.148E+02 8.77E-01 3.61E+00 G

CO-57        3.2838E+02                                        2.72E+02
                           122.06 3.284E+02  (  1.299E+01 2.07E+00 8.56E+01 G

Ce-139       5.8018E+02                                        1.38E+02
                           165.85 5.802E+02 *(  1.149E+02 8.50E+00 7.99E+01 G

Hg-203      -5.1862E-01                                        4.66E+01
                           279.17-5.186E-01 ?(  2.305E+00 1.34E+02 8.15E+01 G

SN-113       1.0438E+03                                        1.15E+02
                           391.69 1.044E+03  (  4.727E+02 1.79E+01 6.40E+01 G

CS-137       4.4755E+02                                        1.10E+04
                           661.66 4.475E+02  (  3.410E+00 8.57E-01 8.52E+01 G

Y-898        2.2899E+03                                        1.07E+02
                           898.02 2.290E+03 *(  9.680E+02 2.03E+01 9.37E+01 G

Co-1173      6.9001E+02                                        1.93E+03
                          1173.24 6.900E+02  (  4.948E+00 9.10E-01 9.99E+01 G

Co-1332      6.9961E+02                                        1.93E+03
                          1332.50 6.996E+02  (  2.559E+00 8.77E-01 1.00E+02 G

Y-1836       1.8162E+03                                        1.07E+02
                          1836.01 1.816E+03  (  1.603E+02 8.94E+00 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
```



```
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
                                       Page 4
```

I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
Hg-203	278.80	1377.	-40.	-0.011	133.76	0.000E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
Pb-210	1.2885E+04	1.3845E+04	6.553E-01%	1.54E+02
AM-241	1.1366E+03	1.1408E+03	6.168E-01%	1.11E+01
CD-109	4.4274E+03	1.5678E+04	8.766E-01%	2.15E+02
CO-57	3.8172E+01	3.2838E+02	2.068E+00%	1.30E+01
Ce-139 #	8.2779E+00	5.8018E+02	8.497E+00%	1.15E+02
Hg-203 #A	-5.1862E-01	>12 Halflives	1.3376E+02%	2.3053E+00
SN-113	6.4765E+00	1.0438E+03	1.791E+01%	4.73E+02
CS-137	4.2434E+02	4.4755E+02	8.571E-01%	3.41E+00
Y-898 #	9.4790E+00	2.2899E+03	2.032E+01%	9.68E+02
Co-1173	5.0921E+02	6.9001E+02	9.096E-01%	4.95E+00
Co-1332	5.1630E+02	6.9961E+02	8.770E-01%	2.56E+00
Y-1836	7.5179E+00	1.8162E+03	8.944E+00%	1.60E+02

ORTEC g v - i (3263) Env32 G53W4.25 7/6/2012 9:20:28 AM Page 6
TestAmerica, Inc. Spectrum name: 14_TunaCan2nd_20120390.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.7 to 1999.5 keV) 1.997E+04 Bq/Sample
Total Decayed Activity (37.7 to 1999.5 keV) 3.8559289E+04 Bq/Sample

2nd Source Verification

Detector:	Ge 15
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1151	98.9
Cs-137	1926	396	0.851	465	435.18	93.6
Co-60	3611	742	0.99974	742	687.16	92.6
Co-60	3612	742	0.999856	742	696.46	93.8

Reviewed By: Jody Watson

Date: 3/23/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  7/5/2012 1:14:04 PM     Page  1
TestAmerica, Inc.               Spectrum name: 15_TunaCan2nd_20120288.An1

Sample description
     15_TunaCan2nd_rad10_032312


Spectrum Filename: C:\User\SPC\Det15\15_TunaCan2nd_20120288.An1

Acquisition information
       Start time:                 3/23/2012 6:10:28 AM
       Live time:               7200
       Real time:               7248
       Dead time:                  0.66 %
       Detector ID:                   15

Detector system
     Ge15 SN/1102216


Calibration
       Filename:                   15_Soil_TunaCan.Clb
     15_TunaCan_90099_032212


       Energy Calibration
            Created:               3/22/2012 1:02:46 PM
            Zero offset:           0.004 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.104E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/22/2012 1:03:01 PM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.00 %
            Log(Eff):             -6.894897E-01 + (-3.290613E-01*Log(E) ) +
                                   ( -3.875629E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.13 %
            Log(Eff):             -2.362677E+01 + ( 8.666669E+00*Log(E) ) +
                                   ( -9.214638E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.53keV )
       Stop channel:            8000 (  1999.56keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (3263) Env32  G53W4.25  7/5/2012 1:14:04 PM     Page  2
TestAmerica, Inc.               Spectrum name: 15_TunaCan2nd_20120288.An1
                                      Page 1
```

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       1/1/2010 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   YES       15_2012-02-26_0425.PBC
                                                 2/26/2012 4:25:10 AM

       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.   12 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:      26.5953
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.48	1231.	11.17	1.20	1.258E-02				
46.44	76440.	0.51	0.91	1.950E-02	46.54	4.250	1.366E+04	Pb210
49.65	1514.	14.37	1.25	2.160E-02				
59.44	80694.	0.48	0.94	2.732E-02	59.54	35.700	1.151E+03	AM241
87.99	43578.	0.68	0.97	3.705E-02	88.03	3.610	1.527E+04	CD109
92.63	219.	44.56	0.42	3.776E-02				
122.00	10133.	1.58	1.01	3.846E-02	122.06	85.600	3.389E+02	CO57
136.33	1390.	8.77	1.13	3.725E-02				
165.85	1699.	7.29	1.05	3.392E-02	165.85	79.900	5.192E+02	Ce139
238.39	480.	20.10	1.42	2.594E-02				
260.67	81.	57.86	0.33	2.424E-02				
279.32	56.	141.32	1.14	2.301E-02	279.17	81.500	HL>Cutoff	Hg203
352.13	110.	54.66	0.68	1.922E-02				
368.26	125.	49.84	0.46	1.856E-02				
391.56	581.	13.59	1.28	1.768E-02	391.69	64.000	9.477E+02	SN113
400.57	73.	61.58	0.54	1.736E-02				
661.57	29285.	0.71	1.46	1.155E-02	661.66	85.210	4.352E+02	CS137
754.74	100.	52.53	0.39	1.034E-02				
898.10	516.	14.74	1.96	8.921E-03	898.02	93.700	1.681E+03	Y898
904.89	86.	54.53	0.36	8.863E-03				
1000.75	82.	43.22	0.58	8.127E-03				
1096.51	181.	26.16	0.80	7.507E-03				
1173.15	26111.	0.71	1.80	7.077E-03	1173.24	99.900	6.872E+02	Co1173
1226.66	98.	36.87	0.74	6.805E-03				
1332.45	23674.	0.68	1.95	6.325E-03	1332.50	99.982	6.965E+02	Co1332
1835.96	284.	9.76	1.20	4.741E-03	1836.01	99.200	1.642E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide

145.78	36.48	5577.	1231.	9.786E+04	11.17	1.202	-	s
198.43	49.65	13746.	1514.	7.010E+04	14.37	1.248	-	sM
370.24	92.63	3274.	219.	5.791E+03	44.56	0.421	-	s

ORTEC g v - i (3263) Env32 G53W4.25 7/5/2012 1:14:04 PM Page 3
TestAmerica, Inc. Spectrum name: 15_TunaCan2nd_20120288.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected	
544.93	136.33	3516.	1390.	3.731E+04	8.77	1.130	-	s
952.92	238.39	2518.	480.	1.849E+04	20.10	1.422	-	sM
1042.01	260.67	968.	81.	3.328E+03	57.86	0.332	-	sM
1407.66	352.13	1248.	110.	5.749E+03	54.66	0.679	-	s
1472.16	368.26	1252.	125.	6.736E+03	49.84	0.459	-	s
1601.36	400.57	843.	73.	4.224E+03	61.58	0.543	-	s
3017.75	754.74	768.	100.	9.719E+03	52.53	0.393	-	s
3618.39	904.89	752.	86.	9.741E+03	54.53	0.363	-	s
4001.87	1000.75	476.	82.	1.015E+04	43.22	0.582	-	s
4385.05	1096.51	621.	181.	2.415E+04	26.16	0.796	-	s
4905.82	1226.66	215.	98.	1.445E+04	36.87	0.740	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.62	46.44	19930.	76355.	10.605	0.51	0.907
AM-241	237.58	59.44	16824.	80694.	11.208	0.48	0.935
CD-109	351.67	87.99	9695.	43578.	6.052	0.68	0.972
CO-57	487.63	122.00	4069.	10133.	1.407	1.58	1.014
Ce-139	662.95	165.85	3411.	1699.	0.236	7.29	1.054
Hg-203	1116.56	279.32	3139.	56.	0.008	141.32	1.144
SN-113	1565.32	391.56	1615.	581.	0.081	13.59	1.282
CS-137	2645.11	661.57	2071.	29285.	4.067	0.71	1.459
Y-898	3591.24	898.10	1317.	516.	0.072	14.74	1.959
Co-1173	4691.69	1173.15	1159.	26111.	3.627	0.71	1.803
Co-1332	5329.20	1332.45	323.	23674.	3.288	0.68	1.945
Y-1836	7345.58	1836.14	48.	260.	0.036	8.96	1.181s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (3263) Env32 G53W4.25 7/5/2012 1:14:04 PM Page 4
TestAmerica, Inc. Spectrum name: 15_TunaCan2nd_20120288.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS

```
Pb-210    N   1.3663E+04                                        8.15E+03
                              46.54 1.366E+04  (P 1.182E+02 5.11E-01 4.25E+00 G

AM-241        1.1510E+03                                        1.58E+05
                              59.54 1.151E+03  (  8.660E+00 4.81E-01 3.57E+01 G

CD-109        1.5268E+04                                        4.63E+02
                              88.03 1.527E+04  (  1.617E+02 6.78E-01 3.61E+00 G

CO-57         3.3887E+02                                        2.72E+02
                             122.06 3.389E+02  (  1.003E+01 1.58E+00 8.56E+01 G

Ce-139        5.1921E+02                                        1.38E+02
                             165.85 5.192E+02  (  8.400E+01 7.29E+00 7.99E+01 G

Hg-203        4.1717E-01                                        4.66E+01
                             279.17 4.172E-01  (  1.954E+00 1.41E+02 8.15E+01 G

SN-113        9.4771E+02                                        1.15E+02
                             391.69 9.477E+02  (  3.099E+02 1.36E+01 6.40E+01 G

CS-137        4.3518E+02                                        1.10E+04
                             661.66 4.352E+02  (  3.191E+00 7.12E-01 8.52E+01 G

Y-898         1.6812E+03                                        1.07E+02
                             898.02 1.681E+03  (  5.598E+02 1.47E+01 9.37E+01 G

Co-1173       6.8716E+02                                        1.93E+03
                            1173.24 6.872E+02  (  4.246E+00 7.12E-01 9.99E+01 G

Co-1332       6.9646E+02                                        1.93E+03
                            1332.50 6.965E+02  (  2.544E+00 6.82E-01 1.00E+02 G

Y-1836        1.5036E+03                                        1.07E+02
                            1836.01 1.504E+03  (  2.033E+02 8.96E+00 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
```



```
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
                                       Page 4
```

F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Activity Time of Count Bq/Sample	Activity Time Corrected Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
Pb-210		1.2751E+04	1.3663E+04	5.115E-01%	1.18E+02
AM-241		1.1469E+03	1.1510E+03	4.812E-01%	8.66E+00
CD-109		4.5239E+03	1.5268E+04	6.776E-01%	1.62E+02
CO-57		4.2749E+01	3.3887E+02	1.583E+00%	1.00E+01
Ce-139		8.7071E+00	5.1921E+02	7.291E+00%	8.40E+01
Hg-203	A	4.1717E-01	>12 Halflives	1.4132E+02%	1.9540E+00
SN-113		7.1340E+00	9.4771E+02	1.359E+01%	3.10E+02
CS-137		4.1344E+02	4.3518E+02	7.117E-01%	3.19E+00
Y-898		8.5738E+00	1.6812E+03	1.474E+01%	5.60E+02
Co-1173		5.1301E+02	6.8716E+02	7.125E-01%	4.25E+00
Co-1332		5.1995E+02	6.9646E+02	6.817E-01%	2.54E+00
Y-1836		7.6681E+00	1.5036E+03	8.962E+00%	2.03E+02

ORTEC g v - i (3263) Env32 G53W4.25 7/5/2012 1:14:04 PM Page 6
TestAmerica, Inc. Spectrum name: 15_TunaCan2nd_20120288.An1

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.5 to 1999.6 keV) 1.994E+04 Bq/Sample
Total Decayed Activity (37.5 to 1999.6 keV) 3.6891324E+04 Bq/Sample

2nd Source Verification

Detector:	Ge17
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1140.2	97.9
Cs-137	1926	396	0.851	465	440.98	94.8
Co-60	3611	742	0.99974	742	682.05	91.9
Co-60	3612	742	0.999856	742	689.63	92.9

Reviewed By: Megan McAfee

Date: 4/13/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  7/6/2012 9:25:36 AM     Page  1
TestAmerica, Inc.               Spectrum name: 17_Tuna2nd_20120265.An1

Sample description
     17_Tuna2nd_81427_032612


Spectrum Filename: C:\User\SPC\Det17\17_Tuna2nd_20120265.An1

Acquisition information
       Start time:                 3/26/2012 9:29:21 AM
       Live time:               3600
       Real time:               3637
       Dead time:                  1.02 %
       Detector ID:                   17

Detector system
     Ge17 SN/11080671


Calibration
       Filename:                   17_Soil_TunaCan.Clb
     17_TunaCan_90099_032612


       Energy Calibration
            Created:               4/12/2012 9:28:30 AM
            Zero offset:           0.118 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -2.376E-08 keV/channel^2

       Efficiency Calibration
            Created:               4/12/2012 9:28:42 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.91 %
            Log(Eff):             -5.264190E-01 + (-4.024164E-01*Log(E) ) +
                                   ( -2.604461E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.00 %
            Log(Eff):             -2.343889E+01 + ( 8.582715E+00*Log(E) ) +
                                   ( -9.075430E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.63keV )
       Stop channel:            8000 (  1999.21keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (3263) Env32  G53W4.25  7/6/2012 9:25:36 AM     Page  2
TestAmerica, Inc.               Spectrum name: 17_Tuna2nd_20120265.An1
                                      Page 1
```

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	17_2012-02-26_0520.PBC 2/26/2012 5:20:29 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0590

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.64	681.	13.12	0.69	1.356E-02				
40.87	116.	86.09	0.16	1.677E-02				
46.62	41004.	0.69	0.76	2.106E-02	46.54	4.250	1.365E+04	Pb210
49.59	775.	17.97	0.63	2.318E-02				
59.61	43179.	0.65	0.77	2.961E-02	59.54	35.700	1.140E+03	AM241
77.20	214.	40.60	1.02	3.765E-02				
88.08	23344.	0.86	0.81	4.060E-02	88.03	3.610	1.500E+04	CD109
121.99	5536.	2.31	0.89	4.276E-02	122.06	85.600	3.357E+02	CO57
136.39	771.	11.84	0.71	4.164E-02				
162.22	87.	50.79	0.72	3.820E-02				
165.73	964.	7.35	1.09	3.765E-02	165.85	79.900	5.310E+02	Ce139
216.43	116.	39.82	0.95	3.196E-02				
217.94	83.	57.15	0.95	3.181E-02				
238.21	247.	27.84	0.94	2.992E-02				
265.99	94.	61.67	0.61	2.773E-02				
301.12	44.	67.34	0.41	2.544E-02				
340.53	91.	61.26	0.55	2.333E-02				
351.73	148.	32.96	0.62	2.280E-02				
391.54	336.	18.56	0.91	2.113E-02	391.69	64.000	9.356E+02	SN113
464.58	72.	65.99	1.18	1.868E-02				
466.04	44.	93.25	1.18	1.864E-02				
582.96	167.	29.62	0.45	1.584E-02				
661.66	18538.	0.82	1.37	1.443E-02	661.66	85.210	4.410E+02	CS137
738.88	57.	57.41	0.44	1.329E-02				
833.91	110.	41.26	0.51	1.214E-02				
856.69	111.	46.51	0.75	1.189E-02				
898.10	352.	17.10	1.23	1.148E-02	898.02	93.700	1.818E+03	Y898
1026.09	89.	47.19	0.52	1.037E-02				
1173.27	17119.	0.83	1.74	9.359E-03	1173.24	99.900	6.820E+02	Co1173
1332.53	15698.	0.82	1.79	8.481E-03	1332.50	99.982	6.896E+02	Co1332
1835.81	220.	7.55	1.96	6.593E-03	1836.01	99.200	1.873E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
146.04	36.64	2578.	681.	5.025E+04	13.12	0.695	-
162.95	40.87	4224.	116.	6.916E+03	86.09	0.161	- c
197.82	49.59	6204.	775.	3.343E+04	17.97	0.635	- sM
308.25	77.20	2934.	214.	5.685E+03	40.60	1.020	- s

ORTEC g v - i (3263) Env32 G53W4.25 7/6/2012 9:25:36 AM Page 3
TestAmerica, Inc. Spectrum name: 17_Tuna2nd_20120265.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
544.96	136.39	1975.	771.	1.852E+04	11.84	0.713	-
648.26	162.22	793.	87.	2.269E+03	50.79	0.719	- s
865.04	216.40	1003.	116.	3.620E+03	39.82	0.953	- D
871.09	217.91	1078.	83.	2.603E+03	57.15	0.955	- D
952.16	238.21	1349.	247.	8.265E+03	27.84	0.937	- s
1063.26	265.99	1020.	94.	3.372E+03	61.67	0.615	- s
1203.77	301.12	417.	44.	1.730E+03	67.34	0.412	- sc
1361.41	340.53	898.	91.	3.887E+03	61.26	0.553	- s
1406.20	351.73	744.	148.	6.491E+03	32.96	0.618	- s
1857.60	464.69	1086.	72.	3.842E+03	65.99	1.178	- sc
1863.46	466.15	839.	44.	2.387E+03	93.25	1.179	- sc
2331.15	582.96	570.	167.	1.054E+04	29.62	0.448	- s
2954.96	738.88	338.	57.	4.289E+03	57.41	0.442	- s
3335.20	833.91	507.	110.	9.049E+03	41.26	0.506	- s
3426.35	856.69	611.	111.	9.318E+03	46.51	0.755	- s
4104.24	1026.09	453.	89.	8.549E+03	47.19	0.517	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.95	46.62	10512.	40927.	11.369	0.69	0.761
AM-241	237.89	59.61	9192.	43179.	11.994	0.65	0.771
CD-109	351.75	88.08	4394.	23344.	6.484	0.86	0.812
CO-57	487.38	121.99	2606.	5536.	1.538	2.31	0.891
Ce-139	662.30	165.73	1283.	964.	0.268	7.35	1.085
Hg-203	1119.82	280.13	1632.	-52.	-0.015	109.81	1.012s
SN-113	1565.42	391.54	971.	336.	0.093	18.56	0.910s
CS-137	2646.04	661.66	840.	18538.	5.149	0.82	1.373
Y-898	3592.05	898.10	753.	352.	0.098	17.10	1.228
Co-1173	4693.24	1173.27	496.	17119.	4.755	0.83	1.743
Co-1332	5330.69	1332.53	136.	15698.	4.361	0.82	1.789
Y-1836	7345.64	1835.81	10.	220.	0.061	7.55	1.956s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample		COMMENTS
Pb-210	N	1.3650E+04					8.15E+03	
			46.54	1.365E+04	(P	1.603E+02	6.87E-01 4.25E+00	G
AM-241		1.1402E+03					1.58E+05	
			59.54	1.140E+03	(	1.187E+01	6.55E-01 3.57E+01	G
CD-109		1.5004E+04					4.63E+02	
			88.03	1.500E+04	(	2.003E+02	8.59E-01 3.61E+00	G
CO-57		3.3573E+02					2.72E+02	
			122.06	3.357E+02	(	1.459E+01	2.31E+00 8.56E+01	G
Ce-139		5.3096E+02					1.38E+02	
			165.85	5.310E+02	(	9.338E+01	7.35E+00 7.99E+01	G
Hg-203		-6.6653E-01					4.66E+01	
			279.17	-6.665E-01	?(	2.427E+00	1.10E+02 8.15E+01	G
SN-113		9.3563E+02					1.15E+02	
			391.69	9.356E+02	@(	4.114E+02	1.86E+01 6.40E+01	G
CS-137		4.4098E+02					1.10E+04	
			661.66	4.410E+02	(	3.277E+00	8.23E-01 8.52E+01	G
Y-898		1.8177E+03					1.07E+02	
			898.02	1.818E+03	(	6.751E+02	1.71E+01 9.37E+01	G
Co-1173		6.8205E+02					1.93E+03	
			1173.24	6.820E+02	(	4.243E+00	8.31E-01 9.99E+01	G
Co-1332		6.8963E+02					1.93E+03	
			1332.50	6.896E+02	(	2.503E+00	8.22E-01 1.00E+02	G
Y-1836		1.8728E+03					1.07E+02	
			1836.01	1.873E+03	(	1.462E+02	7.55E+00 9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.

+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
Hg-203	280.13	1632.	-52.	-0.015	109.81	0.000E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma		MDA Bq/Sample
Pb-210	1.2735E+04	1.3650E+04	6.879E-01%		1.60E+02
AM-241	1.1361E+03	1.1402E+03	6.548E-01%		1.19E+01
CD-109	4.4248E+03	1.5004E+04	8.588E-01%		2.00E+02
CO-57	4.2016E+01	3.3573E+02	2.313E+00%		1.46E+01
Ce-139	8.7645E+00	5.3096E+02	7.352E+00%		9.34E+01
Hg-203 #A	-6.6653E-01	>12 Halflives	1.0981E+02%	2.4271E+00	
SN-113 #	6.9111E+00	9.3563E+02	1.856E+01%		4.11E+02
CS-137	4.1887E+02	4.4098E+02	8.234E-01%		3.28E+00
Y-898	9.0827E+00	1.8177E+03	1.710E+01%		6.75E+02
Co-1173	5.0861E+02	6.8205E+02	8.315E-01%		4.24E+00
Co-1332	5.1427E+02	6.8963E+02	8.225E-01%		2.50E+00
Y-1836 #	9.3579E+00	1.8728E+03	7.550E+00%		1.46E+02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

17_Tuna2nd_20120265

---------- S U M M A R Y ----------

Total Activity (582.9 to 1999.2 keV) 1.981E+04 Bq/Sample

Total Decayed Activity (582.9 to 1999.2 keV) 3.7099195E+04 Bq/Sample

Annual Calibration Verifications

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANNUAL CALIBRATION VERIFICATION

Detector ID: **Detector # 5**

SpectrumID: 5_20160128006_EffVerif

Analysis Description: ACVTop-776670;TunaCan2006

Calibration: 5_Soil_TunaCan_90099_032612

Detector: Ge 5 SN/157

Verification Date: 2016-01-28 10:21

Source Assay Date/Time: 2006-10-01 11:00

Isotope	Gamma Energy (kev)	Source Emission Rate (GPS) (Assay)	Observed Activity (GPS) (Actual)	Percent Difference (%) Assay-Actual / Assay
Am-241	59.54	449	4.57E+02	-1.7%
Cs-137	661.66	400	3.97E+02	0.7%
Co-1332	1332.5	777	7.71E+02	0.8%

Comments:

Perform ___Jody Watson 1/28/16_____

Reviev _____Rachel Mueller 1/28/16_____

C:\User\CRpt\5_20160128006_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge 5 SN/157
Source Date: 10/1/2006 11:00
Acquired: 1/28/2016 10:21:33
Analyzed: 2/4/2016 10:52

Analyst: Jody Watson

Efficiency: 5_Soil_TunaCan_90099_032612
Library: DET_EfficiencyVerification.lib

Nuclide	Activity uCi/Source	Uncertainty %
AM-241	4.566E+02	0.45
CS-137	3.974E+02	0.71
Co-1332	7.707E+02	1.09
Total	1.625E+03	

TestAmerica Spectrum name: 5_20160128006_EffVerif.An1

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det5\5_20160128006_EffVerif.An1

Acquisition information
Start time: 1/28/2016 10:21:33 AM
Live time: 7200
Real time: 7242
Dead time: 0.59 %
Detector ID: 5

Detector system
Ge 5 SN/157

Calibration
Filename: 5_Soil_TunaCan.Clb
5_Soil_TunaCan_90099_032612

Energy Calibration
Created: 2/28/2012 7:35:48 PM
Zero offset: 0.158 keV
Gain: 0.250 keV/channel
Quadratic: 3.911E-08 keV/channel^2

Efficiency Calibration
Created: 3/27/2012 5:20:37 PM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.87 %
Log(Eff): 6.466115E-01 + (-7.830454E-01*Log(E)) +
(-4.117504E-03*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.43 %
Log(Eff): -2.462251E+01 + (9.075211E+00*Log(E)) +
(-9.664422E-01*Log(E)^2)

Library Files
Main analysis library: DET_EfficiencyVerification.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.62keV)
Stop channel: 8000 (2000.81keV)
Peak rejection level: 10.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.
       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       10/1/2006 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.    3 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0281

*****   S U M M A R Y   O F   P E A K S   I N   R A N G E   *****
 Peak       Area   Uncert  FWHM    Corrctn   Nuclide  Brnch.     Act.   Nuc
 Energy                             Factor    Energy   Ratio    uCi/Sour
_____________________________________________________________________________
   46.59    62614.   0.54   0.73  1.791E-02
   59.55    82059.   0.45   0.73  2.534E-02    59.54 100.000  4.566E+02 AM241
   87.79     1068.   8.88   0.81  3.458E-02
  661.63    22901.   0.71   1.29  9.925E-03   661.66 100.000  3.973E+02 CS137
 1173.12     9966.   1.10   1.75  6.139E-03
 1332.41     8977.   1.09   1.90  5.515E-03  1332.50 100.000  7.707E+02 Co1332


************ U N I D E N T I F I E D    P E A K   S U M M A R Y ************
  Peak Centroid  Background Net Area  Efficiency  Uncert   FWHM  Suspected
Channel   Energy   Counts     Counts   * Area    1 Sigma %  keV   Nuclide
_____________________________________________________________________________
  185.88    46.59     15162.     62614. 3.496E+06    0.54   0.733  -
  350.82    87.79      2502.      1068. 3.087E+04    8.88   0.809  -      s
 4692.76  1173.12       266.      9966. 1.624E+06    1.10   1.754  -

  s - Peak fails shape tests.
  D - Peak area deconvoluted.
  L - Peak written from unknown list.
  C - Area < Critical level.

-----------------------------------------------------------------
This section based on library: DET_EfficiencyVerification.lib
```

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.79	59.55	13086.	82059.	11.397	0.45	0.731
CS-137	2647.26	661.63	612.	22901.	3.181	0.71	1.293
Co-1332	5329.50	1332.41	77.	8977.	1.247	1.09	1.898

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity uCi/Source	Peak Energy keV	Peak Activity uCi/Source	Code	MDA Value uCi/Source	COMMENTS
AM-241		4.5663E+02				1.58E+05	
			59.54	4.566E+02	(	2.981E+00 4.47E-01 1.00E+02 G	
CS-137		3.9735E+02				1.10E+04	
			661.66	3.973E+02	(	2.047E+00 7.08E-01 1.00E+02 G	
Co-1332		7.7068E+02				1.93E+03	
			1332.50	7.707E+02	(	3.743E+00 1.09E+00 1.00E+02 G	

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity uCi/Source	Time Corrected Activity uCi/Source	Uncertainty Counting 1 Sigma	MDA
AM-241	4.4986E+02	4.5663E+02	4.468E-01%	2.98E+00
CS-137	3.2049E+02	3.9735E+02	7.077E-01%	2.05E+00
Co-1332	2.2610E+02	7.7068E+02	1.091E+00%	3.74E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 2000.8 keV) 9.965E+02 uCi/Source
Total Decayed Activity (37.6 to 2000.8 keV) 1.6246621E+03 uCi/Source

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANNUAL CALIBRATION VERIFICATION

Detector ID: **Detector # 7**
SpectrumID: 7_20160123003_EffVerif
Analysis Description: ACVTop-776670;TunaCan2006
Calibration: 7_TunaCan_90099_032712
Detector: Ge 7 SN/154

Verification Date: 2016-01-23 19:25
Source Assay Date/Time: 2006-10-01 11:00

Isotope	Gamma Energy (kev)	Source Emission Rate (GPS) (Assay)	Observed Activity (GPS) (Actual)	Percent Difference (%) Assay-Actual / Assay
Am-241	59.54	449	4.38E+02	2.5%
Cs-137	661.66	400	3.86E+02	3.6%
Co-1332	1332.5	777	7.19E+02	7.5%

Comments:

Perform ____Kody Saulters 2/4/16_____ Reviev ___Jody Watson 2/4/16_____

C:\User\CRpt\7_20160123003_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge 7 SN/154
Source Date: 10/1/2006 11:00
Acquired: 1/23/2016 19:25:53
Analyzed: 2/4/2016 10:49

Analyst: Jody Watson

Efficiency: 7_TunaCan_90099_032712
Library: DET_EfficiencyVerification.lib

Nuclide	Activity uCi/Source	Uncertainty %
AM-241	4.380E+02	0.38
CS-137	3.857E+02	0.59
Co-1332	7.189E+02	0.94
Total	1.543E+03	

TestAmerica Spectrum name: 7_20160123003_EffVerif.An1

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det7\7_20160123003_EffVerif.An1

Acquisition information
Start time: 1/23/2016 7:25:53 PM
Live time: 7200
Real time: 7361
Dead time: 2.18 %
Detector ID: 7

Detector system
Ge 7 SN/154

Calibration
Filename: 7_Soil_TunaCan.Clb
7_TunaCan_90099_032712

Energy Calibration
Created: 2/23/2012 8:40:56 AM
Zero offset: 0.117 keV
Gain: 0.250 keV/channel
Quadratic: 3.508E-09 keV/channel^2

Efficiency Calibration
Created: 3/16/2012 11:45:14 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.87 %
Log(Eff): 6.716580E-01 + (-6.166540E-01*Log(E)) + (-2.065917E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.48 %
Log(Eff): -2.689695E+01 + (1.019544E+01*Log(E)) + (-1.081671E+00*Log(E)^2)

Library Files
Main analysis library: DET_EfficiencyVerification.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.61keV)
Stop channel: 8000 (2000.12keV)
Peak rejection level: 10.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.
       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       10/1/2006 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.    3 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0434

*****   S U M M A R Y   O F   P E A K S   I N   R A N G E   *****
 Peak       Area   Uncert  FWHM    Corrctn   Nuclide  Brnch.     Act.   Nuc
 Energy                             Factor    Energy   Ratio    uCi/Sour
_____________________________________________________________________________
   36.52     1402.   9.33   1.11  1.474E-02
   46.60    75982.   0.45   0.84  2.485E-02
   59.55   114994.   0.38   0.89  3.702E-02    59.54 100.000  4.380E+02 AM241
   87.94     1428.   8.44   0.97  5.326E-02
  661.74    33440.   0.59   1.49  1.492E-02   661.66 100.000  3.857E+02 CS137
 1173.38    13650.   0.99   1.95  8.928E-03
 1332.63    12093.   0.94   1.99  7.950E-03  1332.50 100.000  7.189E+02 Co1332


************ U N I D E N T I F I E D    P E A K   S U M M A R Y ************
  Peak Centroid  Background Net Area  Efficiency  Uncert   FWHM  Suspected
Channel   Energy   Counts     Counts   * Area    1 Sigma %  keV   Nuclide
_____________________________________________________________________________
  145.62    36.52      4964.      1402. 9.512E+04    9.33   1.111  -      s
  185.78    46.56     20640.     82430. 3.318E+06    0.48   0.912  -
  351.31    87.94      3932.      1428. 2.682E+04    8.44   0.972  -      s
 4693.26  1173.38       567.     13650. 1.529E+06    0.99   1.950  -

  s - Peak fails shape tests.
  D - Peak area deconvoluted.
  L - Peak written from unknown list.
  C - Area < Critical level.

-------------------------------------------------------------
This section based on library: DET_EfficiencyVerification.lib
```

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.75	59.55	18759.	114994.	15.971	0.38	0.895
CS-137	2646.69	661.74	882.	33440.	4.644	0.59	1.494
Co-1332	5330.24	1332.63	117.	12093.	1.680	0.94	1.990

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity uCi/Source	Peak Energy keV	Peak Activity uCi/Source	Code	MDA Value uCi/Source	COMMENTS
AM-241		4.3796E+02				1.58E+05	
			59.54	4.380E+02	(	2.441E+00 3.82E-01 1.00E+02 G	
CS-137		3.8573E+02				1.10E+04	
			661.66	3.857E+02	(	1.628E+00 5.85E-01 1.00E+02 G	
Co-1332		7.1885E+02				1.93E+03	
			1332.50	7.189E+02	(	3.157E+00 9.42E-01 1.00E+02 G	

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity uCi/Source	Time Corrected Activity uCi/Source	Uncertainty Counting 1 Sigma	MDA
AM-241	4.3147E+02	4.3796E+02	3.822E-01%	2.44E+00
CS-137	3.1121E+02	3.8573E+02	5.852E-01%	1.63E+00
Co-1332	2.1125E+02	7.1885E+02	9.418E-01%	3.16E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 2000.1 keV) 9.539E+02 uCi/Source
Total Decayed Activity (37.6 to 2000.1 keV) 1.5425436E+03 uCi/Source

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANNUAL CALIBRATION VERIFICATION

Detector ID: **Detector # 8**
SpectrumID: 8_20160128004_EffVerif
Analysis Description: ACVTop-776670;TunaCan2006
Calibration: 8_Soil_TunaCan_90099_032712
Detector: Ge 8 SN/174

Verification Date: 2016-01-28 18:34
Source Assay Date/Time: 2006-10-01 11:00

Isotope	Gamma Energy (kev)	Source Emission Rate (GPS) (Assay)	Observed Activity (GPS) (Actual)	Percent Difference (%) Assay-Actual / Assay
Am-241	59.54	449	4.79E+02	-6.7%
Cs-137	661.66	400	3.90E+02	2.5%
Co-1332	1332.5	777	7.56E+02	2.7%

Comments:

Perform Aaron Schroder 1/28/16

Reviev __Jody Watson_____1/29/16_____

C:\User\CRpt\8_20160128004_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge 8 SN/174
Source Date: 10/1/2006 11:00
Acquired: 1/28/2016 18:34:05
Analyzed: 2/4/2016 10:51

Analyst: Jody Watson

Efficiency: 8_Soil_TunaCan_90099_032712
Library: DET_EfficiencyVerification.lib

Nuclide	Activity uCi/Source	Uncertainty %
AM-241	4.789E+02	0.41
CS-137	3.899E+02	0.64
Co-1332	7.564E+02	0.99
Total	1.625E+03	

TestAmerica Spectrum name: 8_20160128004_EffVerif.An1

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det8\8_20160128004_EffVerif.An1

Acquisition information
Start time: 1/28/2016 6:34:05 PM
Live time: 7200
Real time: 7434
Dead time: 3.15 %
Detector ID: 8

Detector system
Ge 8 SN/174

Calibration
Filename: 8_Soil_TunaCan.Clb
8_Soil_TunaCan_90099_032712

Energy Calibration
Created: 2/28/2012 10:34:41 AM
Zero offset: 0.052 keV
Gain: 0.250 keV/channel
Quadratic: 5.282E-10 keV/channel^2

Efficiency Calibration
Created: 3/28/2012 10:35:20 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.39 %
Log(Eff): -1.098764E-01 + (-4.958544E-01*Log(E)) +
(-2.572270E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.71 %
Log(Eff): -2.525301E+01 + (9.398253E+00*Log(E)) +
(-1.000034E+00*Log(E)^2)

Library Files
Main analysis library: DET_EfficiencyVerification.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.55keV)
Stop channel: 8000 (1999.96keV)
Peak rejection level: 10.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.
       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       10/1/2006 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.    3 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0632

*****   S U M M A R Y   O F   P E A K S   I N   R A N G E   *****
 Peak       Area   Uncert  FWHM    Corrctn   Nuclide  Brnch.     Act.   Nuc
 Energy                             Factor    Energy   Ratio    uCi/Sour
_____________________________________________________________________________
   46.57    74004.   0.44   1.01  2.005E-02
   59.58   102880.   0.35   1.02  2.881E-02    59.54 100.000  5.034E+02 AM241
   88.09     1218.   9.96   0.76  3.993E-02
  661.54    27378.   0.64   1.34  1.209E-02   661.66 100.000  3.899E+02 CS137
 1173.07    11810.   1.00   1.56  7.454E-03
 1332.31    10667.   0.99   1.75  6.678E-03  1332.50 100.000  7.564E+02 Co1332


************ U N I D E N T I F I E D    P E A K    S U M M A R Y ************
  Peak Centroid  Background Net Area  Efficiency  Uncert   FWHM  Suspected
Channel   Energy   Counts     Counts   * Area    1 Sigma %  keV   Nuclide
_____________________________________________________________________________
  185.94    46.53     19029.     71370. 3.560E+06    0.54   0.847  -
  352.16    88.09      3683.      1218. 3.051E+04    9.96   0.764  -      s
 4692.32  1173.07       306.     11810. 1.584E+06    1.00   1.561  -

  s - Peak fails shape tests.
  D - Peak area deconvoluted.
  L - Peak written from unknown list.
  C - Area < Critical level.

-------------------------------------------------------------
This section based on library: DET_EfficiencyVerification.lib
```

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.97	59.54	15110.	97876.	13.594	0.41	0.867D
CS-137	2646.10	661.54	638.	27378.	3.802	0.64	1.335
Co-1332	5329.28	1332.31	68.	10667.	1.482	0.99	1.753

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity uCi/Source	Peak Energy keV	Peak Activity uCi/Source	Code	MDA Value uCi/Source	COMMENTS
AM-241		4.7889E+02				1.58E+05	
			59.54	4.789E+02	(	2.816E+00 4.13E-01 1.00E+02 G	
CS-137		3.8993E+02				1.10E+04	
			661.66	3.899E+02	(	1.714E+00 6.40E-01 1.00E+02 G	
Co-1332		7.5635E+02				1.93E+03	
			1332.50	7.564E+02	(	2.913E+00 9.90E-01 1.00E+02 G	

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity uCi/Source	Time Corrected Activity uCi/Source	Uncertainty Counting 1 Sigma	MDA
AM-241	4.7179E+02	4.7889E+02	4.129E-01%	2.82E+00
CS-137	3.1450E+02	3.8993E+02	6.397E-01%	1.71E+00
Co-1332	2.2187E+02	7.5635E+02	9.900E-01%	2.91E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.5 to 2000.0 keV) 1.008E+03 uCi/Source
Total Decayed Activity (37.5 to 2000.0 keV) 1.6251797E+03 uCi/Source

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANNUAL CALIBRATION VERIFICATION

Detector ID: **Detector #12**
SpectrumID: 12_20160128006_EffVerif
Analysis Description: ACVTop-776670;TunaCan2006
Calibration: 12_TunaCanCal_90099_100212
Detector: Ge12 S/N10034336

Verification Date: 2016-01-28 13:28
Source Assay Date/Time: 2006-10-01 11:00

Isotope	Gamma Energy (kev)	Source Emission Rate (GPS) (Assay)	Observed Activity (GPS) (Actual)	Percent Difference (%) Assay-Actual / Assay
Am-241	59.54	449	4.53E+02	-0.9%
Cs-137	661.66	400	3.91E+02	2.2%
Co-1332	1332.5	777	7.46E+02	4.0%

Comments:

Perforn _____Jody Watson 1/29/16_____

Revie _____Aaron Schroder 1/29/2016_____

C:\User\CRpt\12_20160128006_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge12 S/N10034336
Source Date: 10/1/2006 11:00
Acquired: 1/28/2016 13:28:46
Analyzed: 1/29/2016 13:56

Analyst: Jody Watson

Efficiency: 12_TunaCanCal_90099_100212
Library: DET_EfficiencyVerification.lib

Nuclide	Activity uCi/Source	Uncertainty %
AM-241	4.532E+02	0.41
CS-137	3.911E+02	0.59
Co-1332	7.456E+02	0.90
Total	1.590E+03	

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det12\12_20160128006_EffVerif.An1

Acquisition information
Start time: 1/28/2016 1:28:46 PM
Live time: 7200
Real time: 7326
Dead time: 1.72 %
Detector ID: 12

Detector system
Ge12 S/N10034336

Calibration
Filename: 12_Soil_TunaCan.Clb
12_TunaCanCal_90099_100212

Energy Calibration
Created: 2/28/2012 1:26:42 PM
Zero offset: 0.049 keV
Gain: 0.250 keV/channel
Quadratic: -3.945E-08 keV/channel^2

Efficiency Calibration
Created: 10/4/2012 9:05:44 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.70 %
Log(Eff): -7.827468E-01 + (-3.001271E-01*Log(E)) +
(-3.369562E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.96 %
Log(Eff): -2.288409E+01 + (8.352717E+00*Log(E)) +
(-8.812368E-01*Log(E)^2)

Library Files
Main analysis library: DET_EfficiencyVerification.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.58keV)
Stop channel: 8000 (1999.36keV)
Peak rejection level: 10.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.
       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       10/1/2006 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.    3 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0294
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. uCi/Sour	Nuc
36.56	1334.	9.60	1.00	1.444E-02				
46.60	72273.	0.45	0.89	2.231E-02				
59.55	100350.	0.41	0.89	3.122E-02	59.54	100.000	4.532E+02	AM241
87.89	1239.	8.96	1.09	4.274E-02				
238.48	1003.	9.18	1.15	3.221E-02				
661.61	35682.	0.59	1.40	1.571E-02	661.66	100.000	3.911E+02	CS137
1173.14	15564.	0.95	1.81	1.018E-02				
1332.40	14520.	0.90	1.94	9.221E-03	1332.50	100.000	7.456E+02	Co1332

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
145.90	36.56	4764.	1334.	9.239E+04	9.60	0.995	-	s
185.89	46.56	20938.	74360.	3.333E+06	0.53	0.874	-	
351.04	87.89	3330.	1239.	2.899E+04	8.96	1.086	-	s
953.01	238.48	2037.	1003.	3.113E+04	9.18	1.146	-	
4691.52	1173.14	752.	15564.	1.528E+06	0.95	1.813	-	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EfficiencyVerification.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.79	59.55	16419.	100350.	13.938	0.41	0.888
CS-137	2644.93	661.61	1381.	35682.	4.956	0.59	1.395
Co-1332	5329.01	1332.40	280.	14520.	2.017	0.90	1.943

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity uCi/Source	Peak Energy keV	Peak Activity uCi/Source	Code	MDA Value uCi/Source	COMMENTS
AM-241		4.5317E+02				1.58E+05	
			59.54	4.532E+02	(	2.709E+00 4.06E-01 1.00E+02 G	
CS-137		3.9106E+02				1.10E+04	
			661.66	3.911E+02	(	1.928E+00 5.91E-01 1.00E+02 G	
Co-1332		7.4558E+02				1.93E+03	
			1332.50	7.456E+02	(	4.143E+00 8.99E-01 1.00E+02 G	

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity uCi/Source	Time Corrected Activity uCi/Source	Uncertainty 1 Sigma Counting	MDA
AM-241	4.4645E+02	4.5317E+02	4.060E-01%	2.71E+00
CS-137	3.1542E+02	3.9106E+02	5.907E-01%	1.93E+00
Co-1332	2.1873E+02	7.4558E+02	8.990E-01%	4.14E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.4 keV) 9.806E+02 uCi/Source
Total Decayed Activity (37.6 to 1999.4 keV) 1.5898042E+03 uCi/Source

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANNUAL CALIBRATION VERIFICATION

Detector ID: **Detector #13**
SpectrumID: 13_20160407003_EffVerif
Analysis Description: ACVTop-776670;TunaCan2006
Calibration: 13_Soil_TunaCan_90099_032712
Detector: Ge13 SN/10064006

Verification Date: 2016-04-07 10:57
Source Assay Date/Time: 2006-10-01 11:00

Isotope	Gamma Energy (kev)	Source Emission Rate (GPS) (Assay)	Observed Activity (GPS) (Actual)	Percent Difference (%) Assay-Actual / Assay
Am-241	59.54	449	4.53E+02	-0.8%
Cs-137	661.66	400	3.79E+02	5.4%
Co-1332	1332.5	777	7.20E+02	7.4%

Comments:

Perform Jody Watson 4/7/16

Reviev _Amanda Dick 4/7/16_

C:\User\CRpt\13_20160407003_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge13 SN/10064006
Source Date: 10/1/2006 11:00
Acquired: 4/7/2016 10:57:01
Analyzed: 4/7/2016 12:58

Analyst: Jody Watson

Efficiency: 13_Soil_TunaCan_90099_032712
Library: DET_EfficiencyVerification.lib

Nuclide	Activity GPS/Source	Uncertainty %
AM-241	4.528E+02	0.37
CS-137	3.786E+02	0.53
Co-1332	7.197E+02	0.82
Total	1.551E+03	

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det13\13_20160407003_EffVerif.An1

Acquisition information

Start time:	4/7/2016 10:57:01 AM
Live time:	7200
Real time:	7258
Dead time:	0.79 %
Detector ID:	13

Detector system
Ge13 SN/10064006

Calibration

Filename:	13_Soil_TunaCan.Clb

13_Soil_TunaCan_90099_032712

Energy Calibration

Created:	2/23/2012 9:31:24 AM
Zero offset:	0.036 keV
Gain:	0.250 keV/channel
Quadratic:	-2.347E-08 keV/channel^2

Efficiency Calibration

Created:	3/29/2012 7:50:26 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 0.91 %
Log(Eff):	-5.308398E-01 + (-3.057754E-01*Log(E)) + (-3.437570E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.60 %
Log(Eff):	-2.292218E+01 + (8.455931E+00*Log(E)) + (-8.924057E-01*Log(E)^2)

Library Files

Main analysis library:	DET_EfficiencyVerification.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G53W4.25
Start channel:	150 (37.55keV)
Stop channel:	8000 (1999.54keV)
Peak rejection level:	10.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Test America Spectrum name: 13_20160407003_EffVerif.An1

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:    12.000
       Activity range factor:      2.000
       Min. step backg. energy     0.000
       Multiplet shift channel     2.000

Corrections                          Status          Comments
       Decay correct to date:         YES       10/1/2006 11:00:00 AM
       Decay during acquisition:      YES
       Decay during collection:       NO
       True coincidence correction:   NO
       Peaked background correction:  NO
       Absorption (Internal):         NO
       Geometry correction:           NO
       Random summing:                NO


total peaks alloc.    3 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0332
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. GPS/Sour	Nuc
36.54	1974.	5.38	1.01	1.732E-02				
46.54	94328.	0.38	1.02	2.701E-02				
49.59	2173.	8.10	1.02	2.984E-02				
59.47	122086.	0.37	0.84	3.797E-02	59.54	100.000	4.528E+02	AM241
87.82	1531.	6.14	1.06	5.220E-02				
238.45	1089.	9.60	0.99	3.937E-02				
661.68	41444.	0.53	1.46	1.893E-02	661.66	100.000	3.786E+02	CS137
1173.22	17974.	0.85	1.88	1.217E-02				
1332.46	16298.	0.82	2.02	1.100E-02	1332.50	100.000	7.197E+02	Co1332

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
145.50	36.43	5595.	1571.	9.070E+04	9.26	0.868	-	sD
185.75	46.50	22594.	89194.	3.302E+06	0.48	0.810	-	D
198.11	49.59	14395.	2173.	7.284E+04	8.10	1.021	-	D
350.96	87.85	3656.	1531.	2.932E+04	6.14	1.057	-	D
953.25	238.45	2564.	1089.	2.766E+04	9.60	0.992	-	
4692.44	1173.22	644.	17974.	1.477E+06	0.85	1.876	-	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EfficiencyVerification.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.63	59.47	18260.	122086.	16.956	0.37	0.835
CS-137	2645.90	661.68	1130.	41444.	5.756	0.53	1.460
Co-1332	5329.66	1332.46	203.	16298.	2.264	0.82	2.017

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity GPS/Source	Peak Energy keV	Peak Activity GPS/Source	Peak Code	Peak MDA Value GPS/Source	COMMENTS
AM-241		4.5280E+02				1.58E+05	
			59.54	4.528E+02	(	2.346E+00 3.67E-01 1.00E+02	G
CS-137		3.7859E+02				1.10E+04	
			661.66	3.786E+02	(	1.456E+00 5.30E-01 1.00E+02	G
Co-1332		7.1967E+02				1.93E+03	
			1332.50	7.197E+02	(	3.049E+00 8.18E-01 1.00E+02	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

Test America Spectrum name: 13_20160407003_EffVerif.An1

N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity GPS/Source	Time Corrected Activity GPS/Source	Uncertainty Counting 1 Sigma	MDA
AM-241	4.4595E+02	4.5280E+02	3.674E-01%	2.35E+00
CS-137	3.0401E+02	3.7859E+02	5.299E-01%	1.46E+00
Co-1332	2.0588E+02	7.1967E+02	8.182E-01%	3.05E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (95.6 to 1999.5 keV) 9.558E+02 GPS/Source
Total Decayed Activity (95.6 to 1999.5 keV) 1.5510570E+03 GPS/Source

TestAmerica
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ANNUAL CALIBRATION VERIFICATION

Detector ID: **Detector #14**
SpectrumID: 14_20160125003_EffVerif
Analysis Description: ACVTop-776670;TunaCan2006
Calibration: 14_TunaCan_90099_042312
Detector: Ge14 SN/11080670

Verification Date: 2016-01-25 12:29
Source Assay Date/Time: 2006-10-01 11:00

Isotope	Gamma Energy (kev)	Source Emission Rate (GPS) (Assay)	Observed Activity (GPS) (Actual)	Percent Difference (%) Assay-Actual / Assay
Am-241	59.54	449	4.55E+02	-1.4%
Cs-137	661.66	400	3.95E+02	1.3%
Co-1332	1332.5	777	7.57E+02	2.6%

Comments:

Perforn ___Kody Saulters 2/4/16_____

Revie' __Jody Watson 2/4/16_____

C:\User\CRpt\14_20160125003_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge14 SN/11080670
Source Date: 10/1/2006 11:00
Acquired: 1/25/2016 12:29:45
Analyzed: 2/4/2016 09:35

Analyst: Jody Watson

Efficiency: 14_TunaCan_90099_042312
Library: DET_EfficiencyVerification.lib

Nuclide	Activity uCi/Source	Uncertainty %
AM-241	4.553E+02	0.40
CS-137	3.948E+02	0.62
Co-1332	7.566E+02	0.94
Total	1.607E+03	

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det14\14_20160125003_EffVerif.An1

Acquisition information

Start time:	1/25/2016 12:29:45 PM
Live time:	7200
Real time:	7259
Dead time:	0.81 %
Detector ID:	14

Detector system
Ge14 SN/11080670

Calibration

Filename:	14_Soil_TunaCan.Clb

14_TunaCan_90099_042312

Energy Calibration

Created:	2/28/2012 10:48:23 AM
Zero offset:	0.130 keV
Gain:	0.250 keV/channel
Quadratic:	-2.050E-08 keV/channel^2

Efficiency Calibration

Created:	4/23/2012 11:29:47 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 1.02 %
Log(Eff):	2.101260E-01 + (-5.951973E-01*Log(E)) + (-1.605331E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.28 %
Log(Eff):	-2.391492E+01 + (8.828985E+00*Log(E)) + (-9.371496E-01*Log(E)^2)

Library Files

Main analysis library:	DET_EfficiencyVerification.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G53W4.25
Start channel:	150 (37.64keV)
Stop channel:	8000 (1999.52keV)
Peak rejection level:	10.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.
       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       10/1/2006 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.    3 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.1953

*****   S U M M A R Y   O F   P E A K S   I N   R A N G E   *****
 Peak       Area   Uncert  FWHM    Corrctn   Nuclide  Brnch.     Act.   Nuc
 Energy                             Factor    Energy   Ratio    uCi/Sour
_____________________________________________________________________________
   46.67    73404.   0.51   0.89  2.181E-02
   59.66    98988.   0.40   0.90  3.073E-02    59.54 100.000  4.553E+02 AM241
   87.86     1381.   7.63   1.19  4.192E-02
  238.23      859.   9.01   1.08  2.935E-02
  661.34    30113.   0.62   1.47  1.314E-02   661.66 100.000  3.948E+02 CS137
 1172.91    13023.   0.94   1.74  8.246E-03
 1332.21    11875.   0.94   1.86  7.424E-03  1332.50 100.000  7.566E+02 Co1332


************ U N I D E N T I F I E D    P E A K   S U M M A R Y ************
  Peak Centroid  Background Net Area  Efficiency  Uncert   FWHM  Suspected
Channel   Energy   Counts     Counts   * Area    1 Sigma %  keV   Nuclide
_____________________________________________________________________________
  186.09    46.67     18352.     73404. 3.366E+06    0.51   0.888  -      s
  350.79    87.86      3068.      1381. 3.294E+04    7.63   1.186  -      s
  952.14   238.23      1621.       859. 2.928E+04    9.01   1.079  -
 4691.29  1172.91       312.     13023. 1.579E+06    0.94   1.737  -

  s - Peak fails shape tests.
  D - Peak area deconvoluted.
  L - Peak written from unknown list.
  C - Area < Critical level.

-------------------------------------------------------------
This section based on library: DET_EfficiencyVerification.lib
```

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	238.04	59.66	15017.	98988.	13.748	0.40	0.897s
CS-137	2644.50	661.34	859.	30113.	4.182	0.62	1.470
Co-1332	5328.79	1332.21	65.	11875.	1.649	0.94	1.861

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity uCi/Source	Peak Energy keV	Peak Activity uCi/Source	Code	MDA Value uCi/Source	COMMENTS
AM-241		4.5525E+02				1.58E+05	
			59.54	4.553E+02	(	2.639E+00 4.00E-01 1.00E+02 G	
CS-137		3.9479E+02				1.10E+04	
			661.66	3.948E+02	(	1.826E+00 6.21E-01 1.00E+02 G	
Co-1332		7.5658E+02				1.93E+03	
			1332.50	7.566E+02	(	2.566E+00 9.36E-01 1.00E+02 G	

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity uCi/Source	Time Corrected Activity uCi/Source	Uncertainty Counting	1 Sigma	MDA
AM-241 #	4.4851E+02	4.5525E+02	3.997E-01%		2.64E+00
CS-137	3.1849E+02	3.9479E+02	6.211E-01%		1.83E+00
Co-1332	2.2220E+02	7.5658E+02	9.363E-01%		2.57E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 9.892E+02 uCi/Source
Total Decayed Activity (37.6 to 1999.5 keV) 1.6066273E+03 uCi/Source

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANNUAL CALIBRATION VERIFICATION

Detector ID: **Detector #15**
SpectrumID: 15_20160504003_EffVerif
Analysis Description: ACVTop-776670;TunaCan2006
Calibration: 15_TunaCan_90099_032212
Detector: Ge15 SN/11012216

Verification Date: 2016-05-04 18:46
Source Assay Date/Time: 2006-10-01 11:00

Isotope	Gamma Energy (kev)	Source Emission Rate (GPS) (Assay)	Observed Activity (GPS) (Actual)	Percent Difference (%) Assay-Actual / Assay
Am-241	59.54	449	4.45E+02	0.8%
Cs-137	661.66	400	3.87E+02	3.4%
Co-1332	1332.5	777	7.47E+02	3.8%

Comments:

Perform ___Jody Watson 5/5/16_____ Reviev __Kody Saulters 5/5/16_____

C:\User\CRpt\15_20160504003_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge15 SN/11012216
Source Date: 10/1/2006 11:00
Acquired: 5/4/2016 18:46:19
Analyzed: 5/5/2016 12:02

Analyst: Jody Watson

Efficiency: 15_TunaCan_90099_032212
Library: DET_EfficiencyVerification.lib

Nuclide	Activity uCi/Source	Uncertainty %
AM-241	4.452E+02	0.48
CS-137	3.866E+02	0.67
Co-1332	7.472E+02	1.06
Total	1.579E+03	

Test America Spectrum name: 15_20160504003_EffVerif.An1

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det15\15_20160504003_EffVerif.An1

Acquisition information
Start time: 5/4/2016 6:46:19 PM
Live time: 7200
Real time: 7231
Dead time: 0.42 %
Detector ID: 15

Detector system
Ge15 SN/11012216

Calibration
Filename: 15_Soil_TunaCan.Clb
15_TunaCan_90099_032212

Energy Calibration
Created: 2/28/2012 4:29:17 PM
Zero offset: 0.044 keV
Gain: 0.250 keV/channel
Quadratic: -3.267E-08 keV/channel^2

Efficiency Calibration
Created: 3/22/2012 1:03:01 PM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.00 %
Log(Eff): -6.894897E-01 + (-3.290613E-01*Log(E)) + (-3.875629E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.13 %
Log(Eff): -2.362677E+01 + (8.666669E+00*Log(E)) + (-9.214638E-01*Log(E)^2)

Library Files
Main analysis library: DET_EfficiencyVerification.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.57keV)
Stop channel: 8000 (1999.52keV)
Peak rejection level: 10.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.
       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       10/1/2006 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.    3 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0611

*****   S U M M A R Y   O F   P E A K S   I N   R A N G E   *****
 Peak       Area   Uncert  FWHM    Corrctn   Nuclide  Brnch.     Act.   Nuc
 Energy                             Factor    Energy   Ratio    uCi/Sour
_____________________________________________________________________________
   46.58    64528.   0.47   0.95  1.956E-02
   59.53    86404.   0.48   0.90  2.737E-02    59.54 100.000  4.452E+02 AM241
  661.75    25760.   0.67   1.44  1.154E-02   661.66 100.000  3.866E+02 CS137
 1173.43    10608.   1.12   1.87  7.075E-03
 1332.71     9639.   1.06   1.94  6.324E-03  1332.50 100.000  7.472E+02 Co1332


************ U N I D E N T I F I E D     P E A K    S U M M A R Y ************
  Peak Centroid  Background Net Area  Efficiency  Uncert   FWHM  Suspected
Channel   Energy   Counts     Counts   * Area    1 Sigma %  keV   Nuclide
_____________________________________________________________________________
  185.80    46.53     18441.     65393. 3.343E+06    0.57   0.887  -
 4692.75  1173.43       481.     10608. 1.499E+06    1.12   1.872  -

  s - Peak fails shape tests.
  D - Peak area deconvoluted.
  L - Peak written from unknown list.
  C - Area < Critical level.

-------------------------------------------------------------
This section based on library: DET_EfficiencyVerification.lib
```

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.76	59.53	17200.	86404.	12.001	0.48	0.904
CS-137	2645.68	661.75	708.	25760.	3.578	0.67	1.435
Co-1332	5330.21	1332.71	114.	9639.	1.339	1.06	1.942

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity uCi/Source	Peak Energy keV	Peak Activity uCi/Source	Code	MDA Value uCi/Source	COMMENTS
AM-241		4.4521E+02				1.58E+05	
			59.54	4.452E+02	(	3.163E+00 4.77E-01 1.00E+02 G	
CS-137		3.8657E+02				1.10E+04	
			661.66	3.866E+02	(	1.901E+00 6.74E-01 1.00E+02 G	
Co-1332		7.4720E+02				1.93E+03	
			1332.50	7.472E+02	(	4.067E+00 1.06E+00 1.00E+02 G	

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity uCi/Source	Time Corrected Activity uCi/Source	Uncertainty Counting	1 Sigma MDA
AM-241	4.3842E+02	4.4521E+02	4.765E-01%	3.16E+00
CS-137	3.0989E+02	3.8657E+02	6.738E-01%	1.90E+00
Co-1332	2.1166E+02	7.4720E+02	1.062E+00%	4.07E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 9.600E+02 uCi/Source
Total Decayed Activity (37.6 to 1999.5 keV) 1.5789875E+03 uCi/Source

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANNUAL CALIBRATION VERIFICATION

Detector ID: **Detector #17**
SpectrumID: 17_20160127003_EffVerif
Analysis Description: ACVTop-776670;TunaCan2006
Calibration: 17_TunaCan_90099_032612
Detector: Ge17 SN/11080671

Verification Date: 2016-01-27 15:26
Source Assay Date/Time: 2006-10-01 11:00

Isotope	Gamma Energy (kev)	Source Emission Rate (GPS) (Assay)	Observed Activity (GPS) (Actual)	Percent Difference (%) Assay-Actual / Assay
Am-241	59.54	449	4.51E+02	-0.5%
Cs-137	661.66	400	3.90E+02	2.6%
Co-1332	1332.5	777	7.57E+02	2.6%

Comments:

Perforn ____Jody Watson 1/28/16_____ Revie ____Rachel Mueller 1/28/16_____

C:\User\CRpt\17_20160127003_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge17 SN/11080671
Source Date: 10/1/2006 11:00
Acquired: 1/27/2016 15:26:41
Analyzed: 2/4/2016 09:55

Analyst: Jody Watson

Efficiency: 17_TunaCan_90099_032612
Library: DET_EfficiencyVerification.lib

Nuclide	Activity uCi/Source	Uncertainty %
AM-241	4.514E+02	0.41
CS-137	3.896E+02	0.59
Co-1332	7.570E+02	0.90
Total	1.598E+03	

TestAmerica, Inc. Spectrum name: 17_20160127003_EffVerif.An1

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det17\17_20160127003_EffVerif.An1

Acquisition information
Start time: 1/27/2016 3:26:41 PM
Live time: 7200
Real time: 7328
Dead time: 1.74 %
Detector ID: 17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_Soil_TunaCan.Clb
17_TunaCan_90099_032612

Energy Calibration
Created: 2/29/2012 10:33:23 AM
Zero offset: 0.108 keV
Gain: 0.250 keV/channel
Quadratic: -2.584E-08 keV/channel^2

Efficiency Calibration
Created: 4/12/2012 9:28:42 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.91 %
Log(Eff): -5.264190E-01 + (-4.024164E-01*Log(E)) +
(-2.604461E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.00 %
Log(Eff): -2.343889E+01 + (8.582715E+00*Log(E)) +
(-9.075430E-01*Log(E)^2)

Library Files
Main analysis library: DET_EfficiencyVerification.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.63keV)
Stop channel: 8000 (1999.54keV)
Peak rejection level: 10.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.
       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       10/1/2006 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.    3 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0457
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. uCi/Sour	Nuc
36.64	1282.	9.45	0.84	1.356E-02				
46.60	71264.	0.51	0.76	2.105E-02				
59.59	94693.	0.41	0.77	2.960E-02	59.54	100.000	4.514E+02	AM241
87.94	1141.	9.18	0.87	4.058E-02				
661.62	32640.	0.59	1.34	1.443E-02	661.66	100.000	3.896E+02	CS137
1173.18	14804.	0.88	1.69	9.359E-03				
1332.42	13566.	0.90	1.83	8.481E-03	1332.50	100.000	7.570E+02	Co1332

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
146.06	36.64	4466.	1282.	9.453E+04	9.45	0.838	-	s
185.88	46.60	17580.	71264.	3.386E+06	0.51	0.765	-	
351.17	87.94	3107.	1141.	2.812E+04	9.18	0.873	-	s
4692.02	1173.18	370.	14804.	1.582E+06	0.88	1.695	-	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EfficiencyVerification.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.81	59.59	14991.	94693.	13.152	0.41	0.771
CS-137	2645.33	661.62	846.	32640.	4.533	0.59	1.344
Co-1332	5329.31	1332.42	142.	13566.	1.884	0.90	1.830

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity uCi/Source	Peak Energy keV	Peak Activity uCi/Source	Code	MDA Value uCi/Source	COMMENTS
AM-241		4.5144E+02				1.58E+05	
			59.54	4.514E+02	(	2.733E+00 4.12E-01 1.00E+02 G	
CS-137		3.8955E+02				1.10E+04	
			661.66	3.896E+02	(	1.650E+00 5.89E-01 1.00E+02 G	
Co-1332		7.5703E+02				1.93E+03	
			1332.50	7.570E+02	(	3.256E+00 8.96E-01 1.00E+02 G	

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity uCi/Source	Time Corrected Activity uCi/Source	Uncertainty 1 Sigma Counting	MDA
AM-241	4.4475E+02	4.5144E+02	4.119E-01%	2.73E+00
CS-137	3.1422E+02	3.8955E+02	5.894E-01%	1.65E+00
Co-1332	2.2216E+02	7.5703E+02	8.961E-01%	3.26E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 9.811E+02 uCi/Source
Total Decayed Activity (37.6 to 1999.5 keV) 1.5980165E+03 uCi/Source

Monthly Backgrounds

Test America
St. Louis
Background Check

Spectrum: 5_20160730007_BGLong
Description: Background Long PBC Count
Acquired: 7/30/2016 5:50:09 PM
Detector: Detector # 5
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.45	1.30	1.35	1.43	1.55	1.60	PASS

Analyst: Mike Aldridge Reviewer: Rachel Mueller

(Page 1 of 1)

Test America
St. Louis
Background Check

Spectrum: 7_20160730008_BGLong
Description: Background Long PBC Count
Acquired: 7/30/2016 6:29:26 PM
Detector: Detector # 7
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.30	1.16	1.21	1.29	1.40	1.45	PASS

Analyst: Mike Aldridge Reviewer: Rachel Mueller

(Page 1 of 1)

Test America
St. Louis
Background Check

Spectrum: 8_20160807001_BGLong
Description: Background Long PBC Count
Acquired: 8/7/2016 10:06:19 PM
Detector: Detector # 8
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.56	1.39	1.45	1.58	1.68	1.74	PASS

Analyst: Aaron Schroder Reviewer: Aaron Schroder

(Page 1 of 7)

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det8\8_20160807001_BGLong.An1

Acquisition information
Start time: 8/7/2016 10:06:19 PM
Live time: 72000
Real time: 73864
Dead time: 2.52 %
Detector ID: 8

Detector system
Ge 8 SN/174

Calibration
Filename: 8_QC.Clb
Ge8_QC

Energy Calibration
Created: 2/28/2012 10:34:41 AM
Zero offset: 0.052 keV
Gain: 0.250 keV/channel
Quadratic: 5.282E-10 keV/channel^2

Efficiency Calibration
Created: 1/6/2011 8:07:20 AM
Knee Energy: 0.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: DET_Long Background PBC.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.55keV)
Stop channel: 8000 (1999.97keV)
Peak rejection level: 30.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method
Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3

(Page 2 of 7)

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 16 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0882

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
59.59	443.	9.67	1.02	8.697E-02	59.54	35.900	1.971E-01	AM241
63.26	1018.	4.71	1.03	9.237E-02	63.29	3.810	4.015E+00	TH234
84.16	249.	20.41	0.81	1.232E-01				
92.66	2098.	3.77	1.06	1.295E-01	92.59	5.584	4.029E+00	TH234
					93.35	5.561	4.043E+00	AC228
98.58	180.	27.23	0.69	1.303E-01				
143.65	260.	19.95	0.89	1.248E-01	143.79	10.960	2.637E-01	U235
185.84	1118.	6.00	1.00	1.107E-01	185.72	54.000	2.596E-01	U235
					185.99	3.280	4.276E+00	Ra226
238.77	370.	14.28	1.05	9.635E-02	238.63	43.300	1.232E-01	PB212
582.93	136.	29.71	1.21	3.958E-02	583.02	84.500	5.627E-02	TL208
661.65	252.	13.69	1.06	3.334E-02	661.66	85.210	1.234E-01	CS137
1001.01	156.	19.09	1.20	2.158E-02	1001.00	0.837	1.201E+01	PA234M
1332.62	135.	19.92	0.43	1.637E-02	1332.50	99.980	1.145E-01	CO60
					1332.50	99.980	1.145E-01	CO60
1460.44	142.	16.98	2.24	1.543E-02	1460.83	10.670	1.201E+00	K40

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
336.46	84.16	700.	249.	2.021E+03	20.41	0.813	-	s
394.13	98.58	635.	180.	1.382E+03	27.23	0.688	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.95	59.54	751.	444.	0.006	9.94	1.022D
TH-234	252.96	63.29	686.	1018.	0.014	4.80	1.025D
TH-234	370.45	92.66	994.	2098.	0.029	3.77	1.055
U-235	574.42	143.65	661.	260.	0.004	19.95	0.887s
U-235	742.71	185.72	780.	1090.	0.015	4.27	1.003D
PB-212	954.94	238.77	583.	370.	0.005	14.28	1.053
TL-208	2331.65	582.93	288.	136.	0.002	29.71	1.214
CS-137	2646.52	661.65	202.	252.	0.004	13.69	1.062s
PA-234M	4004.05	1001.01	119.	156.	0.002	19.09	1.196s
CO-60	5330.55	1332.62	84.	135.	0.002	19.92	0.434s
K-40	5841.82	1460.44	62.	142.	0.002	16.98	2.244

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Nuclide Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS	Peak Code	MDA Value DPS		COMMENTS
K-40	N	1.2010E+00					4.66E+11	
			1460.83	1.201E+00	(	3.316E-01	1.70E+01	1.07E+01 G
CO-60	F	1.1454E-01					1.93E+03	
			1332.50	1.145E-01	?(	3.854E-02	1.99E+01	1.00E+02 G
CS-137	I	1.2336E-01					1.10E+04	
			661.66	1.234E-01	(	3.368E-02	1.37E+01	8.52E+01 G
TL-208	N	5.6266E-02					6.98E+02	
			583.02	5.627E-02	(	3.394E-02	2.97E+01	8.45E+01 G
			277.28	0.000E+00	%	1.592E-01	9.63E+01	6.31E+00 G
			860.56	0.000E+00	%	1.660E-01	6.24E+01	1.24E+01 G

```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PB-212   N   1.2324E-01                                      6.98E+02
                          238.63 1.232E-01  (  3.834E-02 1.43E+01 4.33E+01 G
                          300.03 0.000E+00 %   3.039E-01 3.89E+01 3.28E+00 GA

TH-234   N   4.0234E+00                                      1.63E+12
                           63.29 4.015E+00  (  4.921E-01 4.80E+00 3.81E+00 G
                           92.59 4.029E+00  (  2.874E-01 3.77E+00 5.58E+00 G

PA-234M  N   1.2010E+01                                      1.63E+12
                         1001.00 1.201E+01 ?(  4.115E+00 1.91E+01 8.37E-01 G
                          766.41 0.000E+00 %   6.184E+00 3.21E+01 2.94E-01 G

U-235    N   2.6374E-01                                      2.57E+11
                          185.72 2.530E-01 }   3.085E-02 4.27E+00 5.40E+01 GA
                          143.79 2.637E-01 *(  1.245E-01 2.00E+01 1.10E+01 G
                          205.33 0.000E+00 %   1.857E-01 3.16E+01 5.01E+00 G
                          163.38 0.000E+00 %   1.792E-01 4.01E+01 5.08E+00 G

AM-241   T   1.9758E-01                                      1.58E+05
                           59.54 1.976E-01  (  5.807E-02 9.94E+00 3.59E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
```

R - Coincidence Corrected C - Coincidence Peak
H - Halflife limit exceeded

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity DPS	Uncertainty 1 Sigma Counting	MDA
BE-7	<	2.1074E-01		
NA-22	<	3.2759E-02		
K-40		1.2010E+00	1.6983E+01%	3.316E-01
Sc-46	<	1.2420E-02		
CR-51	<	1.0349E-01		
MN-54	<	2.1811E-02		
FE-59	<	4.3605E-02		
Co-56	<	2.1139E-02		
CO-57	<	1.0718E-02		
CO-58	<	1.9336E-02		
CO-60	#	1.1454E-01	1.9918E+01%	3.854E-02
ZN-65	<	5.8930E-02		
NB-94	<	2.2388E-02		
ZR-95	<	3.7566E-02		
NB-95	<	3.0190E-02		
RU-103	<	1.7382E-02		
RH-106	<	1.1298E-01		
AG-108M	<	1.7064E-02		
AG-110M	<	3.6859E-02		
SN-113	<	2.2462E-02		
SB-124	<	1.5810E-02		
SB-125	<	5.0181E-02		
I-131	<	1.6793E-02		
BA-133	<	1.7715E-02		
CS-134	<	2.9686E-02		
CS-137		1.2336E-01	1.3691E+01%	3.368E-02
CE-139	<	1.1188E-02		
Ba-140	<	6.6143E-02		
La-140	<	3.0947E-02		
CE-141	<	1.3058E-02		
CE-144	<	8.7434E-02		
PM-144	<	2.3000E-02		
EU-152	<	6.2071E-02		
EU-154	<	2.7305E-01		
EU-155	<	3.8049E-02		

HF-181	<	2.6820E-02		
Ta-182	<	3.8846E-02		
Hg-203	<	1.6311E-02		
TL-208		5.6266E-02	2.9713E+01%	3.394E-02
pm-146	<	5.8568E-02		
y-88	<	3.0340E-02		
PB-210	<	3.8810E-01		
PB-212		1.2324E-01	1.4284E+01%	3.834E-02
PB-214	<	3.2306E-02		
BI-207	<	2.6400E-02		
BI-212	<	2.5440E-01		
BI-214	<	4.1397E-02		
BI-210M	<	1.8907E-02		
RA-224	<	3.8591E-01		
AC-228	<	1.0933E-01		
TH-227	<	1.1459E-01		
TH-229	<	2.1056E-01		
TH-234		4.0234E+00	3.0513E+00%	4.921E-01
PA-231	<	4.0252E-01		
PA-233	<	2.9282E-02		
PA-234	<	5.1695E-02		
PA-234M#		1.2010E+01	1.9092E+01%	4.115E+00
U-235		2.6374E-01	1.9954E+01%	1.245E-01
AM-241		1.9758E-01	9.9404E+00%	5.807E-02
Np-237	<	9.7820E-02		

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.5 to 2000.0 keV) 1.811E+01 DPS

(Page 7 of 7)

Test America
St. Louis
Background Check

Spectrum: 12_20160806005_BGLong
Description: Background Long PBC Count
Acquired: 8/6/2016 5:43:12 PM
Detector: Detector #12
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.08	1.93	1.98	2.02	2.18	2.23	PASS

Analyst: Mike Aldridge Reviewer: Aaron Schroder

(Page 1 of 8)

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det12\12_20160806005_BGLong.An1

Acquisition information

Start time:	8/6/2016 5:43:12 PM
Live time:	72000
Real time:	72617
Dead time:	0.85 %
Detector ID:	12

Detector system
Ge12 S/N10034336

Calibration

Filename:	12_QC.Clb

12_QC-H_83725-334_060211

Energy Calibration

Created:	2/28/2012 1:26:42 PM
Zero offset:	0.049 keV
Gain:	0.250 keV/channel
Quadratic:	-3.945E-08 keV/channel^2

Efficiency Calibration

Created:	6/3/2011 6:41:14 AM		
Knee Energy:	0.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files

Main analysis library:	DET_Long Background PBC.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.58keV)
Stop channel:	8000 (1999.36keV)
Peak rejection level:	30.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 21 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1080

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
46.59	1215.	6.91	1.07	6.304E-02	46.54	4.250	6.303E+00	PB210
63.34	800.	8.80	0.93	8.574E-02	63.29	3.810	3.406E+00	TH234
74.81	242.	18.20	0.92	1.013E-01				
77.34	264.	17.58	0.92	1.048E-01				
92.66	1220.	6.58	1.26	1.198E-01	92.59	5.584	2.532E+00	TH234
					93.35	5.561	2.541E+00	AC228
144.13	165.	25.60	1.71	1.176E-01	143.79	10.960	1.774E-01	U235
					145.44	48.200	4.051E-02	CE141
185.69	645.	10.91	1.01	1.068E-01	185.72	54.000	1.553E-01	U235
					185.99	3.280	2.559E+00	Ra226
198.65	204.	22.67	1.18	1.036E-01				
238.41	513.	11.47	1.01	9.399E-02	238.63	43.300	1.753E-01	PB212
242.00	158.	23.76	1.07	9.312E-02	242.00	7.430	3.168E-01	PB214
295.10	211.	19.02	1.09	8.027E-02	295.09	19.300	1.892E-01	PB214
351.82	356.	12.06	1.18	6.653E-02	351.93	37.600	1.977E-01	PB214
511.12	2258.	4.25	2.61	4.819E-02	511.86	20.000	3.258E+00	RH106
583.09	184.	25.01	1.31	4.296E-02	583.02	84.500	7.060E-02	TL208
609.21	382.	14.08	1.25	4.105E-02	609.31	46.090	2.808E-01	BI214
					610.30	5.750	2.255E+00	RU103
1000.83	123.	25.12	1.73	2.403E-02	1001.00	0.837	8.493E+00	PA234M
1120.03	164.	17.48	2.18	2.185E-02	1120.29	15.100	6.918E-01	BI214
					1120.55	99.987	1.045E-01	Sc46
					1121.30	34.900	2.996E-01	Ta182
1460.85	234.	13.91	1.89	1.768E-02	1460.83	10.670	1.727E+00	K40
1764.28	127.	15.34	0.74	1.522E-02	1764.49	15.400	7.546E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
298.78	74.84	848.	242.	2.388E+03	18.20	0.916	- sD
308.90	77.37	941.	264.	2.516E+03	17.58	0.919	- D
793.79	198.65	611.	204.	1.969E+03	22.67	1.180	- s
2043.08	511.12	818.	2258.	4.687E+04	4.25	2.609	-

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.98	46.59	1343.	1215.	0.017	6.91	1.067
TH-234	252.93	63.34	1188.	800.	0.011	8.80	0.929
TH-234	370.13	92.66	1254.	1220.	0.017	6.58	1.260s
U-235	575.84	144.13	570.	165.	0.002	25.60	1.708s
U-235	742.09	185.72	1032.	587.	0.008	7.95	1.009D
PB-212	953.60	238.63	621.	501.	0.007	8.33	1.071D
PB-214	967.05	242.00	624.	158.	0.002	23.76	1.075D
PB-214	1179.33	295.10	442.	211.	0.003	19.02	1.092
PB-214	1406.11	351.82	425.	356.	0.005	12.06	1.183
TL-208	2330.88	583.09	402.	184.	0.003	25.01	1.310
BI-214	2435.36	609.21	488.	382.	0.005	14.08	1.247
PA-234M	4001.98	1000.83	156.	123.	0.002	25.12	1.729
BI-214	4478.99	1120.03	117.	164.	0.002	17.48	2.178s
K-40	5843.24	1460.85	110.	234.	0.003	13.91	1.893s
BI-214	7058.30	1764.28	48.	127.	0.002	15.34	0.740s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS	Code	MDA Value DPS			COMMENTS
K-40	N	1.7269E+00					4.66E+11		
			1460.83	1.727E+00	(	3.807E-01	1.39E+01	1.07E+01	G
TL-208	N	7.0597E-02					6.98E+02		
			583.02	7.060E-02	(	3.681E-02	2.50E+01	8.45E+01	G
			277.28	0.000E+00	%	1.753E-01	4.46E+01	6.31E+00	G
			860.56	0.000E+00	%	1.915E-01	1.97E+02	1.24E+01	G
PB-210	N	6.3034E+00					8.14E+03		
			46.54	6.303E+00	(	9.004E-01	6.91E+00	4.25E+00	G
PB-212	N	1.7109E-01					6.98E+02		
			238.63	1.711E-01	(	4.059E-02	8.33E+00	4.33E+01	G
			300.03	0.000E+00	%	3.718E-01	1.33E+02	3.28E+00	GA
PB-214	N	1.9483E-01					5.84E+05		
			351.93	1.977E-01	(	5.486E-02	1.21E+01	3.76E+01	G
			295.09	1.892E-01	(	9.026E-02	1.90E+01	1.93E+01	G
			242.00	3.168E-01	+	2.391E-01	2.38E+01	7.43E+00	GA
BI-214	N	2.8084E-01					5.84E+05		
			609.31	2.808E-01	(	7.753E-02	1.41E+01	4.61E+01	G
			1120.29	6.918E-01	+	2.233E-01	1.75E+01	1.51E+01	G
			1764.49	7.546E-01	+	2.067E-01	1.53E+01	1.54E+01	G
TH-234	N	3.4059E+00					1.63E+12		
			63.29	3.406E+00	(	6.948E-01	8.80E+00	3.81E+00	G
			92.59	2.532E+00	-	3.482E-01	6.58E+00	5.58E+00	G
PA-234M	N	8.4934E+00					1.63E+12		
			1001.00	8.493E+00	?(	4.206E+00	2.51E+01	8.37E-01	G
			766.41	0.000E+00	%	7.040E+00	8.43E+01	2.94E-01	G
U-235	N	1.7744E-01					2.57E+11		
			185.72	1.415E-01	}	3.673E-02	7.95E+00	5.40E+01	GA
			143.79	1.774E-01	(	1.227E-01	2.56E+01	1.10E+01	G
			205.33	0.000E+00	%	2.106E-01	6.65E+01	5.01E+00	G
			163.38	0.000E+00	%	1.996E-01	8.18E+01	5.08E+00	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.

```
  ! - Peak is part of a multiplet and this area went
      negative during deconvolution.
  ? - Peak is too narrow.
  @ - Peak is too wide at FW25M, but ok at FWHM.
  % - Peak fails sensitivity test.
  $ - Peak identified, but first peak of this nuclide
      failed one or more qualification tests.
  + - Peak activity higher than counting uncertainty range.
  - - Peak activity lower than counting uncertainty range.
  = - Peak outside analysis energy range.
  & - Calculated peak centroid is not close enough to the
      library energy centroid for positive identification.
  P - Peakbackground subtraction
  } - Peak is too close to another for the activity
      to be found directly.

  Nuclide Codes:                      Peak Codes:
  T - Thermal Neutron Activation      G - Gamma Ray
  F - Fast Neutron Activation         X - X-Ray
  I - Fission Product                 P - Positron Decay
  N - Naturally Occurring Isotope     S - Single-Escape
  P - Photon Reaction                 D - Double-Escape
  C - Charged Particle Reaction       K - Key Line
  M - No MDA Calculation              A - Not in Average
  R - Coincidence Corrected           C - Coincidence Peak
  H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


*************** D I S C A R D E D  I S O T O P E  P E A K S ***************
Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
          Energy   Counts     Counts     Cts/Sec  1 Sigma %
_____________________________________________________________________________
  P - Peakbackground subtraction

*****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
         Time of Count   Uncertainty  1 Sigma
Nuclide    Activity        Counting                    MDA
              DPS
_____________________________________________________________________________
BE-7    <    9.6366E-02
NA-22   <    2.3957E-02
K-40   #     1.7269E+00   1.3905E+01%               3.807E-01
Sc-46   <    3.0724E-02
CR-51   <    1.2470E-01
MN-54   <    2.2503E-02
FE-59   <    4.5326E-02
Co-56   <    2.4196E-02
CO-57   <    1.3697E-02
CO-58   <    3.6857E-02
CO-60   <    2.7075E-02
ZN-65   <    7.7609E-02
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NB-94	<	2.1132E-02		
ZR-95	<	3.5675E-02		
NB-95	<	2.6452E-02		
RU-103	<	1.9981E-02		
RH-106	<	2.1103E-01		
AG-108M	<	1.6550E-02		
AG-110M	<	4.9616E-02		
SN-113	<	2.1882E-02		
SB-124	<	4.4076E-02		
SB-125	<	4.7560E-02		
I-131	<	1.5139E-02		
BA-133	<	2.1682E-02		
CS-134	<	3.0994E-02		
CS-137	<	3.3826E-02		
CE-139	<	1.4853E-02		
Ba-140	<	6.8576E-02		
La-140	<	2.5885E-02		
CE-141	<	1.4923E-02		
CE-144	<	6.5737E-02		
PM-144	<	2.2638E-02		
EU-152	<	3.5595E-02		
EU-154	<	1.7686E-01		
EU-155	<	4.6572E-02		
HF-181	<	2.8749E-02		
Ta-182	<	9.0455E-02		
Hg-203	<	1.4812E-02		
TL-208		7.0597E-02	2.5014E+01%	3.681E-02
pm-146	<	5.5252E-02		
y-88	<	2.8095E-02		
PB-210		6.3034E+00	6.9056E+00%	9.004E-01
PB-212	#	1.7109E-01	8.3347E+00%	4.059E-02
PB-214		1.9483E-01	1.1261E+01%	5.486E-02
BI-207	<	3.7834E-02		
BI-212	<	3.0458E-01		
BI-214		2.8084E-01	1.4082E+01%	7.753E-02
BI-210M	<	2.2966E-02		
RA-224	<	4.8310E-01		
AC-228	<	1.1655E-01		
TH-227	<	9.3285E-02		
TH-229	<	2.3434E-01		
TH-234		3.4059E+00	8.7950E+00%	6.948E-01
PA-231	<	5.3475E-01		
PA-233	<	3.4332E-02		
PA-234	<	7.8229E-02		
PA-234M	#	8.4934E+00	2.5124E+01%	4.206E+00
U-235		1.7744E-01	2.5598E+01%	1.227E-01
AM-241	<	7.4680E-02		
Np-237	<	1.2514E-01		

```
  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded
-----------------------------   S U M M A R Y   -----------------------------
Total Activity (   37.6 to  1999.4 keV)     2.082E+01  DPS
```

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Test America
St. Louis
Background Check

Spectrum: 13_20160806006_BGLong
Description: Background Long PBC Count
Acquired: 8/6/2016 5:44:47 PM
Detector: Detector #13
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.91	1.71	1.77	1.90	2.04	2.10	PASS

Analyst: Mike Aldridge Reviewer: Aaron Schroder

(Page 1 of 7)

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det13\13_20160806006_BGLong.An1

Acquisition information

Start time:	8/6/2016 5:44:47 PM
Live time:	43200
Real time:	43369
Dead time:	0.39 %
Detector ID:	13

Detector system
Ge13 SN/10064006

Calibration

Filename:	13_QC.Clb

13_QC-I_83725-334_060211

Energy Calibration

Created:	2/23/2012 9:31:24 AM
Zero offset:	0.036 keV
Gain:	0.250 keV/channel
Quadratic:	-2.347E-08 keV/channel^2

Efficiency Calibration

Created:	6/5/2011 10:21:36 AM
Knee Energy:	0.00 keV
Above the Knee:	Interpolative Uncertainty = 0.00 %
Below the Knee:	Interpolative Uncertainty = 0.00 %

Library Files

Main analysis library:	DET_Long Background PBC.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.55keV)
Stop channel:	8000 (1999.54keV)
Peak rejection level:	30.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3

```
       Half lives decay limit:    12.000
       Activity range factor:      2.000
       Min. step backg. energy     0.000
       Multiplet shift channel     2.000

Corrections                          Status          Comments
       Decay correct to date:         NO
       Decay during acquisition:      NO
       Decay during collection:       NO
       True coincidence correction:   NO
       Peaked background correction:  NO
       Absorption (Internal):         NO
       Geometry correction:           NO
       Random summing:                NO


total peaks alloc.   10 cutoff: 5.00E+01 %
       Energy Calibration
            Normalized diff:       0.1234

*****   S U M M A R Y   O F   P E A K S   I N   R A N G E   *****
 Peak       Area   Uncert  FWHM    Corrctn   Nuclide  Brnch.     Act.   Nuc
 Energy                             Factor    Energy   Ratio    DPS
_____________________________________________________________________________
  294.77      186.  23.51   2.48  1.133E-01   295.09  19.300  1.964E-01 PB214
  352.04      136.  27.21   1.47  9.369E-02   351.93  37.600  8.958E-02 PB214
  511.07     1421.   5.01   2.57  6.760E-02   511.86  20.000  2.437E+00 RH106
  583.24      110.  21.98   1.34  6.013E-02   583.02  84.500  5.026E-02 TL208
  609.08      155.  23.58   1.00  5.741E-02   609.31  46.090  1.356E-01 BI214
                                              610.30   5.750  1.089E+00 RU103
 1460.53      113.  17.15   1.75  2.372E-02  1460.83  10.670  1.037E+00 K40
 1763.86       68.  24.52   2.56  2.045E-02  1764.49  15.400  4.998E-01 BI214


************ U N I D E N T I F I E D     P E A K    S U M M A R Y ************
  Peak Centroid  Background Net Area  Efficiency  Uncert   FWHM  Suspected
Channel   Energy   Counts     Counts   * Area    1 Sigma %  keV   Nuclide
_____________________________________________________________________________
 2043.50   511.07       392.      1421. 2.103E+04    5.01   2.571  -       M

  s - Peak fails shape tests.
  D - Peak area deconvoluted.
  L - Peak written from unknown list.
  C - Area < Critical level.
  M - Peak is close to a library peak.

-------------------------------------------------------------
This section based on library: DET_Long Background PBC.lib
```

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-214	1178.45	294.77	382.	186.	0.004	23.51	2.481s
PB-214	1407.50	352.04	298.	136.	0.003	27.21	1.465
TL-208	2332.15	583.24	125.	110.	0.003	21.98	1.339s
BI-214	2435.51	609.08	253.	155.	0.004	23.58	0.998s
K-40	5842.25	1460.53	40.	113.	0.003	17.15	1.751
BI-214	7056.40	1763.86	30.	68.	0.002	24.52	2.562

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS	Peak Code	MDA Value DPS		COMMENTS
K-40	N	1.0366E+00					4.66E+11	
			1460.83	1.037E+00	(	2.932E-01	1.71E+01	1.07E+01 G
TL-208	N	5.0263E-02					6.98E+02	
			583.02	5.026E-02	(	2.494E-02	2.20E+01	8.45E+01 G
			277.28	0.000E+00	&	1.704E-01	1.00E+03	6.31E+00 G
			860.56	0.000E+00	%	1.528E-01	5.06E+01	1.24E+01 G
PB-214	N	1.2580E-01					5.84E+05	
			351.93	8.958E-02	(	5.461E-02	2.72E+01	3.76E+01 G
			295.09	1.964E-01	*(	9.921E-02	2.35E+01	1.93E+01 G
			242.00	0.000E+00	%	1.448E-01	9.43E+01	7.43E+00 GA
BI-214	N	1.3560E-01					5.84E+05	
			609.31	1.356E-01	(	6.722E-02	2.36E+01	4.61E+01 G
			1120.29	0.000E+00	%	1.637E-01	3.39E+01	1.51E+01 G
			1764.49	4.998E-01	+	2.075E-01	2.45E+01	1.54E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.

```
  + - Peak activity higher than counting uncertainty range.
  - - Peak activity lower than counting uncertainty range.
  = - Peak outside analysis energy range.
  & - Calculated peak centroid is not close enough to the
      library energy centroid for positive identification.
  P - Peakbackground subtraction
  } - Peak is too close to another for the activity
      to be found directly.

  Nuclide Codes:                      Peak Codes:
  T - Thermal Neutron Activation      G - Gamma Ray
  F - Fast Neutron Activation         X - X-Ray
  I - Fission Product                 P - Positron Decay
  N - Naturally Occurring Isotope     S - Single-Escape
  P - Photon Reaction                 D - Double-Escape
  C - Charged Particle Reaction       K - Key Line
  M - No MDA Calculation              A - Not in Average
  R - Coincidence Corrected           C - Coincidence Peak
  H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


*************** D I S C A R D E D  I S O T O P E  P E A K S ***************
Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
          Energy   Counts     Counts     Cts/Sec  1 Sigma %
_____________________________________________________________________________
  P - Peakbackground subtraction

*****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
        Time of Count   Uncertainty  1 Sigma
Nuclide    Activity        Counting                    MDA
              DPS
_____________________________________________________________________________
BE-7    <    1.7972E-01
NA-22   <    2.9908E-02
K-40         1.0366E+00   1.7150E+01%               2.932E-01
Sc-46   <    1.2505E-02
CR-51   <    1.2453E-01
MN-54   <    2.1979E-02
FE-59   <    4.2215E-02
Co-56   <    2.7365E-02
CO-57   <    8.0005E-03
CO-58   <    1.3466E-02
CO-60   <    2.6496E-02
ZN-65   <    6.3788E-02
NB-94   <    2.2818E-02
ZR-95   <    3.2742E-02
NB-95   <    3.0609E-02
RU-103  <    1.5734E-02
RH-106  <    1.6495E-01
AG-108M <    1.5768E-02
AG-110M <    1.5875E-02
```

SN-113	<	2.2821E-02		
SB-124	<	4.0013E-02		
SB-125	<	4.9544E-02		
I-131	<	1.6898E-02		
BA-133	<	2.3304E-02		
CS-134	<	2.0104E-02		
CS-137	<	2.1450E-02		
CE-139	<	1.7597E-02		
Ba-140	<	6.1472E-02		
La-140	<	2.7750E-02		
CE-141	<	1.8624E-02		
CE-144	<	9.5027E-02		
PM-144	<	2.2599E-02		
EU-152	<	4.9226E-02		
EU-154	<	2.1541E-01		
EU-155	<	4.5547E-02		
HF-181	<	2.6494E-02		
Ta-182	<	1.1121E-01		
Hg-203	<	1.3112E-02		
TL-208	#	5.0263E-02	2.1982E+01%	2.494E-02
pm-146	<	5.1685E-02		
y-88	<	2.7614E-02		
PB-210	<	5.2257E-01		
PB-212	<	2.5190E-02		
PB-214		1.2580E-01	1.7982E+01%	5.461E-02
BI-207	<	3.2014E-02		
BI-212	<	3.6108E-01		
BI-214		1.3560E-01	2.3579E+01%	6.722E-02
BI-210M	<	1.9143E-02		
RA-224	<	2.5978E-01		
AC-228	<	8.1664E-02		
TH-227	<	8.3922E-02		
TH-229	<	2.2294E-01		
TH-234	<	3.0947E-01		
PA-231	<	4.5692E-01		
PA-233	<	3.4335E-02		
PA-234	<	4.8431E-02		
PA-234M	<	2.6298E+00		
Ra-226	<	6.1917E-01		
U-235	<	8.5431E-02		
AM-241	<	3.2464E-02		
Np-237	<	1.0361E-01		

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

```
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded
----------------------------   S U M M A R Y   ----------------------------
Total Activity (   37.6 to  1999.5 keV)     1.348E+00  DPS
```

Test America
St. Louis
Background Check

Spectrum: 14_20160806006_BGLong
Description: Background Long PBC Count
Acquired: 8/6/2016 5:41:03 PM
Detector: Detector #14
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.80	1.66	1.71	1.81	1.90	1.94	PASS

Analyst: Mike Aldridge Reviewer: Aaron Schroder

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Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det14\14_20160806006_BGLong.An1

Acquisition information
Start time: 8/6/2016 5:41:03 PM
Live time: 43200
Real time: 43383
Dead time: 0.42 %
Detector ID: 14

Detector system
Ge14 SN/11080670

Calibration
Filename: 14_QC.Clb
14_QC_79670-334_SOURCE E_042211

Energy Calibration
Created: 2/28/2012 10:48:23 AM
Zero offset: 0.130 keV
Gain: 0.250 keV/channel
Quadratic: -2.050E-08 keV/channel^2

Efficiency Calibration
Created: 5/1/2011 8:43:09 AM
Knee Energy: 0.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: DET_Long Background PBC.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.64keV)
Stop channel: 8000 (1999.51keV)
Peak rejection level: 30.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method
Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3

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Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	5/26/2005 8:30:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.3216

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
46.66	449.	9.37	0.94	6.139E-02	46.54	4.250	5.659E+00	PB210
63.27	381.	11.91	0.62	8.533E-02	63.29	3.810	2.713E+00	TH234
74.95	130.	29.56	0.94	1.022E-01				
92.63	589.	9.89	1.07	1.215E-01	92.59	5.584	2.010E+00	TH234
					93.35	5.561	7.782E+00	AC228
185.34	315.	14.49	1.05	1.073E-01	185.72	54.000	1.260E-01	U235
238.21	212.	14.53	1.08	9.400E-02	238.63	43.300	7.011E+00	PB212
351.56	161.	18.34	0.86	6.556E-02	351.93	37.600	1.518E-01	PB214
609.43	194.	16.70	1.52	3.708E-02	609.31	46.090	2.636E-01	BI214
					610.30	5.750	HL>Cutoff	RU103
1460.71	119.	14.05	2.30	1.557E-02	1460.83	10.670	1.653E+00	K40

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
299.17	74.95	505.	130.	1.272E+03	29.56	0.942	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_Long Background PBC.lib

(Page 3 of 7)

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	186.08	46.66	440.	449.	0.010	9.37	0.944s
TH-234	252.46	63.27	531.	381.	0.009	11.91	0.617s
TH-234	369.86	92.63	731.	589.	0.014	9.89	1.066s
U-235	740.62	185.34	505.	315.	0.007	14.49	1.048
PB-212	952.07	238.21	258.	212.	0.005	14.53	1.085
PB-214	1405.39	351.56	212.	161.	0.004	18.34	0.857
BI-214	2436.82	609.43	176.	194.	0.004	16.70	1.522s
K-40	5843.10	1460.71	23.	119.	0.003	14.05	2.297

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS	Peak Code	MDA Value DPS		COMMENTS
K-40	N	1.6530E+00					4.66E+11	
			1460.83	1.653E+00	(	3.513E-01	1.41E+01	1.07E+01 G
PB-210	N	5.6588E+00					8.14E+03	
			46.54	5.659E+00	@(	1.266E+00	9.37E+00	4.25E+00 G
PB-212	N	7.0110E+00					6.98E+02	
			238.63	7.011E+00	(	2.573E+00	1.45E+01	4.33E+01 G
			300.03	0.000E+00	%	2.777E+01	1.00E+03	3.28E+00 GA
PB-214	N	1.5183E-01					5.84E+05	
			351.93	1.518E-01	(	6.673E-02	1.83E+01	3.76E+01 G
			295.09	0.000E+00	%	7.770E-02	3.60E+01	1.93E+01 G
			242.00	0.000E+00	&	2.539E-01	0.00E+00	7.43E+00 GA
BI-214	N	2.6358E-01					5.84E+05	
			609.31	2.636E-01	*(	8.791E-02	1.67E+01	4.61E+01 G
			1120.29	0.000E+00	%	2.579E-01	5.68E+01	1.51E+01 G
			1764.49	0.000E+00	%	2.898E-01	1.00E+03	1.54E+01 G
TH-234	N	2.7128E+00					1.63E+12	
			63.29	2.713E+00	*(	7.834E-01	1.19E+01	3.81E+00 G
			92.59	2.010E+00	-	4.392E-01	9.89E+00	5.58E+00 G

```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

U-235    N   1.2600E-01                                        2.57E+11
                           185.72 1.260E-01 $   4.297E-02 1.45E+01 5.40E+01 GA
                           143.79 0.000E+00 %   1.272E-01 7.22E+01 1.10E+01 G
                           205.33 0.000E+00 %   2.665E-01 2.07E+02 5.01E+00 G
                           163.38 0.000E+00 %   2.557E-01 9.80E+01 5.08E+00 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  1 Sigma %
 ____________________________________________________________________________
   P - Peakbackground subtraction
```

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***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity DPS	Time Corrected Activity DPS	Uncertainty 1 Sigma Counting	MDA
BE-7			>12 Halflives		
NA-22	<	3.9950E-02	7.8917E-01		
K-40		1.6530E+00	1.6530E+00	1.405E+01%	3.51E-01
Sc-46			>12 Halflives		
CR-51			>12 Halflives		
MN-54			>12 Halflives		
FE-59			>12 Halflives		
Co-56			>12 Halflives		
CO-57			>12 Halflives		
CO-58			>12 Halflives		
CO-60	<	3.1453E-02	1.3717E-01		
ZN-65			>12 Halflives		
NB-94	<	2.9107E-02	2.9118E-02		
ZR-95			>12 Halflives		
NB-95			>12 Halflives		
RU-103			>12 Halflives		
RH-106	<	2.3608E-01	4.6666E+02		
AG-108M	<	2.0086E-02	2.0462E-02		
AG-110M			>12 Halflives		
SN-113			>12 Halflives		
SB-124			>12 Halflives		
SB-125	<	6.1501E-02	1.0260E+00		
I-131			>12 Halflives		
BA-133	<	3.0623E-02	6.3959E-02		
CS-134	<	3.3339E-02	1.4312E+00		
CS-137	<	4.4722E-02	5.7930E-02		
CE-139			>12 Halflives		
Ba-140			>12 Halflives		
La-140			>12 Halflives		
CE-141			>12 Halflives		
CE-144			>12 Halflives		
PM-144	<	3.0136E-02	7.4331E+01		
EU-152	<	6.4822E-02	1.1502E-01		
EU-154	<	3.2360E-01	7.9862E-01		
EU-155	<	4.9908E-02	2.3871E-01		
HF-181			>12 Halflives		
Ta-182			>12 Halflives		
Hg-203			>12 Halflives		
TL-208	<	3.2269E-02	1.8787E+00		
pm-146	<	8.2671E-02	3.3650E-01		
y-88			>12 Halflives		
PB-210	#	3.9953E+00	5.6588E+00	9.367E+00%	1.27E+00
PB-212		1.2042E-01	7.0110E+00	1.453E+01%	2.57E+00

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PB-214		1.5109E-01	1.5183E-01	1.834E+01%	6.67E-02
BI-207	<	3.4569E-02	4.3994E-02		
BI-212	<	3.4555E-01	2.0118E+01		
BI-214	#	2.6230E-01	2.6358E-01	1.670E+01%	8.79E-02
BI-210M	<	2.6629E-02	2.6629E-02		
RA-224	<	5.7896E-01	3.3707E+01		
AC-228	<	1.2901E-01	4.9765E-01		
TH-227	<	1.5262E-01	2.1801E-01		
TH-229	<	2.9251E-01	2.9282E-01		
TH-234	#	2.7128E+00	2.7128E+00	1.191E+01%	7.83E-01
PA-231	<	5.3955E-01	5.3968E-01		
PA-233	<	4.2006E-02	4.2006E-02		
PA-234	<	9.9807E-02	9.9807E-02		
PA-234M	<	3.1784E+00	3.1784E+00		
Ra-226	<	7.6373E-01	7.6744E-01		
U-235		1.2600E-01	1.2600E-01	1.449E+01%	4.30E-02
AM-241	<	8.8619E-02	9.0224E-02		
Np-237	<	1.6311E-01	1.6333E-01		

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 9.021E+00 DPS
Total Decayed Activity (37.6 to 1999.5 keV) 1.7576994E+01 DPS

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Test America
St. Louis
Background Check

Spectrum: 15_20160806006_BGLong
Description: Background Long PBC Count
Acquired: 8/6/2016 5:39:09 PM
Detector: Detector #15
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.68	1.59	1.62	1.66	1.74	1.77	PASS

Analyst: Mike Aldridge Reviewer: Aaron Schroder

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Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det15\15_20160806006_BGLong.An1

Acquisition information

Start time:	8/6/2016 5:39:09 PM
Live time:	43200
Real time:	43222
Dead time:	0.05 %
Detector ID:	15

Detector system
Ge15 SN/11012216

Calibration

Filename:	15_QC.Clb

15_QC_83725-334_SOURCE F_2011

Energy Calibration

Created:	2/28/2012 4:29:17 PM
Zero offset:	0.044 keV
Gain:	0.250 keV/channel
Quadratic:	-3.267E-08 keV/channel^2

Efficiency Calibration

Created:	8/2/2011 8:55:45 AM	
Knee Energy:	0.00 keV	
Above the Knee:	Interpolative	Uncertainty = 0.00 %
Below the Knee:	Interpolative	Uncertainty = 0.00 %

Library Files

Main analysis library:	DET_Long Background PBC.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.57keV)
Stop channel:	8000 (1999.52keV)
Peak rejection level:	30.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3

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Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	5/26/2005 8:30:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 890.0583

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
46.60	408.	13.53	1.12	6.064E-02	46.54	4.250	5.198E+00	PB210
63.47	399.	14.14	1.70	8.224E-02	63.29	3.810	2.954E+00	TH234
92.72	552.	10.12	1.37	1.142E-01	92.59	5.584	2.006E+00	TH234
					93.35	5.561	7.766E+00	AC228
185.88	290.	18.18	1.83	9.774E-02	185.72	54.000	PBC<MDA	U235
					185.99	3.280	2.102E+00	Ra226
609.23	149.	22.27	2.37	3.220E-02	609.31	46.090	2.330E-01	BI214
					610.30	5.750	HL>Cutoff	RU103
1460.92	86.	17.11	1.40	1.314E-02	1460.83	10.670	1.428E+00	K40
1764.82	66.	17.77	0.40	1.107E-02	1764.49	15.400	9.008E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
253.53	63.47	725.	399.	4.848E+03	14.14	1.701	- sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	186.10	46.60	660.	408.	0.009	13.53	1.116s
TH-234	370.42	92.72	672.	552.	0.013	10.12	1.366s
Ra-226	742.83	185.88	573.	290.	0.007	18.18	1.827s
BI-214	2435.62	609.23	183.	149.	0.003	22.27	2.366s
K-40	5843.38	1460.92	18.	86.	0.002	17.11	1.403s
BI-214	7060.07	1764.82	11.	66.	0.002	17.77	0.397s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS	Peak Code	MDA Value DPS	COMMENTS
K-40	N	1.4283E+00				4.66E+11	
			1460.83	1.428E+00	?(	3.757E-01 1.71E+01 1.07E+01	G
Ta-182	F	1.5414E-44				1.14E+02	
			1121.30	0.000E+00	%	0.000E+00 1.00E+03 3.49E+01	G
			1221.41	0.000E+00	%	0.000E+00 5.06E+01 2.70E+01	G
			1189.05	0.000E+00	%	0.000E+00 1.00E+03 1.62E+01	G
PB-210	N	5.1980E+00				8.14E+03	
			46.54	5.198E+00	*(	1.560E+00 1.35E+01 4.25E+00	G
BI-214	N	2.3302E-01				5.84E+05	
			609.31	2.330E-01	*(	1.031E-01 2.23E+01 4.61E+01	G
			1120.29	0.000E+00	%	2.569E-01 1.18E+02 1.51E+01	G
			1764.49	9.008E-01	+	2.479E-01 1.78E+01 1.54E+01	G
Ra-226		2.1017E+00				5.84E+05	
			185.99	2.102E+00	(	8.292E-01 1.82E+01 3.28E+00	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide

failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
TH-234	92.72	672.	552.	0.013	10.12	2.006E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity DPS	Time Corrected Activity DPS	Uncertainty Counting 1 Sigma	MDA
BE-7			>12 Halflives		
NA-22	<	5.2772E-02	1.0425E+00		
K-40	#	1.4283E+00	1.4283E+00	1.711E+01%	3.76E-01
Sc-46			>12 Halflives		
CR-51			>12 Halflives		
MN-54			>12 Halflives		
FE-59			>12 Halflives		
Co-56			>12 Halflives		
CO-57			>12 Halflives		
CO-58			>12 Halflives		
CO-60	<	4.5576E-02	1.9876E-01		
ZN-65			>12 Halflives		
NB-94	<	3.6732E-02	3.6746E-02		
ZR-95			>12 Halflives		
NB-95			>12 Halflives		
RU-103			>12 Halflives		
RH-106	<	2.8541E-01	5.6415E+02		

AG-108M	<	2.7334E-02	2.7846E-02		
AG-110M		>12 Halflives			
SN-113		>12 Halflives			
SB-124		>12 Halflives			
SB-125	<	7.4068E-02	1.2357E+00		
I-131		>12 Halflives			
BA-133	<	2.6374E-02	5.5085E-02		
CS-134	<	4.3712E-02	1.8765E+00		
CS-137	<	2.9831E-02	3.8641E-02		
CE-139		>12 Halflives			
Ba-140		>12 Halflives			
La-140		>12 Halflives			
CE-141		>12 Halflives			
CE-144		>12 Halflives			
PM-144	<	3.4645E-02	8.5454E+01		
EU-152	<	5.7735E-02	1.0244E-01		
EU-154	<	2.6990E-01	6.6608E-01		
EU-155	<	6.9986E-02	3.3474E-01		
HF-181		>12 Halflives			
Ta-182	C	1.5414E-44	>12 Halflives	0.000E+00%	0.00E+00
Hg-203		>12 Halflives			
TL-208	<	3.4517E-02	2.0096E+00		
pm-146	<	7.9341E-02	3.2295E-01		
y-88		>12 Halflives			
PB-210	#	3.6699E+00	5.1980E+00	1.353E+01%	1.56E+00
PB-212	<	3.8675E-02	2.2516E+00		
PB-214	<	5.5708E-02	5.5979E-02		
BI-207	<	4.8073E-02	6.1179E-02		
BI-212	<	4.1728E-01	2.4294E+01		
BI-214		2.3189E-01	2.3302E-01	2.227E+01%	1.03E-01
BI-210M	<	2.9784E-02	2.9784E-02		
RA-224	<	3.6296E-01	2.1131E+01		
AC-228	<	1.2371E-01	4.7723E-01		
TH-227	<	1.2455E-01	1.7791E-01		
TH-229	<	3.3476E-01	3.3512E-01		
TH-234	<	1.0822E+00	1.0822E+00		
PA-231	<	8.8132E-01	8.8153E-01		
PA-233	<	4.5043E-02	4.5043E-02		
PA-234	<	6.7139E-02	6.7139E-02		
PA-234M	<	5.3338E+00	5.3338E+00		
Ra-226	#	2.0915E+00	2.1017E+00	1.818E+01%	8.29E-01
U-235	<	1.2693E-01	1.2693E-01		
AM-241	<	7.0686E-02	7.1965E-02		
Np-237	<	1.8634E-01	1.8659E-01		

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

```
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded
-----------------------------   S U M M A R Y   -----------------------------
Total Activity (   37.6 to  1999.5 keV)     7.422E+00  DPS
Total Decayed Activity (   37.6 to  1999.5 keV) 8.9609756E+00  DPS
```

Test America
St. Louis
Background Check

Spectrum: 17_20160817003_BGLong
Description: Background Long PBC Count
Acquired: 8/17/2016 9:28:24 AM
Detector: Detector #17
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.32	2.18	2.23	2.31	2.42	2.46	PASS

Analyst: Jody Watson Reviewer: Aaron Schroder

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Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det17\17_20160817003_BGLong.An1

Acquisition information
Start time: 8/17/2016 9:28:24 AM
Live time: 72000
Real time: 73176
Dead time: 1.61 %
Detector ID: 17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_QC.Clb
17_QC_83725-334_SOURCE H_042211

Energy Calibration
Created: 2/29/2012 10:33:23 AM
Zero offset: 0.108 keV
Gain: 0.250 keV/channel
Quadratic: -2.584E-08 keV/channel^2

Efficiency Calibration
Created: 5/1/2011 11:17:56 AM
Knee Energy: 0.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: DET_Long Background PBC.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.63keV)
Stop channel: 8000 (1999.54keV)
Peak rejection level: 30.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method
Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3

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Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	5/26/2005 8:30:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 16 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1232

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
46.54	1563.	4.61	0.84	5.941E-02	46.54	4.250	1.219E+01	PB210
63.33	1400.	5.68	0.83	8.041E-02	63.29	3.810	6.350E+00	TH234
74.98	354.	14.39	0.80	9.494E-02				
77.30	221.	21.16	0.80	9.785E-02				
84.51	476.	14.79	1.51	1.069E-01				
92.65	1733.	4.61	1.04	1.119E-01	92.59	5.584	3.853E+00	TH234
					93.35	5.561	1.497E+01	AC228
143.55	238.	24.19	0.84	1.094E-01	143.79	10.960	2.760E-01	U235
163.02	171.	29.41	0.92	1.039E-01	163.38	5.080	4.505E-01	U235
					162.66	6.220	HL>Cutoff	Ba140
185.61	961.	8.49	0.89	9.859E-02	185.72	54.000	2.508E-01	U235
					185.99	3.280	4.151E+00	Ra226
198.41	196.	28.57	1.20	9.568E-02				
238.49	425.	11.73	1.06	8.656E-02	238.63	43.300	9.269E+00	PB212
295.03	216.	21.60	1.21	7.372E-02	295.09	19.300	2.119E-01	PB214
352.09	273.	17.33	1.29	6.077E-02	351.93	37.600	1.667E-01	PB214
511.07	2535.	4.08	2.66	4.372E-02	511.86	20.000	8.127E+03	RH106
609.56	224.	21.12	1.30	3.708E-02	609.31	46.090	1.826E-01	BI214
					610.30	5.750	HL>Cutoff	RU103
1001.26	127.	22.38	1.48	2.198E-02	1001.00	0.837	9.614E+00	PA234M
1120.04	118.	27.06	1.90	1.989E-02	1120.29	15.100	5.483E-01	BI214
					1120.55	99.987	HL>Cutoff	Sc46
					1121.30	34.900	HL>Cutoff	Ta182
1460.76	321.	10.42	1.62	1.608E-02	1460.83	10.670	2.598E+00	K40
1764.03	103.	17.93	2.71	1.381E-02	1764.49	15.400	6.760E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
299.33	74.94	1122.	354.	3.732E+03	14.39	0.802	- D
308.60	77.26	987.	221.	2.262E+03	21.16	0.804	- D
337.44	84.51	1278.	476.	4.447E+03	14.79	1.508	- s
792.86	198.41	840.	196.	2.049E+03	28.57	1.200	- s
2043.15	511.07	830.	2535.	5.797E+04	4.08	2.659	- sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.64	46.54	1040.	1563.	0.022	4.61	0.837s
TH-234	252.74	63.33	1344.	1400.	0.019	5.68	0.832
TH-234	370.00	92.65	1398.	1733.	0.024	4.61	1.037s
U-235	573.48	143.55	973.	238.	0.003	24.19	0.836s
U-235	651.33	163.02	786.	171.	0.002	29.41	0.922s
U-235	742.10	185.72	1267.	878.	0.012	5.64	0.895D
PB-212	953.09	238.49	650.	425.	0.006	11.73	1.064
PB-214	1179.20	295.03	560.	216.	0.003	21.60	1.209s
PB-214	1407.36	352.09	536.	273.	0.004	17.33	1.292s
BI-214	2437.09	609.56	463.	224.	0.003	21.12	1.302
PA-234M	4004.09	1001.26	147.	127.	0.002	22.38	1.479s
BI-214	4479.36	1120.04	169.	118.	0.002	27.06	1.896
K-40	5842.96	1460.76	114.	321.	0.004	10.42	1.621
BI-214	7057.00	1764.03	42.	103.	0.001	17.93	2.710s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS	Code	MDA Value DPS	COMMENTS
K-40	N	2.5977E+00				4.66E+11	
			1460.83	2.598E+00	(	4.246E-01 1.04E+01 1.07E+01	G
PB-210	N	1.2189E+01				8.14E+03	
			46.54	1.219E+01	*(	1.193E+00 4.61E+00 4.25E+00	G
PB-212	N	9.2686E+00				6.98E+02	
			238.63	9.269E+00	(	2.650E+00 1.17E+01 4.33E+01	G
			300.03	0.000E+00	%	2.263E+01 3.62E+01 3.28E+00	GA
PB-214	N	1.8200E-01				5.84E+05	
			351.93	1.667E-01	(	6.752E-02 1.73E+01 3.76E+01	G
			295.09	2.119E-01	(	1.108E-01 2.16E+01 1.93E+01	G
			242.00	0.000E+00		2.537E-01 0.00E+00 7.43E+00	GA
BI-214	N	1.8256E-01				5.84E+05	
			609.31	1.826E-01	(	8.409E-02 2.11E+01 4.61E+01	G
			1120.29	5.483E-01	+	2.941E-01 2.71E+01 1.51E+01	G
			1764.49	6.760E-01	+	2.160E-01 1.79E+01 1.54E+01	G
TH-234	N	6.3505E+00				1.63E+12	
			63.29	6.350E+00	(	7.872E-01 5.68E+00 3.81E+00	G
			92.59	3.853E+00	-	3.933E-01 4.61E+00 5.58E+00	G
PA-234M	N	9.6140E+00				1.63E+12	
			1001.00	9.614E+00	*(	4.466E+00 2.24E+01 8.37E-01	G
			766.41	0.000E+00	%	7.714E+00 5.46E+01 2.94E-01	G
U-235	N	3.3130E-01				2.57E+11	
			185.72	2.292E-01	}	4.399E-02 5.64E+00 5.40E+01	GA
			143.79	2.760E-01	@(	1.716E-01 2.42E+01 1.10E+01	G
			205.33	0.000E+00	%	2.431E-01 3.50E+01 5.01E+00	G
			163.38	4.505E-01	@(	3.513E-01 2.94E+01 5.08E+00	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.

$ - Peak identified, but first peak of this nuclide
failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity DPS	Time Corrected Activity DPS	Uncertainty Counting 1 Sigma	MDA
BE-7			>12 Halflives		
NA-22	<	3.0626E-02	6.0970E-01		
K-40		2.5977E+00	2.5977E+00	1.042E+01%	4.25E-01
Sc-46			>12 Halflives		
CR-51			>12 Halflives		
MN-54			>12 Halflives		
FE-59			>12 Halflives		
Co-56			>12 Halflives		
CO-57			>12 Halflives		
CO-58			>12 Halflives		
CO-60	<	3.4093E-02	1.4925E-01		
ZN-65			>12 Halflives		
NB-94	<	2.5544E-02	2.5553E-02		
ZR-95			>12 Halflives		
NB-95			>12 Halflives		
RU-103			>12 Halflives		
RH-106	<	2.5765E-01	5.1946E+02		

AG-108M	<	1.7786E-02	1.8120E-02		
AG-110M		>12 Halflives			
SN-113		>12 Halflives			
SB-124		>12 Halflives			
SB-125	<	5.5950E-02	9.4029E-01		
I-131		>12 Halflives			
BA-133	<	1.9612E-02	4.1040E-02		
CS-134	<	4.0422E-02	1.7523E+00		
CS-137	<	4.5539E-02	5.9028E-02		
CE-139		>12 Halflives			
Ba-140		>12 Halflives			
La-140		>12 Halflives			
CE-141		>12 Halflives			
CE-144		>12 Halflives			
PM-144	<	2.6534E-02	6.6792E+01		
EU-152	<	3.9729E-02	7.0599E-02		
EU-154	<	2.7796E-01	6.8760E-01		
EU-155	<	4.5907E-02	2.2047E-01		
HF-181		>12 Halflives			
Ta-182		>12 Halflives			
Hg-203		>12 Halflives			
TL-208	<	2.5413E-02	1.4953E+00		
pm-146	<	6.6444E-02	2.7144E-01		
y-88		>12 Halflives			
PB-210	#	8.5983E+00	1.2189E+01	4.615E+00%	1.19E+00
PB-212		1.5752E-01	9.2686E+00	1.173E+01%	2.65E+00
PB-214		1.8112E-01	1.8200E-01	1.384E+01%	6.75E-02
BI-207	<	3.1580E-02	4.0215E-02		
BI-212	<	4.7013E-01	2.7662E+01		
BI-214		1.8168E-01	1.8256E-01	2.112E+01%	8.41E-02
BI-210M	<	2.4873E-02	2.4873E-02		
RA-224	<	2.4211E-01	1.4246E+01		
AC-228	<	1.3763E-01	5.3277E-01		
TH-227	<	1.5910E-01	2.2748E-01		
TH-229	<	2.7569E-01	2.7598E-01		
TH-234		6.3505E+00	6.3505E+00	5.682E+00%	7.87E-01
PA-231	<	6.2900E-01	6.2915E-01		
PA-233	<	3.8187E-02	3.8187E-02		
PA-234	<	8.6311E-02	8.6311E-02		
PA-234M	#	9.6140E+00	9.6140E+00	2.238E+01%	4.47E+00
U-235	#	3.3130E-01	3.3130E-01	1.904E+01%	1.72E-01
AM-241	<	6.9067E-02	7.0321E-02		
Np-237	<	7.6558E-02	7.6660E-02		

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

```
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded
----------------------------   S U M M A R Y   ----------------------------
Total Activity (   37.6 to  1999.5 keV)     2.801E+01  DPS
Total Decayed Activity (   37.6 to  1999.5 keV) 4.0716099E+01  DPS
```

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	160-18552-4	SU02-EXB-079-SS-P-00	267754	264537	901.1	RTM
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	ZZZZZ		267754			
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: GV7

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/12 08:10		IC 160-12302/1		12302			JLW
03/27/12 15:25		ICV 160-12302/2		12302			JLW
01/23/16 19:25		ACVTOP 160-236241/1		236241			PS
07/30/16 18:29		ICB 160-262849/1		262849			RTM
09/01/16 00:23		CCB 160-267755/1		267755			RTM
09/01/16 05:35		CCV 160-267755/2		267755			
09/01/16 05:58		CCV 160-267755/3		267755			RTM
09/01/16 08:44	30	ZZZZZ		267755			
09/01/16 09:20	30	ZZZZZ		267755			
09/01/16 09:59	30	ZZZZZ		267755			
09/01/16 10:47	30	160-18552-3	SU02-EXB-078-SS-P-00	267755	264537	901.1	RTM
09/01/16 11:52	30	ZZZZZ		267755			
09/01/16 12:39	30	ZZZZZ		267755			
09/01/16 13:25	30	ZZZZZ		267755			
09/01/16 14:36	30	ZZZZZ		267755			
09/01/16 15:13	30	ZZZZZ		267755			
09/01/16 16:04	30	ZZZZZ		267755			
09/01/16 19:52	60	ZZZZZ		267755			
09/01/16 21:12	120	ZZZZZ		267755			

Detector: GV8

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/12 10:58		IC 160-12311/1		12311			JLW
03/29/12 01:58		ICV 160-12311/2		12311			JLW
01/28/16 18:34		ACVTOP 160-236248/1		236248			PS
08/07/16 22:06		ICB 160-263973/1		263973			ALS
09/01/16 00:24		CCB 160-267756/1		267756			RTM

Gamma Spectroscopy Run Log

Detector: GV8 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
09/01/16 05:38		CCV 160-267756/2		267756			
09/01/16 06:01		CCV 160-267756/3		267756			RTM
09/01/16 08:46	30	ZZZZZ		267756			
09/01/16 09:21	30	ZZZZZ		267756			
09/01/16 10:00	30	ZZZZZ		267756			
09/01/16 10:46	30	160-18552-2	SU01-EXB-077-SS-P-00	267756	264537	901.1	RTM
09/01/16 11:54	30	ZZZZZ		267756			
09/01/16 12:44	30	ZZZZZ		267756			
09/01/16 13:26	30	ZZZZZ		267756			
09/01/16 14:38	30	ZZZZZ		267756			
09/01/16 15:12	30	ZZZZZ		267756			
09/01/16 16:05	30	ZZZZZ		267756			
09/01/16 17:11		ZZZZZ		267756			
09/01/16 17:56		ZZZZZ		267756			
09/01/16 19:54	60	ZZZZZ		267756			
09/01/16 21:14	30	ZZZZZ		267756			
09/01/16 21:54	30	ZZZZZ		267756			

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	LCS 160-264537/2-A		267757	264537	901.1	RTM
09/01/16 11:37	30	160-18552-1 DU	SU01-EXB-076-SS-P-00 DU	267757	264537	901.1	RTM
09/01/16 12:31	30	ZZZZZ		267757			
09/01/16 13:09	30	ZZZZZ		267757			
09/01/16 14:40	30	ZZZZZ		267757			
09/01/16 15:14	30	ZZZZZ		267757			
09/01/16 16:06	30	ZZZZZ		267757			
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
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

Gamma Spectroscopy Run Log

Detector: GV13 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
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	160-18552-1	SU01-EXB-076-SS-P-00	267758	264537	901.1	RTM
09/01/16 11:38	30	160-18552-5	SU03-S-080-SS-P-00	267758	264537	901.1	RTM
09/01/16 12:32	30	ZZZZZ		267758			
09/01/16 13:10	30	ZZZZZ		267758			
09/01/16 14:42	30	ZZZZZ		267758			
09/01/16 15:15	30	ZZZZZ		267758			
09/01/16 16:09	30	ZZZZZ		267758			
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	160-18552-6	SU03-S-081-SS-P-00	267760	264537	901.1	RTM
09/01/16 12:33	30	ZZZZZ		267760			
09/01/16 13:11	30	ZZZZZ		267760			
09/01/16 14:35	30	ZZZZZ		267760			
09/01/16 15:10	30	ZZZZZ		267760			
09/01/16 16:07	30	ZZZZZ		267760			
09/01/16 16:51	30	ZZZZZ		267760			
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
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			

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 09:48	30	ZZZZZ		267761			
09/01/16 10:38	30	ZZZZZ		267761			
09/01/16 11:40	30	160-18552-7	SU03-S-082-SS-P-00	267761	264537	901.1	RTM
09/01/16 12:33	30	ZZZZZ		267761			
09/01/16 13:12	30	ZZZZZ		267761			
09/01/16 14:33	30	ZZZZZ		267761			
09/01/16 15:08	30	ZZZZZ		267761			
09/01/16 16:08	30	ZZZZZ		267761			
09/01/16 16:48	30	ZZZZZ		267761			
09/01/16 19:57	60	ZZZZZ		267761			
09/01/16 21:16	30	ZZZZZ		267761			

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	MB 160-264537/1-A		267763	264537	901.1	RTM
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	ZZZZZ		267763			
09/01/16 15:05	30	ZZZZZ		267763			
09/01/16 16:11	30	ZZZZZ		267763			
09/01/16 16:46	30	ZZZZZ		267763			
09/01/16 19:59	120	ZZZZZ		267763			

Radiological
Pre-Preparation Data

Shipping and Receiving Documents

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Regulatory Program: ☐DW ☐NPDES ☐RCRA ☐Other:

Client Contact	Project Manager: Greg Bright	Site Contact: Bachir Badaoui	Date: 8/8/2016	COC No: 001
Cabrera Services, Inc	Tel/Fax: 508-315-6246	Lab Contact: Jessica DeHerrera	Carrier:	1 of 1 COCs
3355 Myrtle Ave, Suite 210	Analysis Turnaround Time			Sampler:
North Highlands, CA 95660	☐ CALENDAR DAYS ☑ WORKING DAYS			For Lab Use Only:
(916) 334-3740 Phone	TAT if different from Below 20			Walk-in Client:
(916) 334-4867 FAX	☐ 2 weeks			Lab Sampling:
Project Name: WR 111 - Little Mountain Test Annex	☐ 1 week			
Site: Hill Air Force Base, Utah	☐ 2 days			Job / SDG No.:
PO #:11460	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	Radium 226- by Gamma spec	Isotopic Thorium (Th-230, Th-232)	Sample Specific Notes:
SU01-EXB-076-SS-P-00	8/8/2016	1407		S	1			X	X	
SU01-EXB-077-SS-P-00	8/8/2016	1415		S	1			X	X	
SU02-EXB-078-SS-P-00	8/8/2016	1337		S	1			X	X	
SU02-EXB-079-SS-P-00	8/8/2016	1430		S	1			X	X	
SU03-S-080-SS-P-00	8/8/2016	1356		S	1			X	X	
SU03-S-081-SS-P-00	8/8/2016	1344		S	1			X	X	
SU03-S-082-SS-P-00	8/8/2016	1349		S	1			X	X	

160-18552 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑Non-Hazard ☐Flammable ☐Skin Irritant ☐Poison B ☐Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐Return to Client ☐Disposal by Lab ☐Archive for_____ Months

Special Instructions/QC Requirements & Comments: Gamma spec analysis for Ra-226 which includes 21 day ingrowth. Alpha Spec/ST-RD-0210 (Th-230 and Th-232). Gamma Spec/ST-RD-0102 for (Ra-226)

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Bachir Badaoui	Cabrera Services	8/8/2016 1530	B.	TA	8/9/16 0920
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

Login Sample Receipt Checklist

Client: EA Engineering, Science, and Technology

Job Number: 160-18552-1

Login Number: 18552
List Number: 1
Creator: Daniels, Brian J

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	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 <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	