ANALYTICAL REPORT

Job Number: 160-18426-1

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
8/29/2016 1:03 PM

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08/29/2016

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

The Lab Certification ID# is 4025.

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

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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: 160-18426-1

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 08/01/2016; the samples arrived in good. The temperature of the coolers at receipt was 19.0 C. Thermal preservation is not required for the requested analyses; therefore, the laboratory will proceed with the requested analyses. Corrective action is deemed unnecessary. The client was notified on 8/1/16.

RADIUM-226 & OTHER GAMMA EMITTERS (GS)
Samples WR111-SP-019-C-P-00 (160-18426-1), WR111-SP-020-C-P-00 (160-18426-2) and WR111-SP-021-C-P-00 (160-18426-3) were analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with EPA 901.1. The samples were leached on 08/01/2016, prepared on 08/04/2016 and analyzed on 08/25/2016.

Americium-241 and Cesium-137 exceeded the RPD limit for the duplicate of sample WR111-SP-019-C-P-00DU (160-18426-1). Refer to the QC report for details.

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

Isotopic Thorium-230/232 (Alpha Spectrometry)
Samples WR111-SP-019-C-P-00 (160-18426-1), WR111-SP-020-C-P-00 (160-18426-2) and WR111-SP-021-C-P-00 (160-18426-3) were analyzed for Isotopic Thorium-230/232 (Alpha Spectrometry). The samples were leached on 08/01/2016, prepared on 08/12/2016 and analyzed on 08/25/2016.

Thorium prep batch 160-264618: The following sample(s) could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: WR111-SP-019-C-P-00 (160-18426-1), WR111-SP-020-C-P-00 (160-18426-2), WR111-SP-021-C-P-00 (160-18426-3) and (160-18426-A-1-A DU) . The samples contained rocks.

Thorium-230 was detected in method blank MB 160-264618/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate. If the associated sample reported a result above the RL, the result has been flagged.

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: 160-18426-1

Client Sample ID: WR111-SP-019-C-P-00 — Lab Sample ID: 160-18426-1

No Detections.

Client Sample ID: WR111-SP-020-C-P-00 — Lab Sample ID: 160-18426-2

No Detections.

Client Sample ID: WR111-SP-021-C-P-00 — Lab Sample ID: 160-18426-3

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample ID: WR111-SP-019-C-P-00 — Lab Sample ID: 160-18426-1

Date Collected: 07/29/16 12:00 — **Matrix: Solid**
Date Received: 08/01/16 08:25

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	1.74		0.264	0.320	0.500	0.170	pCi/g	08/04/16 15:01	08/25/16 09:46	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	1.62		0.200	0.241	0.100	0.0438	pCi/g	08/12/16 10:25	08/25/16 20:44	1
Thorium-232	1.99		0.220	0.277	0.100	0.0337	pCi/g	08/12/16 10:25	08/25/16 20:44	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*75.1*		*30 - 110*	*08/12/16 10:25*	*08/25/16 20:44*	*1*

Client Sample ID: WR111-SP-020-C-P-00 — Lab Sample ID: 160-18426-2

Date Collected: 07/29/16 12:20 — **Matrix: Solid**
Date Received: 08/01/16 08:25

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	1.21		0.244	0.274	0.500	0.200	pCi/g	08/04/16 15:01	08/25/16 09:50	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	1.01		0.144	0.168	0.100	0.0154	pCi/g	08/12/16 10:25	08/25/16 20:44	1
Thorium-232	1.18		0.156	0.184	0.100	0.0337	pCi/g	08/12/16 10:25	08/25/16 20:44	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*85.4*		*30 - 110*	*08/12/16 10:25*	*08/25/16 20:44*	*1*

Client Sample ID: WR111-SP-021-C-P-00 — Lab Sample ID: 160-18426-3

Date Collected: 07/29/16 12:30 — **Matrix: Solid**
Date Received: 08/01/16 08:25

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	1.21		0.183	0.222	0.500	0.138	pCi/g	08/04/16 15:01	08/25/16 09:52	1

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.904		0.139	0.159	0.100	0.0296	pCi/g	08/12/16 10:25	08/25/16 20:44	1
Thorium-232	2.08		0.211	0.274	0.100	0.0295	pCi/g	08/12/16 10:25	08/25/16 20:44	1

Client Sample ID: WR111-SP-021-C-P-00

Lab Sample ID: 160-18426-3

Date Collected: 07/29/16 12:30
Date Received: 08/01/16 08:25

Matrix: Solid

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	83.1		30 - 110	08/12/16 10:25	08/25/16 20:44	1

Tracer/Carrier Summary

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

TestAmerica Job ID: 160-18426-1

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)**							
160-18426-1	WR111-SP-019-C-P-00	75.1							
160-18426-1 DU	WR111-SP-019-C-P-00	83.7							
160-18426-2	WR111-SP-020-C-P-00	85.4							
160-18426-3	WR111-SP-021-C-P-00	83.1							
LCS 160-264618/2-A	Lab Control Sample	86.2							
MB 160-264618/1-A	Method Blank	92.0							

Tracer/Carrier Legend

Th-229 = Thorium-229

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

Lab Sample ID: MB 160-263537/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266525 — **Prep Batch: 263537**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.1257	U	0.0690	0.0702	0.500	0.356	pCi/g	08/04/16 15:01	08/25/16 10:26	1

Lab Sample ID: LCS 160-263537/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266452 — **Prep Batch: 263537**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits		
Americium-241			97.1	93.95		9.84		1.00	pCi/g	97	87 - 116		
Cesium-137			29.5	29.26		3.12		0.256	pCi/g	99	87 - 120		
Cobalt-60			16.7	16.27		1.68		0.0356	pCi/g	98	87 - 115		

Lab Sample ID: 160-18426-1 DU — **Client Sample ID: WR111-SP-019-C-P-00**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266526 — **Prep Batch: 263537**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit			RER	RER Limit
Radium-226	1.74			1.793		0.323	0.500	0.176	pCi/g			0.09	1

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

Lab Sample ID: MB 160-264618/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266596 — **Prep Batch: 264618**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.08361		0.0417	0.0423	0.100	0.0278	pCi/g	08/12/16 10:25	08/25/16 20:44	1
Thorium-232	-0.001252	U	0.0123	0.0124	0.100	0.0369	pCi/g	08/12/16 10:25	08/25/16 20:44	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*92.0*		*30 - 110*	*08/12/16 10:25*	*08/25/16 20:44*	*1*

Lab Sample ID: LCS 160-264618/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266597 — **Prep Batch: 264618**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits		
Thorium-230			24.5	24.85		2.31	0.100	0.0663	pCi/g	101	81 - 118		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Thorium-229	*86.2*		*30 - 110*

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

Lab Sample ID: 160-18426-1 DU
Matrix: Solid
Analysis Batch: 266600

Client Sample ID: WR111-SP-019-C-P-00
Prep Type: Total/NA
Prep Batch: 264618

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit			RER	RER Limit
Thorium-230	1.62			1.634		0.231	0.100	0.0293	pCi/g			0.04	1
Thorium-232	1.99			1.996		0.265	0.100	0.0158	pCi/g			0.01	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Thorium-229	*83.7*		*30 - 110*

Rad

Leach Batch: 262882

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18426-1	WR111-SP-019-C-P-00	Total/NA	Solid	Dry and Grind	
160-18426-2	WR111-SP-020-C-P-00	Total/NA	Solid	Dry and Grind	
160-18426-3	WR111-SP-021-C-P-00	Total/NA	Solid	Dry and Grind	
160-18426-1 DU	WR111-SP-019-C-P-00	Total/NA	Solid	Dry and Grind	

Prep Batch: 263537

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18426-1	WR111-SP-019-C-P-00	Total/NA	Solid	Fill_Geo-21	262882
160-18426-2	WR111-SP-020-C-P-00	Total/NA	Solid	Fill_Geo-21	262882
160-18426-3	WR111-SP-021-C-P-00	Total/NA	Solid	Fill_Geo-21	262882
MB 160-263537/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-263537/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-18426-1 DU	WR111-SP-019-C-P-00	Total/NA	Solid	Fill_Geo-21	262882

Prep Batch: 264618

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18426-1	WR111-SP-019-C-P-00	Total/NA	Solid	ExtChrom	262882
160-18426-2	WR111-SP-020-C-P-00	Total/NA	Solid	ExtChrom	262882
160-18426-3	WR111-SP-021-C-P-00	Total/NA	Solid	ExtChrom	262882
MB 160-264618/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-264618/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18426-1 DU	WR111-SP-019-C-P-00	Total/NA	Solid	ExtChrom	262882

Lab Chronicle

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

TestAmerica Job ID: 160-18426-1

Client Sample ID: WR111-SP-019-C-P-00 — Lab Sample ID: 160-18426-1

Date Collected: 07/29/16 12:00
Date Received: 08/01/16 08:25
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			262882	08/01/16 14:43	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			263537	08/04/16 15:01	R1S	TAL SL
Total/NA	Analysis	901.1		1	266451	08/25/16 09:46	RTM	TAL SL
Total/NA	Leach	Dry and Grind			262882	08/01/16 14:43	DRO	TAL SL
Total/NA	Prep	ExtChrom			264618	08/12/16 10:25	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	266598	08/25/16 20:44	ALD	TAL SL

Client Sample ID: WR111-SP-020-C-P-00 — Lab Sample ID: 160-18426-2

Date Collected: 07/29/16 12:20
Date Received: 08/01/16 08:25
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			262882	08/01/16 14:43	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			263537	08/04/16 15:01	R1S	TAL SL
Total/NA	Analysis	901.1		1	266526	08/25/16 09:50	RTM	TAL SL
Total/NA	Leach	Dry and Grind			262882	08/01/16 14:43	DRO	TAL SL
Total/NA	Prep	ExtChrom			264618	08/12/16 10:25	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	266601	08/25/16 20:44	ALD	TAL SL

Client Sample ID: WR111-SP-021-C-P-00 — Lab Sample ID: 160-18426-3

Date Collected: 07/29/16 12:30
Date Received: 08/01/16 08:25
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			262882	08/01/16 14:43	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			263537	08/04/16 15:01	R1S	TAL SL
Total/NA	Analysis	901.1		1	266525	08/25/16 09:52	RTM	TAL SL
Total/NA	Leach	Dry and Grind			262882	08/01/16 14:43	DRO	TAL SL
Total/NA	Prep	ExtChrom			264618	08/12/16 10:25	ATS	TAL SL
Total/NA	Analysis	A-01-R		1	266602	08/25/16 20:44	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: 160-18426-1

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	07-31-16 *
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	08-31-16 *
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: 160-18426-1

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: 160-18426-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-18426-1	WR111-SP-019-C-P-00	Solid	07/29/16 12:00	08/01/16 08:25
160-18426-2	WR111-SP-020-C-P-00	Solid	07/29/16 12:20	08/01/16 08:25
160-18426-3	WR111-SP-021-C-P-00	Solid	07/29/16 12:30	08/01/16 08:25

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18426-1

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
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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18426-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
.Gamma Ampuole_00001	04/07/59		Analytics, Lot 79670-334		(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source G_00001	01/01/61	01/01/11	water, Lot 83725-334	10 mL	Gamma Ampuole_00003	1.8639 g	Americium-241	1693.09 Bq
							Cd-109	24592.1 Bq
							Ce-139	816.481 Bq
							Cesium-137	681.815 Bq
							Co-57	532.386 Bq
							Cobalt-60	1120.87 Bq
							Hg-203	1766.08 Bq
							Sn-113	1445.98 Bq
							Y-88	2359.21 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-18426-1

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.: 160-18426-1

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."

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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."

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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

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Atlanta, Georgia 30318
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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."

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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

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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."

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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

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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."

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ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

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

82240-334_00001

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
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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."

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ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

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

82241-334_00001

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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

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."

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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

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Atlanta, Georgia 30318
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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

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
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
Tel 404•352•8677
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

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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

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 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."

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 G_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

Eckert & Ziegler
Analytics

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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

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

Th-229_00016

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

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

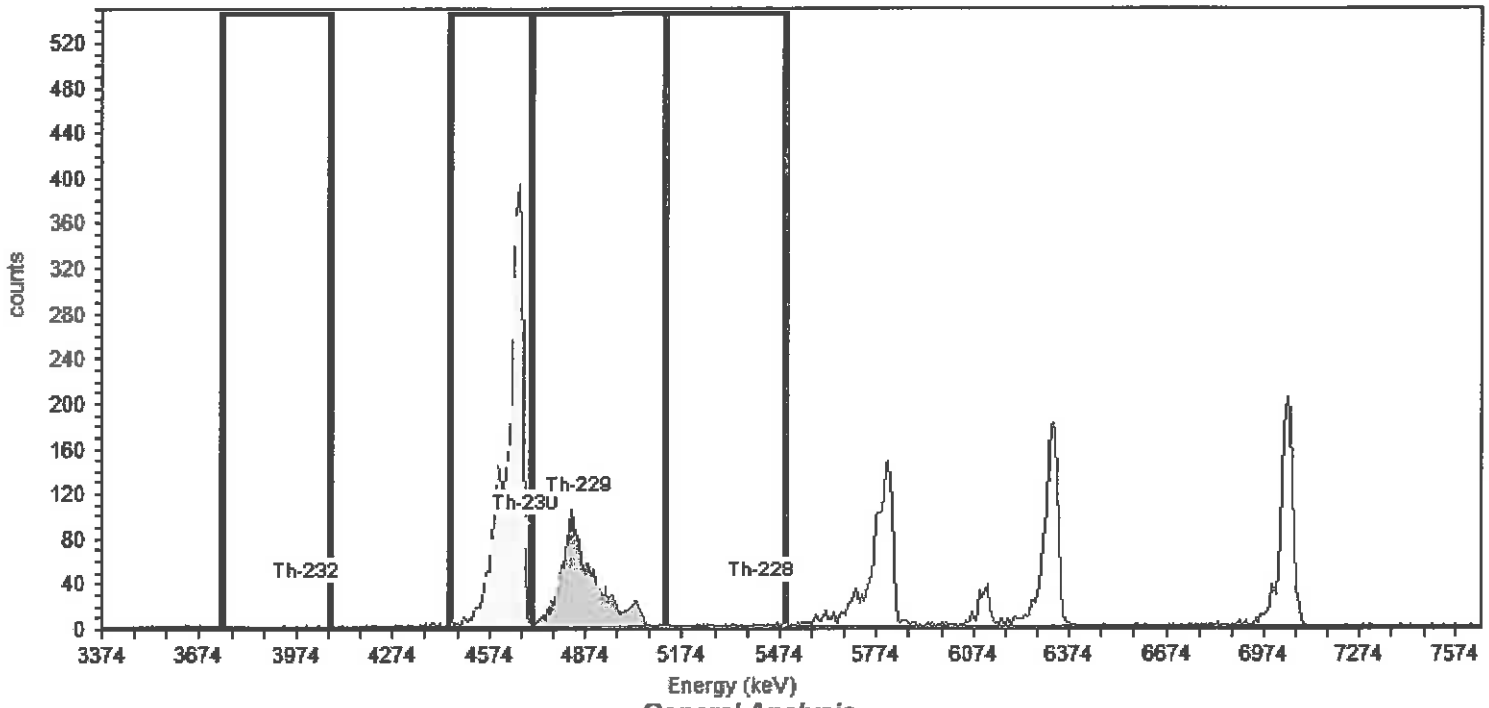
Tracer Name: Th-230_00029
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:19:32AM

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

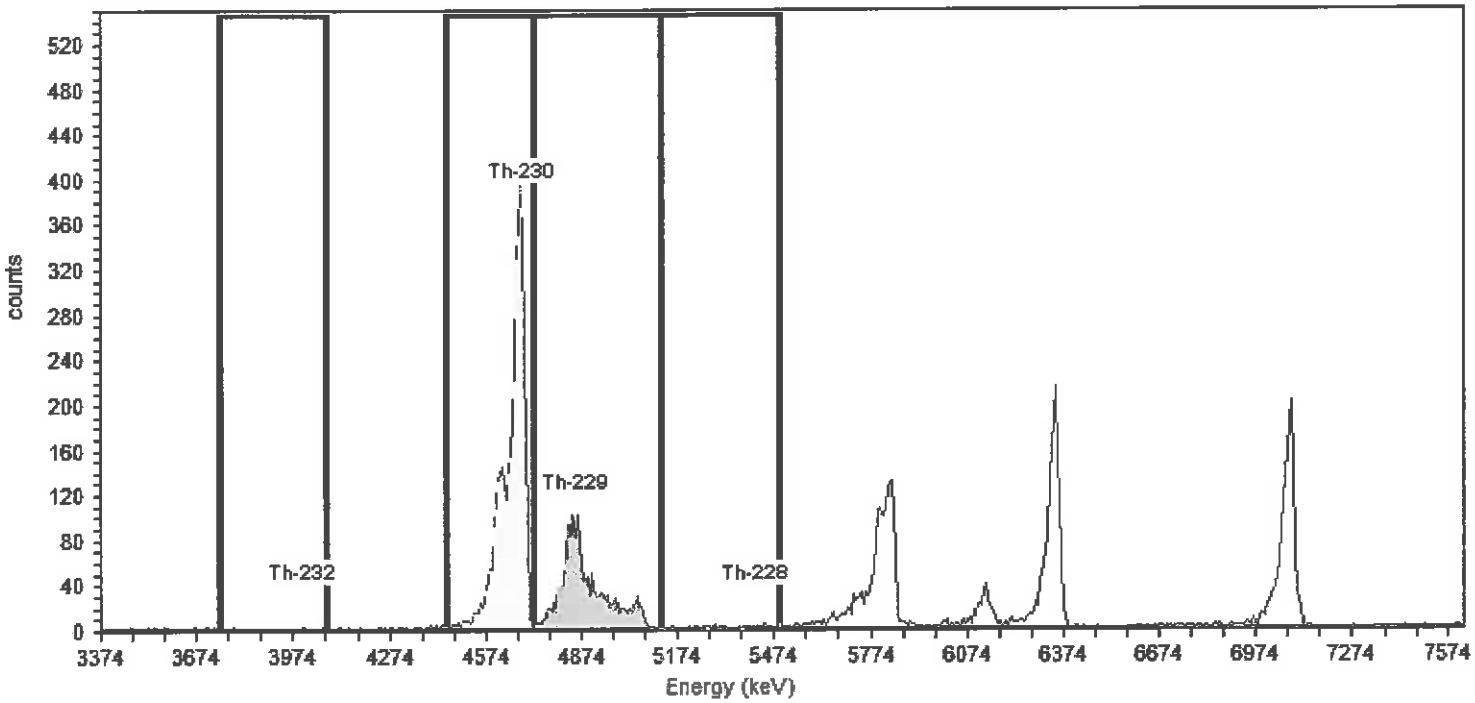
Tracer Name: Th-230_00029
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:19:32AM

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

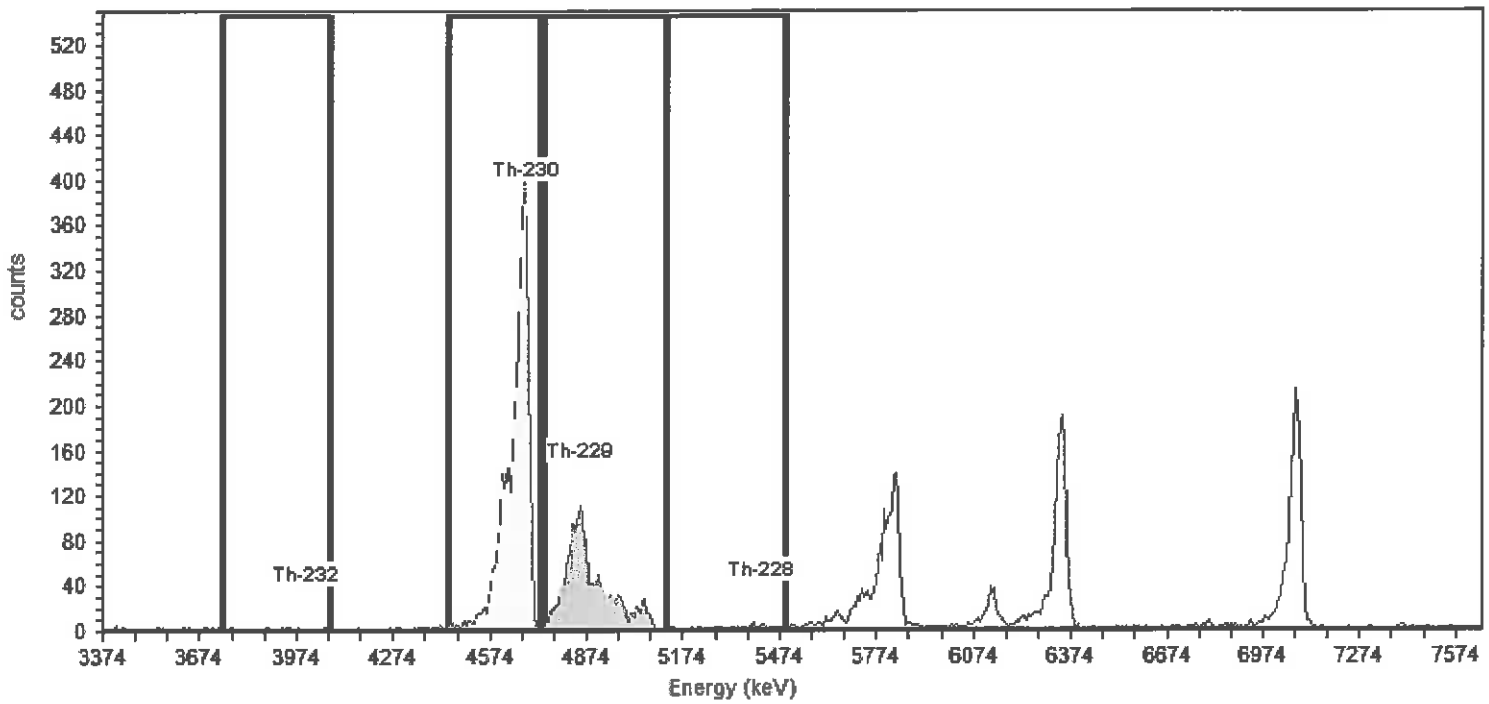
Tracer Name: Th-230_00029
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:19:32AM

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

SamplID	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

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

End of Certificate

Reagent

Tuna Can_00002

Rc'd 2/3/10

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

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

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
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

Tuna Can_00006

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

ALPHA SPECTROSCOPY

Method A-01-R Th

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

Prep Batch: 264618

Preparation, Extraction Chromatography Resin Actinide Separation

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 264618

Lab ID: MB 160-264618/1-A
Client ID:
Sigma: 2

Analyzed: 08/25/16 20:44
Detector: AV200
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	0.08361	0.0417	0.0423		pCi/g	0.100	0.0278	266596
Thorium-232	-0.001252	0.0123	0.0124	U	pCi/g	0.100	0.0369	266596

Tracer	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.785	0.228	0.326		pCi/g	0.0373	3.03	92.0	30 - 110

Lab ID: LCS 160-264618/2-A
Client ID:
Sigma: 2

Analyzed: 08/25/16 20:44
Detector: AV203
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	24.85	1.00	2.31		pCi/g	0.100	0.0663	266597

Tracer	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	5.224	0.427	0.612		pCi/g	0.0571	6.06	86.2	30 - 110

Lab ID: 160-18426-1
Client ID: WR111-SP-019-C-P-00
Sigma: 2

Analyzed: 08/25/16 20:44
Detector: AV206
Dil Fac: 1

Decay Corrected: No
Yield Truncated: No
Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Thorium-230	1.62	0.200	0.241		pCi/g	0.100	0.0438	266598
Thorium-232	1.99	0.220	0.277		pCi/g	0.100	0.0337	266598

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.27	0.205	0.280		pCi/g	0.0398	3.03	75.1	30 - 110

Lab ID: 160-18426-1 DU
Client ID: WR111-SP-019-C-P-00
Sigma: 2

Analyzed: 08/25/16 20:44
Detector: AV208
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	1.634	0.186	0.231		pCi/g	0.100	0.0293	266600
Thorium-232	1.996	0.205	0.265		pCi/g	0.100	0.0158	266600

Tracer	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.536	0.212	0.301		pCi/g	0.0291	3.03	83.7	30 - 110

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 264618

Lab ID: 160-18426-2
Client ID: WR111-SP-020-C-P-00
Sigma: 2

Analyzed: 08/25/16 20:44
Detector: AV209
Dil Fac: 1

Decay Corrected: No
Yield Truncated: No
Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Thorium-230	1.01	0.144	0.168		pCi/g	0.100	0.0154	266601
Thorium-232	1.18	0.156	0.184		pCi/g	0.100	0.0337	266601

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.59	0.213	0.304		pCi/g	0.0243	3.03	85.4	30 - 110

Lab ID: 160-18426-3
Client ID: WR111-SP-021-C-P-00
Sigma: 2

Analyzed: 08/25/16 20:44
Detector: AV210
Dil Fac: 1

Decay Corrected: No
Yield Truncated: No
Ts: 400

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Thorium-230	0.904	0.139	0.159		pCi/g	0.100	0.0296	266602
Thorium-232	2.08	0.211	0.274		pCi/g	0.100	0.0295	266602

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	2.52	0.212	0.299		pCi/g	0.0134	3.03	83.1	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 160-264618/1-A	Thorium-230			0.08361		pCi/g							3.95002292
MB 160-264618/1-A	Thorium-232			-0.001252	U	pCi/g							-.20271387

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-264618/2-A	Thorium-230		24.5	24.85		pCi/g	101	81 - 118					.2149116759

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-18426-1	Thorium-230	1.62		1.634		pCi/g			1	0.04	0.1	1	
160-18426-1	Thorium-232	1.99		1.996		pCi/g			0.4	0.01	0.04	1	

Glossary:

Ts = Count Duration, Sample

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-18426-1

SDG No.:

Batch Number: 264618 Batch Start Date: 08/12/16 10:25 Batch Analyst: Sherman, Austin T

Batch Method: ExtChrom Batch End Date: 08/24/16 15:37

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Th-229 00021	TRM-2 00001			
MB 160-264618/1		ExtChrom, A-01-R		1.0 g	0.1 mL				
LCS 160-264618/2		ExtChrom, A-01-R		0.4998 g	0.1 mL	0.4998 g			
160-18426-A-1-A	WR111-SP-019-C-P -00	ExtChrom, A-01-R	T	0.9999 g	0.1 mL				
160-18426-A-1-A DU	WR111-SP-019-C-P -00	ExtChrom, A-01-R	T	0.9991 g	0.1 mL				
160-18426-A-2-A	WR111-SP-020-C-P -00	ExtChrom, A-01-R	T	1.0006 g	0.1 mL				
160-18426-A-3-A	WR111-SP-021-C-P -00	ExtChrom, A-01-R	T	0.9993 g	0.1 mL				

Batch Notes	
Balance ID	1123433897
Analyst ID - Column	nmn per scb
Column Date	8/24/16
Analyst ID - CoPrecipitation	scb
CoPrecipitation Date	8/24/16
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
3:24:25AM 8/26/2016

Sample

Sample Name: MB 160-264618/1-A Type: Blank
Spectrum #1 Analysis #1
: MB 160-264618/1-A
Sample Collection Date: 8/24/2016 3:40:00PM
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: 264618
AnalysisResultsID: 175193
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

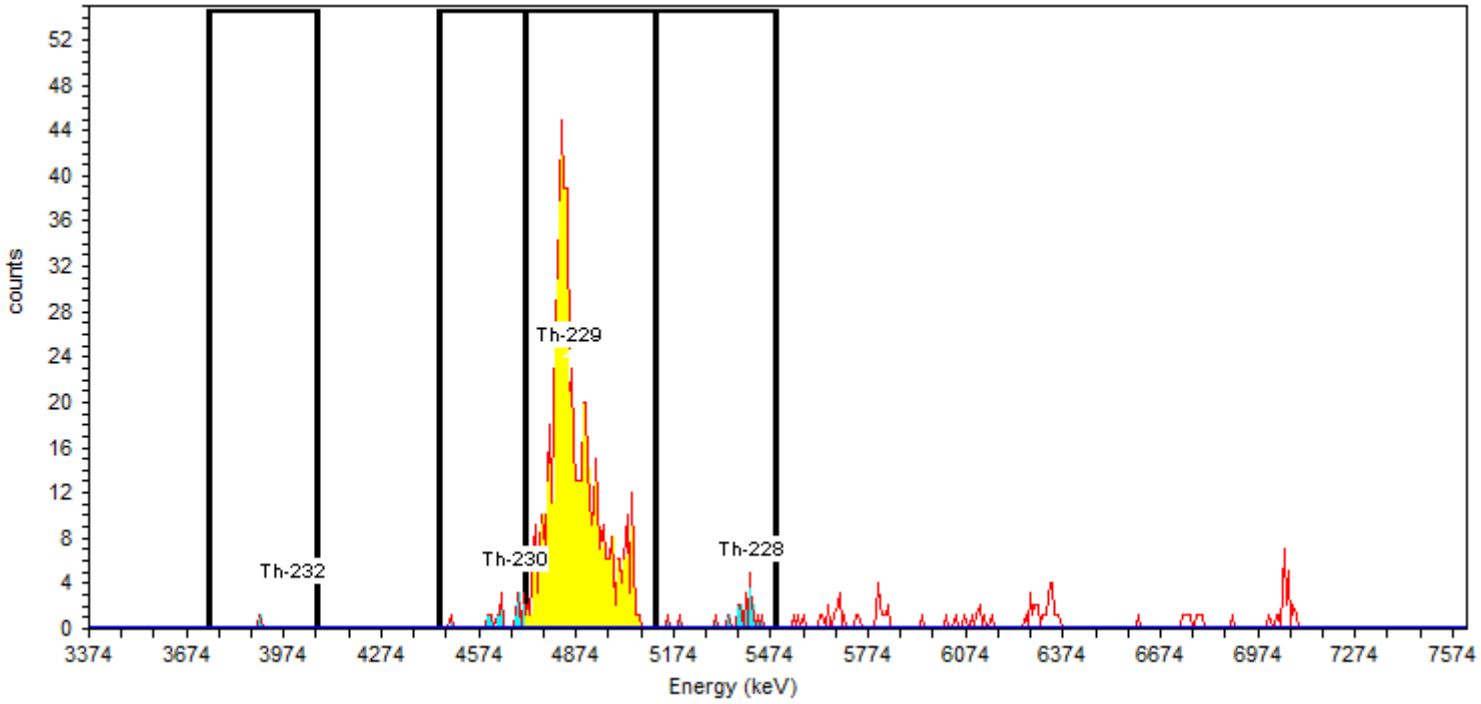
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 91.97%

Acquisition

Detector: AV200 SN: 50-117J6
Acquisition Start Date: 8/25/2016 8:44:05PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/25/2016 1:13:59PM
Bkgd Info: Sample: ICB;AV200; Det: AV200; Spectrum #1; 7/25/2016 1:13:59 PM

Energy Calibration: IC-9884;AV200-20151017
Efficiency Calibration:IC-9884;AV200-20151017
Calibration Date: 10/18/2015 3:55:33PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.41% +/- 0.35% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/25/2016 8:40:49PM
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	44.5	100.2	1	1.2500	-0.25	-1.252E-003	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	12.8	99.7	17	0.4167	16.61	8.361E-002	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	63.7	99.6	603	1.6667	601.36	2.785E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	51.2	99.8	20	6.6667	13.33	6.706E-002	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:25:02AM 8/26/2016

Sample

Sample Name: LCS 160-264618/2-A Type: Control
Spectrum #1 Analysis #1
: LCS 160-264618/2-A
Sample Collection Date: 8/24/2016 3:40:00PM
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: 264618
AnalysisResultsID: 175196
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

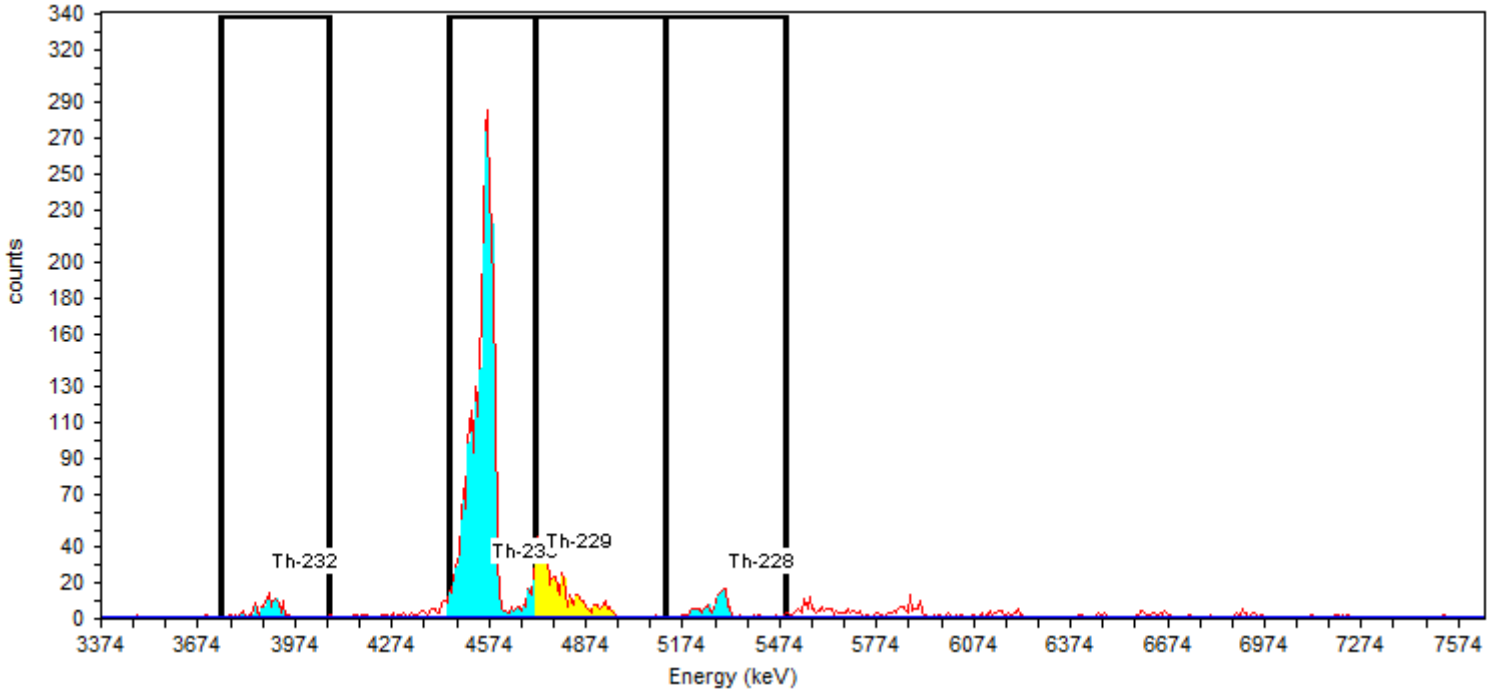
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 67.22%

Acquisition

Detector: AV203 SN: 50-117J4
Acquisition Start Date: 8/25/2016 8:44:05PM
Live Time: 400.00 min.
Real Time: 400.01 min.
Background Date: 7/25/2016 1:14:00PM
Bkgd Info: Sample: ICB;AV203; Det: AV203; Spectrum #1; 7/25/2016 1:14:00 PM

Energy Calibration: IC-7107;AV203-20151018a
Efficiency Calibration:IC-7107;AV203-20151018a
Calibration Date: 10/18/2015 6:42:12PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.98% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/25/2016 8:40:48PM
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	71.8	100.2	104	0.0000	103.54	1.333E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	59.1	99.7	2536	1.2500	2534.93	3.280E+001	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	.0	99.6	468	0.4167	467.92	4.073E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	50.5	99.8	134	5.4167	128.58	1.663E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:45:13AM 8/26/2016

Sample

Sample Name: LCS 160-264618/2-A Type: Control
Spectrum #1 Analysis #1
: LCS 160-264618/2-A
Sample Collection Date: 8/24/2016 3:40:00PM
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: 264618
AnalysisResultsID: 175217
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

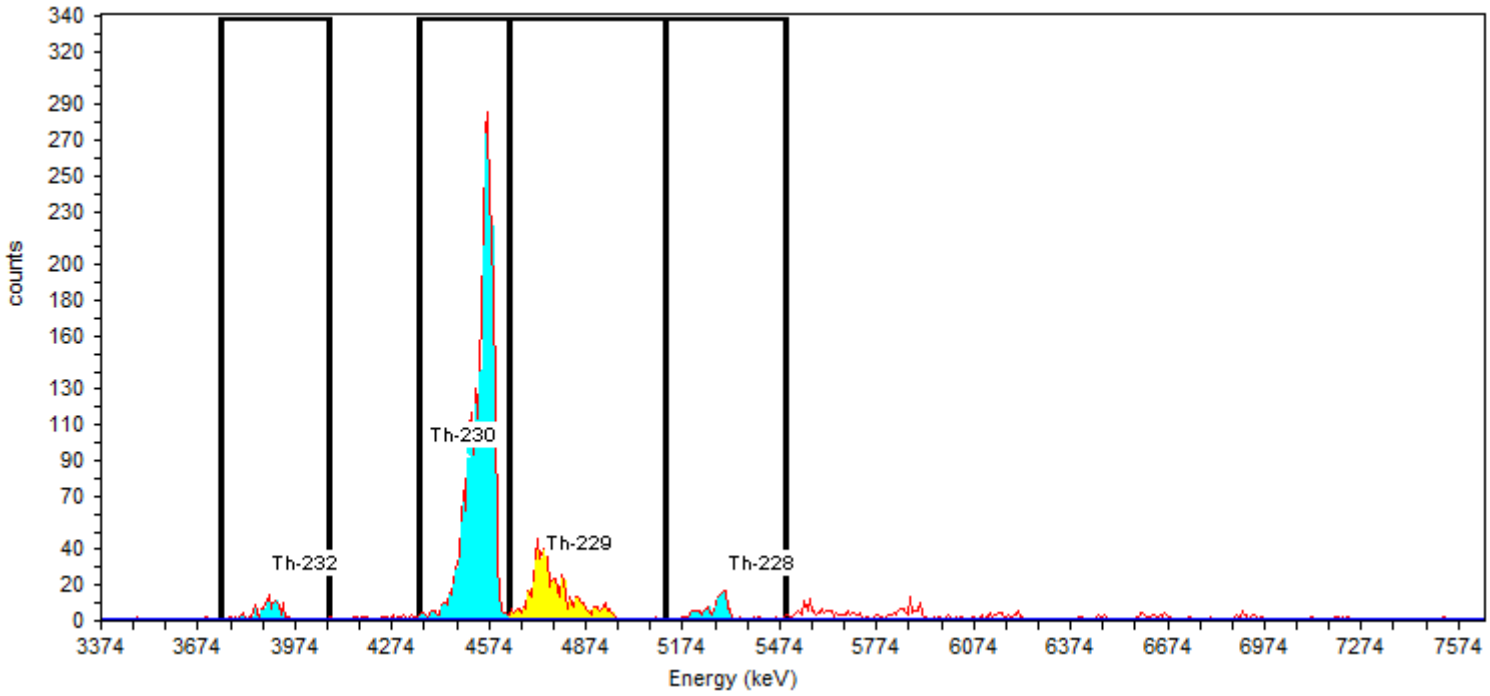
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 86.24%

Acquisition

Detector: AV203 SN: 50-117J4
Acquisition Start Date: 8/25/2016 8:44:05PM
Live Time: 400.00 min.
Real Time: 400.01 min.
Background Date: 7/25/2016 1:14:00PM
Bkgd Info: Sample: ICB;AV203; Det: AV203; Spectrum #1; 7/25/2016 1:14:00 PM

Energy Calibration: IC-7107;AV203-20151018a
Efficiency Calibration:IC-7107;AV203-20151018a
Calibration Date: 10/18/2015 6:42:12PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.98% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:8/25/2016 8:40:48PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Manual Integration for tailing. 08/26/2016 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	71.8	100.2	104	0.0000	103.54	1.039E+000	pCi/g
Th-230	4496.8	4,687.5	-190.7	4358.8	4634.7	61.6	99.7	2464	0.8333	2463.17	2.485E+001	pCi/g
Th-229	4848.0	4,845.3	2.7	4634.7	5119.5	77.4	99.8	602	0.8333	601.17	5.225E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	50.5	99.8	134	5.4167	128.58	1.296E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:25:14AM 8/26/2016

Sample

Sample Name: 160-18426-A-1-D Type: Sample
Spectrum #1 Analysis #1
: 160-18426-A-1-D
Sample Collection Date: 7/29/2016 12:00:00PM
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: 264618
AnalysisResultsID: 175197
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

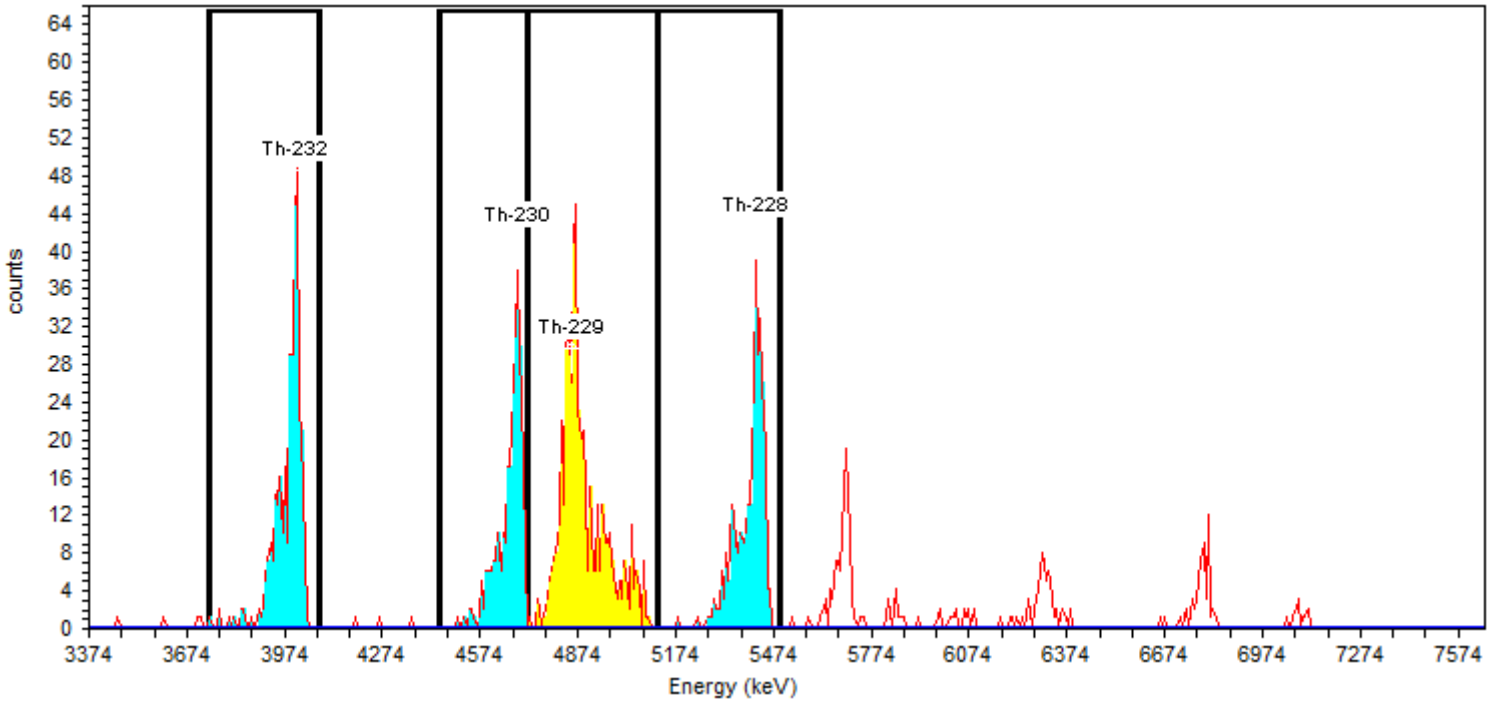
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 75.11%

Acquisition

Detector: AV206 SN: 50-119AA6
Acquisition Start Date: 8/25/2016 8:44:05PM
Live Time: 400.00 min.
Real Time: 400.30 min.
Background Date: 7/25/2016 1:14:01PM
Bkgd Info: Sample: ICB;AV206; Det: AV206; Spectrum #1; 7/25/2016 1:14:01 PM

Energy Calibration: IC-8876;AV206-20151018
Efficiency Calibration:IC-8876;AV206-20151018
Calibration Date: 10/18/2015 6:41:49PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.55% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/25/2016 8:40:48PM
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	58.4	100.2	327	0.4167	326.16	1.988E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	34.7	99.7	265	1.1216	263.91	1.617E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	67.8	99.6	496	2.0833	493.95	2.275E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	52.9	99.8	309	5.0000	304.00	1.862E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:24:11AM 8/26/2016

Sample

Sample Name: 160-18426-A-1-F DU Type: Sample
Spectrum #1 Analysis #1
: 160-18426-A-1-F DU
Sample Collection Date: 7/29/2016 12:00:00PM
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: 264618
AnalysisResultsID: 175192
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

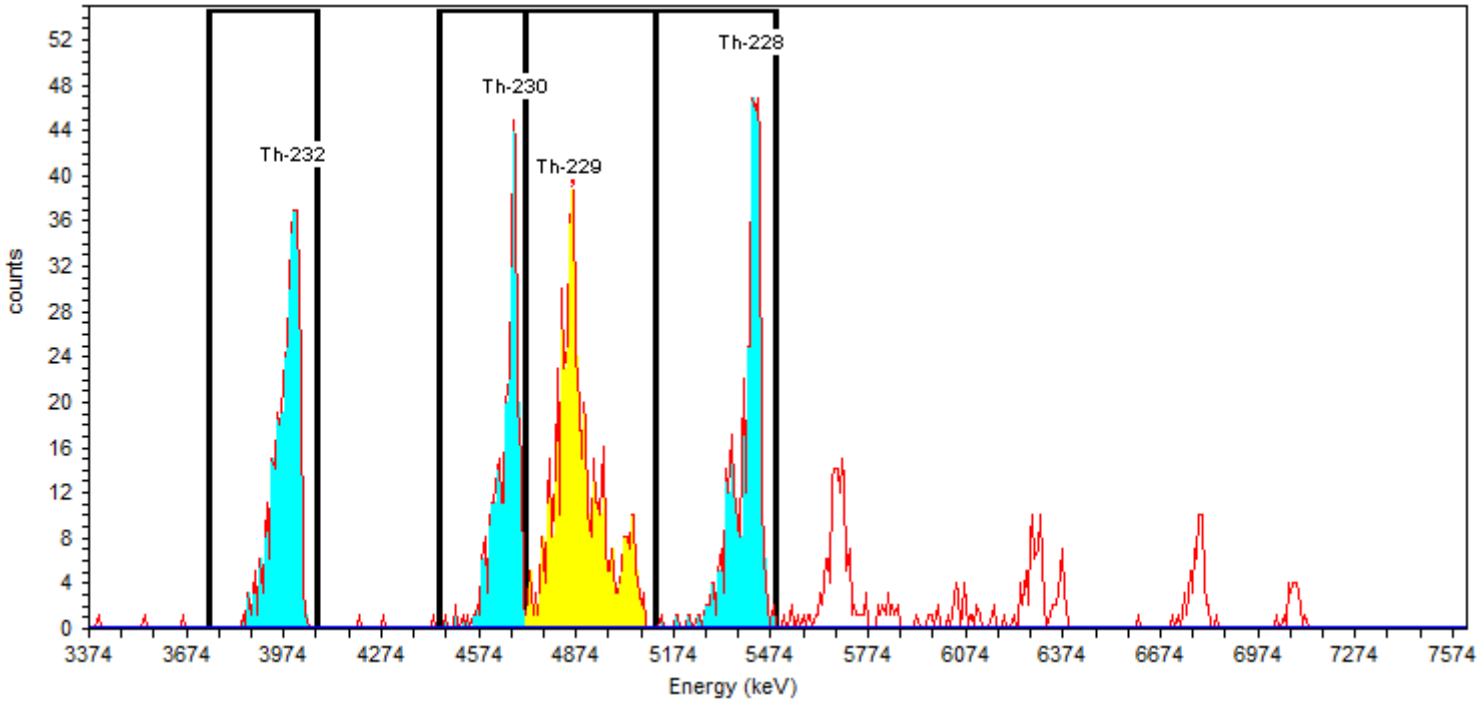
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 83.69%

Acquisition

Detector: AV208 SN: 50-112Z6
Acquisition Start Date: 8/25/2016 8:44:06PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/25/2016 1:14:01PM
Bkgd Info: Sample: ICB;AV208; Det: AV208; Spectrum #1; 7/25/2016 1:14:01 PM

Energy Calibration: IC-9520;AV208-20151018a
Efficiency Calibration:IC-9520;AV208-20151018a
Calibration Date: 10/18/2015 6:42:37PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.52% +/- 0.36% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/25/2016 8:40:48PM
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	379	0.0000	379.00	1.996E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	28.8	99.7	309	0.4167	308.61	1.634E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	77.5	99.6	573	0.8333	572.20	2.537E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	56.4	99.8	409	5.8333	403.17	2.133E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:24:38AM 8/26/2016

Sample

Sample Name: 160-18426-A-2-C Type: Sample
Spectrum #1 Analysis #1
: 160-18426-A-2-C
Sample Collection Date: 7/29/2016 12:20:00PM
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: 264618
AnalysisResultsID: 175194
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

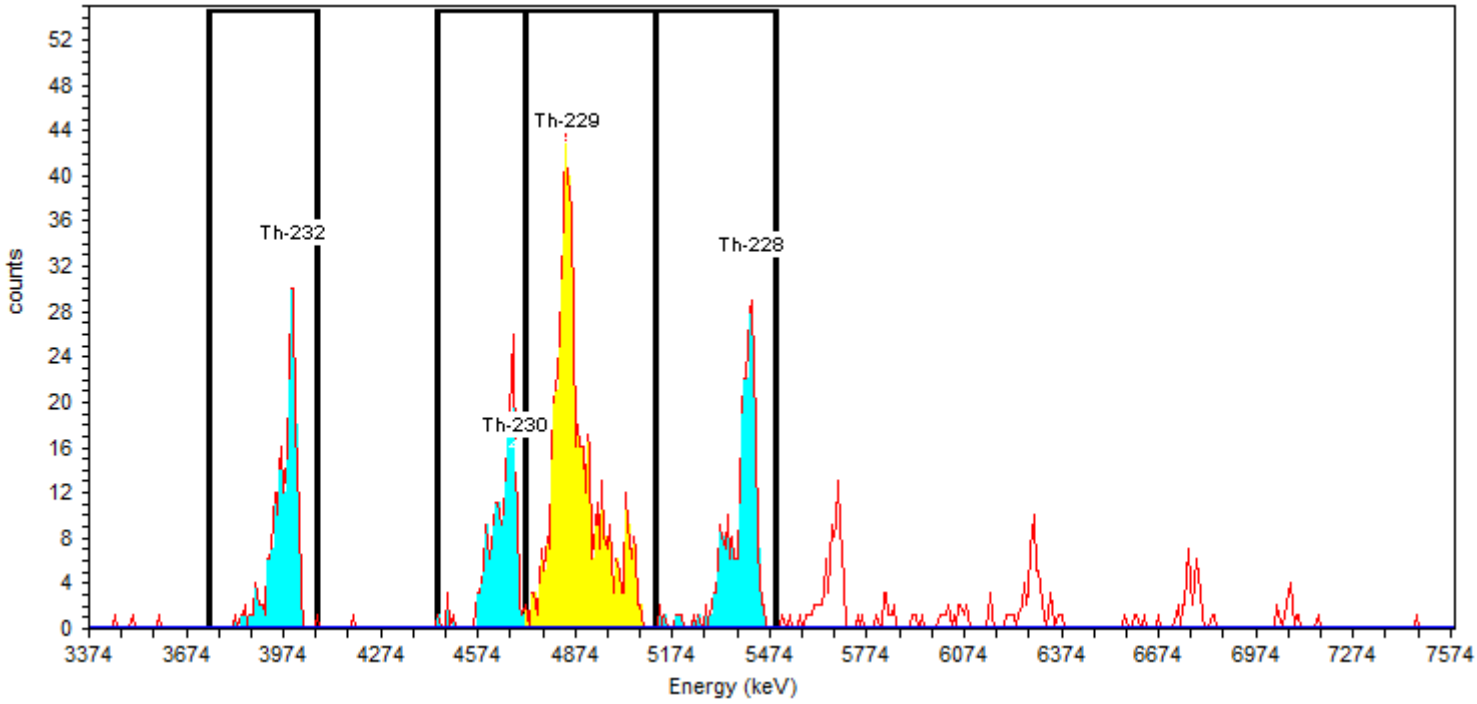
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 85.72%

Acquisition

Detector: AV209 SN: 50-117H7
Acquisition Start Date: 8/25/2016 8:44:06PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/25/2016 1:14:01PM
Bkgd Info: Sample: ICB;AV209; Det: AV209; Spectrum #1; 7/25/2016 1:14:01 PM

Energy Calibration: IC-9792;AV209-20151018
Efficiency Calibration:IC-9792;AV209-20151018
Calibration Date: 10/18/2015 6:42:01PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.67% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/25/2016 8:40:48PM
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	61.5	100.2	231	0.8333	229.71	1.173E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	26.1	99.7	196	0.0000	195.66	1.004E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	69.2	99.6	590	0.4167	589.55	2.594E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	54.4	99.8	265	6.6667	258.33	1.324E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:44:55AM 8/26/2016

Sample

Sample Name: 160-18426-A-2-C Type: Sample
Spectrum #1 Analysis #1
: 160-18426-A-2-C
Sample Collection Date: 7/29/2016 12:20:00PM
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: 264618
AnalysisResultsID: 175218
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

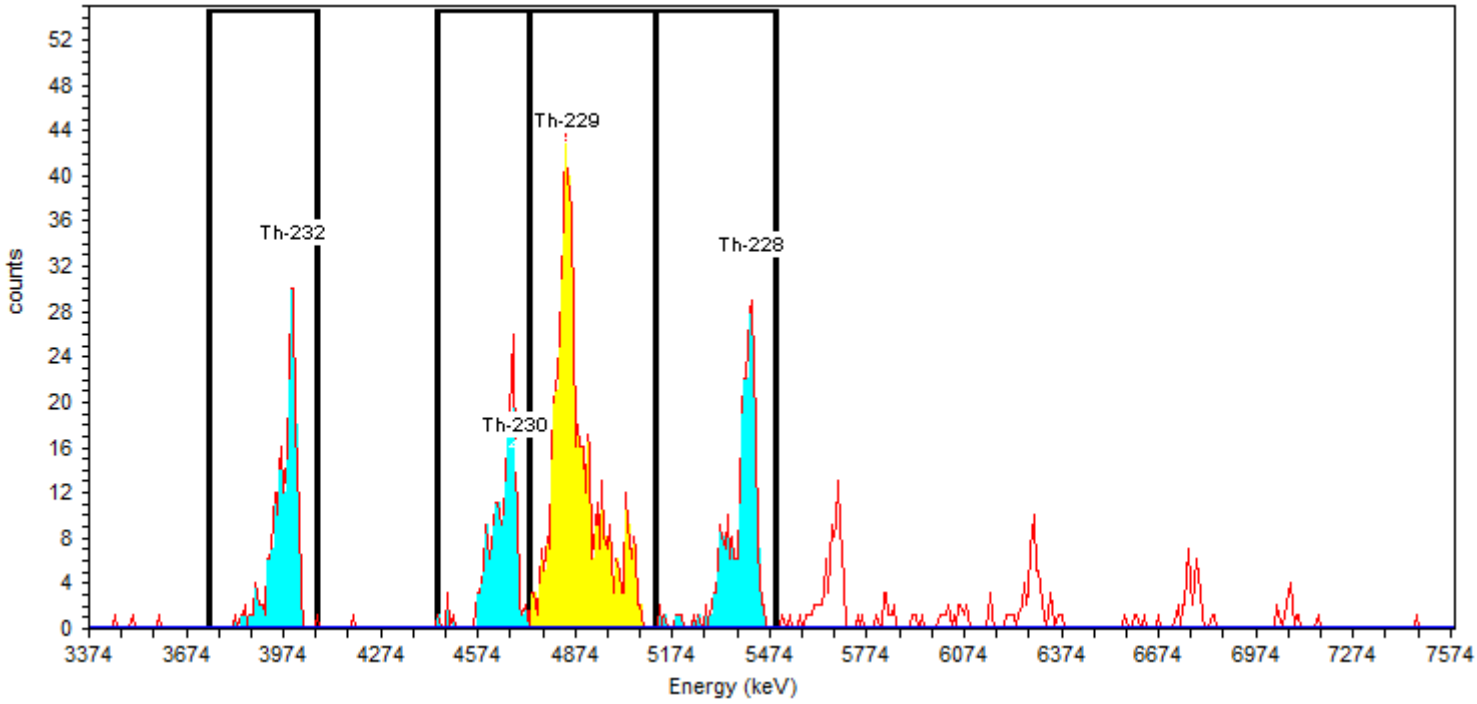
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 85.43%

Acquisition

Detector: AV209 SN: 50-117H7
Acquisition Start Date: 8/25/2016 8:44:06PM
Live Time: 400.00 min.
Real Time: 400.00 min.
Background Date: 7/25/2016 1:14:01PM
Bkgd Info: Sample: ICB;AV209; Det: AV209; Spectrum #1; 7/25/2016 1:14:01 PM

Energy Calibration: IC-9792;AV209-20151018
Efficiency Calibration:IC-9792;AV209-20151018
Calibration Date: 10/18/2015 6:42:01PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.67% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:8/25/2016 8:40:48PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Manual Integration for tailing. 08/26/2016 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	61.5	100.2	231	0.8333	229.71	1.176E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4448.3	4731.7	56.2	99.7	197	0.0000	197.00	1.014E+000	pCi/g
Th-229	4848.0	4,845.3	2.7	4731.7	5119.5	69.2	99.6	588	0.4167	587.58	2.586E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	54.4	99.8	265	6.6667	258.33	1.329E+000	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:24:50AM 8/26/2016

Sample

Sample Name: 160-18426-A-3-C Type: Sample
Spectrum #1 Analysis #1
: 160-18426-A-3-C
Sample Collection Date: 7/29/2016 12:30:00PM
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: 264618
AnalysisResultsID: 175195
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

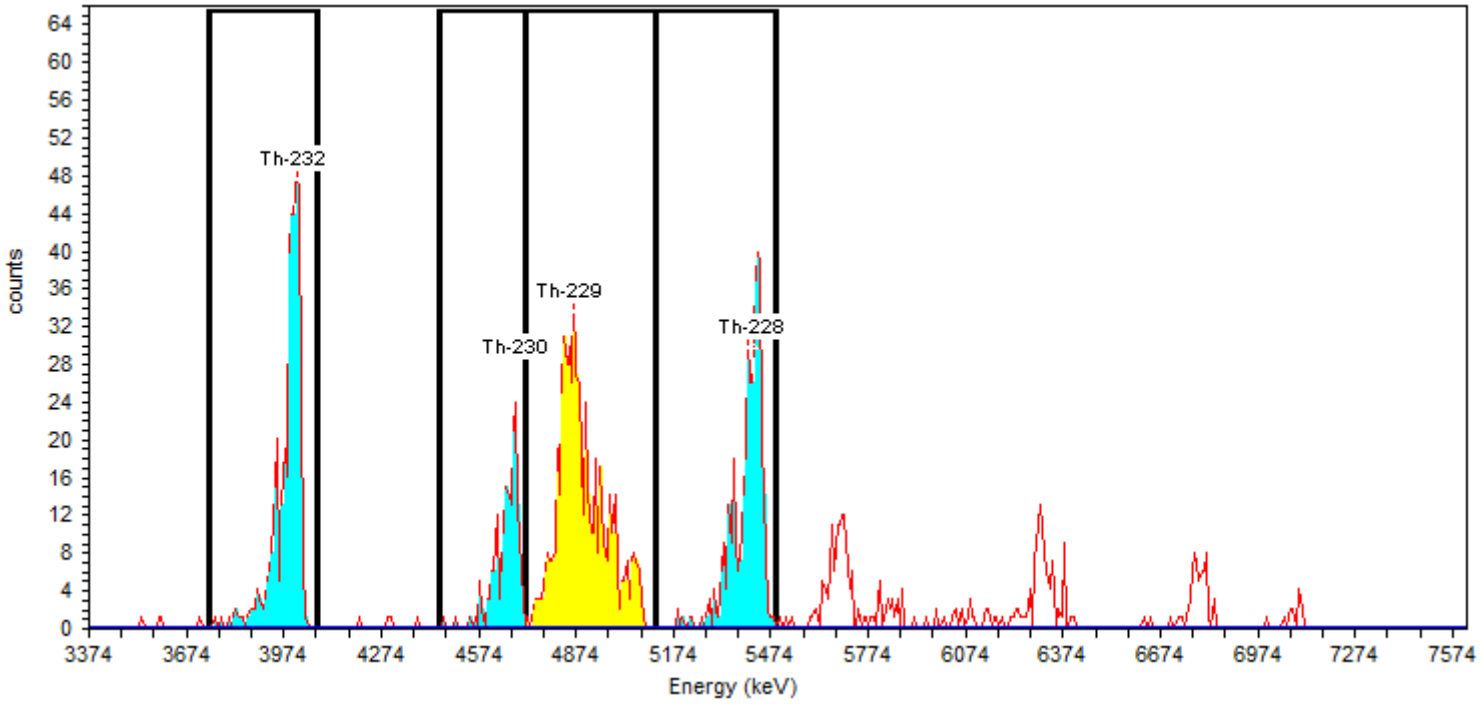
Tracer Name: Th-229_00021
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/16/2014 2:33:14PM

Tracer Nuclide: Th-229
Tracer Recovery: 83.12%

Acquisition

Detector: AV210 SN: 50-119AA1
Acquisition Start Date: 8/25/2016 8:44:06PM
Live Time: 400.00 min.
Real Time: 400.01 min.
Background Date: 7/25/2016 1:14:01PM
Bkgd Info: Sample: ICB;AV210; Det: AV210; Spectrum #1; 7/25/2016 1:14:01 PM

Energy Calibration: IC-9793;AV210-20151018a
Efficiency Calibration:IC-9793;AV210-20151018a
Calibration Date: 10/18/2015 6:42:41PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.37% +/- 0.32% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction:8/25/2016 8:40:48PM
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	391	0.4167	390.58	2.083E+000	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	30.1	99.7	169	0.4167	168.61	9.037E-001	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	86.6	99.6	565	0.0000	565.03	2.519E+000	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	55.7	99.8	368	5.8333	362.25	1.940E+000	pCi/g

Daily Checks

Alpha Spectroscopy Daily Pulser Check

Analysis Date: 08/25/16

		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
AV200	08/25/16 09:43	5979	5688.6 - 6287.4	Pass	16.1	10 - 20	Pass	222.0	216.9 - 226.9	Pass	5023	4981.7 - 5061.7	Pass
AV203	08/25/16 09:43	6018	5646.6 - 6240.9	Pass	14.0	10 - 20	Pass	209.0	204.0 - 214.0	Pass	4926	4885.5 - 4965.5	Pass
AV206	08/25/16 09:43	6000	5675.7 - 6273.2	Pass	14.4	10 - 20	Pass	220.8	216.1 - 226.1	Pass	5014	4975.8 - 5055.8	Pass
AV208	08/25/16 09:43	5803	5698.3 - 6298.1	Pass	13.0	10 - 20	Pass	224.0	219.0 - 229.0	Pass	5037	4997.1 - 5077.1	Pass
AV209	08/25/16 09:43	6027	5544.5 - 6128.1	Pass	13.7	10 - 20	Pass	221.0	216.5 - 226.5	Pass	5015	4979.1 - 5059.1	Pass
AV210	08/25/16 09:43	6010	5674.3 - 6271.6	Pass	15.4	10 - 20	Pass	223.0	218.0 - 228.0	Pass	5030	4990.1 - 5070.1	Pass

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:51:47AM 8/25/2016

Sample

Sample Name: Pulser;AV200
Comment:

Spectrum #23 Analysis #1

Batch

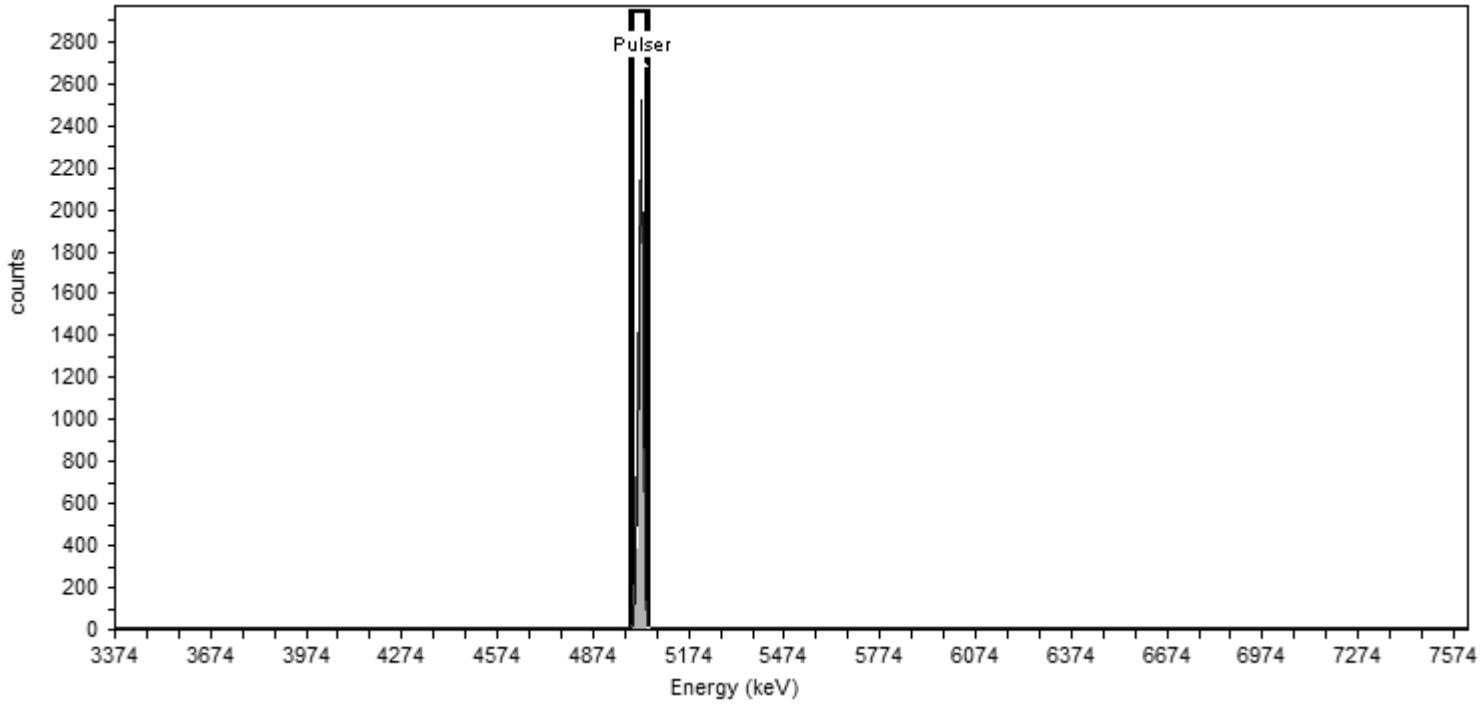
Batch Name: July2016b
Description:

Acquisition

Detector: AV200 , SN: 50-117J6
Acquisition Start Date: 8/25/2016 9:43:04AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9884;AV200-20151017
Calibration Date: 10/18/2015 3:55:33PM

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	5022.853	4995.504	5050.202	16.07	5,804.08	5,979.32

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:51:46AM 8/25/2016

Sample

Sample Name: Pulser;AV203
Comment:

Spectrum #23 Analysis #1

Batch

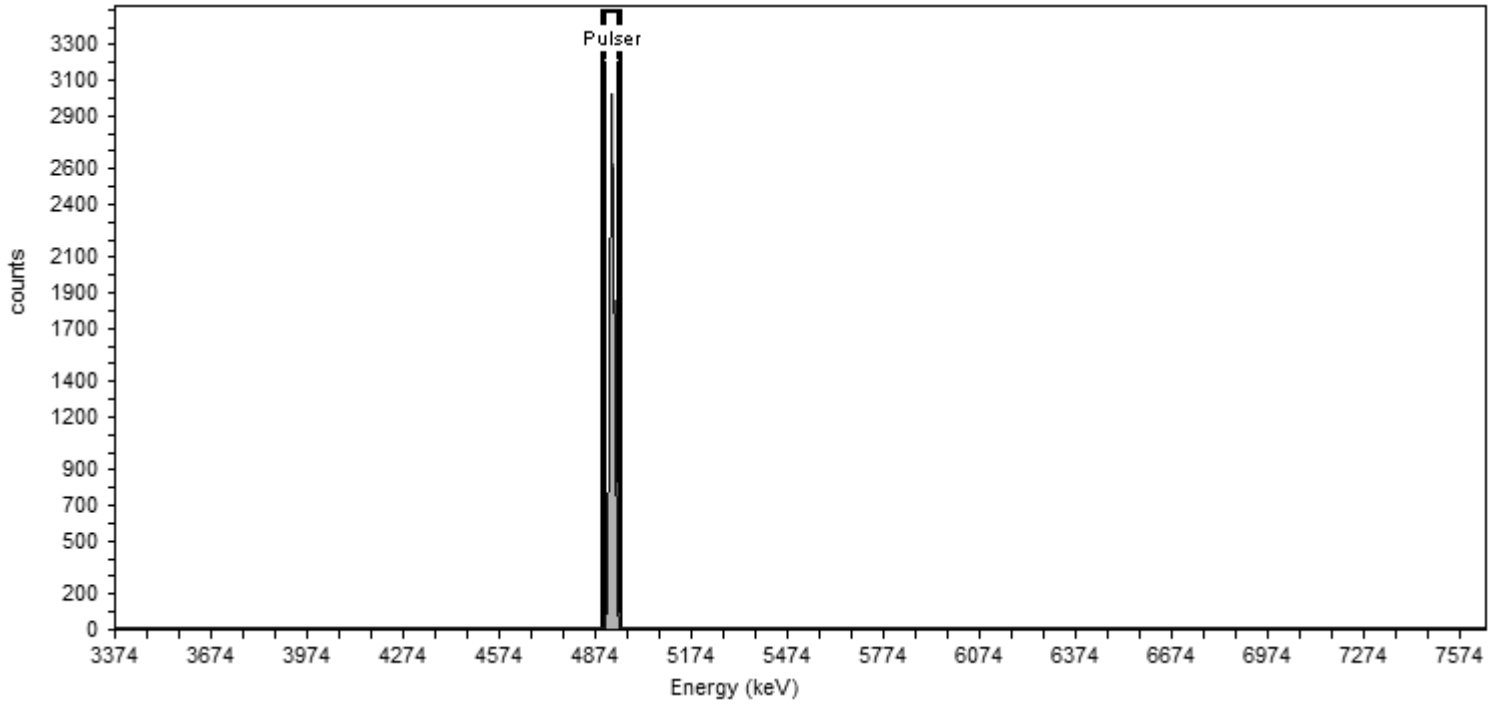
Batch Name: July2016b
Description:

Acquisition

Detector: AV203 , SN: 50-117J4
Acquisition Start Date: 8/25/2016 9:43:04AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-7107;AV203-20151018a
Calibration Date: 10/18/2015 6:42:12PM

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	4925.548	4901.761	4949.336	13.98	6,057.67	6,018.03

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:51:49AM 8/25/2016

Sample

Sample Name: Pulser;AV206
Comment:

Spectrum #27 Analysis #1

Batch

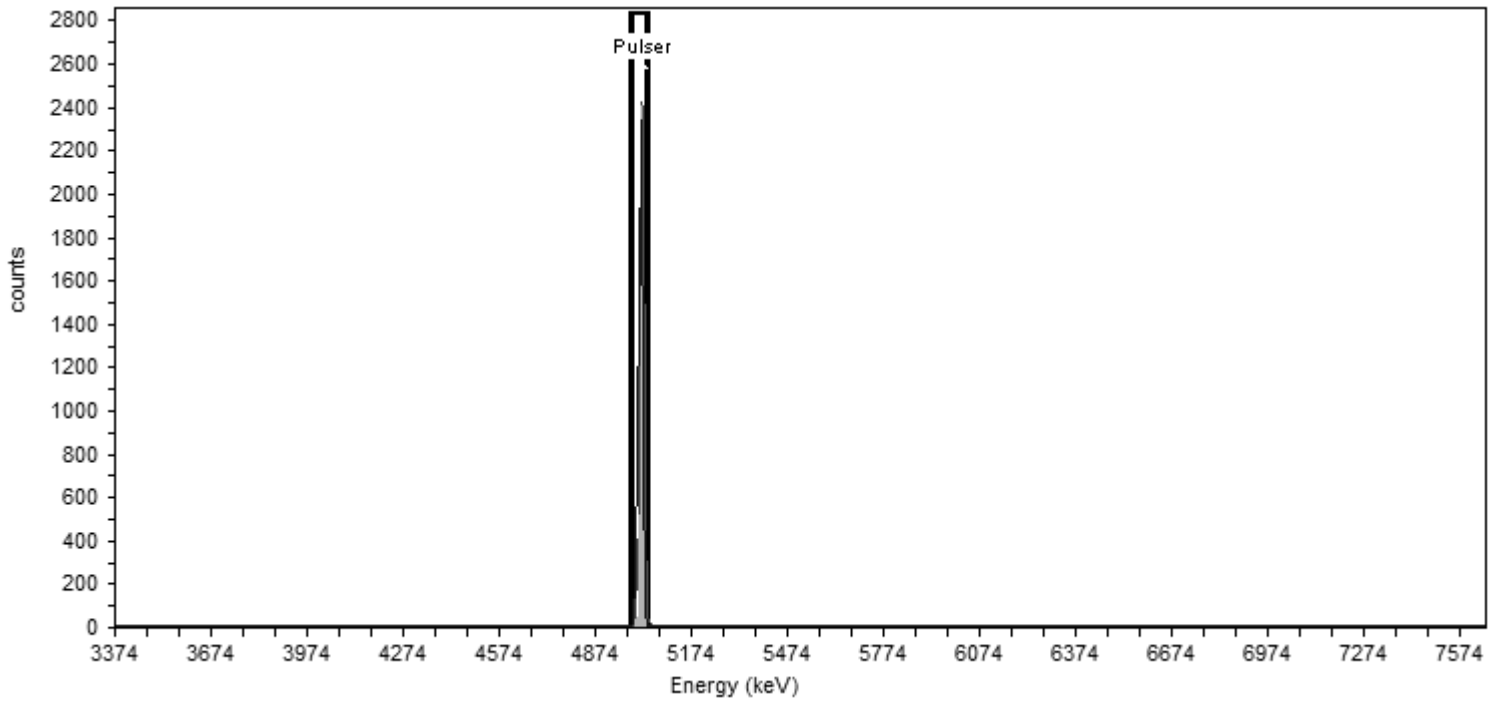
Batch Name: July2016b
Description:

Acquisition

Detector: AV206 , SN: 50-119AA6
Acquisition Start Date: 8/25/2016 9:43:04AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-8876;AV206-20151018
Calibration Date: 10/18/2015 6:41:49PM

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	5013.500	4988.943	5038.057	14.43	5,007.36	6,000.21

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:51:51AM 8/25/2016

Sample

Sample Name: Pulser;AV208
Comment:

Spectrum #23 Analysis #1

Batch

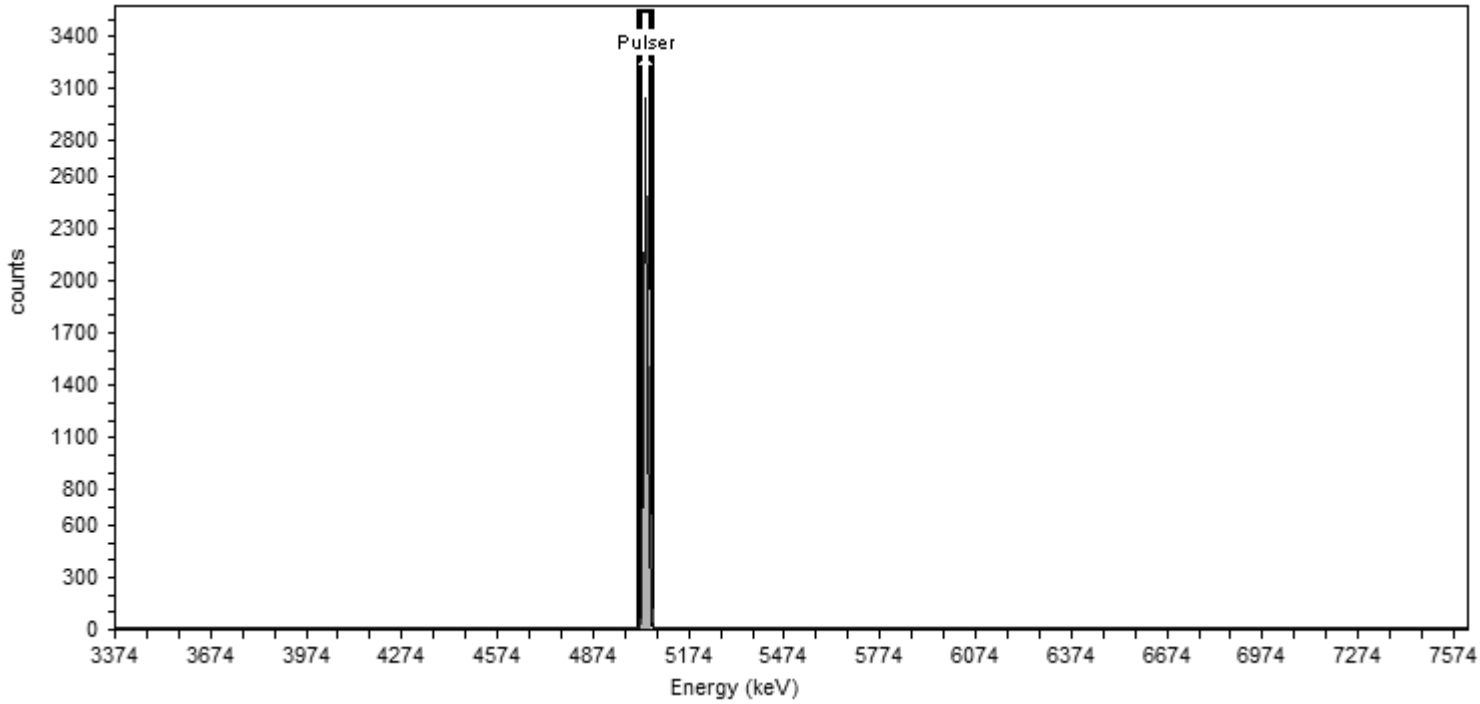
Batch Name: July2016b
Description:

Acquisition

Detector: AV208 , SN: 50-112Z6
Acquisition Start Date: 8/25/2016 9:43:04AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9520;AV208-20151018a
Calibration Date: 10/18/2015 6:42:37PM

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	5037.228	5015.181	5059.275	12.95	5,651.47	5,802.75

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:51:52AM 8/25/2016

Sample

Sample Name: Pulser;AV209
Comment:

Spectrum #23 Analysis #1

Batch

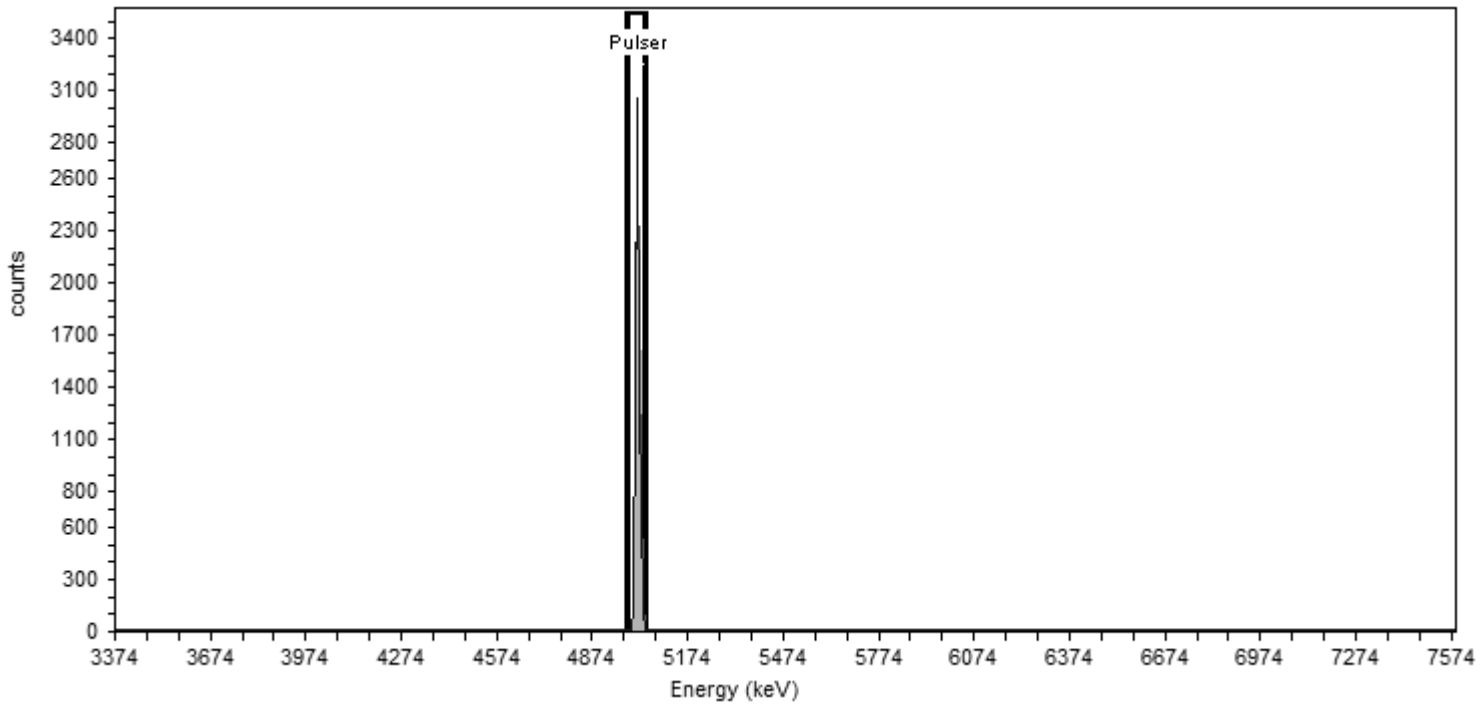
Batch Name: July2016b
Description:

Acquisition

Detector: AV209 , SN: 50-117H7
Acquisition Start Date: 8/25/2016 9:43:05AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9792;AV209-20151018
Calibration Date: 10/18/2015 6:42:01PM

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	5014.939	4991.570	5038.308	13.73	6,019.72	6,026.77

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:51:50AM 8/25/2016

Sample

Sample Name: Pulser;AV210
Comment:

Spectrum #23 Analysis #1

Batch

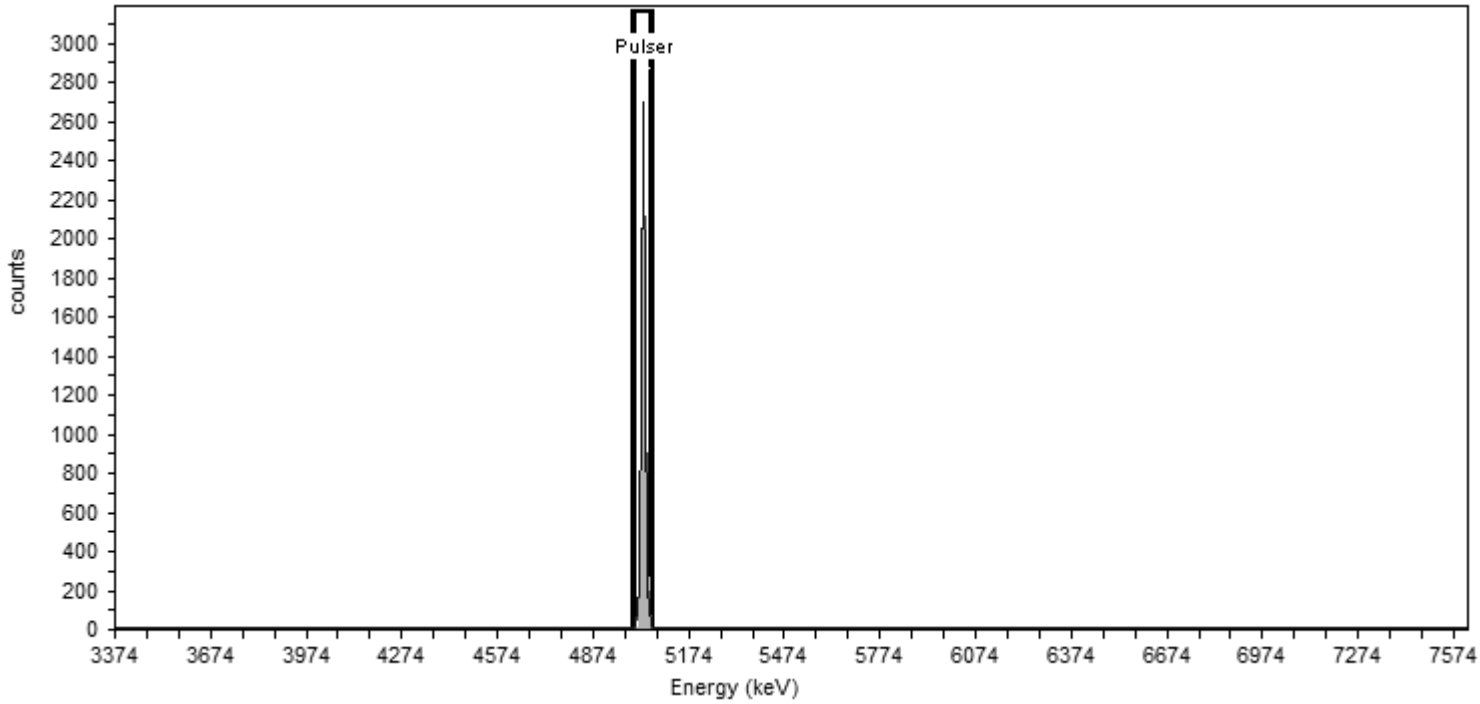
Batch Name: July2016b
Description:

Acquisition

Detector: AV210 , SN: 50-119AA1
Acquisition Start Date: 8/25/2016 9:43:05AM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-9793;AV210-20151018a
Calibration Date: 10/18/2015 6:42:41PM

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	5029.961	5003.757	5056.166	15.40	5,944.32	6,009.86

Initial Calibrations

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:55:34PM 10/18/2015

Calibration

Sample Name: IC-9884;AV200-20151017
Description:
Detector: AV200

Analyst: 60040
Analysis Date: 10/18/2015 3:55:33PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

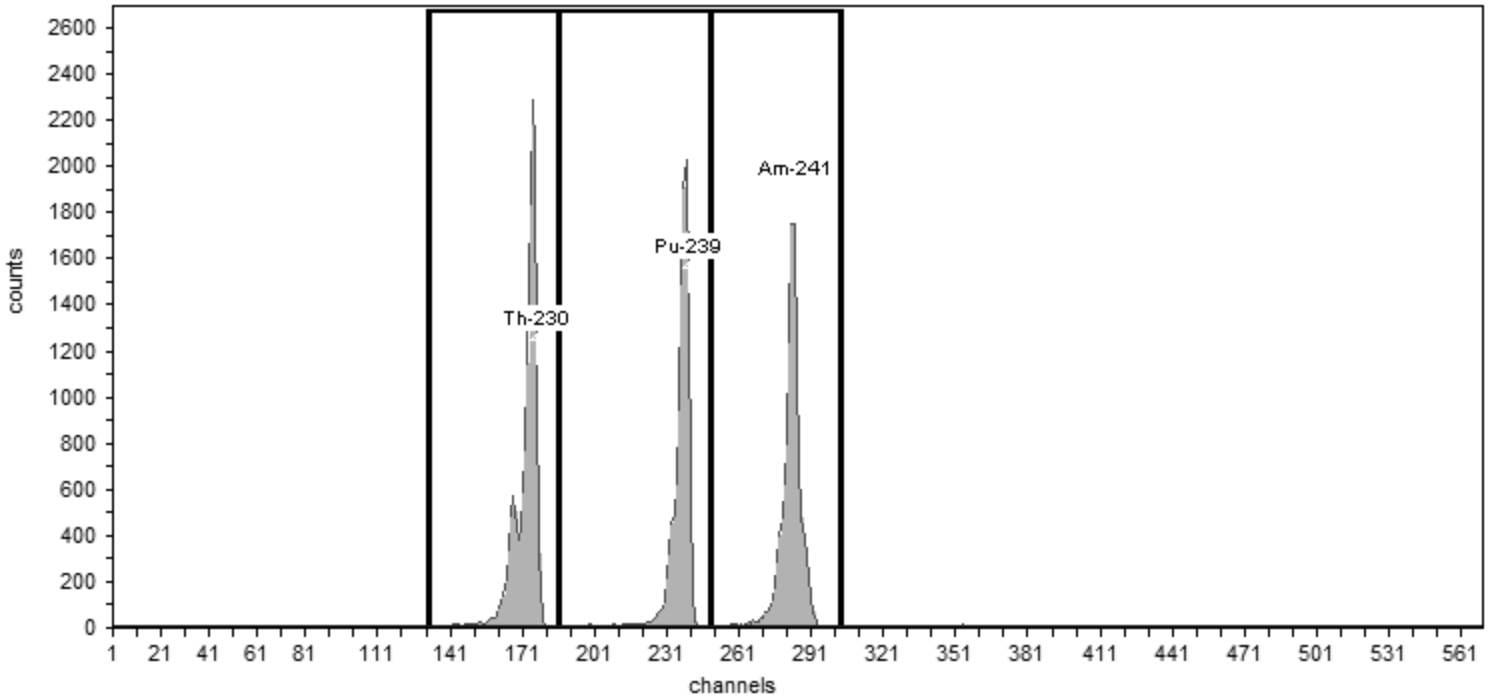
Detector: AV200 , SN: 50-117J6
Acquisition Start Date: 10/17/2015 6:15:29PM

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

Efficiency Calibration Name: IC-9884;AV200-20151017

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

Efficiency: 24.41% +/- 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	29.48	13,618.00	97.27
Pu-239	240	5,155.40	186	249	32.34	11,160.00	79.71
Am-241	284	5,485.70	249	303	33.15	11,444.00	81.74

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:42:13PM 10/18/2015

Calibration

Sample Name: IC-7107;AV203-20151018a
Description:
Detector: AV203

Analyst: 60040
Analysis Date: 10/18/2015 6:42:12PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

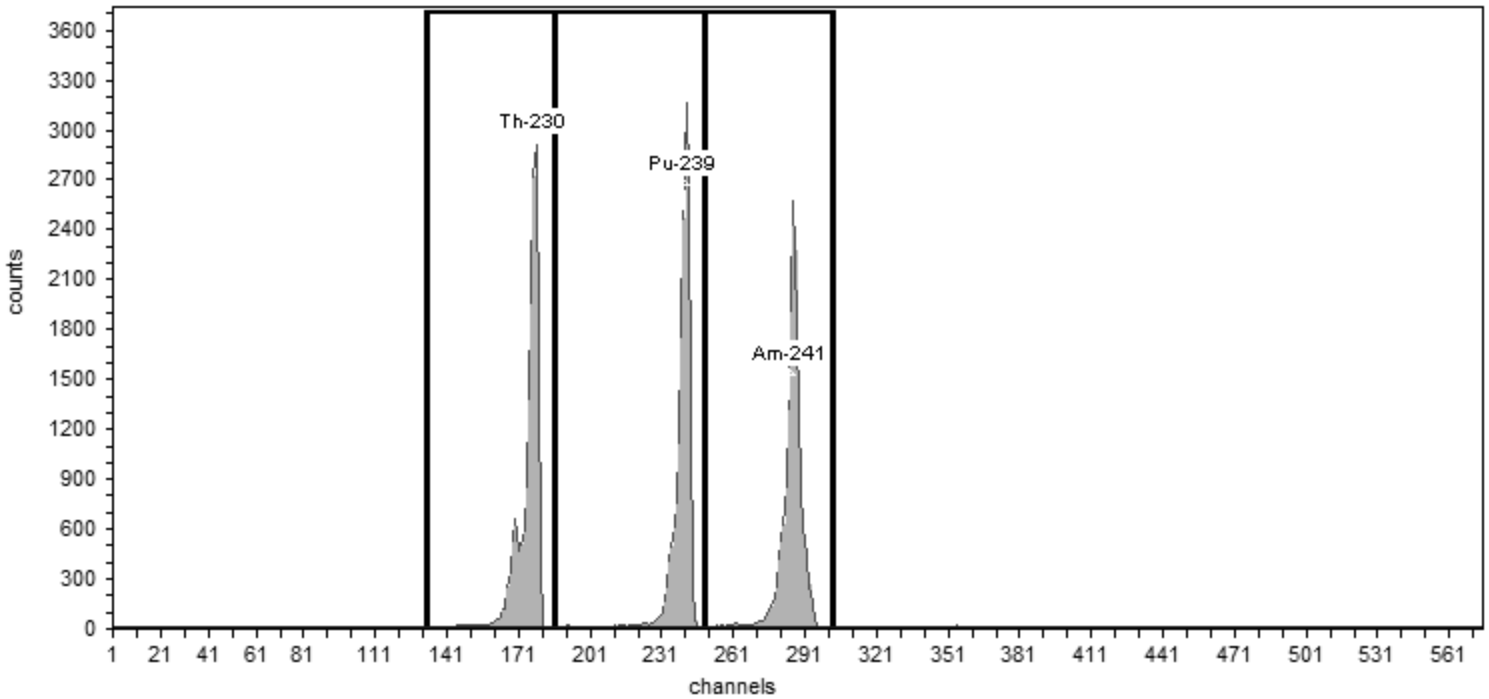
Detector: AV203 , SN: 50-117J4
Acquisition Start Date: 10/18/2015 4:18:34PM

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

Efficiency Calibration Name: IC-7107;AV203-20151018a

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

Efficiency: 25.98% +/- 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	29.84	16,326.00	116.61
Pu-239	240	5,155.40	186	249	30.09	15,954.00	113.96
Am-241	284	5,485.70	249	303	30.75	15,747.00	112.48

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:41:51PM 10/18/2015

Calibration

Sample Name: IC-8876;AV206-20151018
Description:
Detector: AV206

Analyst: 60040
Analysis Date: 10/18/2015 6:41:49PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

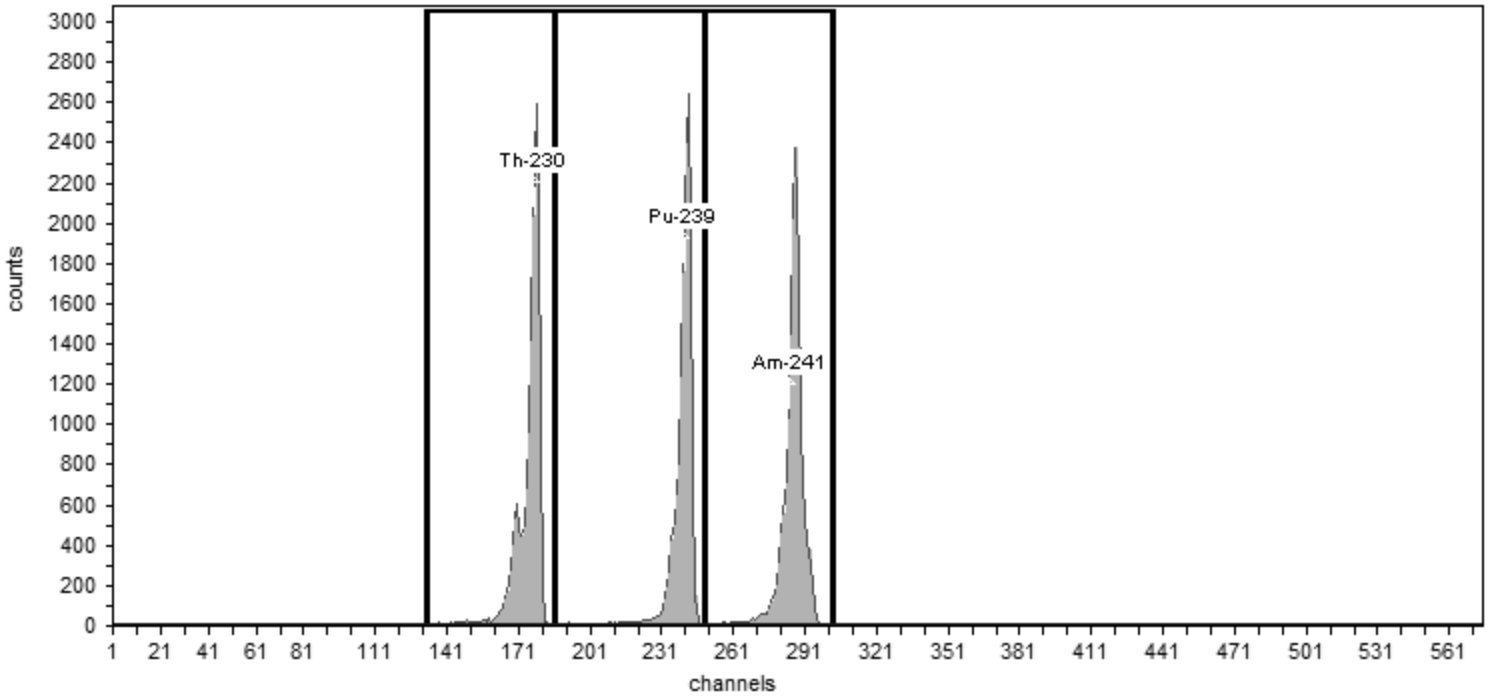
Detector: AV206 , SN: 50-119AA6
Acquisition Start Date: 10/18/2015 4:10:49PM

Live Time: 140.00 min.
Real Time: 140.02 min.

Efficiency Calibration Name: IC-8876;AV206-20151018

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

Efficiency: 24.55% +/- 0.29% 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	29.56	14,971.00	106.94
Pu-239	240	5,155.40	186	249	32.27	14,290.00	102.07
Am-241	284	5,485.70	249	303	32.56	15,026.00	107.33

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:42:38PM 10/18/2015

Calibration

Sample Name: IC-9520;AV208-20151018a
Description:
Detector: AV208

Analyst: 60040
Analysis Date: 10/18/2015 6:42:37PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

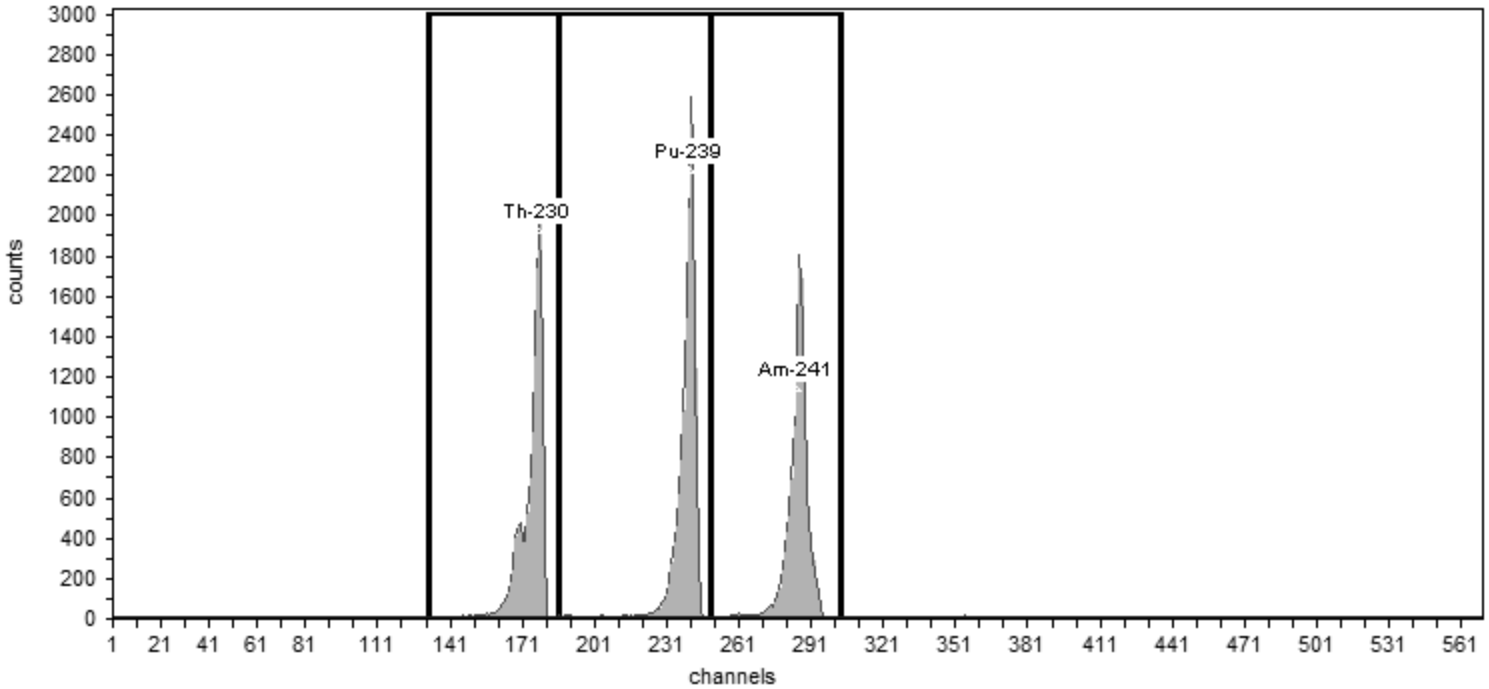
Detector: AV208 , SN: 50-112Z6
Acquisition Start Date: 10/18/2015 4:19:21PM

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

Efficiency Calibration Name: IC-9520;AV208-20151018a

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

Efficiency: 25.52% +/- 0.36% 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	30.93	12,005.00	85.75
Pu-239	240	5,155.40	186	249	32.55	14,370.00	102.64
Am-241	284	5,485.70	249	303	34.84	11,892.00	84.94

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:29:01PM 11/23/2015

Calibration

Sample Name: IC-9792;AV209-20151018
Description:
Detector: AV209

Analyst: 60040
Analysis Date: 10/18/2015 6:42:01PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

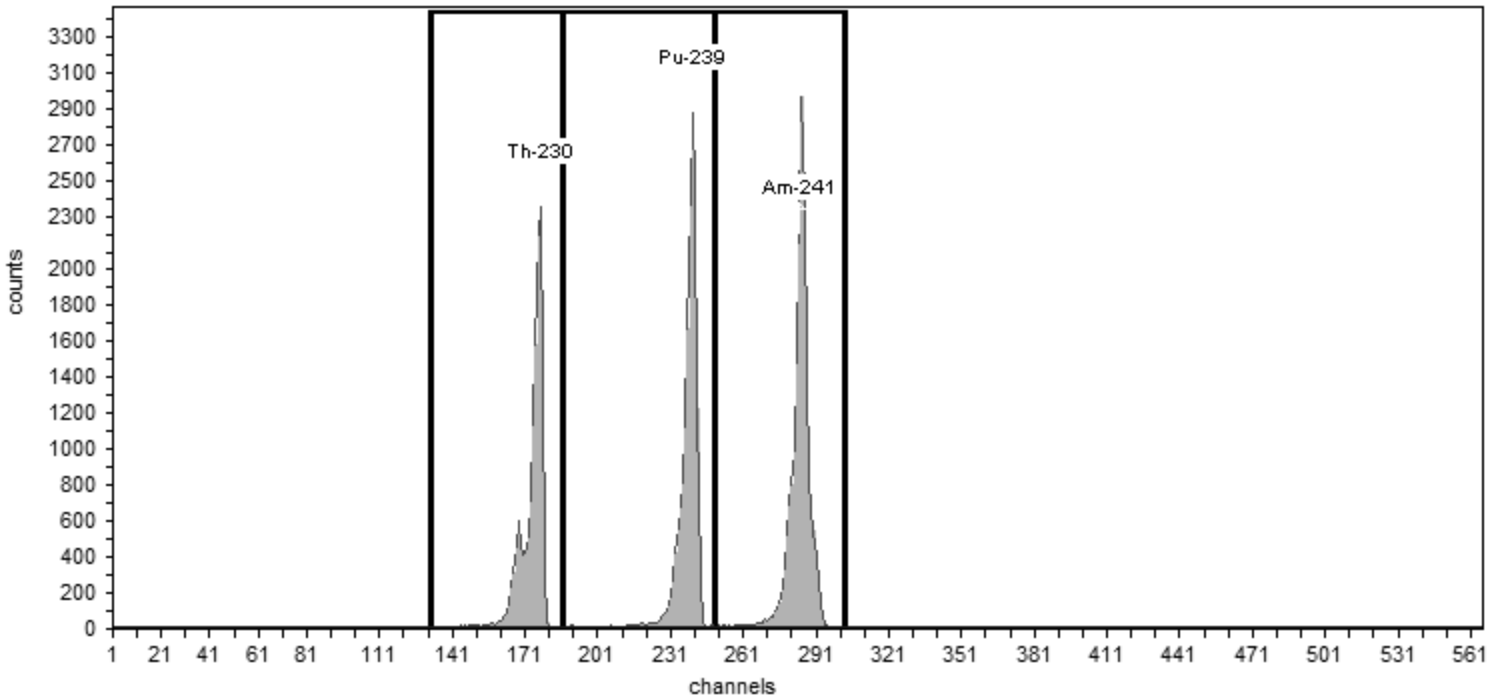
Detector: AV209 , SN: 50-117H7
Acquisition Start Date: 10/18/2015 4:11:29PM

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

Efficiency Calibration Name: IC-9792;AV209-20151018

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

Efficiency: 25.67% +/- 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	30.70	13,691.00	97.79
Pu-239	240	5,155.40	186	249	31.61	15,526.00	110.90
Am-241	284	5,485.70	249	303	29.28	17,594.00	125.67

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

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

Calibration

Sample Name: IC-9793;AV210-20151018a
Description:
Detector: AV210

Analyst: 60040
Analysis Date: 10/18/2015 6:42:41PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

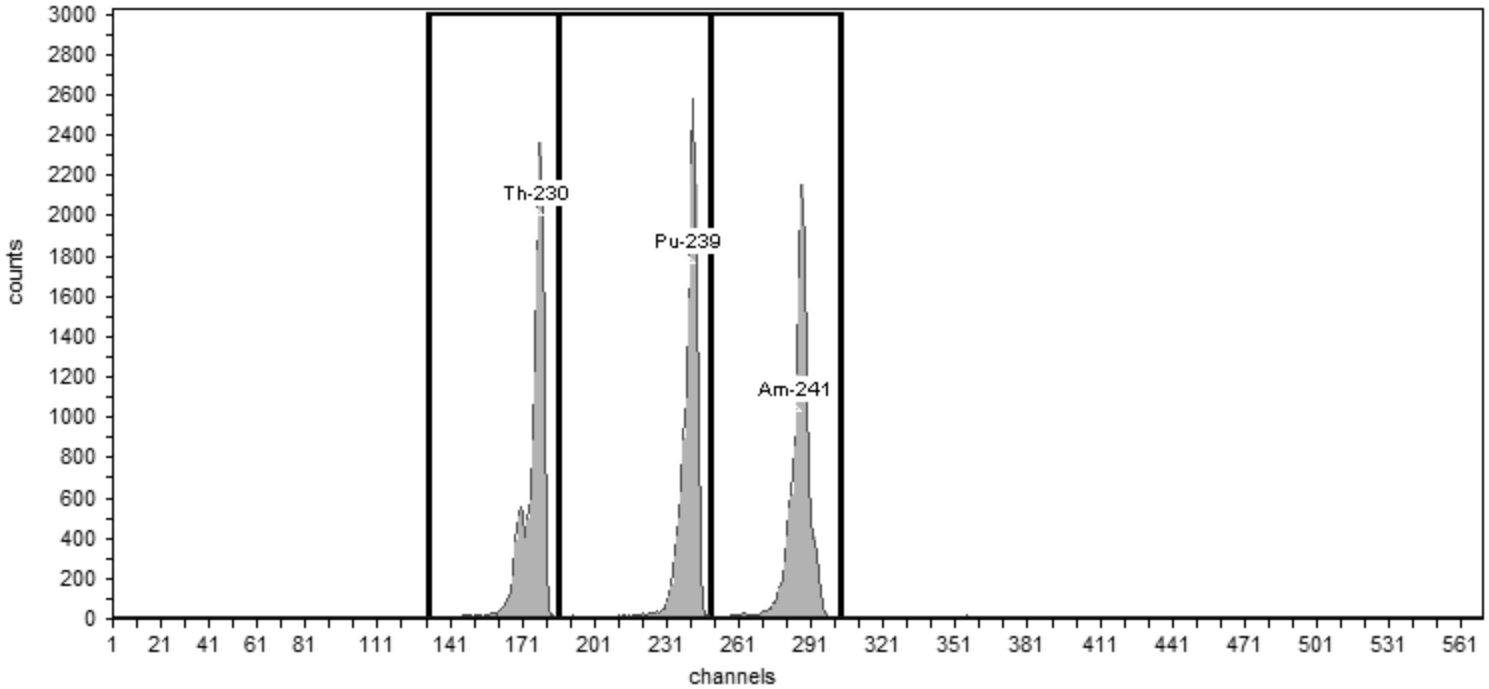
Detector: AV210 , SN: 50-119AA1
Acquisition Start Date: 10/18/2015 4:19:38PM

Live Time: 140.00 min.
Real Time: 140.05 min.

Efficiency Calibration Name: IC-9793;AV210-20151018a

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

Efficiency: 25.37% +/- 0.32% 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	30.49	14,132.00	100.94
Pu-239	240	5,155.40	186	249	32.86	14,534.00	103.81
Am-241	284	5,485.70	249	303	34.07	13,987.00	99.91

Initial Calibration Verifications

Alpha Spectroscopy Calibration Summary

Detector: AV200

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223497/1	10/17/15 18:15	82245-334_00001	0.2441	0.20-0.32		
ICV 160-223615/1	11/01/15 14:26	82234-334_00001	0.2409	0.20-0.32	98.7	95-105
CCV 160-262177/1	07/26/16 12:13	82245-334_00001	0.2323	0.20-0.32	95.2	95-105

Detector: AV203

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223500/1	10/18/15 16:18	82232-334_00001	0.2598	0.20-0.32		
ICV 160-223618/2	11/01/15 18:11	82233-334_00001	0.2646	0.20-0.32	101.9	95-105
CCV 160-262178/1	07/26/16 17:47	82232-334_00001	0.2588	0.20-0.32	99.6	95-105

Detector: AV206

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223503/1	10/18/15 16:10	82235-334_00001	0.2455	0.20-0.32		
ICV 160-223621/1	11/01/15 16:02	82247-334_00001	0.2375	0.20-0.32	96.7	95-105
CCV 160-262180/1	07/26/16 19:07	82235-334_00001	0.2335	0.20-0.32	95.1	95-105

Detector: AV208

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223505/1	10/18/15 16:19	82237-334_00003	0.2552	0.20-0.32		
ICV 160-223623/1	11/01/15 16:11	82242-334_00001	0.2536	0.20-0.32	99.4	95-105
CCV 160-262182/1	07/26/16 12:14	82237-334_00003	0.2538	0.20-0.32	99.4	95-105

Detector: AV209

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223506/1	10/18/15 16:11	82240-334_00001	0.2567	0.20-0.32		
ICV 160-223624/1	11/01/15 16:11	82243-334_00001	0.2597	0.20-0.32	101.2	95-105
CCV 160-262183/1	07/26/16 13:39	82240-334_00001	0.2552	0.20-0.32	99.4	95-105

Detector: AV210

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-223507/1	10/18/15 16:19	82241-334_00001	0.2537	0.20-0.32		
ICV 160-223625/1	11/01/15 16:03	82244-334_00001	0.2488	0.20-0.32	98.0	95-105
CCV 160-262184/1	07/26/16 10:46	82241-334_00001	0.2473	0.20-0.32	97.5	95-105

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:56:11PM 11/1/2015

Calibration

Sample Name: ICV-8875;AV200-20151101
Description:
Detector: AV200

Analyst: 60040
Analysis Date: 11/1/2015 3:56:11PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

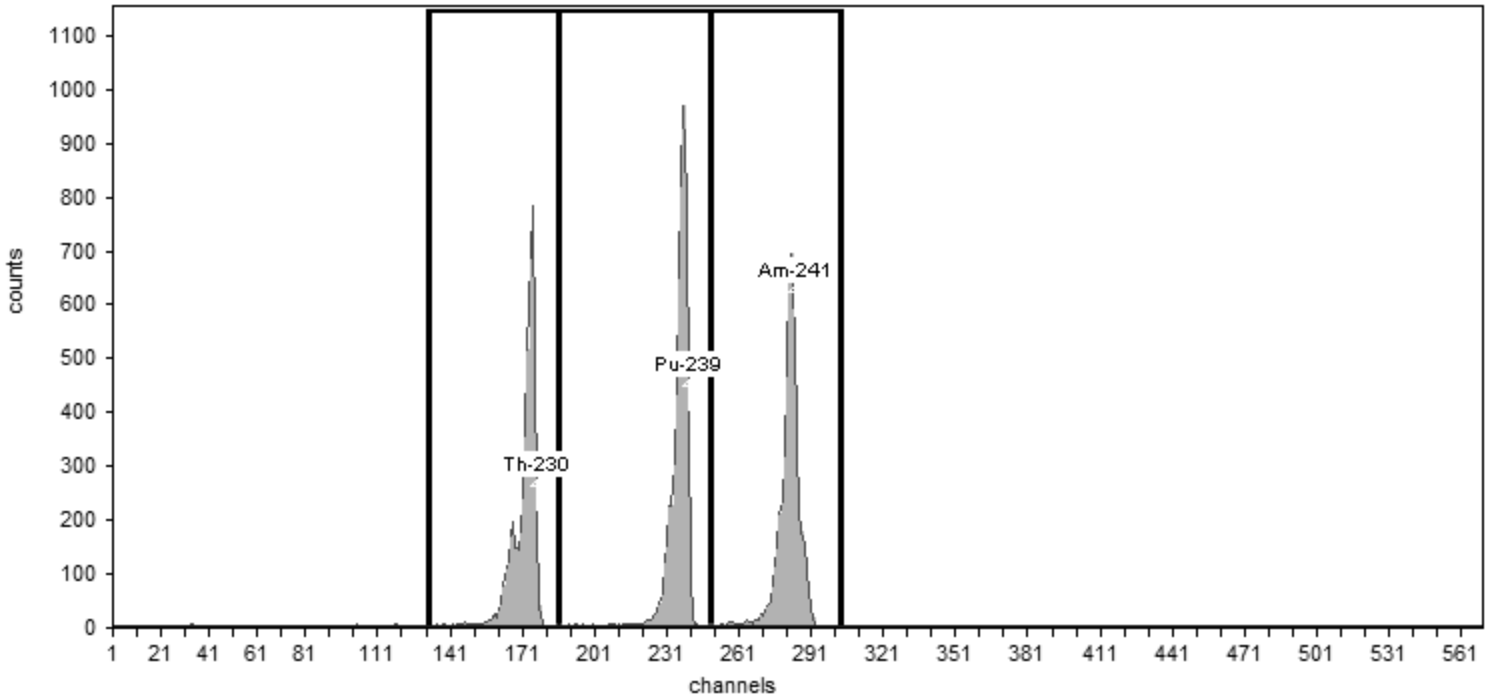
Detector: AV200 , SN: 50-117J6
Acquisition Start Date: 11/1/2015 2:26:11PM

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

Efficiency Calibration Name: ICV-8875;AV200-2015110

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

Efficiency: 24.09% +/- 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	31.02	4,670.00	77.83
Pu-239	240	5,155.40	186	249	33.77	5,472.00	91.20
Am-241	284	5,485.70	249	303	35.49	4,837.00	80.62

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:12:47PM 11/1/2015

Calibration

Sample Name: ICV-8874;AV203-20151101b
Description:
Detector: AV203

Analyst: 60040
Analysis Date: 11/1/2015 7:12:45PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

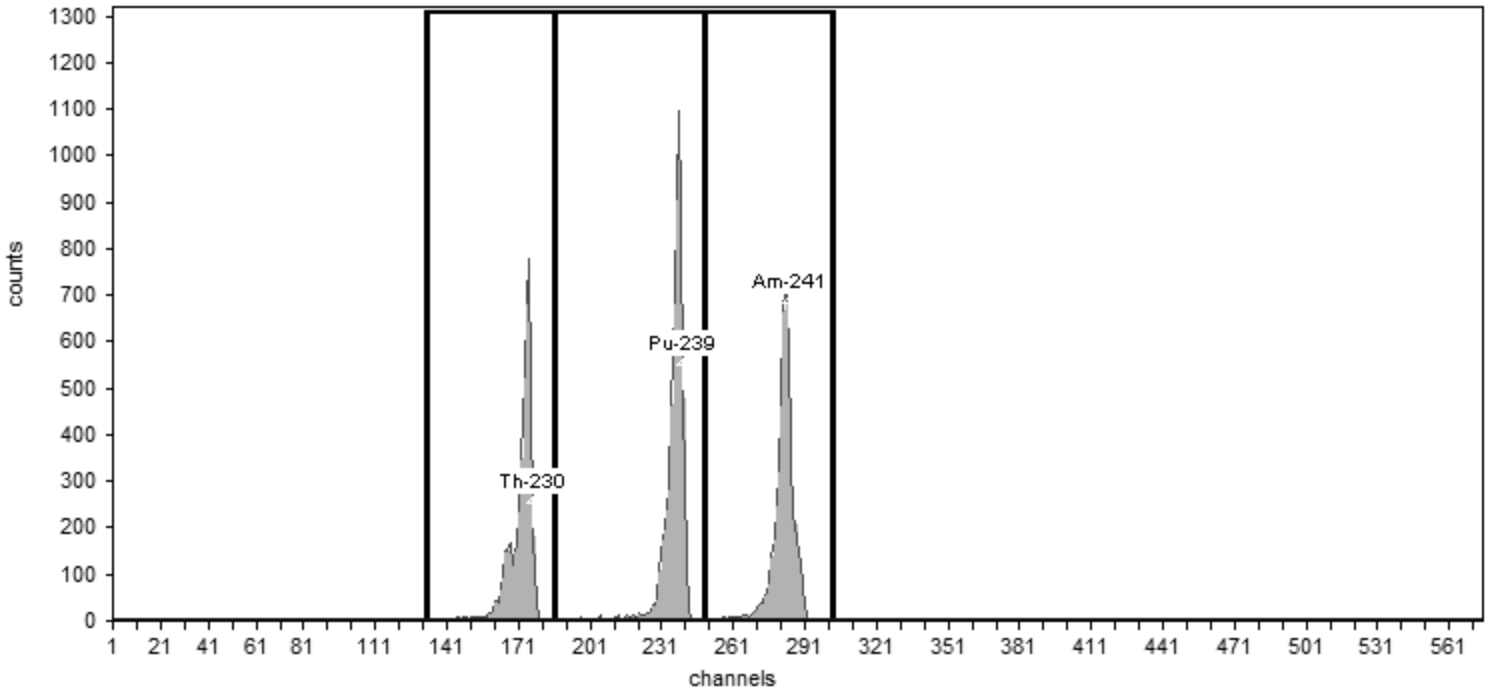
Detector: AV203 , SN: 50-117J4
Acquisition Start Date: 11/1/2015 6:11:42PM

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

Efficiency Calibration Name: ICV-8874;AV203-2015110

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

Efficiency: 26.46% +/- 0.50% 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	30.68	4,516.00	75.27
Pu-239	240	5,155.40	186	249	33.04	5,913.00	98.55
Am-241	284	5,485.70	249	303	33.43	4,905.00	81.75

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:32:31PM 11/23/2015

Calibration

Sample Name: ICV-9886;AV206-20151101
Description:
Detector: AV206

Analyst: 60040
Analysis Date: 11/1/2015 6:06:45PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

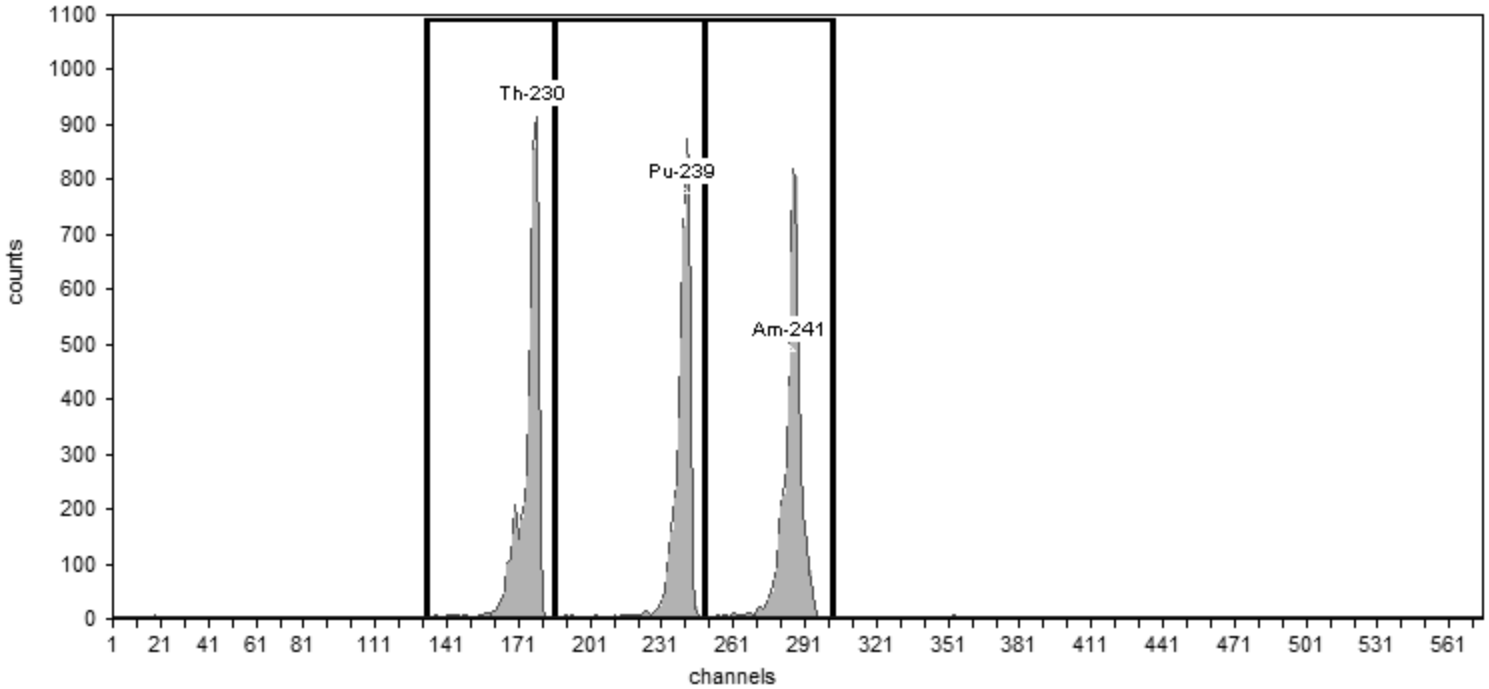
Detector: AV206 , SN: 50-119AA6
Acquisition Start Date: 11/1/2015 4:02:23PM

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

Efficiency Calibration Name: ICV-9886;AV206-2015110

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

Efficiency: 23.75% +/- 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	29.65	5,304.00	88.40
Pu-239	240	5,155.40	186	249	34.18	4,902.00	81.70
Am-241	284	5,485.70	249	303	32.70	5,387.00	89.78

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:07:13PM 11/1/2015

Calibration

Sample Name: ICV-9794;AV208-20151101a
Description:
Detector: AV208

Analyst: 60040
Analysis Date: 11/1/2015 6:07:12PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

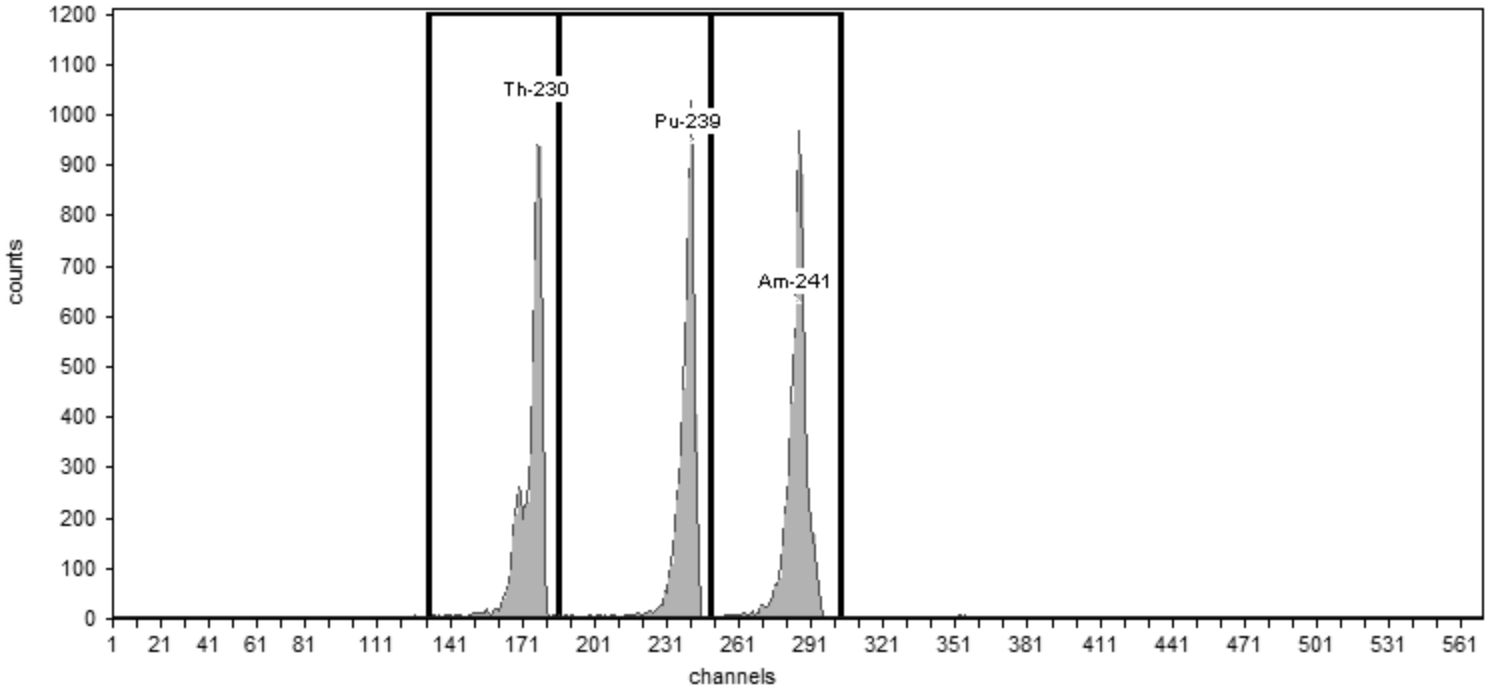
Detector: AV208 , SN: 50-112Z6
Acquisition Start Date: 11/1/2015 4:11:10PM

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

Efficiency Calibration Name: ICV-9794;AV208-2015110

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

Efficiency: 25.36% +/- 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	32.70	6,034.00	100.57
Pu-239	240	5,155.40	186	249	33.04	5,859.00	97.65
Am-241	284	5,485.70	249	303	33.63	6,444.00	107.40

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:32:40PM 11/23/2015

Calibration

Sample Name: ICV-9795;AV209-20151101a
Description:
Detector: AV209

Analyst: 60040
Analysis Date: 11/1/2015 6:07:16PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

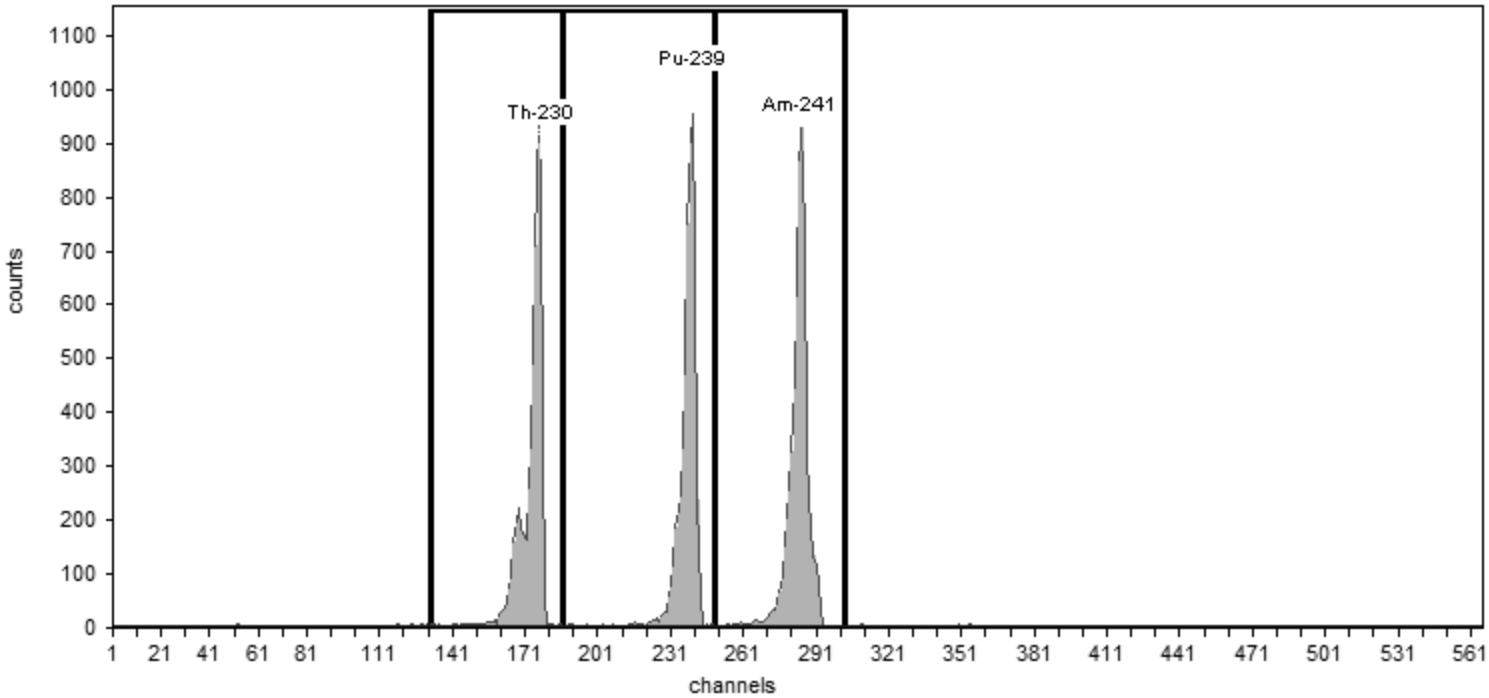
Detector: AV209 , SN: 50-117H7
Acquisition Start Date: 11/1/2015 4:11:24PM

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

Efficiency Calibration Name: ICV-9795;AV209-2015110

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

Efficiency: 25.97% +/- 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	28.41	5,476.00	91.27
Pu-239	240	5,155.40	186	249	33.26	5,485.00	91.42
Am-241	284	5,485.70	249	303	33.82	6,037.00	100.62

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:06:49PM 11/1/2015

Calibration

Sample Name: ICV-9817;AV210-20151101
Description:
Detector: AV210

Analyst: 60040
Analysis Date: 11/1/2015 6:06:48PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

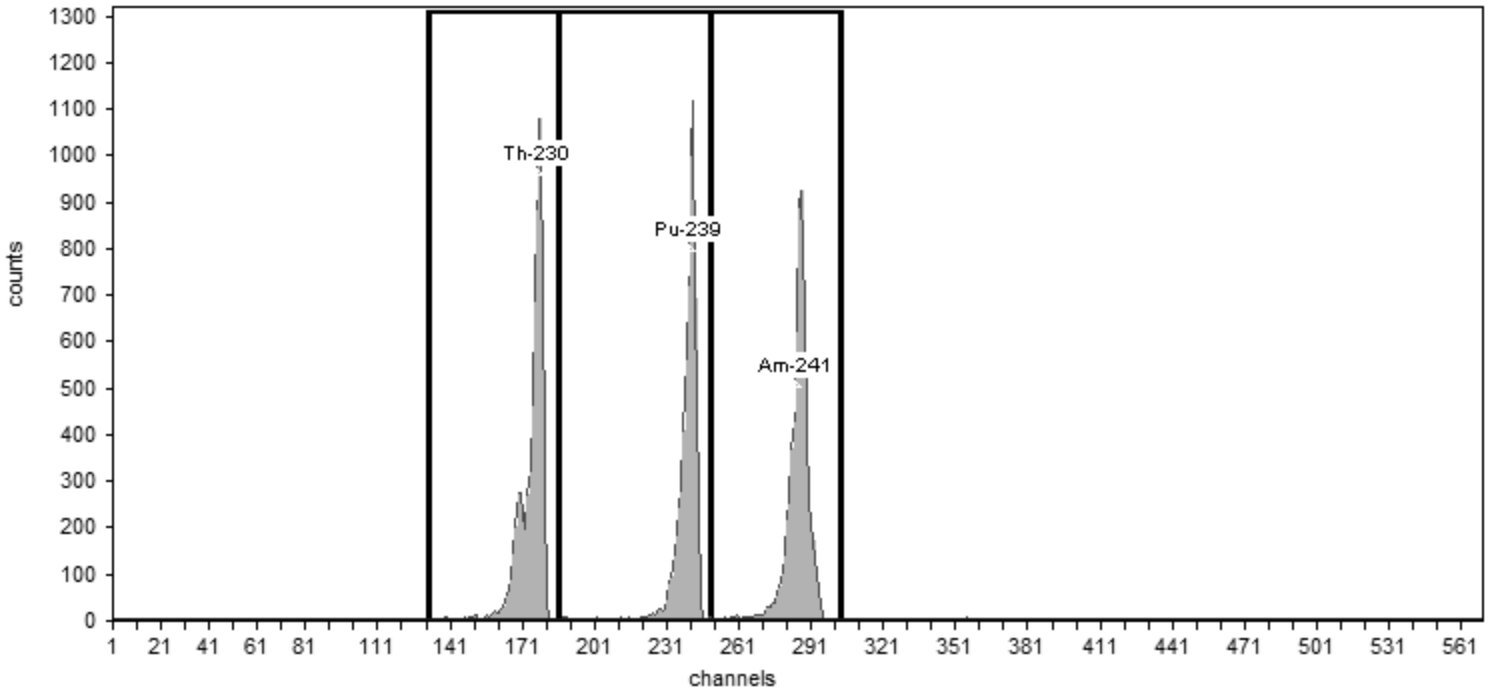
Detector: AV210 , SN: 50-119AA1
Acquisition Start Date: 11/1/2015 4:03:18PM

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

Efficiency Calibration Name: ICV-9817;AV210-2015110

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

Efficiency: 24.88% +/- 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	30.92	6,513.00	108.55
Pu-239	240	5,155.40	186	249	32.12	6,022.00	100.37
Am-241	284	5,485.70	249	303	34.32	6,199.00	103.32

Monthly Calibration Verifications

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:21:44PM 7/26/2016

Calibration

Sample Name: CCV-9884;AV200-20160726
Description:
Detector: AV200

Analyst: 60040
Analysis Date: 7/26/2016 1:21:43PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

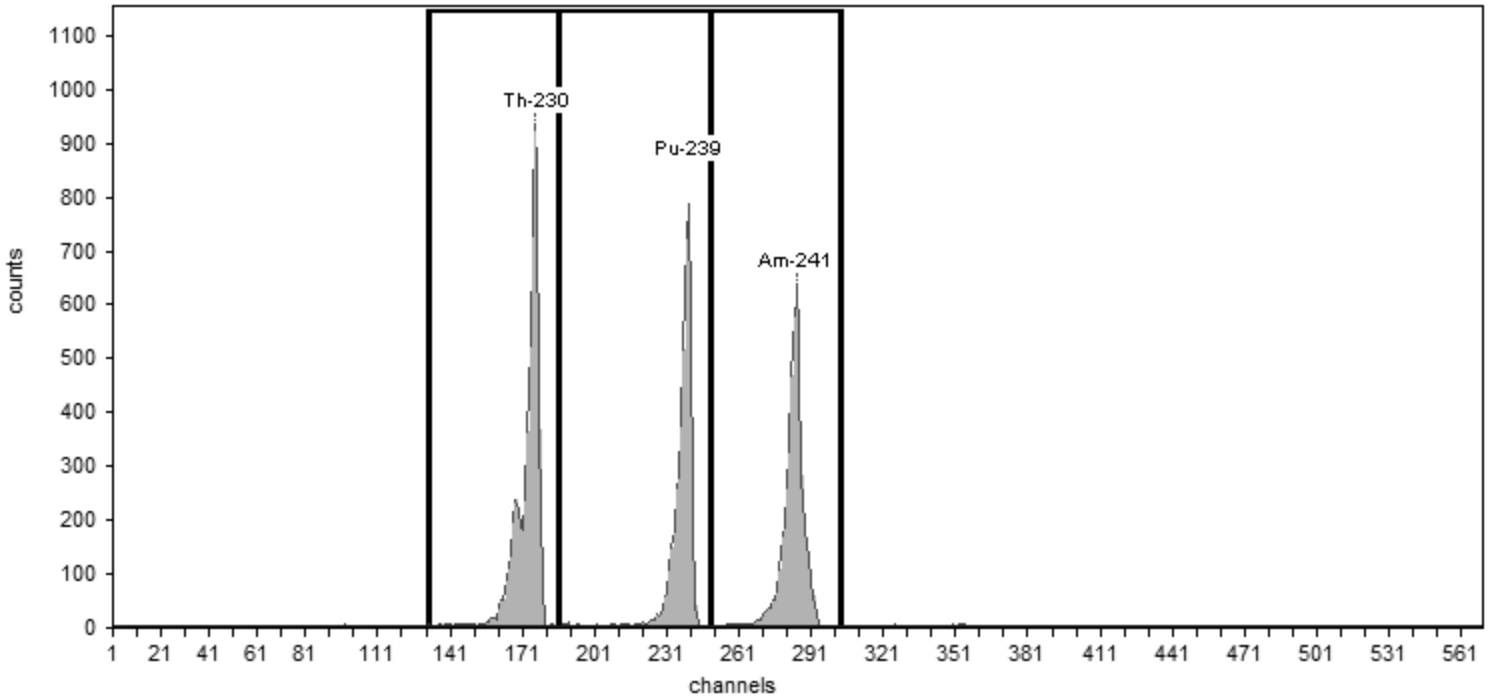
Detector: AV200 , SN: 50-117J6
Acquisition Start Date: 7/26/2016 12:13:27PM

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

Efficiency Calibration Name: CCV-9884;AV200-201607

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

Efficiency: 23.23% +/- 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	29.82	5,734.00	95.57
Pu-239	240	5,155.40	186	249	32.46	4,488.00	74.80
Am-241	284	5,485.70	249	303	33.51	4,531.00	75.52

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:00:29PM 7/26/2016

Calibration

Sample Name: CCV-7107;AV203-20160726
Description:
Detector: AV203

Analyst: 60040
Analysis Date: 7/26/2016 7:00:28PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

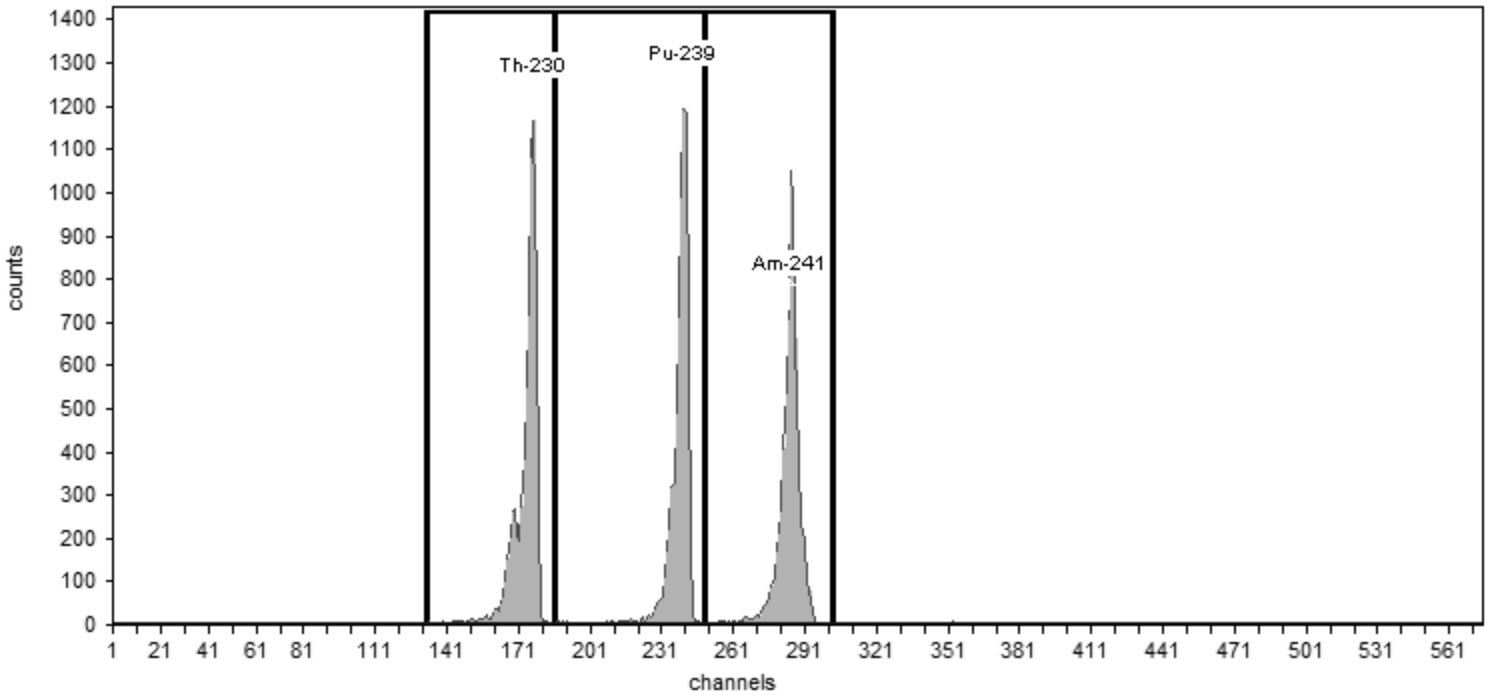
Detector: AV203 , SN: 50-117J4
Acquisition Start Date: 7/26/2016 5:47:17PM

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

Efficiency Calibration Name: CCV-7107;AV203-201607

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

Efficiency: 25.88% +/- 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	30.86	6,910.00	115.17
Pu-239	240	5,155.40	186	249	34.24	6,891.00	114.85
Am-241	284	5,485.70	249	303	33.90	6,698.00	111.63

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:07:36AM 7/27/2016

Calibration

Sample Name: CCV-8876;AV206-20160726
Description:
Detector: AV206

Analyst: 60040
Analysis Date: 7/27/2016 6:07:35AM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

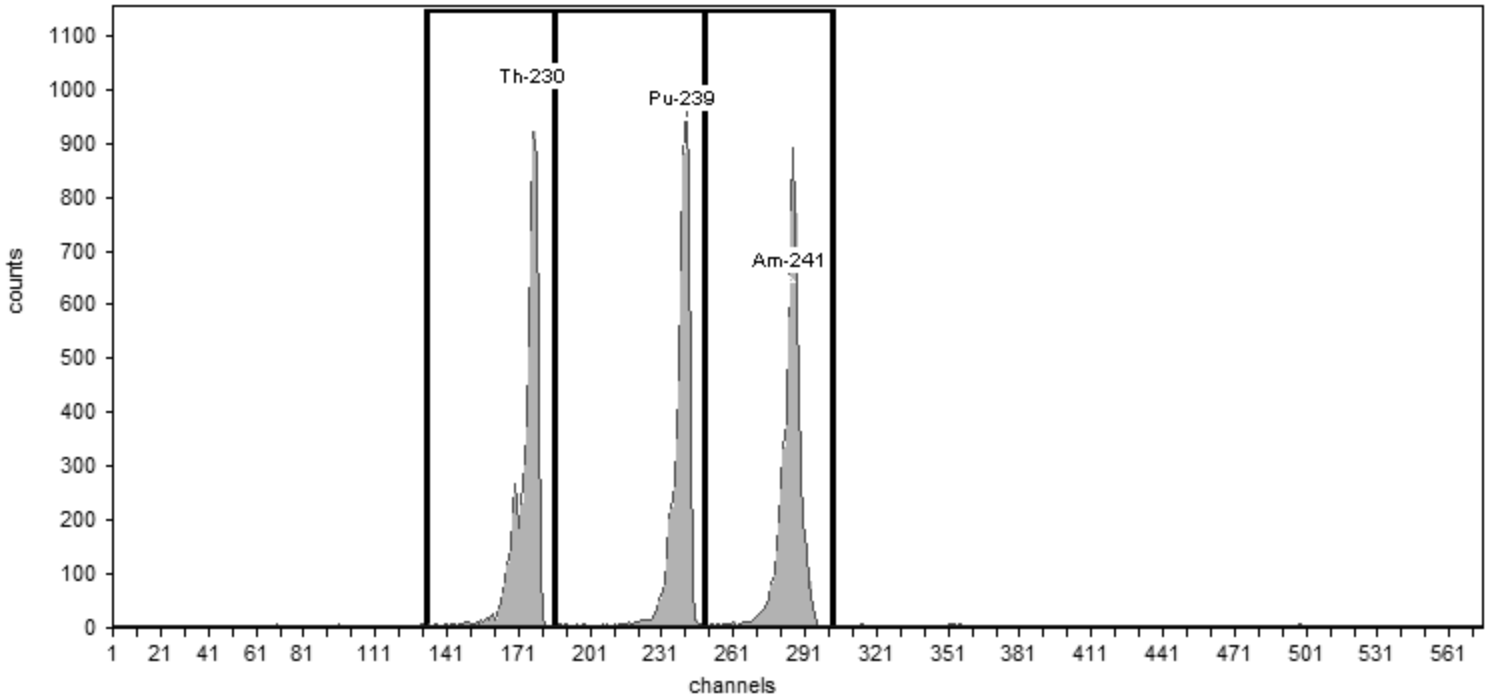
Detector: AV206 , SN: 50-119AA6
Acquisition Start Date: 7/26/2016 7:07:26PM

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

Efficiency Calibration Name: CCV-8876;AV206-201607

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

Efficiency: 23.35% +/- 0.39% 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	32.55	6,077.00	101.28
Pu-239	240	5,155.40	186	249	34.60	5,809.00	96.82
Am-241	284	5,485.70	249	303	34.64	6,160.00	102.67

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:22:38PM 7/26/2016

Calibration

Sample Name: CCV-9520;AV208-20160726
Description:
Detector: AV208

Analyst: 60040
Analysis Date: 7/26/2016 1:22:37PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

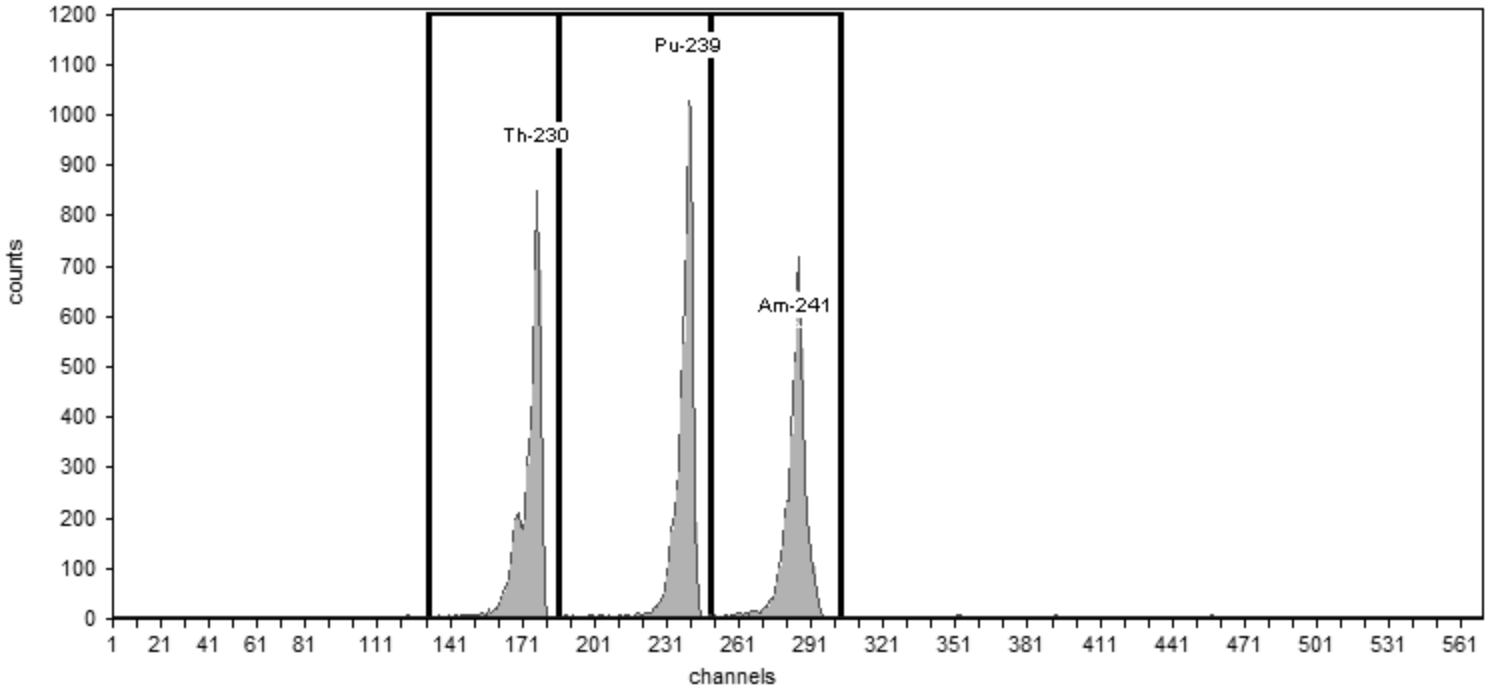
Detector: AV208 , SN: 50-112Z6
Acquisition Start Date: 7/26/2016 12:14:17PM

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

Efficiency Calibration Name: CCV-9520;AV208-201607

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

Efficiency: 25.38% +/- 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	30.13	5,259.00	87.65
Pu-239	240	5,155.40	186	249	34.16	6,039.00	100.65
Am-241	284	5,485.70	249	303	35.47	4,999.00	83.32

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:49:58PM 7/26/2016

Calibration

Sample Name: CCV-9792;AV209-20160726
Description:
Detector: AV209

Analyst: 60040
Analysis Date: 7/26/2016 2:49:57PM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

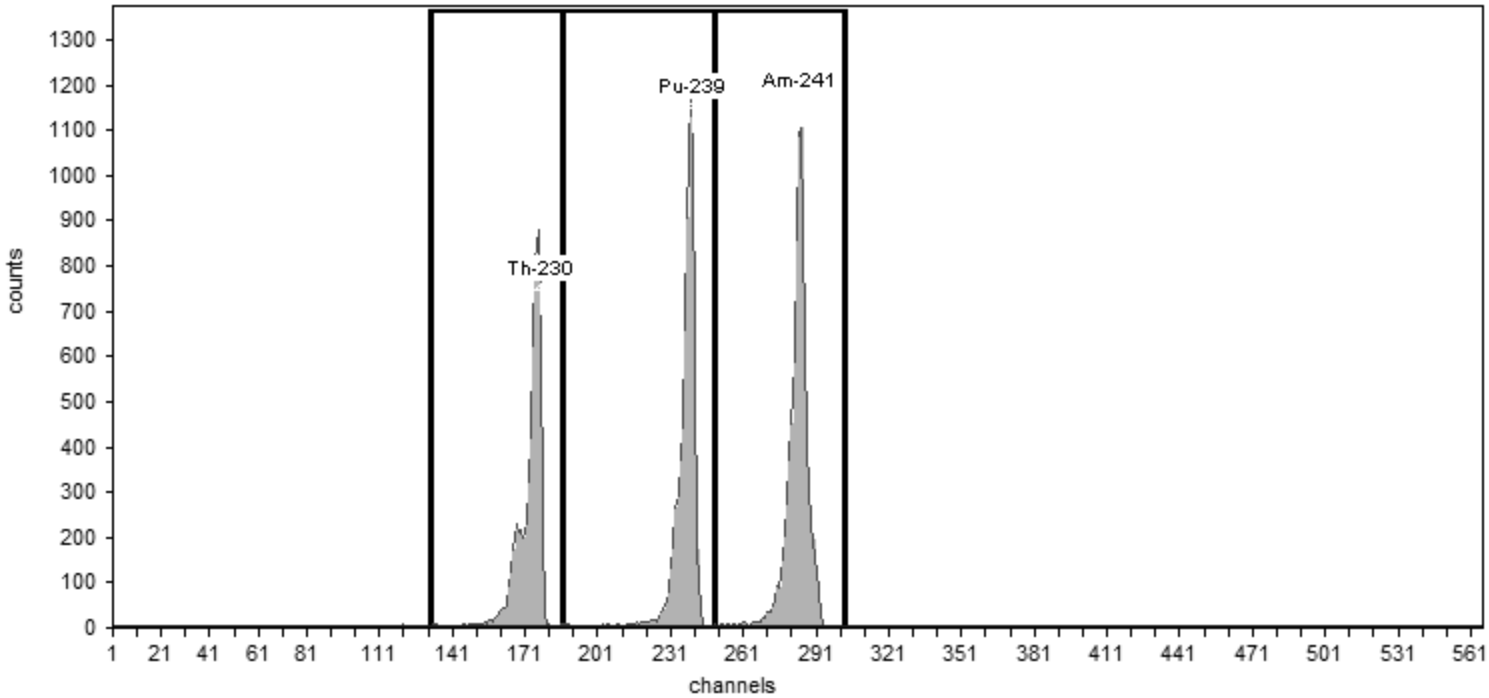
Detector: AV209 , SN: 50-117H7
Acquisition Start Date: 7/26/2016 1:39:54PM

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

Efficiency Calibration Name: CCV-9792;AV209-201607

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

Efficiency: 25.52% +/- 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	32.80	5,705.00	95.08
Pu-239	240	5,155.40	186	249	31.98	6,667.00	111.12
Am-241	284	5,485.70	249	303	34.51	7,555.00	125.92

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:49:34AM 7/26/2016

Calibration

Sample Name: CCV-9793;AV210-20160726
Description:
Detector: AV210

Analyst: 60040
Analysis Date: 7/26/2016 11:49:32AM
Calibration Type: Energy And Efficiency

Source Info

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

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

Acquisition

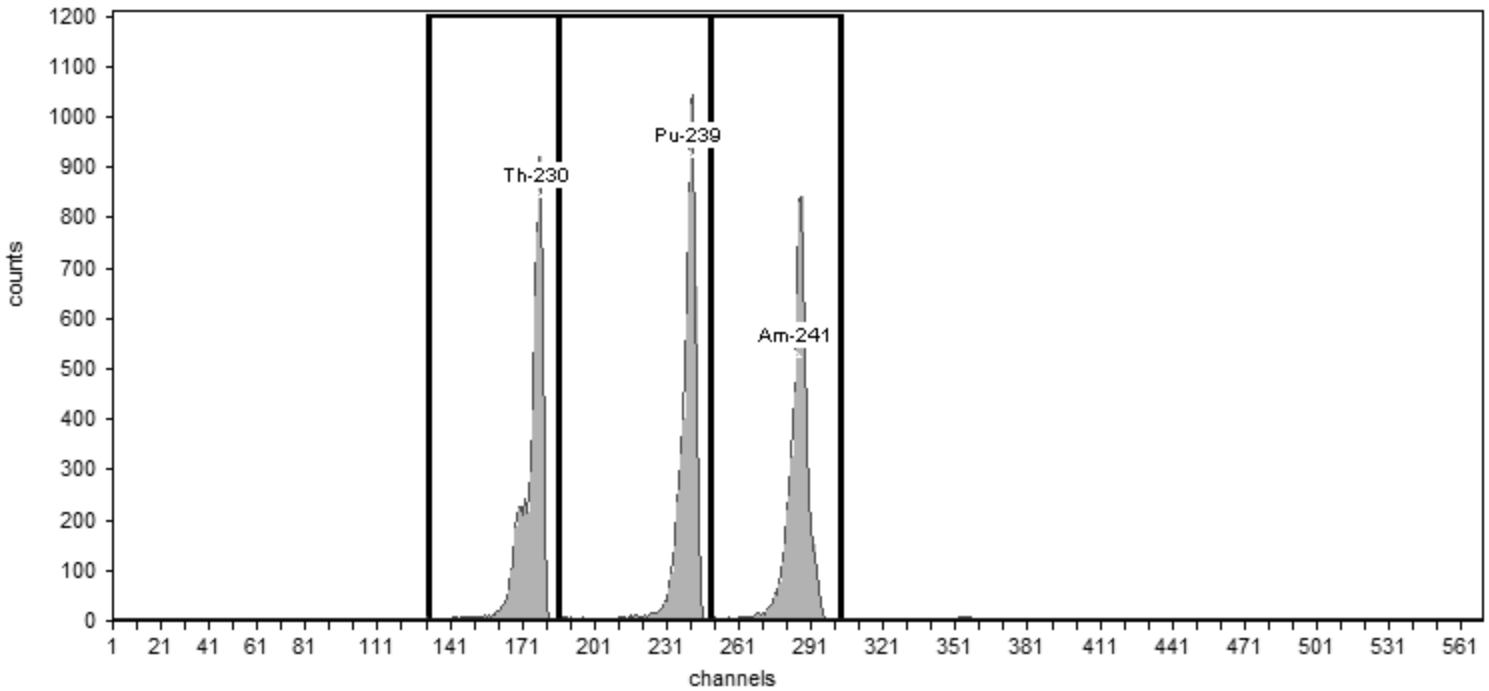
Detector: AV210 , SN: 50-119AA1
Acquisition Start Date: 7/26/2016 10:46:50AM

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

Efficiency Calibration Name: CCV-9793;AV210-201607

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

Efficiency: 24.73% +/- 0.42% 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	31.97	5,724.00	95.40
Pu-239	240	5,155.40	186	249	35.25	6,223.00	103.72
Am-241	284	5,485.70	249	303	37.03	5,877.00	97.95

Monthly Backgrounds

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:16:08AM 7/26/2016

Sample

Sample Name: ICB;AV200
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

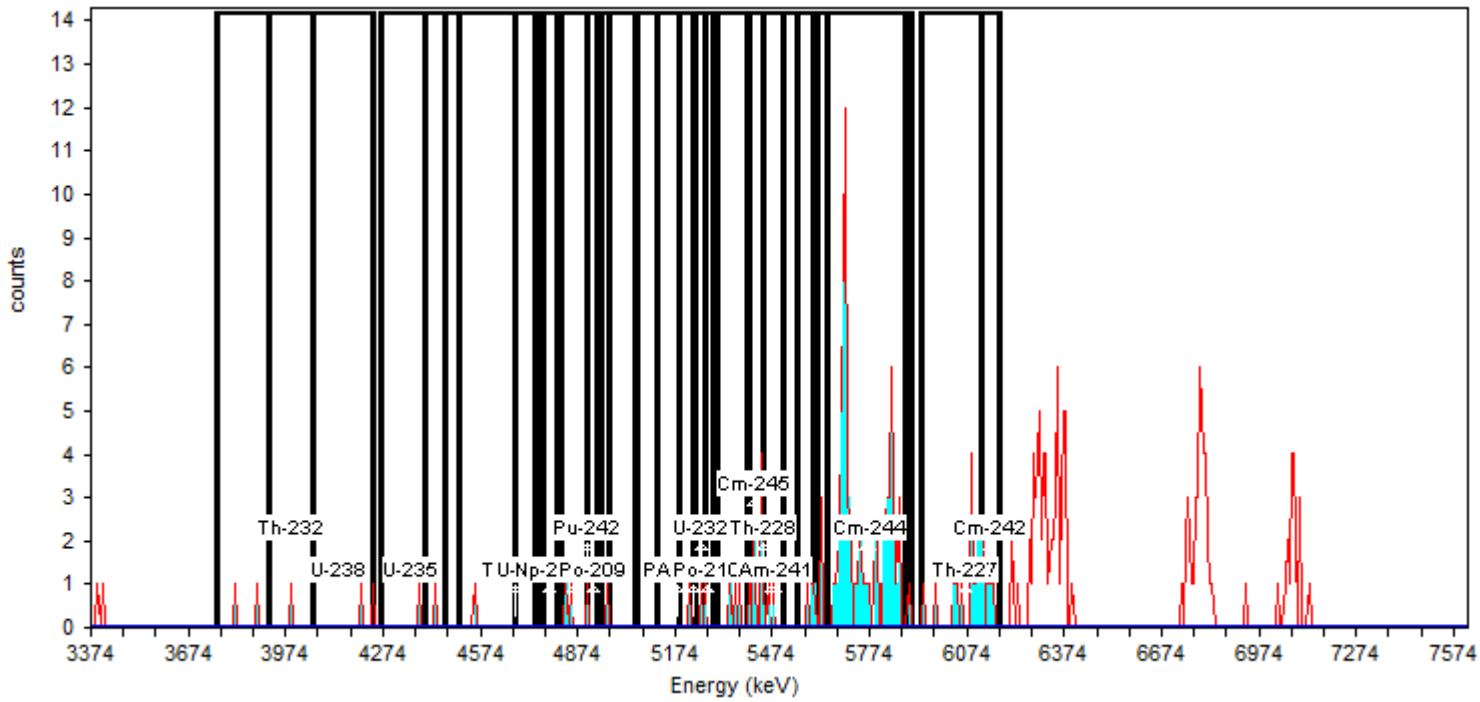
Batch Name: July2016a
Description:

Acquisition

Detector: AV200 , SN: 50-117J6
Acquisition Start Date: 7/25/2016 1:13:59PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-9884;AV200-20151017
Calibration Date: 10/18/2015 3:55:33PM

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: 228.00

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	2.00	2.083E-003	1.804E-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	3.00	3.125E-003	2.083E-003
Th-229	4,858.46	4,739.14	5,119.48	4.00	4.167E-003	2.329E-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	1.00	1.042E-003	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	3.00	3.125E-003	2.083E-003
U-232	5,253.71	5,059.82	5,402.86	7.00	7.292E-003	2.946E-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	2.00	2.083E-003	1.804E-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	16.00	1.667E-002	4.295E-003
Cm-245	5,417.78	5,395.41	5,447.61	8.00	8.333E-003	3.125E-003
Pu-236	5,760.83	5,611.67	5,887.60	70.00	7.292E-002	8.777E-003
Cm-244	5,775.74	5,641.51	5,902.52	68.00	7.083E-002	8.653E-003
Th-227	6,074.04	5,932.35	6,178.45	20.00	2.083E-002	4.774E-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
5:16:33AM 7/26/2016

Sample

Sample Name: ICB;AV203
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

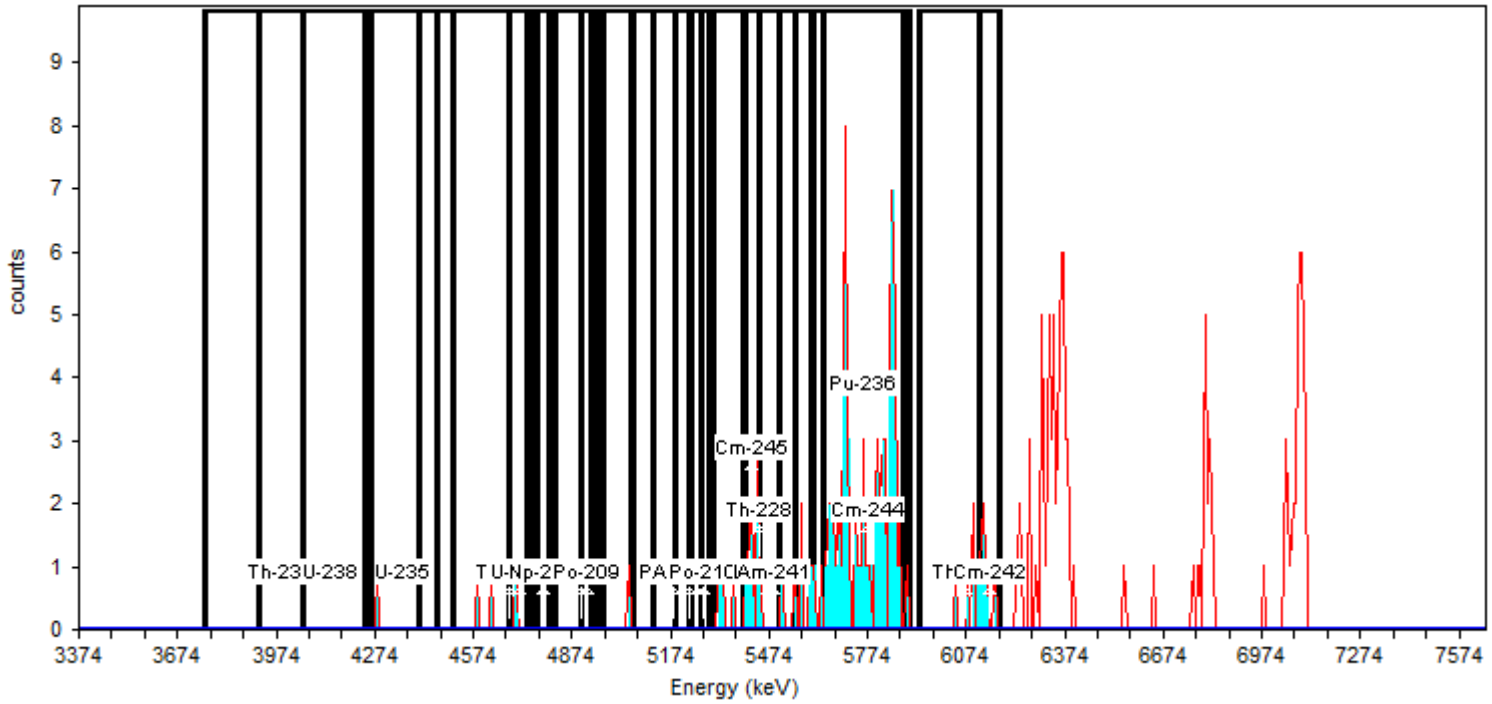
Batch Name: July2016a
Description:

Acquisition

Detector: AV203 , SN: 50-117J4
Acquisition Start Date: 7/25/2016 1:14:00PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-7107;AV203-20151018a
Calibration Date: 10/18/2015 6:42:12PM

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: 209.00

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	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	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	0.00	0.000E+000	1.473E-003
U-232	5,253.71	5,059.82	5,402.86	5.00	5.208E-003	2.552E-003
Th-228	5,447.61	5,186.59	5,507.27	13.00	1.354E-002	3.898E-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	19.00	1.979E-002	4.658E-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	70.00	7.292E-002	8.777E-003
Cm-244	5,775.74	5,641.51	5,902.52	69.00	7.188E-002	8.715E-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	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
5:16:51AM 7/26/2016

Sample

Sample Name: ICB;AV206
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

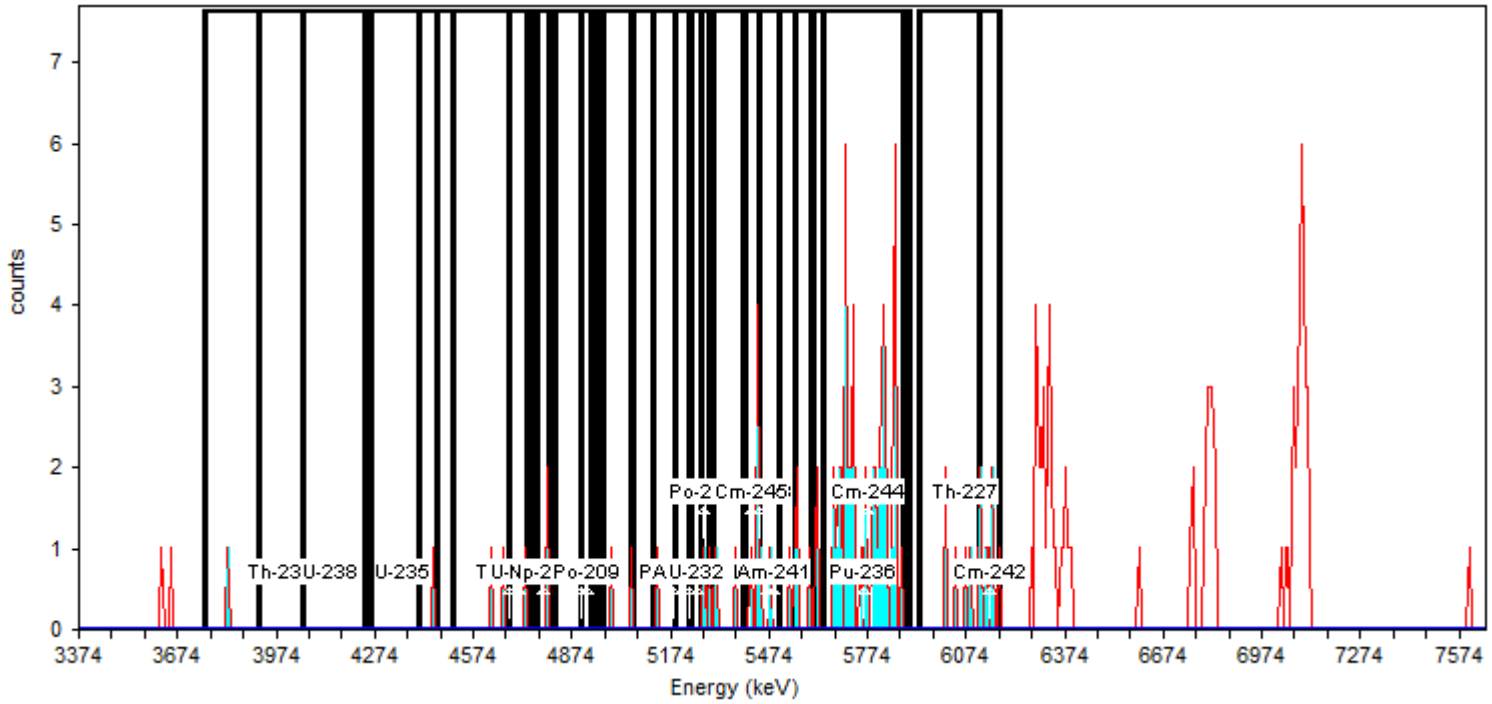
Batch Name: July2016a
Description:

Acquisition

Detector: AV206 , SN: 50-119AA6
Acquisition Start Date: 7/25/2016 1:14:01PM
Live Time: 960.00 min.
Real Time: 960.40 min.
Calibration Name: IC-8876;AV206-20151018
Calibration Date: 10/18/2015 6:41:49PM

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: 163.00

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	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	4.00	4.167E-003	2.329E-003
U-234	4,709.31	4,507.96	4,821.17	5.00	5.208E-003	2.552E-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	4.00	4.167E-003	2.329E-003
Np-237	4,783.89	4,768.97	4,806.26	2.00	2.083E-003	1.804E-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	5.00	5.208E-003	2.552E-003
Th-228	5,447.61	5,186.59	5,507.27	11.00	1.146E-002	3.608E-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	13.00	1.354E-002	3.898E-003
Am-241	5,484.90	5,298.46	5,604.22	14.00	1.458E-002	4.034E-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	50.00	5.208E-002	7.439E-003
Cm-244	5,775.74	5,641.51	5,902.52	48.00	5.000E-002	7.292E-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	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
5:16:45AM 7/26/2016

Sample

Sample Name: ICB;AV208
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

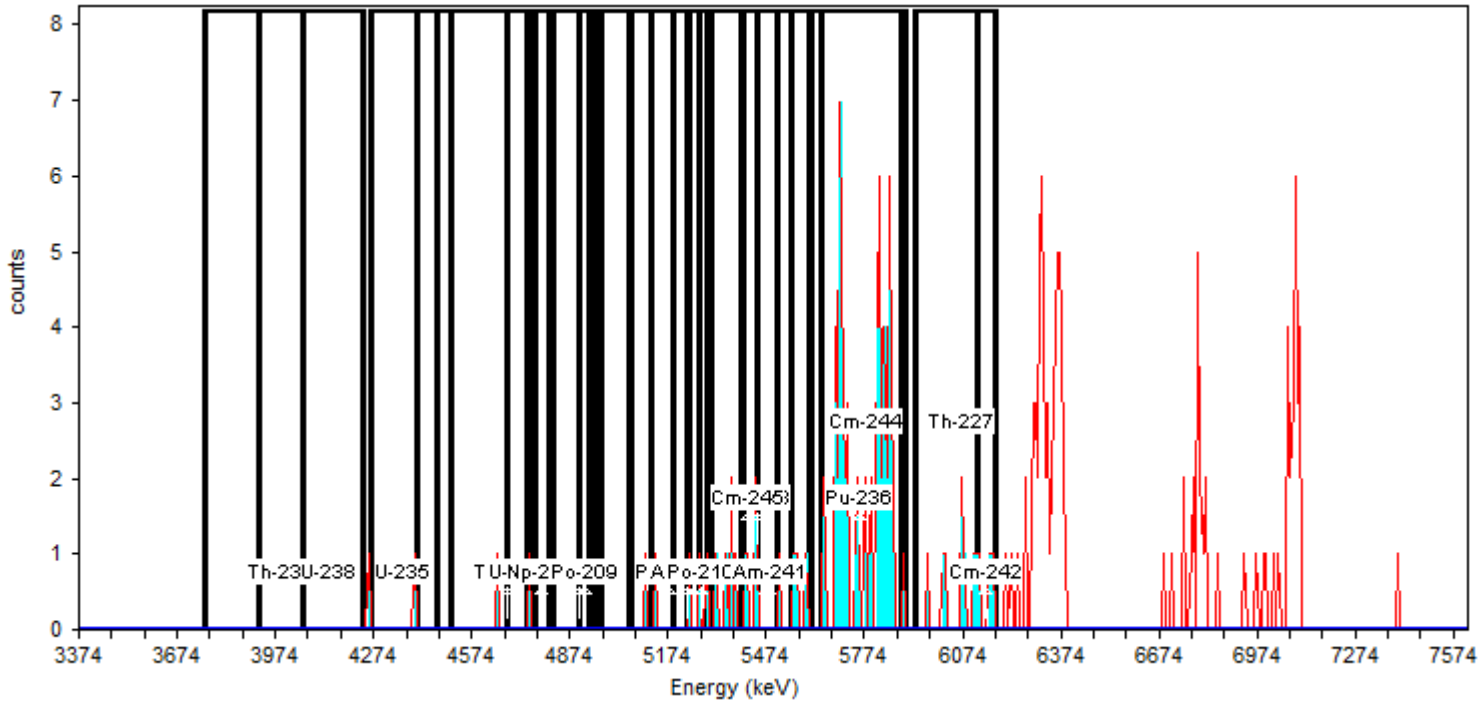
Batch Name: July2016a
Description:

Acquisition

Detector: AV208 , SN: 50-112Z6
Acquisition Start Date: 7/25/2016 1:14:01PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9520;AV208-20151018a
Calibration Date: 10/18/2015 6:42:37PM

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: 196.00

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	2.00	2.083E-003	1.804E-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	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	3.00	3.125E-003	2.083E-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	10.00	1.042E-002	3.455E-003
Th-228	5,447.61	5,186.59	5,507.27	13.00	1.354E-002	3.898E-003
Po-210	5,276.09	5,231.34	5,291.00	3.00	3.125E-003	2.083E-003
Pu-238	5,469.98	5,268.63	5,552.01	13.00	1.354E-002	3.898E-003
Am-241	5,484.90	5,298.46	5,604.22	14.00	1.458E-002	4.034E-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	62.00	6.458E-002	8.268E-003
Cm-244	5,775.74	5,641.51	5,902.52	63.00	6.563E-002	8.333E-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	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
5:14:03AM 7/26/2016

Sample

Sample Name: ICB;AV209
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

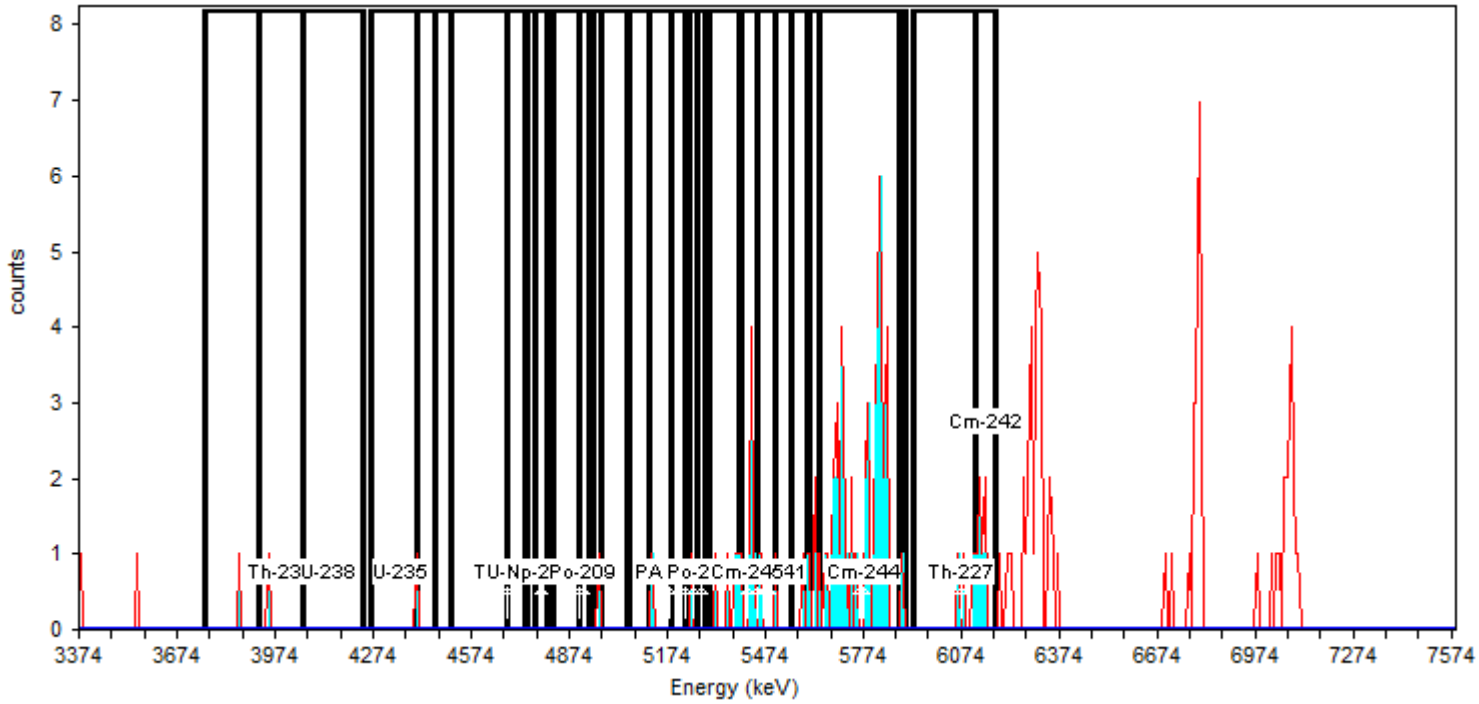
Batch Name: July2016a
Description:

Acquisition

Detector: AV209 , SN: 50-117H7
Acquisition Start Date: 7/25/2016 1:14:01PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-9792;AV209-20151018
Calibration Date: 10/18/2015 6:42:01PM

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: 158.00

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	2.00	2.083E-003	1.804E-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	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	0.00	0.000E+000	1.473E-003
Pu-242	4,903.21	4,679.48	4,947.95	0.00	0.000E+000	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	2.00	2.083E-003	1.804E-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	16.00	1.667E-002	4.295E-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	17.00	1.771E-002	4.419E-003
Cm-245	5,417.78	5,395.41	5,447.61	8.00	8.333E-003	3.125E-003
Pu-236	5,760.83	5,611.67	5,887.60	52.00	5.417E-002	7.583E-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	10.00	1.042E-002	3.455E-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
5:16:39AM 7/26/2016

Sample

Sample Name: ICB;AV210
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

Batch

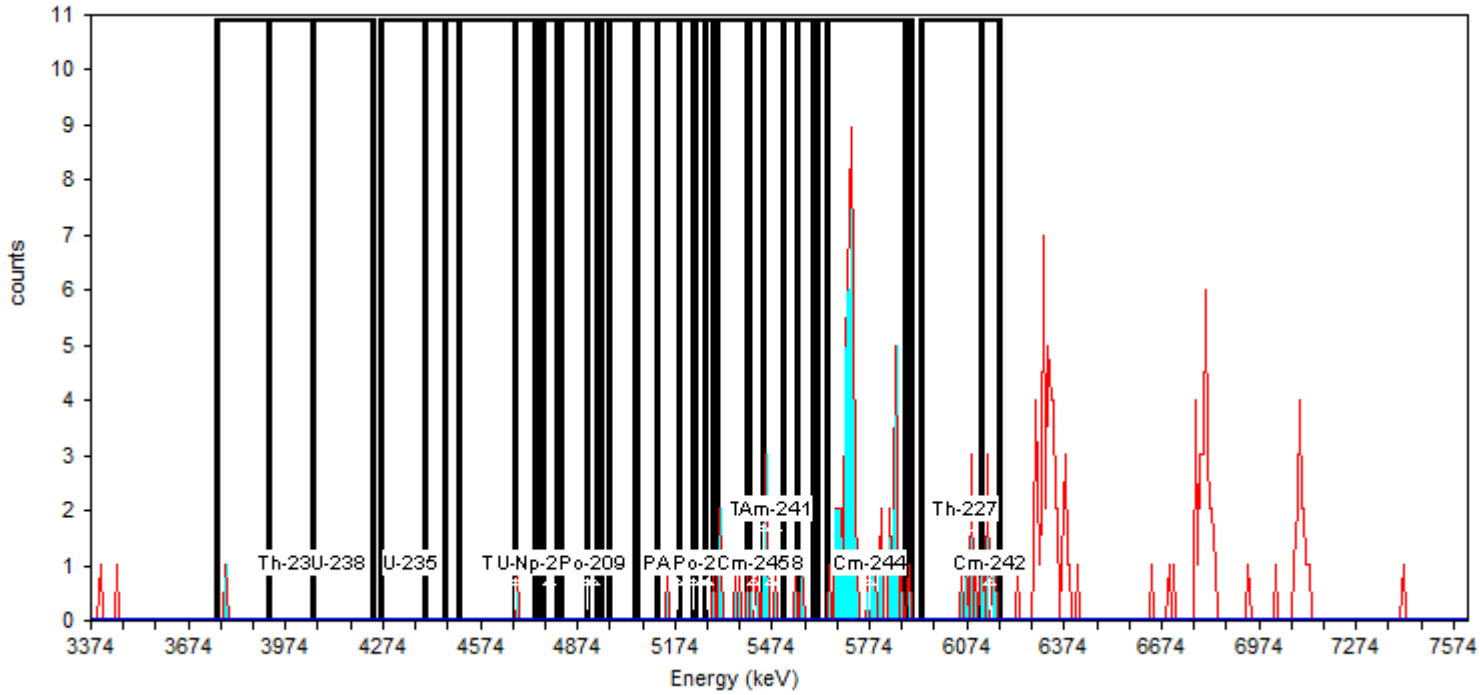
Batch Name: July2016a
Description:

Acquisition

Detector: AV210 , SN: 50-119AA1
Acquisition Start Date: 7/25/2016 1:14:01PM
Live Time: 960.00 min.
Real Time: 960.08 min.
Calibration Name: IC-9793;AV210-20151018a
Calibration Date: 10/18/2015 6:42:41PM

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: 175.00

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	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	1.00	1.042E-003	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	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	1.00	1.042E-003	1.473E-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	7.00	7.292E-003	2.946E-003
Th-228	5,447.61	5,186.59	5,507.27	13.00	1.354E-002	3.898E-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	14.00	1.458E-002	4.034E-003
Am-241	5,484.90	5,298.46	5,604.22	14.00	1.458E-002	4.034E-003
Cm-245	5,417.78	5,395.41	5,447.61	4.00	4.167E-003	2.329E-003
Pu-236	5,760.83	5,611.67	5,887.60	54.00	5.625E-002	7.725E-003
Cm-244	5,775.74	5,641.51	5,902.52	55.00	5.729E-002	7.795E-003
Th-227	6,074.04	5,932.35	6,178.45	13.00	1.354E-002	3.898E-003
Cm-242	6,148.62	6,118.79	6,178.45	7.00	7.292E-003	2.946E-003

Run Logs

Alpha Spectroscopy Run Log

Detector: AV200

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/17/15 18:15	140	IC 160-223497/1		223497			PS
11/01/15 14:26	60	ICV 160-223615/1		223615			PS
07/25/16 13:13	960	ICB 160-262019/1		262019			PS
07/26/16 12:13	60	CCV 160-262177/1		262177			PS
08/25/16 09:43	1	PULSER 160-266596/1		266596			ALD
08/25/16 11:22	240	ZZZZZ		266596			
08/25/16 20:44	400	MB 160-264618/1-A		266596	264618	A-01-R	ALD

Detector: AV203

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:18	140	IC 160-223500/1		223500			PS
11/01/15 16:01	60	ICV 160-223618/1		223618			
11/01/15 18:11	60	ICV 160-223618/2		223618			PS
07/25/16 13:14	960	ICB 160-262022/1		262022			PS
07/26/16 17:47	60	CCV 160-262178/1		262178			PS
08/25/16 09:43	1	PULSER 160-266597/1		266597			ALD
08/25/16 11:22	240	ZZZZZ		266597			
08/25/16 20:44	400	LCS 160-264618/2-A		266597	264618	A-01-R	ALD

Detector: AV206

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:10	140	IC 160-223503/1		223503			PS
11/01/15 16:02	60	ICV 160-223621/1		223621			PS
07/25/16 13:14	960	ICB 160-262024/1		262024			PS
07/26/16 19:07	60	CCV 160-262180/1		262180			PS
08/25/16 09:43	1	PULSER 160-266598/1		266598			ALD
08/25/16 11:22	240	ZZZZZ		266598			
08/25/16 20:44	400	160-18426-1	WR111-SP-019-C-P-00	266598	264618	A-01-R	ALD

Detector: AV208

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:19	140	IC 160-223505/1		223505			PS
11/01/15 16:11	60	ICV 160-223623/1		223623			PS
07/25/16 13:14	960	ICB 160-262025/1		262025			PS
07/26/16 12:14	60	CCV 160-262182/1		262182			PS
08/25/16 09:43	1	PULSER 160-266600/1		266600			ALD
08/25/16 11:22	400	ZZZZZ		266600			
08/25/16 20:44	400	160-18426-1 DU	WR111-SP-019-C-P-00 DU	266600	264618	A-01-R	ALD

Detector: AV209

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:11	140	IC 160-223506/1		223506			PS
11/01/15 16:11	60	ICV 160-223624/1		223624			PS
07/25/16 13:14	960	ICB 160-262026/1		262026			PS
07/26/16 13:39	60	CCV 160-262183/1		262183			PS
08/25/16 09:43	1	PULSER 160-266601/1		266601			ALD
08/25/16 11:22	400	ZZZZZ		266601			
08/25/16 20:44	400	160-18426-2	WR111-SP-020-C-P-00	266601	264618	A-01-R	ALD

Alpha Spectroscopy Run Log

Detector: AV210

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
10/18/15 16:19	140	IC 160-223507/1		223507			PS
11/01/15 16:03	60	ICV 160-223625/1		223625			PS
07/25/16 13:14	960	ICB 160-262027/1		262027			PS
07/26/16 10:46	60	CCV 160-262184/1		262184			PS
08/25/16 09:43	1	PULSER 160-266602/1		266602			ALD
08/25/16 11:22	400	ZZZZZ		266602			
08/25/16 20:44	400	160-18426-3	WR111-SP-021-C-P-00	266602	264618	A-01-R	ALD

GAMMA SPECTROSCOPY

Method 901.1
Ra-226

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

Prep Batch: 263537

Fill Geometry, 21-Day In-Growth

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 263537

Lab ID: MB 160-263537/1-A Analyzed: 08/25/16 10:26 Ts: 30 Sigma: 2
Client ID: Detector: GV9 Decay Corrected: No

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	-0.1257	0.0690	0.0702	U	pCi/g	0.500	0.356	266525

Lab ID: LCS 160-263537/2-A Analyzed: 08/25/16 09:46 Ts: 30 Sigma: 2
Client ID: Detector: GV16 Decay Corrected: No

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Americium-241	93.95	1.32	9.84		pCi/g		1.00	266452
Cesium-137	29.26	0.684	3.12		pCi/g		0.256	266452
Cobalt-60	16.27	0.404	1.68		pCi/g		0.0356	266452

Lab ID: 160-18426-1 Analyzed: 08/25/16 09:46 Ts: 30 Sigma: 2
Client ID: WR111-SP-019-C-P-00 Detector: GV14 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.74	0.264	0.320		pCi/g	0.500	0.170	266451

Lab ID: 160-18426-1 DU Analyzed: 08/25/16 10:25 Ts: 30 Sigma: 2
Client ID: WR111-SP-019-C-P-00 Detector: GV12 Decay Corrected: No

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.793	0.264	0.323		pCi/g	0.500	0.176	266526

Lab ID: 160-18426-2 Analyzed: 08/25/16 09:50 Ts: 30 Sigma: 2
Client ID: WR111-SP-020-C-P-00 Detector: GV12 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.21	0.244	0.274		pCi/g	0.500	0.200	266526

Lab ID: 160-18426-3 Analyzed: 08/25/16 09:52 Ts: 30 Sigma: 2
Client ID: WR111-SP-021-C-P-00 Detector: GV9 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	LOQ	MDC	Anly Batch
Radium-226	1.21	0.183	0.222		pCi/g	0.500	0.138	266525

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 263537

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 160-263537/1-A	Radium-226			-0.1257	U	pCi/g							-3.57824933

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-263537/2-A	Americium-241		97.1	93.95		pCi/g	97	87 - 116					-.4445991693
LCS 160-263537/2-A	Cesium-137		29.5	29.26		pCi/g	99	87 - 120					-.1134764767
LCS 160-263537/2-A	Cobalt-60		16.7	16.27		pCi/g	98	87 - 115					-.3306456803

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-18426-1	Radium-226	1.74		1.793		pCi/g			3	0.09	0.26	1	

Glossary:

Ts = Count Duration, Sample

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-18426-1

SDG No.:

Batch Number: 263537 Batch Start Date: 08/04/16 15:01 Batch Analyst: Sloan, Robert 1

Batch Method: Fill_Geo-21 Batch End Date: 08/04/16 16:00

Lab Sample ID	Client Sample ID	Method Chain	Basis	TareWeight	GrossWeight	InitialAmount	IngDecDate1	IngDecDate3	Geometry
MB 160-263537/1		Fill_Geo-21, 901.1				291.18 g	8/4/2016	8/25/2016	Tuna Can
LCS 160-263537/2		Fill_Geo-21, 901.1				341.9 g	8/4/2016	8/25/2016	Tuna Can
160-18426-A-1-A	WR111-SP-019-C-P-00	Fill_Geo-21, 901.1	T	46.5 g	335.9 g	289.4 g	8/4/2016	8/25/2016	Tuna Can
160-18426-A-1-A DU	WR111-SP-019-C-P-00	Fill_Geo-21, 901.1	T	46.5 g	335.9 g	289.4 g	8/4/2016	8/25/2016	Tuna Can
160-18426-A-2-A	WR111-SP-020-C-P-00	Fill_Geo-21, 901.1	T	46.6 g	324.2 g	277.6 g	8/4/2016	8/25/2016	Tuna Can
160-18426-A-3-A	WR111-SP-021-C-P-00	Fill_Geo-21, 901.1	T	46.7 g	343.8 g	297.1 g	8/4/2016	8/25/2016	Tuna Can

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00005					
MB 160-263537/1		Fill_Geo-21, 901.1							
LCS 160-263537/2		Fill_Geo-21, 901.1		# g					
160-18426-A-1-A	WR111-SP-019-C-P-00	Fill_Geo-21, 901.1	T						
160-18426-A-1-A DU	WR111-SP-019-C-P-00	Fill_Geo-21, 901.1	T						
160-18426-A-2-A	WR111-SP-020-C-P-00	Fill_Geo-21, 901.1	T						
160-18426-A-3-A	WR111-SP-021-C-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: 9_Gamma_20161561

Sample Description: 263537_Gamma_MB 160-263537~1-A
Detector: Detector # 9
Batch ID: 263537
Work Order Number: Gamma
Lot Number: MB 160-263537~1-A

Decay to Time: 8/25/2016 10:26 Live Time: 1800 sec
Acquisition Time: 8/25/2016 10:26:37 Real Time: 1803 sec
Analysis Time: 8/25/2016 10:57 Dead Time: 0.15 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 9_Soil_TunaCan.Clb
Efficiency Cal Desc: 9_Soil_TunaCan_90099_050312
Efficiency Cal Date: 6/14/2012 10:19
Energy Cal Date: 3/1/2012 13:57
Library: Client_Long_Rev11.lib
Bkgd Correction File: 9_2016-08-07_0421.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	1.087E+00	110.9	1.205E+00	1.207E+00	4.212E+00
NA-22	0.000E+00	1.#INF	7.223E-02	7.223E-02	3.764E-01
K-40	-3.820E+00	124.9	4.772E+00	4.776E+00	1.262E+01
Sc-46	-4.679E-01	106.1	4.962E-01	4.968E-01	1.678E+00
CR-51	-1.735E+00	121.7	2.111E+00	2.113E+00	1.052E+01
MN-54	-2.930E-01	112.2	3.286E-01	3.290E-01	7.603E-01
FE-59	6.235E-01	30.9	1.925E-01	1.951E-01	5.919E-01
Co-56	-2.948E-02	92.3	2.720E-02	2.725E-02	6.647E-01
CO-57	0.000E+00	1.#INF	6.703E-02	6.703E-02	4.941E-01
CO-58	2.088E-01	87.6	1.829E-01	1.832E-01	6.281E-01
CO-60	0.000E+00	1.#INF	5.291E-02	5.291E-02	3.900E-01
ZN-65	0.000E+00	1.#INF	9.073E-02	9.073E-02	1.883E+00
NB-94	2.551E-01	92.2	2.353E-01	2.357E-01	8.032E-01
ZR-95	1.699E-01	111.2	1.889E-01	1.892E-01	4.597E-01
NB-95	-3.899E-01	75.5	2.942E-01	2.949E-01	9.845E-01
RU-103	4.556E-02	266.5	1.214E-01	1.214E-01	3.393E-01
RH-106	-7.870E-01	322.6	2.539E+00	2.539E+00	9.014E+00
AG-108M	-2.139E-02	941.1	2.013E-01	2.013E-01	5.578E-01
AG-110M	-1.586E-01	70.6	1.120E-01	1.123E-01	1.947E+00
SN-113	-2.954E-02	882.9	2.608E-01	2.608E-01	1.099E+00
SB-124	-3.395E-01	129.2	4.386E-01	4.390E-01	1.487E+00
SB-125	-1.539E-01	93.5	1.439E-01	1.441E-01	1.470E+00
I-131	-1.425E-01	94.3	1.344E-01	1.346E-01	6.707E-01
Gd-153	0.000E+00	1.#INF	1.802E-01	1.802E-01	2.714E+00
Ga-68	5.273E-01	2233.8	1.178E+01	1.178E+01	2.836E+01
Tc-99m	-4.487E-02	618.5	2.775E-01	2.775E-01	9.452E-01
BA-133	-1.720E-01	103.2	1.774E-01	1.776E-01	9.643E-01
CS-134	1.509E-01	25.8	3.896E-02	3.974E-02	1.575E+00
CS-137	-2.695E-01	84.2	2.270E-01	2.274E-01	9.168E-01
CE-139	-2.122E-01	99.0	2.101E-01	2.111E-01	7.072E-01
Ba-140	-3.235E-01	252.0	8.154E-01	8.156E-01	2.104E+00
La-140	6.669E-02	264.3	1.762E-01	1.763E-01	4.733E-01
CE-141	2.469E-01	177.1	4.372E-01	4.374E-01	1.481E+00

CE-144	-1.308E+00	150.3	1.965E+00	1.966E+00	6.630E+00
PM-144	-1.450E-01	168.5	2.444E-01	2.445E-01	8.604E-01
EU-152	7.963E-01	40.8	3.251E-01	3.277E-01	4.311E+00
EU-154	1.249E-01	111.0	1.386E-01	1.387E-01	8.651E+00
EU-155	4.037E-01	207.2	8.365E-01	8.368E-01	2.851E+00
HF-181	1.465E-01	125.1	1.833E-01	1.835E-01	6.446E-01
Ta-182	-1.235E+00	85.1	1.051E+00	1.053E+00	3.556E+00
Hg-203	-1.689E-01	110.9	1.873E-01	1.875E-01	6.412E-01
TL-208	2.571E-01	41.8	1.075E-01	1.083E-01	2.599E-01
pm-146	-8.906E-01	94.3	8.397E-01	8.409E-01	1.994E+00
y-88	9.641E-02	227.3	2.192E-01	2.192E-01	5.708E-01
Cd-113m	-1.813E+03	137.7	2.496E+03	2.499E+03	8.621E+03
Cd-109	-3.057E+00	211.2	6.456E+00	6.458E+00	2.183E+01
Cf-251	5.508E-01	137.0	7.547E-01	7.562E-01	2.008E+00
Cf-249	0.000E+00	1.#INF	7.720E-02	7.720E-02	1.071E+00
Sn-126	1.014E+00	139.0	1.409E+00	1.410E+00	4.860E+00
PB-210	-5.279E+00	94.9	5.007E+00	5.017E+00	1.697E+01
PB-212	3.728E-01	106.0	3.953E-01	3.960E-01	1.341E+00
PB-214	1.884E-01	201.1	3.788E-01	3.789E-01	1.430E+00
BI-207	-9.366E-03	1374.8	1.288E-01	1.288E-01	4.970E-01
BI-212	-2.376E+00	118.9	2.826E+00	2.829E+00	1.201E+01
BI-214	-1.354E+00	27.5	3.718E-01	3.784E-01	3.835E+00
BI-210M	2.188E-01	136.1	2.978E-01	2.981E-01	1.028E+00
AC-228	2.023E-01	346.8	7.015E-01	7.016E-01	1.843E+00
TH-227	2.295E+00	51.3	1.176E+00	1.183E+00	8.728E+00
TH-229	-4.034E+00	102.7	4.142E+00	4.154E+00	1.031E+01
TH-234	5.618E+00	51.9	2.914E+00	2.929E+00	9.345E+00
PA-231	4.862E+00	124.9	6.075E+00	6.081E+00	2.853E+01
PA-233	5.658E-01	138.3	7.827E-01	7.833E-01	2.226E+00
PA-234	3.122E-01	83.8	2.616E-01	2.621E-01	3.791E+00
PA-234M	1.275E+01	159.9	2.038E+01	2.039E+01	9.401E+01
U-235	3.896E-01	259.9	1.013E+00	1.013E+00	7.605E+00
AM-241	4.836E-02	592.1	2.863E-01	2.864E-01	1.039E+00
Np-237	-1.012E+00	175.2	1.772E+00	1.773E+00	5.988E+00
Ir-192	1.274E-01	219.6	2.797E-01	2.798E-01	9.620E-01
Cs-136	1.700E-01	37.8	6.424E-02	6.497E-02	8.109E-01
Np-239	4.461E-01	191.0	8.521E-01	8.525E-01	2.892E+00
Nd-147	-2.654E+00	89.3	2.370E+00	2.375E+00	5.692E+00
Total	3.533E+01				

Analyst: Amanda Dick

Sample description
263537_Gamma_MB 160-263537~1-A

Spectrum Filename: C:\User\SPC\Det9\9_Gamma_20161561.An1

Acquisition information
Start time: 8/25/2016 10:26:37 AM
Live time: 1800
Real time: 1803
Dead time: 0.15 %
Detector ID: 9

Detector system
Ge9 S/N100228730

Calibration
Filename: 9_Soil_TunaCan.Clb
9_Soil_TunaCan_90099_050312

Energy Calibration
Created: 3/1/2012 1:57:17 PM
Zero offset: 0.074 keV
Gain: 0.250 keV/channel
Quadratic: -2.269E-08 keV/channel^2

Efficiency Calibration
Created: 6/14/2012 10:19:51 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.30 %
Log(Eff): -8.079856E-01 + (-2.367265E-01*Log(E)) +
(-3.950640E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.42 %
Log(Eff): -2.387916E+01 + (8.875647E+00*Log(E)) +
(-9.401100E-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 (37.59keV)
Stop channel: 8000 (1999.34keV)
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	8/25/2016 10:26:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	9_2016-08-07_0421.PBC 8/7/2016 4:21:32 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 2 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 1.0000

***** 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	7.	143.06	1.00	2.900E-02	50.14	8.000	PBC<MDA	TH227
59.54	1.	592.14	1.01	3.659E-02	59.54	35.900	PBC<MDA	AM241
63.29	15.	51.87	1.01	3.921E-02	63.29	3.810	PBC<MDA	TH234
64.28	7.	139.04	1.02	3.987E-02	64.28	9.700	PBC<MDA	Sn126
105.31	8.	207.20	1.05	5.318E-02	105.31	21.200	PBC<MDA	EU155
106.13	10.	191.00	1.05	5.323E-02	106.13	22.700	PBC<MDA	Np239
123.10	9.	110.98	1.07	5.296E-02	123.10	40.790	PBC<MDA	EU154
145.44	11.	177.06	1.09	5.012E-02	145.44	48.200	PBC<MDA	CE141
176.60	8.	137.01	1.12	4.549E-02	176.60	17.000	PBC<MDA	Cf251
205.33	5.	259.90	1.15	4.123E-02	205.33	5.010	PBC<MDA	U235
210.85	8.	104.08	1.15	4.052E-02	210.85	2.990	PBC<MDA	TH229
227.00	6.	105.08	1.17	3.858E-02	227.00	6.300	PBC<MDA	Cf251
238.63	11.	106.03	1.18	3.732E-02	238.63	43.300	PBC<MDA	PB212
242.00	10.	112.36	1.18	3.697E-02	242.00	7.430	PBC<MDA	PB214
256.24	13.	51.26	1.20	3.558E-02	256.24	7.000	PBC<MDA	TH227
265.83	7.	136.11	1.20	3.470E-02	265.83	50.000	PBC<MDA	BI210M
277.28	7.	76.53	1.21	3.372E-02	277.28	6.310	PBC<MDA	TL208
295.09	6.	201.06	1.23	3.232E-02	295.09	19.300	PBC<MDA	PB214
300.03	7.	160.94	1.24	3.195E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	5.257E+00	PA231
					300.18	6.200	2.086E+00	PA233
300.07	7.	169.09	1.24	3.195E-02	300.03	3.280	PBC<MDA	PB212

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					300.07	2.460	5.257E+00	PA231
					300.18	6.200	2.086E+00	PA233
300.18	7.	176.86	1.24	3.194E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	5.257E+00	PA231
					300.18	6.200	2.086E+00	PA233
302.65	7.	183.98	1.24	3.176E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	7.113E-01	BA133
302.85	5.	265.82	1.24	3.175E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	5.088E-01	BA133
312.01	6.	212.76	1.25	3.110E-02	312.01	36.000	PBC<MDA	PA233
316.49	6.	219.59	1.25	3.080E-02	316.49	87.040	PBC<MDA	Ir192
383.84	6.	162.06	1.31	2.691E-02	383.84	8.940	PBC<MDA	BA133
463.37	4.	150.00	1.38	2.352E-02	463.37	10.470	PBC<MDA	SB125
477.60	5.	110.92	1.39	2.301E-02	477.60	10.520	PBC<MDA	BE7
482.00	5.	125.10	1.40	2.286E-02	482.00	80.500	PBC<MDA	HF181
497.05	2.	266.46	1.41	2.236E-02	497.05	90.900	PBC<MDA	RU103
511.86	64.	19.74	2.67	2.188E-02	511.86	20.000	8.124E+00	RH106
563.24	4.	140.98	1.47	2.040E-02	563.24	8.350	PBC<MDA	CS134
569.32	1.	659.55	1.47	2.024E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.232E-01	PA234
					569.70	97.740	1.873E-02	BI207
583.02	8.	41.81	1.48	1.989E-02	583.02	84.500	PBC<MDA	TL208
636.97	1.	596.87	1.53	1.862E-02	636.97	7.170	PBC<MDA	I131
702.63	8.	92.24	1.58	1.730E-02	702.63	97.900	PBC<MDA	NB94
724.20	6.	111.22	1.60	1.691E-02	724.20	44.150	PBC<MDA	ZR95
763.94	6.	74.14	1.63	1.624E-02	763.94	22.280	PBC<MDA	AG110M
766.41	5.	159.92	1.63	1.620E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	5.462E+01	PA234M
795.87	15.	25.82	1.66	1.574E-02	795.87	85.530	6.191E-01	CS134
810.78	6.	87.58	1.67	1.551E-02	810.78	99.460	PBC<MDA	CO58
815.77	2.	264.26	1.67	1.544E-02	815.77	23.280	PBC<MDA	La140
898.04	2.	227.32	1.74	1.434E-02	898.04	93.700	PBC<MDA	y88
911.07	1.	346.78	1.75	1.418E-02	911.07	29.000	PBC<MDA	AC228
946.02	6.	91.54	1.77	1.377E-02	946.02	13.400	PBC<MDA	PA234
964.11	6.	40.82	1.79	1.357E-02	964.11	14.605	PBC<MDA	EU152
1037.84	4.	140.81	1.84	1.281E-02	1037.84	14.130	PBC<MDA	Co56
1048.07	7.	37.80	1.85	1.271E-02	1048.07	80.000	PBC<MDA	Cs136
1099.25	8.	38.67	1.89	1.224E-02	1099.25	56.500	6.086E-01	FE59
1112.07	4.	121.98	1.89	1.213E-02	1112.07	13.644	PBC<MDA	EU152
1189.05	5.	47.15	1.95	1.150E-02	1189.05	16.200	PBC<MDA	Ta182
1291.60	5.	48.16	2.02	1.077E-02	1291.60	43.200	PBC<MDA	FE59
1459.58	-7.	124.91	2.13	9.749E-03	1460.83	10.670	PBC<MDA	K40

No unknown peaks passed sensitivity test.

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	44.	-10.	-0.006	94.85	0.998
TH-227	200.20	50.14	52.	7.	0.004	143.06	1.001s
AM-241	237.77	59.54	22.	1.	0.001	592.14	1.010s
TH-234	252.77	63.29	23.	15.	0.008	51.87	1.014
Sn-126	256.74	64.28	45.	7.	0.004	139.04	1.015s
BA-133	323.56	80.99	40.	-5.	-0.003	226.94	1.031s
Np-237	345.55	86.49	213.	-12.	-0.007	175.18	1.036s
EU-155	345.76	86.54	201.	-12.	-0.007	170.33	1.036s
Sn-126	347.35	86.94	200.	-12.	-0.007	169.68	1.037s
Sn-126	349.87	87.57	212.	-12.	-0.007	174.42	1.037s
Cd-109	351.75	88.04	242.	-11.	-0.006	211.16	1.038s
Nd-147	363.99	91.10	253.	0.	0.000	1000.00	1.041s
TH-234	369.94	92.59	253.	0.	0.000	1000.00	1.042s
AC-228	372.98	93.35	253.	0.	0.000	1000.00	1.043s
Gd-153	389.58	97.50	253.	0.	0.000	1000.00	1.047s
Np-239	397.58	99.50	253.	0.	0.000	1000.00	1.049
Gd-153	412.37	103.20	253.	0.	0.000	1000.00	1.052s
Np-239	414.37	103.70	253.	0.	0.000	1000.00	1.053s
EU-155	420.82	105.31	140.	8.	0.005	207.20	1.054s
Np-239	424.09	106.13	167.	10.	0.005	191.00	1.055s
EU-152	486.65	121.78	59.	-7.	-0.004	167.03	1.070s
CO-57	487.80	122.06	65.	0.	0.000	1000.00	1.070s
EU-154	491.95	123.10	47.	9.	0.005	110.98	1.071s
PA-234	524.72	131.29	173.	-14.	-0.008	140.37	1.079s
HF-181	531.64	133.02	187.	-14.	-0.008	145.32	1.081s
CE-144	533.69	133.54	200.	-14.	-0.008	150.25	1.081s
HF-181	544.74	136.30	214.	-14.	-0.008	154.72	1.084s
CO-57	545.43	136.47	228.	-14.	-0.008	159.41	1.084s
Tc-99m	561.57	140.51	241.	-4.	-0.002	618.46	1.088s
U-235	574.67	143.79	245.	0.	0.000	1000.00	1.091s
CE-141	581.29	145.44	175.	11.	0.006	177.06	1.092s
Ba-140	650.15	162.66	72.	-13.	-0.007	97.68	1.108s
CE-139	662.92	165.85	95.	-14.	-0.008	99.01	1.111s
Cf-251	705.90	176.60	29.	8.	0.004	137.01	1.122
TH-229	773.52	193.51	48.	-14.	-0.008	102.67	1.137s
U-235	820.80	205.33	36.	5.	0.003	259.90	1.148s
TH-229	842.87	210.85	16.	8.	0.004	104.08	1.153s
Cf-251	907.45	227.00	8.	6.	0.003	105.08	1.168s
PB-212	953.97	238.63	61.	11.	0.006	106.03	1.179s
PB-214	967.43	242.00	58.	10.	0.006	112.36	1.182s
EU-152	978.21	244.69	85.	-12.	-0.006	115.67	1.185s
TH-227	1024.40	256.24	8.	13.	0.007	51.26	1.195s
Cd-113m	1054.23	263.70	41.	-7.	-0.004	137.67	1.202s
BI-210M	1062.75	265.83	40.	7.	0.004	136.11	1.204

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
TL-208	1108.55	277.28	12.	7.	0.004	76.53	1.215s
Hg-203	1116.22	279.20	38.	-8.	-0.005	110.87	1.216s
I-131	1136.61	284.30	33.	-8.	-0.004	88.02	1.221s
PB-214	1179.77	295.09	62.	6.	0.003	201.06	1.231
PB-212	1199.52	300.03	68.	7.	0.004	160.94	1.235s
PA-231	1199.68	300.07	75.	7.	0.004	169.09	1.235s
PA-233	1200.12	300.18	83.	7.	0.004	176.86	1.235s
PA-231	1210.00	302.65	90.	7.	0.004	183.98	1.237s
BA-133	1210.81	302.85	98.	5.	0.003	265.82	1.238s
BI-210M	1218.99	304.90	103.	0.	0.000	1000.00	1.240s
Ir-192	1233.16	308.44	103.	0.	0.000	1000.00	1.243s
PA-233	1247.44	312.01	82.	6.	0.003	212.76	1.246s
Ir-192	1265.35	316.49	88.	6.	0.003	219.59	1.250s
CR-51	1279.73	320.08	138.	-9.	-0.005	121.65	1.253s
La-140	1314.43	328.76	112.	-13.	-0.007	92.46	1.261s
Cf-249	1333.15	333.44	122.	-12.	-0.006	137.63	1.265s
AC-228	1352.66	338.32	134.	-12.	-0.007	98.16	1.270
Cs-136	1361.66	340.57	146.	-4.	-0.002	438.21	1.272s
HF-181	1382.70	345.83	40.	-14.	-0.008	83.55	1.276s
BA-133	1423.37	356.00	36.	-12.	-0.007	103.16	1.285s
I-131	1457.31	364.48	28.	-8.	-0.005	94.30	1.293s
BA-133	1534.73	383.84	39.	6.	0.003	162.06	1.310s
Cf-249	1551.17	387.95	45.	0.	0.000	1000.00	1.314s
SN-113	1566.12	391.69	44.	-1.	-0.001	882.89	1.317s
SB-125	1710.86	427.88	13.	-7.	-0.004	111.73	1.349s
AG-108M	1735.10	433.94	18.	-1.	0.000	941.14	1.354s
SB-125	1852.82	463.37	16.	4.	0.002	150.00	1.380s
Ir-192	1871.59	468.06	26.	-6.	-0.004	118.67	1.384s
BE-7	1909.73	477.60	11.	5.	0.003	110.92	1.392s
HF-181	1927.34	482.00	16.	5.	0.003	125.10	1.396s
La-140	1947.43	487.02	42.	-9.	-0.005	59.90	1.400s
RU-103	1987.56	497.05	4.	2.	0.001	266.46	1.409s
RH-106	2046.81	511.86	14.	64.	0.036	19.74	2.672
Nd-147	2123.35	531.00	30.	-13.	-0.007	89.32	1.438s
Ba-140	2148.39	537.26	13.	-3.	-0.002	252.03	1.444s
CS-134	2252.30	563.24	5.	4.	0.002	140.98	1.466s
CS-134	2276.64	569.32	9.	1.	0.000	659.55	1.471s
PA-234	2277.24	569.47	10.	0.	0.000	1000.00	1.471s
TL-208	2331.45	583.02	1.	8.	0.004	41.81	1.482s
SB-125	2401.36	600.50	96.	-12.	-0.007	29.09	1.497s
SB-124	2410.29	602.73	107.	-12.	-0.006	129.18	1.499s
CS-134	2418.21	604.71	119.	-12.	-0.006	135.52	1.500s
BI-214	2436.61	609.31	158.	-22.	-0.012	27.46	1.505
RU-103	2440.56	610.30	162.	-9.	-0.005	197.60	1.505
PM-144	2471.62	618.06	22.	-7.	-0.004	102.02	1.512s
RH-106	2487.04	621.92	36.	-3.	-0.001	322.59	1.515s
SB-125	2542.94	635.89	23.	-10.	-0.005	76.72	1.526s
I-131	2547.28	636.97	31.	1.	0.001	596.87	1.527s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AG-110M	2630.43	657.76	12.	-1.	-0.001	466.04	1.544s
CS-137	2646.03	661.66	24.	-7.	-0.004	84.22	1.548s
PM-144	2785.58	696.54	26.	-4.	-0.002	168.51	1.576s
NB-94	2809.93	702.63	22.	8.	0.004	92.24	1.581
SB-124	2890.57	722.79	24.	-10.	-0.005	78.20	1.598s
AG-108M	2891.17	722.94	33.	-1.	0.000	933.33	1.598s
EU-154	2892.85	723.36	34.	0.	0.000	1000.00	1.598s
ZR-95	2896.22	724.20	16.	6.	0.003	111.22	1.599s
BI-212	2908.11	727.17	28.	-5.	-0.003	118.94	1.601s
pm-146	2942.31	735.72	14.	-4.	-0.002	151.43	1.608s
pm-146	2988.08	747.16	14.	-9.	-0.005	94.28	1.617s
AG-110M	3055.23	763.94	6.	6.	0.003	74.14	1.631s
NB-95	3062.61	765.79	31.	-11.	-0.006	75.45	1.632s
PA-234M	3065.10	766.41	26.	5.	0.003	159.92	1.633s
EU-152	3115.14	778.92	10.	-4.	-0.002	180.85	1.643s
BI-212	3141.15	785.42	32.	-6.	-0.003	139.44	1.648s
CS-134	3182.95	795.87	0.	15.	0.008	25.82	1.656s
CS-134	3207.29	801.95	15.	0.	0.000	1000.00	1.661s
CO-58	3242.59	810.78	10.	6.	0.003	87.58	1.668s
La-140	3262.58	815.77	16.	2.	0.001	264.26	1.672s
Cs-136	3273.50	818.50	18.	0.	0.000	1000.00	1.674s
MN-54	3338.91	834.85	15.	-8.	-0.004	112.15	1.687s
Co-56	3386.61	846.77	11.	-6.	-0.003	119.35	1.696s
TL-208	3441.80	860.56	0.	0.	0.000	1000.00	1.707s
NB-94	3483.94	871.10	19.	-10.	-0.006	67.30	1.715s
EU-154	3492.47	873.23	29.	-1.	0.000	866.17	1.717s
PA-234	3521.68	880.53	32.	-10.	-0.006	83.13	1.722s
PA-234	3532.53	883.24	42.	-4.	-0.002	259.25	1.724s
AG-110M	3538.30	884.68	54.	-9.	-0.005	120.19	1.725s
Sc-46	3556.69	889.28	77.	-12.	-0.007	106.06	1.729
y-88	3591.74	898.04	6.	2.	0.001	227.32	1.736s
AC-228	3643.88	911.07	6.	1.	0.001	346.78	1.746s
AG-110M	3749.60	937.49	10.	-1.	-0.001	702.38	1.766s
PA-234	3783.72	946.02	5.	6.	0.003	91.54	1.772s
EU-152	3856.11	964.11	0.	6.	0.003	40.82	1.786s
AC-228	3875.56	968.97	15.	-6.	-0.003	104.40	1.790s
EU-154	3985.03	996.33	11.	-1.	0.000	703.56	1.810s
EU-154	4018.82	1004.77	0.	0.	0.000	1000.00	1.816s
Co-56	4151.13	1037.84	6.	4.	0.002	140.81	1.841s
Cs-136	4192.07	1048.07	0.	7.	0.004	37.80	1.848s
RH-106	4201.23	1050.36	7.	0.	0.000	1000.00	1.850s
BI-207	4254.46	1063.66	21.	-13.	-0.007	85.79	1.860s
FE-59	4396.88	1099.25	0.	8.	0.004	38.67	1.886s
EU-152	4448.20	1112.07	11.	4.	0.002	121.98	1.895s
ZN-65	4462.09	1115.55	15.	0.	0.000	1000.00	1.897s
BI-214	4481.06	1120.29	19.	-4.	-0.002	99.12	1.901s
Ta-182	4485.12	1121.30	27.	-9.	-0.005	85.10	1.901s
CO-60	4692.96	1173.24	17.	-10.	-0.006	47.16	1.938s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ta-182	4756.25	1189.05	0.	5.	0.003	47.15	1.949s
Ta-182	4885.75	1221.41	6.	-2.	-0.001	127.30	1.972s
Co-56	4953.27	1238.28	12.	-4.	-0.002	65.92	1.984s
NA-22	5098.35	1274.53	0.	0.	0.000	1000.00	2.008s
EU-154	5098.40	1274.54	0.	0.	0.000	1000.00	2.008s
FE-59	5166.65	1291.60	1.	5.	0.003	48.16	2.020s
CO-60	5330.37	1332.50	0.	0.	0.000	1000.00	2.047s
AG-110M	5537.69	1384.30	11.	-9.	-0.005	90.70	2.082s
EU-152	5632.56	1408.00	6.	-2.	-0.001	131.26	2.097s
K-40	5844.03	1460.83	20.	-7.	-0.004	124.91	2.131s
La-140	6385.95	1596.21	0.	0.	0.000	1000.00	2.215s
SB-124	6765.35	1690.98	6.	-2.	-0.001	275.72	2.272s
BI-214	7059.65	1764.49	4.	-4.	-0.002	213.40	2.314s
Co-56	7087.11	1771.35	0.	0.	0.000	1000.00	2.318s
y-88	7346.20	1836.06	0.	0.	0.000	1000.00	2.354s

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	1.0868E+00				5.31E+01	
			477.60	1.087E+00	?(P	4.212E+00 1.11E+02 1.05E+01	G
K-40	N	-3.8202E+00				4.66E+11	
			1460.83	-3.820E+00	&(P	1.262E+01 1.25E+02 1.07E+01	G
Sc-46	F	-4.6786E-01				8.38E+01	
			889.28	-4.679E-01	?(	1.678E+00 1.06E+02 1.00E+02	G
			1120.55	-7.679E-03	%	9.611E-01 3.31E+03 1.00E+02	G
CR-51	F	-1.7349E+00				2.77E+01	
			320.08	-1.735E+00	&(P	1.052E+01 1.22E+02 9.94E+00	G
MN-54	C	-2.9302E-01				3.12E+02	
			834.85	-2.930E-01	?(	7.603E-01 1.12E+02 1.00E+02	G
FE-59	F	6.2346E-01				4.45E+01	
			1099.25	6.086E-01	?(P	5.919E-01 3.87E+01 5.65E+01	G
			1291.60	6.429E-01	?(P	8.802E-01 4.82E+01 4.32E+01	G
Co-56	C	-2.9476E-02				7.73E+01	
			846.77	-2.106E-01	?(P	6.647E-01 1.19E+02 9.99E+01	G
			1238.28	-3.382E-01	+ P	1.447E+00 6.59E+01 6.61E+01	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			1037.84	1.252E+00	?(P	4.312E+00	1.41E+02	1.41E+01 G
			1771.35	0.000E+00	+	3.178E+00	1.00E+03	1.55E+01 A
CO-58	C	2.0881E-01					7.09E+01	
			810.78	2.088E-01	?(	6.281E-01	8.76E+01	9.95E+01 G
NB-94	I	2.5507E-01					7.41E+06	
			702.63	2.551E-01	?(	8.032E-01	9.22E+01	9.79E+01 G
			871.10	-3.913E-01	+	8.721E-01	6.73E+01	9.99E+01 G
ZR-95	I	1.6988E-01					6.40E+01	
			756.73	-2.778E-02	%(P	4.597E-01	1.49E+03	5.45E+01 G
			724.20	4.137E-01	?(	1.603E+00	1.11E+02	4.42E+01 G
NB-95	I	-3.8995E-01					6.40E+01	
			765.79	-3.899E-01	?(	9.845E-01	7.55E+01	9.98E+01 G
RU-103	I	4.5563E-02					3.93E+01	
			497.05	4.556E-02	&(	3.393E-01	2.66E+02	9.09E+01 G
			610.30	-4.640E+00	+	3.115E+01	1.98E+02	5.75E+00 GA
RH-106	I	-7.8703E-01					3.74E+02	
			621.92	-7.870E-01	?(	9.014E+00	3.23E+02	9.93E+00 G
			1050.36	0.000E+00	+	4.220E+01	1.00E+03	1.56E+00 G
			511.86	8.124E+00	?	2.557E+00	1.97E+01	2.00E+01 GA
AG-108M	C	-2.1390E-02					1.53E+05	
			433.94	-2.139E-02	?(P	5.578E-01	9.41E+02	9.05E+01 G
			722.94	-3.171E-02	+	1.067E+00	9.33E+02	9.08E+01 G
			614.28	-1.233E-07	%	2.057E+00	4.85E+08	8.98E+01 G
AG-110M	F	-1.5862E-01					2.50E+02	
			884.68	-4.742E-01	?(	1.947E+00	1.20E+02	7.27E+01 G
			657.76	-4.209E-02	+ P	6.153E-01	4.66E+02	9.46E+01 G
			937.49	-1.166E-01	+	2.034E+00	7.02E+02	3.44E+01 G
			1384.30	-2.096E+00	+	4.132E+00	9.07E+01	2.43E+01 G
			763.94	8.708E-01	?(	2.169E+00	7.41E+01	2.23E+01 G
SN-113	F	-2.9544E-02					1.15E+02	
			391.69	-2.954E-02	?(P	1.099E+00	8.83E+02	6.40E+01 G
SB-124	F	-3.3954E-01					6.02E+01	
			602.73	-3.395E-01	?(	1.487E+00	1.29E+02	9.83E+01 G
			1690.98	-3.136E-01	+	1.941E+00	2.76E+02	4.78E+01 G
			722.79	-2.920E+00	+	7.679E+00	7.82E+01	1.08E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SB-125	I	-1.5386E-01					1.01E+03	
			427.88	-5.274E-01	?(	1.470E+00	1.12E+02	2.96E+01 G
			600.50	-1.947E+00	+ P	7.747E+00	2.91E+01	1.79E+01 G
			635.89	-2.547E+00	+	6.559E+00	7.67E+01	1.13E+01 G
			463.37	9.023E-01	&(	4.816E+00	1.50E+02	1.05E+01 G
I-131	I	-1.4249E-01					8.02E+00	
			364.48	-2.037E-01	?(P	6.707E-01	9.43E+01	8.17E+01 G
			284.30	-2.109E+00	+ P	8.016E+00	8.80E+01	6.14E+00 G
			636.97	5.548E-01	?(	1.192E+01	5.97E+02	7.17E+00 G
Ga-68	C	5.2728E-01					4.71E-02	
			1077.40	5.273E-01	%(	2.836E+01	2.23E+03	3.30E+00 G
Tc-99m	I	-4.4871E-02					2.51E-01	
			140.51	-4.487E-02	?(	9.452E-01	6.18E+02	8.93E+01 G
BA-133	F	-1.7195E-01					3.85E+03	
			356.00	-3.730E-01	?(	9.643E-01	1.03E+02	6.20E+01 G
			302.85	5.088E-01	?(	4.656E+00	2.66E+02	1.83E+01 G
			383.84	1.309E+00	?	7.375E+00	1.62E+02	8.94E+00 GA
			80.99	-1.801E-01	+	1.091E+00	2.27E+02	3.41E+01 GA
CS-134	I	1.5087E-01					7.54E+02	
			604.71	-3.430E-01	?(	1.575E+00	1.36E+02	9.76E+01 G
			795.87	6.191E-01	?(	3.042E-01	2.58E+01	8.55E+01 G
			569.32	1.190E-01	?(	3.024E+00	6.60E+02	1.54E+01 G
			801.95	0.000E+00	-	8.482E+00	1.00E+03	8.69E+00 G
			563.24	1.187E+00	?(P	4.403E+00	1.41E+02	8.35E+00 G
CS-137	I	-2.6950E-01					1.10E+04	
			661.66	-2.695E-01	?(P	9.168E-01	8.42E+01	8.52E+01 G
CE-139	F	-2.1220E-01					1.38E+02	
			165.85	-2.122E-01	?(	7.072E-01	9.90E+01	7.99E+01 G
Ba-140	I	-3.2353E-01					1.28E+01	
			537.26	-3.235E-01	?(	2.104E+00	2.52E+02	2.44E+01 G
			162.66	-2.433E+00	+	8.020E+00	9.77E+01	6.22E+00 G
			304.85	-1.563E-06	%	2.049E+01	3.76E+08	4.29E+00 G
La-140	I	6.6694E-02					1.28E+01	
			1596.21	0.000E+00	?(	4.733E-01	1.00E+03	9.54E+01 G
			487.02	-4.873E-01	+ P	1.767E+00	5.99E+01	4.55E+01 G
			328.76	-1.152E+00	& P	4.744E+00	9.25E+01	2.03E+01 G
			815.77	3.400E-01	(	3.281E+00	2.64E+02	2.33E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CE-141	I	2.4693E-01					3.25E+01	
			145.44	2.469E-01	?(	1.481E+00	1.77E+02	4.82E+01 G
CE-144	I	-1.3079E+00					2.85E+02	
			133.54	-1.308E+00	?(	6.630E+00	1.50E+02	1.11E+01 G
PM-144	C	-1.4502E-01					3.63E+02	
			696.54	-1.450E-01	?(	8.604E-01	1.69E+02	9.90E+01 G
			618.06	-2.061E-01	+	7.232E-01	1.02E+02	9.91E+01 G
EU-152	F	7.9633E-01					4.94E+03	
			344.29	-1.682E-03	%(P	4.311E+00	5.06E+04	2.65E+01 G
			1112.07	1.398E+00	?(	6.057E+00	1.22E+02	1.36E+01 G
			121.78	-2.443E-01	+	1.407E+00	1.67E+02	2.86E+01 G
			778.92	-1.073E+00	+	4.682E+00	1.81E+02	1.29E+01 G
			964.11	1.682E+00	?(	2.066E+00	4.08E+01	1.46E+01 G
			244.69	-2.326E+00	&	9.117E+00	1.16E+02	7.58E+00 G
			1408.00	-5.660E-01	+ P	3.757E+00	1.31E+02	2.10E+01 GA
EU-154	I	1.2486E-01					3.14E+03	
			873.23	-2.438E-01	?(P	8.651E+00	8.66E+02	1.23E+01 G
			123.10	2.358E-01	&(	8.928E-01	1.11E+02	4.08E+01 G
			1274.54	0.000E+00	-	1.069E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	-	4.852E+00	1.00E+03	2.02E+01 G
			1004.77	0.000E+00	-	1.730E+00	1.00E+03	1.80E+01 G
			996.33	-2.642E-01	+	7.104E+00	7.04E+02	1.06E+01 G
EU-155	I	4.0373E-01					1.81E+03	
			105.31	4.037E-01	?(	2.851E+00	2.07E+02	2.12E+01 G
			86.54	-4.315E-01	+	2.485E+00	1.70E+02	3.07E+01 G
HF-181	F	1.4652E-01					4.24E+01	
			482.00	1.465E-01	?(	6.446E-01	1.25E+02	8.05E+01 G
			133.02	-3.344E-01	+	1.640E+00	1.45E+02	4.33E+01 G
			345.83	-1.805E+00	+ P	4.104E+00	8.36E+01	1.51E+01 G
			136.30	-2.503E+00	+	1.306E+01	1.55E+02	5.85E+00 G
Ta-182	F	-1.2352E+00					1.14E+02	
			1121.30	-1.235E+00	?(	3.556E+00	8.51E+01	3.49E+01 G
			1221.41	-3.556E-01	+ P	2.572E+00	1.27E+02	2.70E+01 G
			1189.05	1.453E+00	+ P	2.197E+00	4.72E+01	1.62E+01 G
Hg-203	F	-1.6890E-01					4.66E+01	
			279.20	-1.689E-01	?(	6.412E-01	1.11E+02	8.15E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
TL-208	N	2.5714E-01					6.98E+02	
			583.02	2.571E-01	?(P	2.599E-01	4.18E+01	8.45E+01 G
			277.28	1.909E+00	+	4.922E+00	7.65E+01	6.31E+00 G
			860.56	0.000E+00	-	2.224E+00	1.00E+03	1.24E+01 G
pm-146	C	-8.9059E-01					2.02E+03	
			747.16	-8.906E-01	?(	1.994E+00	9.43E+01	3.40E+01 G
			735.72	-6.399E-01	+ P	3.008E+00	1.51E+02	2.25E+01 G
			453.88	1.744E-02	% P	7.102E-01	1.54E+03	6.50E+01 G
y-88	F	9.6407E-02					1.07E+02	
			898.04	9.641E-02	?(P	5.708E-01	2.27E+02	9.37E+01 G
			1836.06	0.000E+00	-	5.109E-01	1.00E+03	9.92E+01 G
Cd-113m		-1.8133E+03					5.33E+03	
			263.70	-1.813E+03	?(	8.621E+03	1.38E+02	6.00E-03 K
Cd-109	F	-3.0573E+00					4.53E+02	
			88.04	-3.057E+00	&(	2.183E+01	2.11E+02	3.79E+00 G
Cf-251	T	5.5081E-01					3.28E+05	
			176.60	5.508E-01	?(	2.008E+00	1.37E+02	1.70E+01 G
			227.00	1.312E+00	?	3.632E+00	1.05E+02	6.30E+00 GA
Sn-126		1.0136E+00					3.65E+07	
			87.57	-3.516E-01	&	2.073E+00	1.74E+02	3.75E+01 GA
			64.28	1.014E+00	?(	4.860E+00	1.39E+02	9.70E+00 G
			86.94	-1.463E+00	+	8.389E+00	1.70E+02	9.04E+00 GA
PB-210	N	-5.2786E+00					8.14E+03	
			46.54	-5.279E+00	?(	1.697E+01	9.49E+01	4.25E+00 G
PB-212	N	3.7277E-01					6.98E+02	
			238.63	3.728E-01	&(	1.341E+00	1.06E+02	4.33E+01 G
			300.03	3.942E+00	?	2.179E+01	1.61E+02	3.28E+00 GA
PB-214	N	1.8838E-01					5.84E+05	
			351.93	2.524E-02	%(P	1.430E+00	1.59E+03	3.76E+01 G
			295.09	5.062E-01	?(P	3.516E+00	2.01E+02	1.93E+01 G
			242.00	2.023E+00	@ P	7.720E+00	1.12E+02	7.43E+00 GA
BI-207	C	-9.3656E-03					1.18E+04	
			569.70	-9.366E-03	%(	4.970E-01	1.37E+03	9.77E+01 G
			1063.66	-7.677E-01	+	1.438E+00	8.58E+01	7.45E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-212	N	-2.3759E+00					6.98E+02	
			727.17	-2.376E+00	?(P	1.201E+01	1.19E+02	7.55E+00 G
			785.42	-1.638E+01	+	7.937E+01	1.39E+02	1.28E+00 GA
BI-214	N	-1.3538E+00					5.84E+05	
			609.31	-1.354E+00	?(P	3.835E+00	2.75E+01	4.61E+01 G
			1120.29	-1.368E+00	+ P	7.102E+00	9.91E+01	1.51E+01 G
			1764.49	-1.917E+00	+ P	5.412E+00	2.13E+02	1.54E+01 G
BI-210M	T	2.1879E-01					1.10E+09	
			265.83	2.188E-01	?(	1.028E+00	1.36E+02	5.00E+01 G
			304.90	0.000E+00	-	3.140E+00	1.00E+03	2.80E+01 G
AC-228	N	2.0230E-01					2.10E+03	
			911.07	2.023E-01	?(P	1.843E+00	3.47E+02	2.90E+01 G
			968.97	-1.334E+00	+	4.839E+00	1.04E+02	1.75E+01 G
			338.32	-1.882E+00	+ P	8.924E+00	9.82E+01	1.20E+01 G
			93.35	0.000E+00	-	1.483E+01	1.00E+03	5.56E+00 XA
TH-227	N	2.2946E+00					7.95E+03	
			50.14	1.773E+00	?(	8.728E+00	1.43E+02	8.00E+00 G
			256.24	2.890E+00	?(P	3.553E+00	5.13E+01	7.00E+00 G
TH-229	N	-4.0337E+00					2.68E+06	
			193.51	-4.034E+00	&(	1.031E+01	1.03E+02	4.40E+00 G
			210.85	3.669E+00	+	9.790E+00	1.04E+02	2.99E+00 G
TH-234	N	5.6179E+00					1.63E+12	
			63.29	5.618E+00	?(	9.345E+00	5.19E+01	3.81E+00 G
			92.59	0.000E+00	-	1.482E+01	1.00E+03	5.58E+00 G
PA-231	N	4.8624E+00					1.20E+07	
			302.65	4.525E+00	?(	2.853E+01	1.84E+02	2.88E+00 G
			300.07	5.257E+00	?(	3.051E+01	1.69E+02	2.46E+00 G
PA-233	C	5.6578E-01					7.82E+08	
			312.01	3.039E-01	?(	2.226E+00	2.13E+02	3.60E+01 G
			300.18	2.086E+00	?(	1.266E+01	1.77E+02	6.20E+00 G
PA-234	N	3.1217E-01					1.63E+12	
			131.29	-8.000E-01	&(	3.791E+00	1.40E+02	1.80E+01 G
			946.02	1.806E+00	&(	3.952E+00	9.15E+01	1.34E+01 G
			569.47	0.000E+00	-	5.841E+00	1.00E+03	8.20E+00 G
			883.24	-1.445E+00	+	1.316E+01	2.59E+02	9.60E+00 G
			880.53	-6.597E+00	+	1.849E+01	8.31E+01	6.00E+00 GA

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PA-234M  N   1.2746E+01                                      1.63E+12
                         1001.00-1.962E+00 %(P 9.401E+01 1.36E+03 8.37E-01 G
                          766.41 5.462E+01 ?(  3.071E+02 1.60E+02 2.94E-01 G

U-235    N   3.8963E-01                                      2.57E+11
                          143.79 0.000E+00 &(  7.605E+00 1.00E+03 1.10E+01 G
                          205.33 1.242E+00 ?(P 8.288E+00 2.60E+02 5.01E+00 G
                          163.38-1.691E-01 &   1.064E+01 1.80E+03 5.08E+00 G

AM-241   T   4.8358E-02                                      1.58E+05
                           59.54 4.836E-02 ?(P 1.039E+00 5.92E+02 3.59E+01 G

Np-237   F  -1.0116E+00                                      2.14E+06
                           86.49-1.012E+00 ?(  5.988E+00 1.75E+02 1.31E+01 G

Ir-192   F   1.2735E-01                                      7.40E+01
                          316.49 1.274E-01 ?(  9.620E-01 2.20E+02 8.70E+01 G
                          468.06-2.988E-01 +   1.227E+00 1.19E+02 5.18E+01 G
                          308.44 0.000E+00 -   2.791E+00 1.00E+03 3.18E+01 G

Cs-136   F   1.6996E-01                                      1.30E+01
                          818.50 0.000E+00 ?(  8.109E-01 1.00E+03 1.00E+02 G
                         1048.07 3.824E-01 ?(  4.026E-01 3.78E+01 8.00E+01 G
                          340.57-1.588E-01 +   2.387E+00 4.38E+02 4.69E+01 G

Np-239   T   4.4611E-01                                      2.36E+00
                          103.70 0.000E+00 &   3.349E+00 1.00E+03 2.40E+01 X
                          106.13 4.461E-01 ?(  2.892E+00 1.91E+02 2.27E+01 G
                           99.50 0.000E+00 -   5.401E+00 1.00E+03 1.50E+01 X

Nd-147      -2.6538E+00                                      1.11E+01
                          531.00-2.654E+00 &(  5.692E+00 8.93E+01 1.30E+01 G
                           91.10 0.000E+00 +   2.942E+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.
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& - 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	44.	-10.	-0.006	94.85	-5.279E+00	
TH-227	50.14	52.	7.	0.004	143.06	1.773E+00	
AM-241	59.54	22.	1.	0.001	592.14	4.836E-02	P
TH-234	63.29	23.	15.	0.008	51.87	5.618E+00	
Sn-126	64.28	45.	7.	0.004	139.04	1.014E+00	
BA-133	80.99	40.	-5.	-0.003	226.94	-1.801E-01	
Np-237	86.49	213.	-12.	-0.007	175.18	-1.012E+00	
EU-155	86.54	201.	-12.	-0.007	170.33	-4.315E-01	
Sn-126	86.94	200.	-12.	-0.007	169.68	-1.463E+00	
Sn-126	87.57	212.	-12.	-0.007	174.42	-3.516E-01	
Cd-109	88.04	242.	-11.	-0.006	211.16	-3.057E+00	
EU-155	105.31	140.	8.	0.005	207.20	4.037E-01	
Np-239	106.13	167.	10.	0.005	191.00	4.461E-01	
EU-152	121.78	59.	-7.	-0.004	167.03	-2.443E-01	
EU-154	123.10	47.	9.	0.005	110.98	2.358E-01	
PA-234	131.29	173.	-14.	-0.008	140.37	-8.000E-01	
HF-181	133.02	187.	-14.	-0.008	145.32	-3.344E-01	
CE-144	133.54	200.	-14.	-0.008	150.25	-1.308E+00	
HF-181	136.30	214.	-14.	-0.008	154.72	-2.503E+00	
CO-57	136.47	228.	-14.	-0.008	159.41	-1.372E+00	
Tc-99m	140.51	241.	-4.	-0.002	618.46	-4.487E-02	
CE-141	145.44	175.	11.	0.006	177.06	2.469E-01	
Ba-140	162.66	72.	-13.	-0.007	97.68	-2.433E+00	
CE-139	165.85	95.	-14.	-0.008	99.01	-2.122E-01	
Cf-251	176.60	29.	8.	0.004	137.01	5.508E-01	
TH-229	193.51	48.	-14.	-0.008	102.67	-4.034E+00	
U-235	205.33	36.	5.	0.003	259.90	1.242E+00	P
TH-229	210.85	16.	8.	0.004	104.08	3.669E+00	
Cf-251	227.00	8.	6.	0.003	105.08	1.312E+00	
PB-212	238.63	61.	11.	0.006	106.03	3.728E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-214	242.00	58.	10.	0.006	112.36	2.023E+00	P
EU-152	244.69	85.	-12.	-0.006	115.67	-2.326E+00	
TH-227	256.24	8.	13.	0.007	51.26	2.890E+00	P
Cd-113m	263.70	41.	-7.	-0.004	137.67	-1.813E+03	
BI-210M	265.83	40.	7.	0.004	136.11	2.188E-01	
TL-208	277.28	12.	7.	0.004	76.53	1.909E+00	
Hg-203	279.20	38.	-8.	-0.005	110.87	-1.689E-01	
I-131	284.30	33.	-8.	-0.004	88.02	-2.109E+00	P
PB-214	295.09	62.	6.	0.003	201.06	5.062E-01	P
PB-212	300.03	68.	7.	0.004	160.94	3.942E+00	
PA-231	300.07	75.	7.	0.004	169.09	5.257E+00	
PA-233	300.18	83.	7.	0.004	176.86	2.086E+00	
PA-231	302.65	90.	7.	0.004	183.98	4.525E+00	
BA-133	302.85	98.	5.	0.003	265.82	5.088E-01	
PA-233	312.01	82.	6.	0.003	212.76	3.039E-01	
Ir-192	316.49	88.	6.	0.003	219.59	1.274E-01	
CR-51	320.08	138.	-9.	-0.005	121.65	-1.735E+00	P
La-140	328.76	112.	-13.	-0.007	92.46	-1.152E+00	P
Cf-249	333.44	122.	-12.	-0.006	137.63	-1.403E+00	
AC-228	338.32	134.	-12.	-0.007	98.16	-1.882E+00	P
Cs-136	340.57	146.	-4.	-0.002	438.21	-1.588E-01	
HF-181	345.83	40.	-14.	-0.008	83.55	-1.805E+00	P
BA-133	356.00	36.	-12.	-0.007	103.16	-3.730E-01	
I-131	364.48	28.	-8.	-0.005	94.30	-2.037E-01	P
BA-133	383.84	39.	6.	0.003	162.06	1.309E+00	
SN-113	391.69	44.	-1.	-0.001	882.89	-2.954E-02	P
SB-125	427.88	13.	-7.	-0.004	111.73	-5.274E-01	
AG-108M	433.94	18.	-1.	0.000	941.14	-2.139E-02	P
SB-125	463.37	16.	4.	0.002	150.00	9.023E-01	
Ir-192	468.06	26.	-6.	-0.004	118.67	-2.988E-01	
BE-7	477.60	11.	5.	0.003	110.92	1.087E+00	P
HF-181	482.00	16.	5.	0.003	125.10	1.465E-01	
La-140	487.02	42.	-9.	-0.005	59.90	-4.873E-01	P
RU-103	497.05	4.	2.	0.001	266.46	4.556E-02	
RH-106	511.86	14.	64.	0.036	19.74	8.124E+00	
Nd-147	531.00	30.	-13.	-0.007	89.32	-2.654E+00	
Ba-140	537.26	13.	-3.	-0.002	252.03	-3.235E-01	
CS-134	563.24	5.	4.	0.002	140.98	1.187E+00	P
CS-134	569.32	9.	1.	0.000	659.55	1.190E-01	
TL-208	583.02	1.	8.	0.004	41.81	2.571E-01	P
SB-125	600.50	96.	-12.	-0.007	29.09	-1.947E+00	P
SB-124	602.73	107.	-12.	-0.006	129.18	-3.395E-01	
CS-134	604.71	119.	-12.	-0.006	135.52	-3.430E-01	
BI-214	609.31	158.	-22.	-0.012	27.46	-1.354E+00	P
RU-103	610.30	162.	-9.	-0.005	197.60	-4.640E+00	
PM-144	618.06	22.	-7.	-0.004	102.02	-2.061E-01	
RH-106	621.92	36.	-3.	-0.001	322.59	-7.870E-01	
SB-125	635.89	23.	-10.	-0.005	76.72	-2.547E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
I-131	636.97	31.	1.	0.001	596.87	5.548E-01	
AG-110M	657.76	12.	-1.	-0.001	466.04	-4.209E-02	P
CS-137	661.66	24.	-7.	-0.004	84.22	-2.695E-01	P
PM-144	696.54	26.	-4.	-0.002	168.51	-1.450E-01	
NB-94	702.63	22.	8.	0.004	92.24	2.551E-01	
SB-124	722.79	24.	-10.	-0.005	78.20	-2.920E+00	
AG-108M	722.94	33.	-1.	0.000	933.33	-3.171E-02	
ZR-95	724.20	16.	6.	0.003	111.22	4.137E-01	
BI-212	727.17	28.	-5.	-0.003	118.94	-2.376E+00	P
pm-146	735.72	14.	-4.	-0.002	151.43	-6.399E-01	P
pm-146	747.16	14.	-9.	-0.005	94.28	-8.906E-01	
AG-110M	763.94	6.	6.	0.003	74.14	8.708E-01	
NB-95	765.79	31.	-11.	-0.006	75.45	-3.899E-01	
PA-234M	766.41	26.	5.	0.003	159.92	5.462E+01	
EU-152	778.92	10.	-4.	-0.002	180.85	-1.073E+00	
BI-212	785.42	32.	-6.	-0.003	139.44	-1.638E+01	
CS-134	795.87	0.	15.	0.008	25.82	6.191E-01	
CO-58	810.78	10.	6.	0.003	87.58	2.088E-01	
La-140	815.77	16.	2.	0.001	264.26	3.400E-01	
MN-54	834.85	15.	-8.	-0.004	112.15	-2.930E-01	
Co-56	846.77	11.	-6.	-0.003	119.35	-2.106E-01	P
NB-94	871.10	19.	-10.	-0.006	67.30	-3.913E-01	
EU-154	873.23	29.	-1.	0.000	866.17	-2.438E-01	P
PA-234	880.53	32.	-10.	-0.006	83.13	-6.597E+00	
PA-234	883.24	42.	-4.	-0.002	259.25	-1.445E+00	
AG-110M	884.68	54.	-9.	-0.005	120.19	-4.742E-01	
Sc-46	889.28	77.	-12.	-0.007	106.06	-4.679E-01	
y-88	898.04	6.	2.	0.001	227.32	9.641E-02	P
AC-228	911.07	6.	1.	0.001	346.78	2.023E-01	P
AG-110M	937.49	10.	-1.	-0.001	702.38	-1.166E-01	
PA-234	946.02	5.	6.	0.003	91.54	1.806E+00	
EU-152	964.11	0.	6.	0.003	40.82	1.682E+00	
AC-228	968.97	15.	-6.	-0.003	104.40	-1.334E+00	
EU-154	996.33	11.	-1.	0.000	703.56	-2.642E-01	
Co-56	1037.84	6.	4.	0.002	140.81	1.252E+00	P
Cs-136	1048.07	0.	7.	0.004	37.80	3.824E-01	
BI-207	1063.66	21.	-13.	-0.007	85.79	-7.677E-01	
EU-152	1112.07	11.	4.	0.002	121.98	1.398E+00	
BI-214	1120.29	19.	-4.	-0.002	99.12	-1.368E+00	P
Ta-182	1121.30	27.	-9.	-0.005	85.10	-1.235E+00	
CO-60	1173.24	17.	-10.	-0.006	47.16	-4.750E-01	P
Ta-182	1189.05	0.	5.	0.003	47.15	1.453E+00	P
Ta-182	1221.41	6.	-2.	-0.001	127.30	-3.556E-01	P
Co-56	1238.28	12.	-4.	-0.002	65.92	-3.382E-01	P
AG-110M	1384.30	11.	-9.	-0.005	90.70	-2.096E+00	
EU-152	1408.00	6.	-2.	-0.001	131.26	-5.660E-01	P
K-40	1460.83	20.	-7.	-0.004	124.91	-3.820E+00	P
SB-124	1690.98	6.	-2.	-0.001	275.72	-3.136E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-214	1764.49		4.	-4.	-0.002	213.40	-1.917E+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	1.0868E+00	1.0868E+00	1.109E+02%	4.21E+00
NA-22	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.76E-01
K-40	#A	-3.8202E+00	-3.8202E+00	1.249E+02%	1.26E+01
Sc-46	#A	-4.6785E-01	-4.6786E-01	1.061E+02%	1.68E+00
CR-51	#A	-1.7349E+00	-1.7349E+00	1.217E+02%	1.05E+01
MN-54	#A	-2.9302E-01	-2.9302E-01	1.122E+02%	7.60E-01
FE-59	#	6.2346E-01	6.2346E-01	3.088E+01%	5.92E-01
Co-56	#A	-2.9476E-02	-2.9476E-02	9.229E+01%	6.65E-01
CO-57	#A	0.0000E+00	0.0000E+00	1.000E+03%	4.94E-01
CO-58	#A	2.0881E-01	2.0881E-01	8.758E+01%	6.28E-01
CO-60	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.90E-01
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.88E+00
NB-94	#A	2.5507E-01	2.5507E-01	9.224E+01%	8.03E-01
ZR-95	#A	1.6988E-01	1.6988E-01	1.112E+02%	4.60E-01
NB-95	#A	-3.8995E-01	-3.8995E-01	7.545E+01%	9.84E-01
RU-103	#A	4.5563E-02	4.5563E-02	2.665E+02%	3.39E-01
RH-106	#A	-7.8703E-01	-7.8703E-01	3.226E+02%	9.01E+00
AG-108M	#A	-2.1390E-02	-2.1390E-02	9.411E+02%	5.58E-01
AG-110M	#A	-1.5862E-01	-1.5862E-01	7.061E+01%	1.95E+00
SN-113	#A	-2.9544E-02	-2.9544E-02	8.829E+02%	1.10E+00
SB-124	#A	-3.3954E-01	-3.3954E-01	1.292E+02%	1.49E+00
SB-125	#A	-1.5386E-01	-1.5386E-01	9.352E+01%	1.47E+00
I-131	#A	-1.4248E-01	-1.4249E-01	9.430E+01%	6.71E-01
Gd-153	#A	0.0000E+00	0.0000E+00	7.071E+02%	2.71E+00
Ga-68	#A	5.2397E-01	5.2728E-01	2.234E+03%	2.84E+01
Tc-99m	#A	-4.4818E-02	-4.4871E-02	6.185E+02%	9.45E-01
BA-133	#A	-1.7195E-01	-1.7195E-01	1.032E+02%	9.64E-01
CS-134	#A	1.5087E-01	1.5087E-01	2.582E+01%	1.58E+00
CS-137	#A	-2.6950E-01	-2.6950E-01	8.422E+01%	9.17E-01
CE-139	#A	-2.1220E-01	-2.1220E-01	9.901E+01%	7.07E-01
Ba-140	#A	-3.2352E-01	-3.2353E-01	2.520E+02%	2.10E+00
La-140	#A	6.6693E-02	6.6694E-02	2.643E+02%	4.73E-01
CE-141	#A	2.4693E-01	2.4693E-01	1.771E+02%	1.48E+00
CE-144	#A	-1.3079E+00	-1.3079E+00	1.503E+02%	6.63E+00
PM-144	#A	-1.4502E-01	-1.4502E-01	1.685E+02%	8.60E-01
EU-152	#A	7.9633E-01	7.9633E-01	4.082E+01%	4.31E+00
EU-154	#A	1.2486E-01	1.2486E-01	1.110E+02%	8.65E+00
EU-155	#A	4.0373E-01	4.0373E-01	2.072E+02%	2.85E+00
HF-181	#A	1.4652E-01	1.4652E-01	1.251E+02%	6.45E-01

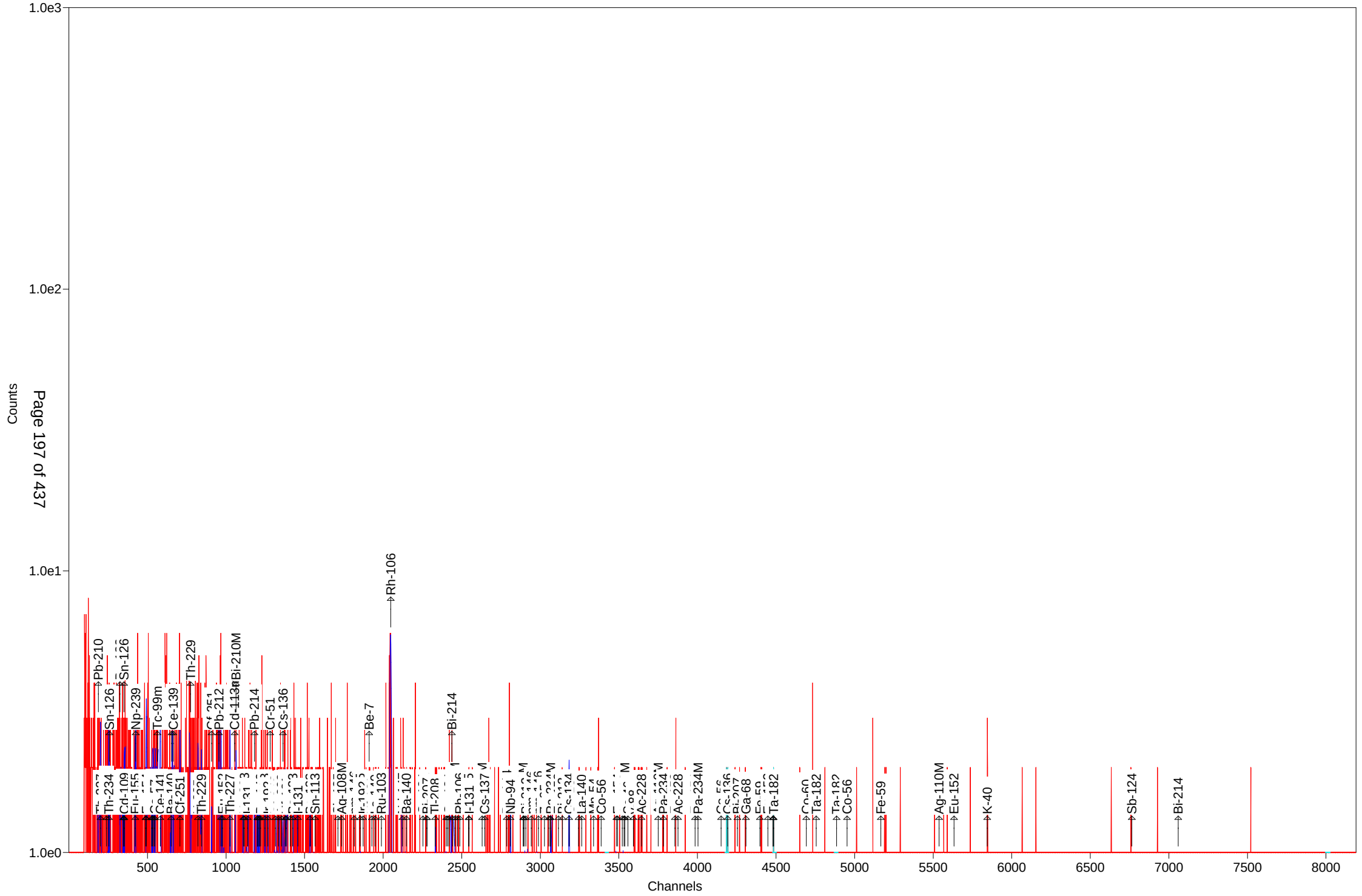
Ta-182 #A	-1.2352E+00	-1.2352E+00	8.510E+01%	3.56E+00
Hg-203 #A	-1.6890E-01	-1.6890E-01	1.109E+02%	6.41E-01
TL-208 #A	2.5714E-01	2.5714E-01	4.181E+01%	2.60E-01
pm-146 #A	-8.9059E-01	-8.9059E-01	9.428E+01%	1.99E+00
y-88 #A	9.6407E-02	9.6407E-02	2.273E+02%	5.71E-01
Cd-113m#A	-1.8133E+03	-1.8133E+03	1.377E+02%	8.62E+03
Cd-109 #A	-3.0573E+00	-3.0573E+00	2.112E+02%	2.18E+01
Cf-251 #A	5.5081E-01	5.5081E-01	1.370E+02%	2.01E+00
Cf-249 #A	0.0000E+00	0.0000E+00	1.000E+03%	1.07E+00
Sn-126 #A	1.0136E+00	1.0136E+00	1.390E+02%	4.86E+00
PB-210 #A	-5.2786E+00	-5.2786E+00	9.485E+01%	1.70E+01
PB-212 #A	3.7277E-01	3.7277E-01	1.060E+02%	1.34E+00
PB-214 #A	1.8838E-01	1.8838E-01	2.011E+02%	1.43E+00
BI-207 #A	-9.3656E-03	-9.3656E-03	1.375E+03%	4.97E-01
BI-212 #A	-2.3759E+00	-2.3759E+00	1.189E+02%	1.20E+01
BI-214 #A	-1.3538E+00	-1.3538E+00	2.746E+01%	3.84E+00
BI-210M#A	2.1879E-01	2.1879E-01	1.361E+02%	1.03E+00
AC-228 #A	2.0230E-01	2.0230E-01	3.468E+02%	1.84E+00
TH-227 #A	2.2946E+00	2.2946E+00	5.126E+01%	8.73E+00
TH-229 #A	-4.0337E+00	-4.0337E+00	1.027E+02%	1.03E+01
TH-234 #A	5.6179E+00	5.6179E+00	5.187E+01%	9.35E+00
PA-231 #A	4.8624E+00	4.8624E+00	1.249E+02%	2.85E+01
PA-233 #A	5.6578E-01	5.6578E-01	1.383E+02%	2.23E+00
PA-234 #A	3.1217E-01	3.1217E-01	8.379E+01%	3.79E+00
PA-234M#A	1.2746E+01	1.2746E+01	1.599E+02%	9.40E+01
U-235 #A	3.8963E-01	3.8963E-01	2.599E+02%	7.61E+00
AM-241 #A	4.8358E-02	4.8358E-02	5.921E+02%	1.04E+00
Np-237 #A	-1.0116E+00	-1.0116E+00	1.752E+02%	5.99E+00
Ir-192 #A	1.2735E-01	1.2735E-01	2.196E+02%	9.62E-01
Cs-136 #A	1.6995E-01	1.6996E-01	3.780E+01%	8.11E-01
Np-239 #A	4.4605E-01	4.4611E-01	1.910E+02%	2.89E+00
Nd-147 #A	-2.6537E+00	-2.6538E+00	8.932E+01%	5.69E+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 1999.3 keV) 0.000E+00 Bq/Sample
Total Decayed Activity (37.6 to 1999.3 keV) 0.0000000E+00 Bq/Sample

263537_Gamma_MB 160-263537~1-A. 9_Gamma_20161561.spc.



Test America St. Louis Spectrum ID: 16_Gamma_20162040

Sample Description: 263537_Gamma_LCS 160-263537~2-A
Detector: Detector #16
Batch ID: 263537
Work Order Number: Gamma
Lot Number: LCS 160-263537~2-A

Decay to Time: 8/25/2016 09:46 Live Time: 1800 sec
Acquisition Time: 8/25/2016 09:46:10 Real Time: 1814 sec
Analysis Time: 8/25/2016 10:17 Dead Time: 0.79 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 16_Soil_TunaCan.Clb
Efficiency Cal Desc: 16_TunaCan_90099_071012
Efficiency Cal Date: 7/13/2012 09:47
Energy Cal Date: 2/28/2012 09:35
Library: Client_Long_Rev11.lib
Bkgd Correction File: 16_2016-08-07_0542.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	-1.442E+01	37.6	5.424E+00	5.474E+00	4.746E+01
NA-22	-3.939E-02	1341.6	5.285E-01	5.285E-01	1.894E+00
K-40	1.147E+01	34.0	3.903E+00	3.947E+00	1.085E+01
Sc-46	1.072E+00	79.6	8.533E-01	8.550E-01	5.924E+00
CR-51	1.103E+01	157.1	1.734E+01	1.735E+01	5.749E+01
MN-54	3.008E-01	512.7	1.542E+00	1.542E+00	3.376E+00
FE-59	-2.313E+00	148.7	3.440E+00	3.442E+00	7.080E+00
Co-56	1.362E+00	74.6	1.016E+00	1.018E+00	3.155E+00
CO-57	-2.531E-02	2679.3	6.781E-01	6.781E-01	2.271E+00
CO-58	1.488E+00	80.1	1.192E+00	1.194E+00	3.954E+00
CO-60	2.058E+02	1.2	2.555E+00	1.064E+01	4.502E-01
ZN-65	3.517E+00	94.6	3.327E+00	3.331E+00	1.106E+01
NB-94	1.230E+00	90.3	1.111E+00	1.112E+00	3.693E+00
ZR-95	1.027E+00	213.8	2.195E+00	2.195E+00	4.982E+00
NB-95	1.802E-01	547.8	9.869E-01	9.869E-01	3.349E+00
RU-103	2.358E+00	55.1	1.300E+00	1.306E+00	2.987E+00
RH-106	0.000E+00	1.#INF	6.451E+00	6.451E+00	5.787E+01
AG-108M	2.542E-01	560.0	1.424E+00	1.424E+00	3.323E+00
AG-110M	1.288E+00	142.0	1.829E+00	1.830E+00	8.182E+00
SN-113	-1.998E+00	94.2	1.882E+00	1.885E+00	6.647E+00
SB-124	1.866E+00	35.6	6.635E-01	6.706E-01	1.658E+00
SB-125	4.509E+00	94.9	4.280E+00	4.287E+00	9.905E+00
I-131	1.548E-01	348.9	5.400E-01	5.401E-01	3.225E+00
Gd-153	-2.578E+00	149.1	3.843E+00	3.846E+00	1.273E+01
Ga-68	7.219E+01	83.8	6.049E+01	6.063E+01	1.267E+02
Tc-99m	-8.796E-01	139.0	1.223E+00	1.224E+00	4.050E+00
BA-133	-9.582E-01	177.2	1.698E+00	1.699E+00	5.661E+00
CS-134	7.701E-01	78.3	6.030E-01	6.043E-01	5.832E+00
CS-137	3.701E+02	1.2	4.324E+00	1.974E+01	3.239E+00
CE-139	9.692E-01	95.2	9.227E-01	9.273E-01	3.057E+00
Ba-140	-1.910E+00	195.8	3.741E+00	3.742E+00	1.132E+01
La-140	1.276E+00	83.4	1.063E+00	1.065E+00	1.417E+00
CE-141	1.543E+00	146.2	2.256E+00	2.257E+00	7.473E+00

CE-144	-6.614E+00	147.2	9.734E+00	9.740E+00	3.225E+01
PM-144	1.202E-02	159.8	1.921E-02	1.922E-02	3.950E+00
EU-152	2.440E+00	124.4	3.036E+00	3.039E+00	1.931E+01
EU-154	5.439E-01	101.5	5.517E-01	5.524E-01	3.623E+01
EU-155	3.385E+00	133.6	4.523E+00	4.527E+00	1.499E+01
HF-181	-9.805E-01	181.8	1.782E+00	1.783E+00	5.937E+00
Ta-182	-6.439E+00	72.1	4.643E+00	4.654E+00	1.536E+01
Hg-203	0.000E+00	1.#INF	6.588E-01	6.588E-01	3.377E+00
TL-208	2.426E+00	51.7	1.254E+00	1.261E+00	2.900E+00
pm-146	-4.460E+00	86.1	3.838E+00	3.845E+00	8.597E+00
y-88	1.374E+00	25.8	3.547E-01	3.616E-01	3.841E+00
Cd-113m	-1.702E+04	115.6	1.967E+04	1.970E+04	6.520E+04
Cd-109	2.095E+01	171.2	3.587E+01	3.589E+01	1.188E+02
Cf-251	-4.273E+00	105.6	4.513E+00	4.529E+00	1.137E+01
Cf-249	1.293E+00	142.5	1.843E+00	1.844E+00	6.130E+00
Sn-126	-1.935E+01	217.9	4.215E+01	4.216E+01	1.392E+02
PB-210	9.838E+03	0.9	9.106E+01	5.848E+02	1.766E+02
PB-212	8.319E+00	20.2	1.683E+00	1.767E+00	4.162E+00
PB-214	3.418E+00	69.9	2.388E+00	2.394E+00	8.065E+00
BI-207	-3.368E-01	254.3	8.565E-01	8.567E-01	2.890E+00
BI-212	-2.111E+01	248.0	5.236E+01	5.237E+01	4.824E+01
BI-214	7.951E+00	19.4	1.545E+00	1.599E+00	4.058E+00
BI-210M	-2.041E+00	117.9	2.406E+00	2.409E+00	7.976E+00
AC-228	8.376E+00	58.3	4.884E+00	4.902E+00	1.287E+01
TH-227	6.496E+00	377.5	2.452E+01	2.452E+01	8.139E+01
TH-229	6.658E+00	279.0	1.857E+01	1.858E+01	4.703E+01
TH-234	3.129E+01	68.5	2.145E+01	2.151E+01	5.676E+01
PA-231	-3.798E+01	148.1	5.625E+01	5.629E+01	1.865E+02
PA-233	2.943E+00	162.1	4.772E+00	4.774E+00	1.582E+01
PA-234	-4.043E+00	149.4	6.039E+00	6.042E+00	2.001E+01
PA-234M	-3.186E+02	67.8	2.160E+02	2.166E+02	7.596E+02
U-235	7.458E+00	50.0	3.725E+00	3.745E+00	1.220E+01
AM-241	1.189E+03	0.7	8.351E+00	6.224E+01	1.265E+01
Np-237	-6.111E+00	174.7	1.067E+01	1.068E+01	3.533E+01
Ir-192	1.770E+00	89.3	1.581E+00	1.584E+00	6.061E+00
Cs-136	1.684E+00	59.1	9.947E-01	9.994E-01	4.284E+00
Np-239	7.831E-07	531663493.6	4.164E+00	4.164E+00	1.386E+01
Nd-147	2.399E+00	169.8	4.073E+00	4.076E+00	2.103E+01
Total	1.184E+04				

Analyst: Amanda Dick

Sample description
263537_Gamma_LCS 160-263537~2-A

Spectrum Filename: C:\User\SPC\Det16\16_Gamma_20162040.An1

Acquisition information
Start time: 8/25/2016 9:46:10 AM
Live time: 1800
Real time: 1814
Dead time: 0.79 %
Detector ID: 16

Detector system
Ge16 SN/11012217

Calibration
Filename: 16_Soil_TunaCan.Clb
16_TunaCan_90099_071012

Energy Calibration
Created: 2/28/2012 9:35:31 AM
Zero offset: 0.050 keV
Gain: 0.250 keV/channel
Quadratic: -2.285E-08 keV/channel^2

Efficiency Calibration
Created: 7/13/2012 9:47:24 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.01 %
Log(Eff): 1.477416E-02 + (-5.514266E-01*Log(E)) + (-1.443482E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.17 %
Log(Eff): -2.408438E+01 + (8.948554E+00*Log(E)) + (-9.513599E-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 (1999.64keV)
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	8/25/2016 9:46:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	16_2016-08-07_0542.PBC 8/7/2016 5:42:47 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 29 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1460

***** 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	17703.	0.93	0.96	2.345E-02	46.54	4.250	9.838E+03	PB210
49.86	35.	257.16	0.96	2.617E-02	50.14	8.000	9.160E+00	TH227
59.48	26473.	0.81	0.99	3.323E-02	59.54	35.900	1.232E+03	AM241
63.13	76.	68.55	0.50	3.561E-02	63.29	3.810	PBC<MDA	TH234
77.26	171.	27.75	0.90	4.233E-02				
87.96	237.	26.56	1.34	4.549E-02	86.94	9.040	3.219E+01	Sn126
					87.57	37.500	7.734E+00	Sn126
					88.04	3.790	7.635E+01	Cd109
91.10	65.	169.80	1.00	4.612E-02	91.10	28.300	PBC<MDA	Nd147
92.59	24.	454.76	1.00	4.638E-02	92.59	5.584	PBC<MDA	TH234
105.31	62.	133.62	1.01	4.766E-02	105.31	21.200	PBC<MDA	EU155
123.10	52.	101.45	1.03	4.721E-02	123.10	40.790	PBC<MDA	EU154
143.50	66.	49.96	1.05	4.466E-02	143.79	10.960	PBC<MDA	U235
145.16	59.	146.21	1.05	4.440E-02	145.44	48.200	PBC<MDA	CE141
156.25	42.	58.03	0.42	4.254E-02				
165.74	58.	95.20	1.07	4.156E-02	165.85	79.900	PBC<MDA	CE139
193.51	20.	278.96	1.09	3.730E-02	193.51	4.400	PBC<MDA	TH229
238.39	222.	18.91	1.37	3.219E-02	238.63	43.300	8.319E+00	PB212
260.01	21.	84.25	0.41	3.026E-02				
295.09	52.	95.92	1.19	2.765E-02	295.09	19.300	PBC<MDA	PB214
308.44	51.	162.14	1.20	2.678E-02	308.44	31.750	PBC<MDA	Ir192
312.01	51.	162.12	1.20	2.656E-02	312.01	36.000	PBC<MDA	PA233

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
316.49	49.	155.11	1.21	2.629E-02	316.49	87.040	PBC<MDA	Ir192
320.08	51.	157.14	1.21	2.608E-02	320.08	9.940	PBC<MDA	CR51
351.93	39.	101.57	1.24	2.436E-02	351.93	37.600	PBC<MDA	PB214
383.84	48.	100.91	1.27	2.288E-02	383.84	8.940	PBC<MDA	BA133
387.95	35.	142.48	1.27	2.271E-02	387.95	66.000	PBC<MDA	Cf249
427.88	51.	94.93	1.31	2.115E-02	427.88	29.600	PBC<MDA	SB125
433.94	9.	560.05	1.31	2.093E-02	433.94	90.480	PBC<MDA	AG108M
468.06	33.	146.46	1.34	1.981E-02	468.06	51.750	PBC<MDA	Ir192
480.08	49.	53.43	1.03	1.945E-02				
497.05	73.	55.13	1.37	1.896E-02	497.05	90.900	PBC<MDA	RU103
531.00	7.	567.84	1.40	1.807E-02	531.00	13.000	PBC<MDA	Nd147
569.32	16.	148.64	1.43	1.717E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	6.513E+00	PA234
					569.70	97.740	5.466E-01	BI207
583.02	62.	51.71	1.44	1.687E-02	583.02	84.500	PBC<MDA	TL208
603.20	54.	35.56	2.38	1.646E-02	602.73	98.260	1.866E+00	SB124
609.28	91.	24.54	1.31	1.633E-02	609.31	46.090	6.729E+00	BI214
619.54	19.	260.46	1.47	1.616E-02	618.06	99.100	PBC<MDA	PM144
636.97	7.	348.86	1.49	1.581E-02	636.97	7.170	PBC<MDA	I131
661.67	8724.	1.17	1.53	1.537E-02	661.66	85.210	3.701E+02	CS137
691.42	21.	47.81	0.56	1.488E-02				
702.63	32.	90.29	1.55	1.470E-02	702.63	97.900	PBC<MDA	NB94
722.43	19.	130.10	1.57	1.439E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	8.215E-01	AG108M
756.73	14.	213.81	1.60	1.391E-02	756.73	54.460	PBC<MDA	ZR95
763.94	17.	141.96	1.60	1.381E-02	763.94	22.280	PBC<MDA	AG110M
765.79	4.	547.75	1.60	1.379E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
766.41	26.	85.84	1.60	1.378E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
795.87	35.	79.41	1.63	1.340E-02	795.87	85.530	PBC<MDA	CS134
801.95	14.	197.02	1.64	1.332E-02	801.95	8.690	PBC<MDA	CS134
811.79	35.	80.09	1.64	1.322E-02	810.78	99.460	PBC<MDA	CO58
815.77	35.	83.35	1.65	1.316E-02	815.77	23.280	PBC<MDA	La140
818.50	35.	87.34	1.65	1.312E-02	818.50	100.000	PBC<MDA	Cs136
833.59	7.	512.66	1.66	1.293E-02	834.85	99.980	PBC<MDA	MN54
846.77	29.	115.22	1.67	1.280E-02	846.77	99.935	PBC<MDA	Co56
883.42	12.	329.63	1.71	1.238E-02	883.24	9.600	PBC<MDA	PA234
					884.68	72.680	7.407E-01	AG110M
889.28	8.	479.98	1.71	1.234E-02	889.28	99.984	PBC<MDA	Sc46
898.04	33.	112.17	1.72	1.225E-02	898.04	93.700	PBC<MDA	y88
911.07	40.	94.12	1.73	1.211E-02	911.07	29.000	PBC<MDA	AC228
964.11	21.	124.42	1.77	1.161E-02	964.11	14.605	PBC<MDA	EU152
968.97	43.	68.84	1.78	1.157E-02	968.97	17.460	PBC<MDA	AC228
1048.07	30.	79.61	1.84	1.091E-02	1048.07	80.000	PBC<MDA	Cs136
1077.40	39.	83.80	1.87	1.068E-02	1077.40	3.300	PBC<MDA	Ga68
1113.67	33.	94.58	1.90	1.041E-02	1115.55	50.600	PBC<MDA	ZN65
1120.55	33.	79.59	1.91	1.037E-02	1120.29	15.100	PBC<MDA	BI214

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	5.092E+00	Ta182
1173.32	3767.	1.77	1.86	1.002E-02	1173.24	99.900	2.091E+02	CO60
1189.05	9.	242.54	1.96	9.916E-03	1189.05	16.200	PBC<MDA	Ta182
1238.28	17.	94.71	2.00	9.617E-03	1238.28	66.070	PBC<MDA	Co56
1332.59	3315.	1.74	2.00	9.096E-03	1332.50	99.980	2.025E+02	CO60
1461.32	19.	34.02	1.92	8.482E-03	1460.83	10.670	1.147E+01	K40
1691.06	3.	270.74	2.37	7.585E-03	1690.98	47.790	PBC<MDA	SB124
1764.59	24.	30.13	2.43	7.342E-03	1764.49	15.400	1.161E+01	BI214
1836.06	15.	25.82	2.48	7.121E-03	1836.06	99.200	1.180E+00	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
308.67	77.26	735.	171.	4.037E+03	27.75	0.903	-
624.52	156.25	248.	42.	9.755E+02	58.03	0.417	- s
1039.40	260.01	146.	21.	6.940E+02	84.25	0.407	- sc
1920.56	480.08	269.	30.	1.534E+03	79.87	1.353	- sc
2765.53	691.42	63.	30.	1.989E+03	42.11	1.539	- 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	185.86	46.54	4570.	17703.	9.835	0.93	0.959D
TH-227	200.26	50.14	4346.	25.	0.014	377.46	0.962D
AM-241	237.83	59.54	3338.	25548.	14.194	0.70	0.971D
TH-234	252.18	63.13	851.	76.	0.042	68.55	0.501s
Sn-126	256.79	64.28	35411.	-122.	-0.068	217.86	0.976
BA-133	323.60	80.99	2729.	-72.	-0.040	103.27	0.991s
Np-237	345.59	86.49	6421.	-65.	-0.036	174.65	0.996
EU-155	345.80	86.54	6163.	-65.	-0.036	171.36	0.996
Sn-126	347.39	86.94	6072.	-65.	-0.036	170.06	0.997s
Sn-126	349.91	87.57	1030.	12.	0.007	368.47	0.997D
Cd-109	351.79	88.04	6167.	65.	0.036	171.18	0.998A
Nd-147	364.02	91.10	6102.	65.	0.036	169.80	1.001s
TH-234	369.98	92.59	6077.	24.	0.013	454.76	1.002

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Gd-153	389.61	97.50	4739.	-66.	-0.036	149.08	1.007s
Np-239	397.61	99.50	4804.	-66.	-0.036	149.82	1.008s
Gd-153	412.40	103.20	4870.	-66.	-0.037	150.36	1.012
Np-239	414.40	103.70	4936.	-66.	-0.037	151.29	1.012
EU-155	420.85	105.31	3352.	62.	0.034	133.62	1.014s
EU-152	486.67	121.78	1595.	-62.	-0.034	92.23	1.029s
EU-154	491.96	123.10	1356.	52.	0.029	101.45	1.030s
PA-234	524.73	131.29	4089.	-61.	-0.034	149.38	1.038s
HF-181	531.64	133.02	4028.	-61.	-0.034	148.04	1.039
CE-144	533.70	133.54	3985.	-61.	-0.034	147.18	1.040s
HF-181	544.74	136.30	4046.	-61.	-0.034	147.93	1.042
CO-57	545.43	136.47	4107.	-61.	-0.034	149.04	1.042
Tc-99m	561.57	140.51	3684.	-62.	-0.034	138.99	1.046
U-235	574.67	143.79	505.	66.	0.037	49.96	1.049D
CE-141	581.29	145.44	3745.	59.	0.033	146.21	1.050s
Ba-140	650.14	162.66	1396.	-58.	-0.032	91.49	1.066s
U-235	653.01	163.38	1390.	-16.	-0.009	335.42	1.067
CE-139	662.90	165.85	1492.	58.	0.032	95.20	1.069s
Cf-251	705.88	176.60	847.	-52.	-0.029	105.62	1.079s
TH-229	773.49	193.51	854.	20.	0.011	278.96	1.094s
TH-229	842.82	210.85	885.	-27.	-0.015	123.11	1.110s
Cf-251	907.40	227.00	840.	-20.	-0.011	276.57	1.125
PB-212	952.93	238.39	475.	209.	0.116	20.23	1.371s
PB-214	967.37	242.00	2137.	-59.	-0.033	111.90	1.139s
EU-152	978.14	244.69	1944.	-59.	-0.033	107.27	1.141s
TH-227	1024.32	256.24	1985.	-55.	-0.031	76.44	1.152
Cd-113m	1054.15	263.70	1997.	-55.	-0.031	115.58	1.158s
BI-210M	1062.67	265.83	2052.	-55.	-0.030	117.88	1.160s
TL-208	1108.46	277.28	880.	-19.	-0.011	221.99	1.171s
Hg-203	1116.13	279.20	899.	0.	0.000	1000.00	1.173s
I-131	1136.52	284.30	656.	-40.	-0.022	104.60	1.177s
PB-214	1179.67	295.09	636.	52.	0.029	95.92	1.187s
PB-212	1199.42	300.03	2973.	-53.	-0.030	79.05	1.191s
PA-231	1199.58	300.07	3001.	-53.	-0.030	145.83	1.192s
PA-233	1200.02	300.18	3054.	-53.	-0.030	147.11	1.192s
PA-231	1209.90	302.65	3107.	-53.	-0.030	148.10	1.194s
BA-133	1210.70	302.85	3161.	-53.	-0.030	149.33	1.194s
Ba-140	1218.69	304.85	3227.	-54.	-0.030	150.65	1.196s
BI-210M	1218.88	304.90	3281.	-30.	-0.017	272.44	1.196s
Ir-192	1233.05	308.44	3398.	51.	0.028	162.14	1.199s
PA-233	1247.34	312.01	3348.	51.	0.028	162.12	1.202
Ir-192	1265.24	316.49	2809.	49.	0.027	155.11	1.206s
CR-51	1279.62	320.08	3248.	51.	0.029	157.14	1.210
La-140	1314.31	328.76	2296.	-40.	-0.022	170.85	1.217s
Cf-249	1333.02	333.44	2336.	0.	0.000	1000.00	1.222s
AC-228	1352.54	338.32	2336.	0.	0.000	1000.00	1.226s
Cs-136	1361.54	340.57	2336.	0.	0.000	1000.00	1.228
HF-181	1382.56	345.83	532.	-19.	-0.011	422.00	1.233s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-214	1406.97	351.93	781.	39.	0.022	101.57	1.238s
BA-133	1423.24	356.00	1037.	-26.	-0.014	177.21	1.242s
I-131	1457.16	364.48	557.	-5.	-0.003	864.36	1.250s
BA-133	1534.57	383.84	1170.	48.	0.027	100.91	1.267s
Cf-249	1551.01	387.95	1218.	35.	0.019	142.48	1.271
SN-113	1565.96	391.69	1330.	-52.	-0.029	94.18	1.274s
SB-125	1710.67	427.88	546.	51.	0.028	94.93	1.307s
AG-108M	1734.91	433.94	563.	9.	0.005	560.05	1.312s
pm-146	1814.67	453.88	680.	-31.	-0.017	170.86	1.330s
SB-125	1852.61	463.37	1227.	-46.	-0.025	105.20	1.338
Ir-192	1871.38	468.06	1175.	33.	0.019	146.46	1.342
BE-7	1909.51	477.60	1374.	-53.	-0.030	37.63	1.351s
HF-181	1927.12	482.00	1240.	-28.	-0.015	181.78	1.355s
La-140	1947.21	487.02	1268.	0.	0.000	1000.00	1.359s
RU-103	1987.33	497.05	373.	73.	0.041	55.13	1.368s
Nd-147	2123.10	531.00	342.	7.	0.004	567.84	1.398s
Ba-140	2148.14	537.26	343.	-15.	-0.008	195.83	1.404s
CS-134	2252.03	563.24	277.	-35.	-0.020	83.05	1.427s
CS-134	2276.36	569.32	292.	16.	0.009	148.64	1.432s
PA-234	2276.96	569.47	309.	0.	0.000	1000.00	1.432s
BI-207	2277.89	569.70	329.	-10.	-0.006	254.31	1.432s
TL-208	2331.16	583.02	237.	62.	0.035	51.71	1.444
SB-125	2401.07	600.50	1409.	-41.	-0.023	130.69	1.460s
SB-124	2411.88	603.20	96.	54.	0.030	35.56	2.376s
CS-134	2417.91	604.71	1263.	-29.	-0.016	175.73	1.463s
BI-214	2436.19	609.28	126.	91.	0.051	24.54	1.310
AG-108M	2456.19	614.28	1234.	0.	0.000	1000.00	1.472s
PM-144	2471.31	618.06	1215.	19.	0.011	260.46	1.475s
RH-106	2486.73	621.92	1234.	0.	0.000	1000.00	1.479s
SB-125	2542.62	635.89	263.	-3.	-0.001	847.11	1.491s
I-131	2546.96	636.97	295.	7.	0.004	348.86	1.492s
AG-110M	2630.10	657.76	9158.	-25.	-0.014	538.13	1.510
CS-137	2645.75	661.67	250.	8724.	4.847	1.17	1.532
PM-144	2785.22	696.54	474.	-17.	-0.009	185.28	1.544s
NB-94	2809.57	702.63	398.	32.	0.018	90.29	1.549
SB-124	2890.19	722.79	307.	19.	0.011	130.10	1.567s
AG-108M	2890.80	722.94	326.	0.	0.000	1000.00	1.567s
EU-154	2892.47	723.36	326.	0.	0.000	1000.00	1.567s
ZR-95	2895.84	724.20	326.	0.	0.000	1000.00	1.568s
BI-212	2907.73	727.17	383.	-41.	-0.023	247.99	1.570s
pm-146	2941.93	735.72	252.	-40.	-0.022	85.01	1.578s
pm-146	2987.69	747.16	233.	-38.	-0.021	86.06	1.588
ZR-95	3025.97	756.73	196.	14.	0.008	213.81	1.596s
AG-110M	3054.82	763.94	284.	17.	0.009	141.96	1.602s
NB-95	3062.21	765.79	297.	4.	0.002	547.75	1.604s
PA-234M	3064.70	766.41	244.	26.	0.015	85.84	1.605s
EU-152	3114.73	778.92	280.	-44.	-0.024	83.00	1.615s
BI-212	3140.74	785.42	215.	-20.	-0.011	112.54	1.621

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CS-134	3182.53	795.87	367.	35.	0.019	79.41	1.630s
CS-134	3206.86	801.95	377.	14.	0.008	197.02	1.635s
CO-58	3242.16	810.78	380.	35.	0.020	80.09	1.643s
La-140	3262.14	815.77	415.	35.	0.020	83.35	1.647s
Cs-136	3273.06	818.50	447.	35.	0.019	87.34	1.649s
MN-54	3338.46	834.85	265.	7.	0.004	512.66	1.663s
Co-56	3386.15	846.77	225.	29.	0.016	115.22	1.674s
NB-94	3483.47	871.10	390.	-46.	-0.025	62.96	1.695s
EU-154	3492.00	873.23	437.	-7.	-0.004	481.80	1.696s
PA-234	3521.21	880.53	695.	-47.	-0.026	80.03	1.703s
PA-234	3532.05	883.24	718.	-46.	-0.026	83.15	1.705s
AG-110M	3537.82	884.68	776.	12.	0.007	329.63	1.706s
Sc-46	3556.21	889.28	764.	8.	0.005	479.98	1.710s
y-88	3591.26	898.04	270.	33.	0.018	112.17	1.718s
AC-228	3643.38	911.07	285.	40.	0.022	94.12	1.729s
AG-110M	3749.09	937.49	360.	-52.	-0.029	81.92	1.751
PA-234	3783.21	946.02	415.	-56.	-0.031	65.56	1.759s
EU-152	3855.58	964.11	344.	21.	0.012	124.42	1.774
AC-228	3875.02	968.97	413.	43.	0.024	68.84	1.778
EU-154	3984.48	996.33	683.	-50.	-0.028	75.08	1.801s
PA-234M	4003.15	1001.00	737.	-54.	-0.030	67.80	1.805s
Co-56	4150.56	1037.84	268.	-26.	-0.014	143.66	1.836s
Cs-136	4191.49	1048.07	280.	30.	0.017	79.61	1.845s
RH-106	4200.65	1050.36	360.	-24.	-0.014	111.29	1.847s
BI-207	4253.86	1063.66	267.	-44.	-0.025	83.41	1.858s
Ga-68	4308.84	1077.40	203.	39.	0.022	83.80	1.870s
FE-59	4396.27	1099.25	246.	-25.	-0.014	148.69	1.888s
ZN-65	4461.46	1115.55	480.	33.	0.019	94.58	1.901s
Sc-46	4481.49	1120.55	331.	33.	0.018	79.59	1.906s
Ta-182	4484.49	1121.30	436.	-42.	-0.023	72.10	1.906s
CO-60	4692.65	1173.32	90.	3767.	2.093	1.77	1.864
Ta-182	4755.57	1189.05	85.	9.	0.005	242.54	1.963s
Ta-182	4885.06	1221.41	91.	-12.	-0.006	193.63	1.990s
Co-56	4952.57	1238.28	47.	17.	0.010	94.71	2.004s
EU-154	5097.68	1274.54	40.	0.	0.000	1000.00	2.034s
FE-59	5165.91	1291.60	40.	-6.	-0.003	284.81	2.048s
CO-60	5329.96	1332.59	0.	3315.	1.842	1.74	1.999
AG-110M	5536.89	1384.30	24.	-6.	-0.003	201.38	2.124s
K-40	5845.14	1461.32	10.	19.	0.010	34.02	1.916
SB-124	6764.37	1690.98	13.	3.	0.002	270.74	2.369s
BI-214	7058.61	1764.49	13.	24.	0.013	30.13	2.427s
y-88	7345.12	1836.06	0.	15.	0.008	25.82	2.483s

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  -1.4415E+01                                     5.31E+01
                          477.60-1.442E+01 ?(P 4.746E+01 3.76E+01 1.05E+01 G

NA-22    C  -3.9388E-02                                     9.50E+02
                         1274.53-3.939E-02 %(  1.894E+00 1.34E+03 9.99E+01 G

K-40     N   1.1471E+01                                     4.66E+11
                         1460.83 1.147E+01  (P 1.085E+01 3.40E+01 1.07E+01 G

Sc-46    F   1.0721E+00                                     8.38E+01
                          889.28 3.678E-01 ?(  5.924E+00 4.80E+02 1.00E+02 G
                         1120.55 1.776E+00  (P 4.689E+00 7.96E+01 1.00E+02 G

CR-51    F   1.1034E+01                                     2.77E+01
                          320.08 1.103E+01 &(  5.749E+01 1.57E+02 9.94E+00 G

MN-54    C   3.0078E-01                                     3.12E+02
                          834.85 3.008E-01 &(  3.376E+00 5.13E+02 1.00E+02 G

FE-59    F  -2.3135E+00                                     4.45E+01
                         1099.25-2.313E+00 &(P 7.080E+00 1.49E+02 5.65E+01 G
                         1291.60-7.967E-01 + P 4.432E+00 2.85E+02 4.32E+01 G

Co-56    C   1.3618E+00                                     7.73E+01
                          846.77 1.260E+00  (  3.155E+00 1.15E+02 9.99E+01 G
                         1238.28 1.516E+00 @(P 3.020E+00 9.47E+01 6.61E+01 G
                         1037.84-9.160E+00 + P 2.825E+01 1.44E+02 1.41E+01 G
                         1771.35-2.451E-01 %   1.532E+01 1.74E+03 1.55E+01  A

CO-57    C  -2.5307E-02                                     2.72E+02
                          122.06-2.531E-02 %(  2.271E+00 2.68E+03 8.56E+01 G
                          136.47-6.942E+00 &   3.427E+01 1.49E+02 1.07E+01 G

CO-58    C   1.4880E+00                                     7.09E+01
                          810.78 1.488E+00 &(  3.954E+00 8.01E+01 9.95E+01 G

CO-60    F   2.0580E+02                                     1.93E+03
                         1332.50 2.025E+02  (  4.502E-01 1.74E+00 1.00E+02 G
                         1173.24 2.091E+02  (P 2.610E+00 1.77E+00 9.99E+01 G
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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
ZN-65	F	3.5171E+00					2.44E+02	
			1115.55	3.517E+00	&(	1.106E+01	9.46E+01	5.06E+01 G
NB-94	I	1.2300E+00					7.41E+06	
			702.63	1.230E+00	?(	3.693E+00	9.03E+01	9.79E+01 G
			871.10	-2.026E+00	+	4.206E+00	6.30E+01	9.99E+01 G
ZR-95	I	1.0265E+00					6.40E+01	
			756.73	1.027E+00	&(	4.982E+00	2.14E+02	5.45E+01 G
			724.20	0.000E+00	&	7.603E+00	1.00E+03	4.42E+01 G
NB-95	I	1.8016E-01					6.40E+01	
			765.79	1.802E-01	?(	3.349E+00	5.48E+02	9.98E+01 G
RU-103	I	2.3579E+00					3.93E+01	
			497.05	2.358E+00	*(P	2.987E+00	5.51E+01	9.09E+01 G
			610.30	4.519E-06	%	9.857E+01	6.51E+08	5.75E+00 GA
AG-108M	C	2.5419E-01					1.53E+05	
			433.94	2.542E-01	&(	3.323E+00	5.60E+02	9.05E+01 G
			722.94	0.000E+00	-	3.690E+00	1.00E+03	9.08E+01 G
			614.28	0.000E+00	-	6.338E+00	1.00E+03	8.98E+01 G
AG-110M	F	1.2884E+00					2.50E+02	
			884.68	7.407E-01	&(	8.182E+00	3.30E+02	7.27E+01 G
			657.76	-9.572E-01	+	1.706E+01	5.38E+02	9.46E+01 G
			937.49	-7.046E+00	+	1.243E+01	8.19E+01	3.44E+01 G
			1384.30	-1.553E+00	+	6.610E+00	2.01E+02	2.43E+01 G
			763.94	3.075E+00	&(	1.466E+01	1.42E+02	2.23E+01 G
SN-113	F	-1.9981E+00					1.15E+02	
			391.69	-1.998E+00	*(P	6.647E+00	9.42E+01	6.40E+01 G
SB-124	F	1.8661E+00					6.02E+01	
			602.73	1.866E+00	(	1.658E+00	3.56E+01	9.83E+01 G
			1690.98	5.109E-01	-	2.957E+00	2.71E+02	4.78E+01 G
			722.79	6.903E+00	+	3.010E+01	1.30E+02	1.08E+01 G
SB-125	I	4.5090E+00					1.01E+03	
			427.88	4.509E+00	(P	9.905E+00	9.49E+01	2.96E+01 G
			600.50	-7.708E+00	+	3.347E+01	1.31E+02	1.79E+01 G
			635.89	-8.227E-01	- P	2.428E+01	8.47E+02	1.13E+01 G
			463.37	-1.219E+01	+ P	4.411E+01	1.05E+02	1.05E+01 G
I-131	I	1.5479E-01					8.02E+00	
			364.48	-1.328E-01	&(P	3.225E+00	8.64E+02	8.17E+01 G
			284.30	-1.286E+01	& P	3.891E+01	1.05E+02	6.14E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			636.97	3.432E+00	&(	4.054E+01	3.49E+02	7.17E+00 G
Gd-153	F	-2.5781E+00					2.42E+02	
			97.50	-2.578E+00	?(	1.273E+01	1.49E+02	3.00E+01 G
			103.20	-3.529E+00	+	1.757E+01	1.50E+02	2.18E+01 G
Ga-68	C	7.2188E+01					4.71E-02	
			1077.40	7.219E+01	(	1.267E+02	8.38E+01	3.30E+00 G
Tc-99m	I	-8.7959E-01					2.51E-01	
			140.51	-8.796E-01	?(	4.050E+00	1.39E+02	8.93E+01 G
BA-133	F	-9.5822E-01					3.85E+03	
			356.00	-9.582E-01	&(	5.661E+00	1.77E+02	6.20E+01 G
			302.85	-5.971E+00	+	2.956E+01	1.49E+02	1.83E+01 G
			383.84	1.315E+01	& P	4.402E+01	1.01E+02	8.94E+00 GA
			80.99	-2.693E+00	+	9.206E+00	1.03E+02	3.41E+01 GA
CS-134	I	7.7008E-01					7.54E+02	
			604.71	-9.966E-01	?(	5.832E+00	1.76E+02	9.76E+01 G
			795.87	1.693E+00	&(	4.460E+00	7.94E+01	8.55E+01 G
			569.32	3.472E+00	?(	1.734E+01	1.49E+02	1.54E+01 G
			801.95	6.748E+00	&(	4.471E+01	1.97E+02	8.69E+00 G
			563.24	-1.363E+01	+ P	3.089E+01	8.31E+01	8.35E+00 G
CS-137	I	3.7014E+02					1.10E+04	
			661.66	3.701E+02	(P	3.239E+00	1.17E+00	8.52E+01 G
CE-139	F	9.6919E-01					1.38E+02	
			165.85	9.692E-01	?(	3.057E+00	9.52E+01	7.99E+01 G
Ba-140	I	-1.9101E+00					1.28E+01	
			537.26	-1.910E+00	&(P	1.132E+01	1.96E+02	2.44E+01 G
			162.66	-1.260E+01	+	3.818E+01	9.15E+01	6.22E+00 G
			304.85	-2.567E+01	+	1.282E+02	1.51E+02	4.29E+00 G
La-140	I	1.2757E+00					1.28E+01	
			1596.21	2.449E-02	%(	1.417E+00	2.66E+03	9.54E+01 G
			487.02	0.000E+00	&	1.070E+01	1.00E+03	4.55E+01 G
			328.76	-4.261E+00	+	2.417E+01	1.71E+02	2.03E+01 G
			815.77	6.403E+00	?(	1.772E+01	8.34E+01	2.33E+01 G
CE-141	I	1.5427E+00					3.25E+01	
			145.44	1.543E+00	?(	7.473E+00	1.46E+02	4.82E+01 G
CE-144	I	-6.6135E+00					2.85E+02	
			133.54	-6.614E+00	@(	3.225E+01	1.47E+02	1.11E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PM-144	C	1.2020E-02					3.63E+02	
			696.54	-6.357E-01	&(	3.950E+00	1.85E+02	9.90E+01 G
			618.06	6.591E-01	&(	5.729E+00	2.60E+02	9.91E+01 G
EU-152	F	2.4402E+00					4.94E+03	
			344.29	-7.964E-02	%(P	1.931E+01	8.74E+03	2.65E+01 G
			1112.07	-1.301E-01	%	4.228E+01	9.61E+03	1.36E+01 G
			121.78	-2.540E+00	+	7.757E+00	9.22E+01	2.86E+01 G
			778.92	-1.372E+01	+	2.544E+01	8.30E+01	1.29E+01 G
			964.11	7.012E+00	&(	2.920E+01	1.24E+02	1.46E+01 G
			244.69	-1.358E+01	+	4.828E+01	1.07E+02	7.58E+00 G
			1408.00	-3.516E-01	% P	7.766E+00	1.42E+03	2.10E+01 GA
EU-154	I	5.4385E-01					3.14E+03	
			873.23	-2.620E+00	(P	3.623E+01	4.82E+02	1.23E+01 G
			123.10	1.496E+00	(P	5.030E+00	1.01E+02	4.08E+01 G
			1274.54	0.000E+00	-	5.421E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	&	1.659E+01	1.00E+03	2.02E+01 G
			1004.77	8.956E-02	%	3.492E+01	1.16E+04	1.80E+01 G
			996.33	-2.318E+01	+	5.758E+01	7.51E+01	1.06E+01 G
EU-155	I	3.3851E+00					1.81E+03	
			105.31	3.385E+00	?(	1.499E+01	1.34E+02	2.12E+01 G
			86.54	-2.603E+00	&	1.477E+01	1.71E+02	3.07E+01 G
HF-181	F	-9.8050E-01					4.24E+01	
			482.00	-9.805E-01	&(	5.937E+00	1.82E+02	8.05E+01 G
			133.02	-1.691E+00	+	8.292E+00	1.48E+02	4.33E+01 G
			345.83	-2.909E+00	+ P	1.647E+01	4.22E+02	1.51E+01 G
			136.30	-1.267E+01	&	6.208E+01	1.48E+02	5.85E+00 G
Ta-182	F	-6.4394E+00					1.14E+02	
			1121.30	-6.439E+00	&(	1.536E+01	7.21E+01	3.49E+01 G
			1221.41	-2.470E+00	+	9.970E+00	1.94E+02	2.70E+01 G
			1189.05	3.112E+00	+	1.580E+01	2.43E+02	1.62E+01 G
TL-208	N	2.4260E+00					6.98E+02	
			583.02	2.426E+00	?(P	2.900E+00	5.17E+01	8.45E+01 G
			277.28	-5.787E+00	-	4.293E+01	2.22E+02	6.31E+00 G
			860.56	5.361E-01	% P	2.711E+01	2.30E+03	1.24E+01 G
pm-146	C	-4.4597E+00					2.02E+03	
			747.16	-4.460E+00	?(	8.597E+00	8.61E+01	3.40E+01 G
			735.72	-7.006E+00	+	1.333E+01	8.50E+01	2.25E+01 G
			453.88	-1.322E+00	&	5.242E+00	1.71E+02	6.50E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

y-88     F   1.3738E+00                                     1.07E+02
                          898.04 1.579E+00 ?(P 3.841E+00 1.12E+02 9.37E+01 G
                         1836.06 1.180E+00 ?(  5.796E-01 2.58E+01 9.92E+01 G

Cd-113m     -1.7016E+04                                     5.33E+03
                          263.70-1.702E+04 &(  6.520E+04 1.16E+02 6.00E-03   K

Cd-109   F   2.0955E+01                                     4.53E+02
                                                          Derived Ave Activity
                           88.04 2.095E+01 }(  1.188E+02 1.71E+02 3.79E+00 G

Cf-251   T  -4.2730E+00                                     3.28E+05
                          176.60-4.273E+00 ?(  1.137E+01 1.06E+02 1.70E+01 G
                          227.00-5.204E+00 &   3.645E+01 2.77E+02 6.30E+00 GA

Cf-249   T   1.2934E+00                                     1.28E+05
                          387.95 1.293E+00 ?(  6.130E+00 1.42E+02 6.60E+01 G
                          333.44 0.000E+00 -   3.223E+01 1.00E+03 1.55E+01 G

Sn-126      -1.9347E+01                                     3.65E+07
                           87.57 4.033E-01 }   4.970E+00 3.68E+02 3.75E+01 GA
                           64.28-1.935E+01  (  1.392E+02 2.18E+02 9.70E+00 G
                           86.94-8.824E+00 &   4.968E+01 1.70E+02 9.04E+00 GA

PB-210   N   9.8383E+03                                     8.14E+03
                           46.54 9.838E+03  (P 1.766E+02 9.26E-01 4.25E+00 G

PB-212   N   8.3190E+00                                     6.98E+02
                          238.63 8.319E+00  (P 4.162E+00 2.02E+01 4.33E+01 G
                          300.03-3.313E+01 - P 1.592E+02 7.91E+01 3.28E+00 GA

PB-214   N   3.4182E+00                                     5.84E+05
                          351.93 2.393E+00  (P 8.065E+00 1.02E+02 3.76E+01 G
                          295.09 5.416E+00 ?(  1.252E+01 9.59E+01 1.93E+01 G
                          242.00-1.381E+01 +   5.122E+01 1.12E+02 7.43E+00 GA

BI-207   C  -3.3678E-01                                     1.18E+04
                          569.70-3.368E-01 ?(  2.890E+00 2.54E+02 9.77E+01 G
                         1063.66-3.050E+00 + P 5.453E+00 8.34E+01 7.45E+01 G

BI-212   N  -2.1113E+01                                     6.98E+02
                          727.17-2.111E+01 ?(P 4.824E+01 2.48E+02 7.55E+00 G
                          785.42-6.470E+01 & P 2.279E+02 1.13E+02 1.28E+00 GA

BI-214   N   7.9509E+00                                     5.84E+05
                          609.31 6.729E+00  (P 4.058E+00 2.45E+01 4.61E+01 G
                         1120.29-1.116E+00 % P 3.851E+01 1.17E+03 1.51E+01 G
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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			1764.49	1.161E+01	?(P	9.706E+00	3.01E+01	1.54E+01 G
BI-210M	T	-2.0408E+00						1.10E+09
			265.83	-2.041E+00	?(	7.976E+00	1.18E+02	5.00E+01 G
			304.90	-2.189E+00	+	1.981E+01	2.72E+02	2.80E+01 G
AC-228	N	8.3760E+00						2.10E+03
			911.07	6.325E+00	(	1.287E+01	9.41E+01	2.90E+01 G
			968.97	1.178E+01	(	2.681E+01	6.88E+01	1.75E+01 G
			338.32	0.000E+00	&	4.207E+01	1.00E+03	1.20E+01 G
			93.35	5.823E-03	%	7.810E+01	4.04E+05	5.56E+00 XA
TH-227	N	6.4956E+00						7.95E+03
			50.14	6.496E+00	!(	8.139E+01	3.77E+02	8.00E+00 G
			256.24	-1.433E+01	+ P	5.459E+01	7.64E+01	7.00E+00 G
TH-229	N	6.6579E+00						2.68E+06
			193.51	6.658E+00	?(	4.703E+01	2.79E+02	4.40E+00 G
			210.85	-1.413E+01	+ P	7.479E+01	1.23E+02	2.99E+00 G
TH-234	N	3.1293E+01						1.63E+12
			63.29	3.129E+01	(P	5.676E+01	6.85E+01	3.81E+00 G
			92.59	5.207E+00	- P	7.850E+01	4.55E+02	5.58E+00 G
PA-231	N	-3.7981E+01						1.20E+07
			302.65	-3.798E+01	(	1.865E+02	1.48E+02	2.88E+00 G
			300.07	-4.411E+01	+	2.133E+02	1.46E+02	2.46E+00 G
PA-233	C	2.9433E+00						7.82E+08
			312.01	2.943E+00	&(P	1.582E+01	1.62E+02	3.60E+01 G
			300.18	-1.751E+01	+	8.538E+01	1.47E+02	6.20E+00 G
PA-234	N	-4.0426E+00						1.63E+12
			131.29	-4.043E+00	?(	2.001E+01	1.49E+02	1.80E+01 G
			946.02	-1.965E+01	+ P	3.437E+01	6.56E+01	1.34E+01 G
			569.47	0.000E+00	+	3.340E+01	1.00E+03	8.20E+00 G
			883.24	-2.161E+01	+	5.955E+01	8.31E+01	9.60E+00 G
			880.53	-3.529E+01	+	9.353E+01	8.00E+01	6.00E+00 GA
PA-234M	N	-3.1861E+02						1.63E+12
			1001.00	-3.186E+02	&(P	7.596E+02	6.78E+01	8.37E-01 G
			766.41	3.621E+02	+ P	1.034E+03	8.58E+01	2.94E-01 G
U-235	N	7.4577E+00						2.57E+11
			143.79	7.458E+00	(P	1.220E+01	5.00E+01	1.10E+01 G
			205.33	3.100E-01	&	4.093E+01	5.19E+03	5.01E+00 G
			163.38	-4.182E+00	-	4.681E+01	3.35E+02	5.08E+00 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241   T   1.1885E+03                                      1.58E+05
                           59.54 1.189E+03  (P 1.265E+01 7.03E-01 3.59E+01 G

Np-237   F  -6.1108E+00                                      2.14E+06
                           86.49-6.111E+00 &(  3.533E+01 1.75E+02 1.31E+01 G

Ir-192   F   1.7701E+00                                      7.40E+01
                          316.49 1.178E+00 ?(  6.061E+00 1.55E+02 8.70E+01 G
                          468.06 1.806E+00 ?(  8.802E+00 1.46E+02 5.18E+01 G
                          308.44 3.334E+00 &(  1.792E+01 1.62E+02 3.18E+01 G

Cs-136   F   1.6835E+00                                      1.30E+01
                          818.50 1.477E+00 ?(  4.284E+00 8.73E+01 1.00E+02 G
                         1048.07 1.942E+00  (  5.133E+00 7.96E+01 8.00E+01 G
                          340.57 0.000E+00 &   1.082E+01 1.00E+03 4.69E+01 G

Np-239   T   7.8314E-07                                      2.36E+00
                          103.70-3.206E+00 &   1.606E+01 1.51E+02 2.40E+01 X
                          106.13 7.831E-07 %(  1.386E+01 5.32E+08 2.27E+01 G
                           99.50-5.143E+00 &   2.552E+01 1.50E+02 1.50E+01 X

Nd-147       2.3988E+00                                      1.11E+01
                          531.00 1.577E+00  (  2.103E+01 5.68E+02 1.30E+01 G
                           91.10 2.776E+00 ?(  1.561E+01 1.70E+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
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	
BA-133	80.99	2729.	-72.	-0.040	103.27	-2.693E+00	
Np-237	86.49	6421.	-65.	-0.036	174.65	-6.111E+00	
EU-155	86.54	6163.	-65.	-0.036	171.36	-2.603E+00	
Nd-147	91.10	6102.	65.	0.036	169.80	2.776E+00	
Gd-153	97.50	4739.	-66.	-0.036	149.08	-2.578E+00	
Np-239	99.50	4804.	-66.	-0.036	149.82	-5.143E+00	
Gd-153	103.20	4870.	-66.	-0.037	150.36	-3.529E+00	
Np-239	103.70	4936.	-66.	-0.037	151.29	-3.206E+00	
EU-155	105.31	3352.	62.	0.034	133.62	3.385E+00	
EU-152	121.78	1595.	-62.	-0.034	92.23	-2.540E+00	
EU-154	123.10	1356.	52.	0.029	101.45	1.496E+00	P
PA-234	131.29	4089.	-61.	-0.034	149.38	-4.043E+00	
HF-181	133.02	4028.	-61.	-0.034	148.04	-1.691E+00	
CE-144	133.54	3985.	-61.	-0.034	147.18	-6.614E+00	
HF-181	136.30	4046.	-61.	-0.034	147.93	-1.267E+01	
CO-57	136.47	4107.	-61.	-0.034	149.04	-6.942E+00	
Tc-99m	140.51	3684.	-62.	-0.034	138.99	-8.796E-01	
Ba-140	162.66	1396.	-58.	-0.032	91.49	-1.260E+01	
Cf-251	176.60	847.	-52.	-0.029	105.62	-4.273E+00	
TH-229	193.51	854.	20.	0.011	278.96	6.658E+00	
TH-229	210.85	885.	-27.	-0.015	123.11	-1.413E+01	P
Cf-251	227.00	840.	-20.	-0.011	276.57	-5.204E+00	
PB-214	242.00	2137.	-59.	-0.033	111.90	-1.381E+01	
EU-152	244.69	1944.	-59.	-0.033	107.27	-1.358E+01	
Cd-113m	263.70	1997.	-55.	-0.031	115.58	-1.702E+04	
BI-210M	265.83	2052.	-55.	-0.030	117.88	-2.041E+00	
TL-208	277.28	880.	-19.	-0.011	221.99	-5.787E+00	
I-131	284.30	656.	-40.	-0.022	104.60	-1.286E+01	P
PB-214	295.09	636.	52.	0.029	95.92	5.416E+00	
PA-231	300.07	3001.	-53.	-0.030	145.83	-4.411E+01	
PA-233	300.18	3054.	-53.	-0.030	147.11	-1.751E+01	
PA-231	302.65	3107.	-53.	-0.030	148.10	-3.798E+01	
BA-133	302.85	3161.	-53.	-0.030	149.33	-5.971E+00	
Ba-140	304.85	3227.	-54.	-0.030	150.65	-2.567E+01	
BI-210M	304.90	3281.	-30.	-0.017	272.44	-2.189E+00	
Ir-192	308.44	3398.	51.	0.028	162.14	3.334E+00	
PA-233	312.01	3348.	51.	0.028	162.12	2.943E+00	P
Ir-192	316.49	2809.	49.	0.027	155.11	1.178E+00	
CR-51	320.08	3248.	51.	0.029	157.14	1.103E+01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
La-140	328.76	2296.	-40.	-0.022	170.85	-4.261E+00	
HF-181	345.83	532.	-19.	-0.011	422.00	-2.909E+00	P
PB-214	351.93	781.	39.	0.022	101.57	2.393E+00	P
BA-133	356.00	1037.	-26.	-0.014	177.21	-9.582E-01	
I-131	364.48	557.	-5.	-0.003	864.36	-1.328E-01	P
BA-133	383.84	1170.	48.	0.027	100.91	1.315E+01	P
Cf-249	387.95	1218.	35.	0.019	142.48	1.293E+00	
SN-113	391.69	1330.	-52.	-0.029	94.18	-1.998E+00	P
SB-125	427.88	546.	51.	0.028	94.93	4.509E+00	P
AG-108M	433.94	563.	9.	0.005	560.05	2.542E-01	
pm-146	453.88	680.	-31.	-0.017	170.86	-1.322E+00	
SB-125	463.37	1227.	-46.	-0.025	105.20	-1.219E+01	P
Ir-192	468.06	1175.	33.	0.019	146.46	1.806E+00	
BE-7	477.60	1374.	-53.	-0.030	37.63	-1.442E+01	P
HF-181	482.00	1240.	-28.	-0.015	181.78	-9.805E-01	
RU-103	497.05	373.	73.	0.041	55.13	2.358E+00	P
Nd-147	531.00	342.	7.	0.004	567.84	1.577E+00	
Ba-140	537.26	343.	-15.	-0.008	195.83	-1.910E+00	P
CS-134	563.24	277.	-35.	-0.020	83.05	-1.363E+01	P
CS-134	569.32	292.	16.	0.009	148.64	3.472E+00	
BI-207	569.70	329.	-10.	-0.006	254.31	-3.368E-01	
TL-208	583.02	237.	62.	0.035	51.71	2.426E+00	P
SB-125	600.50	1409.	-41.	-0.023	130.69	-7.708E+00	
CS-134	604.71	1263.	-29.	-0.016	175.73	-9.966E-01	
SB-125	635.89	263.	-3.	-0.001	847.11	-8.227E-01	P
I-131	636.97	295.	7.	0.004	348.86	3.432E+00	
NB-94	702.63	398.	32.	0.018	90.29	1.230E+00	
BI-212	727.17	383.	-41.	-0.023	247.99	-2.111E+01	P
pm-146	735.72	252.	-40.	-0.022	85.01	-7.006E+00	
pm-146	747.16	233.	-38.	-0.021	86.06	-4.460E+00	
ZR-95	756.73	196.	14.	0.008	213.81	1.027E+00	
PA-234M	766.41	244.	26.	0.015	85.84	3.621E+02	P
EU-152	778.92	280.	-44.	-0.024	83.00	-1.372E+01	
BI-212	785.42	215.	-20.	-0.011	112.54	-6.470E+01	P
CS-134	795.87	367.	35.	0.019	79.41	1.693E+00	
CS-134	801.95	377.	14.	0.008	197.02	6.748E+00	
La-140	815.77	415.	35.	0.020	83.35	6.403E+00	
Cs-136	818.50	447.	35.	0.019	87.34	1.477E+00	
Co-56	846.77	225.	29.	0.016	115.22	1.260E+00	
NB-94	871.10	390.	-46.	-0.025	62.96	-2.026E+00	
EU-154	873.23	437.	-7.	-0.004	481.80	-2.620E+00	P
PA-234	880.53	695.	-47.	-0.026	80.03	-3.529E+01	
PA-234	883.24	718.	-46.	-0.026	83.15	-2.161E+01	
Sc-46	889.28	764.	8.	0.005	479.98	3.678E-01	
y-88	898.04	270.	33.	0.018	112.17	1.579E+00	P
AC-228	911.07	285.	40.	0.022	94.12	6.325E+00	
PA-234	946.02	415.	-56.	-0.031	65.56	-1.965E+01	P
EU-152	964.11	344.	21.	0.012	124.42	7.012E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
AC-228	968.97	413.	43.	0.024	68.84	1.178E+01		
EU-154	996.33	683.	-50.	-0.028	75.08	-2.318E+01		
PA-234M	1001.00	737.	-54.	-0.030	67.80	-3.186E+02		P
Co-56	1037.84	268.	-26.	-0.014	143.66	-9.160E+00		P
Cs-136	1048.07	280.	30.	0.017	79.61	1.942E+00		
RH-106	1050.36	360.	-24.	-0.014	111.29	-8.013E+01		
BI-207	1063.66	267.	-44.	-0.025	83.41	-3.050E+00		P
Ga-68	1077.40	203.	39.	0.022	83.80	7.219E+01		
FE-59	1099.25	246.	-25.	-0.014	148.69	-2.313E+00		P
Sc-46	1120.55	331.	33.	0.018	79.59	1.776E+00		P
Ta-182	1121.30	436.	-42.	-0.023	72.10	-6.439E+00		
Ta-182	1189.05	85.	9.	0.005	242.54	3.112E+00		
Ta-182	1221.41	91.	-12.	-0.006	193.63	-2.470E+00		
Co-56	1238.28	47.	17.	0.010	94.71	1.516E+00		P
FE-59	1291.60	40.	-6.	-0.003	284.81	-7.967E-01		P
y-88	1836.06	0.	15.	0.008	25.82	1.180E+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
BE-7	#A	-1.4415E+01	-1.4415E+01	3.763E+01%	4.75E+01
NA-22	#A	-3.9388E-02	-3.9388E-02	1.342E+03%	1.89E+00
K-40		1.1471E+01	1.1471E+01	3.402E+01%	1.08E+01
Sc-46	#A	1.0721E+00	1.0721E+00	7.959E+01%	5.92E+00
CR-51	#A	1.1034E+01	1.1034E+01	1.571E+02%	5.75E+01
MN-54	#A	3.0078E-01	3.0078E-01	5.127E+02%	3.38E+00
FE-59	#A	-2.3135E+00	-2.3135E+00	1.487E+02%	7.08E+00
Co-56	#A	1.3618E+00	1.3618E+00	7.458E+01%	3.15E+00
CO-57	#A	-2.5307E-02	-2.5307E-02	2.679E+03%	2.27E+00
CO-58	#A	1.4880E+00	1.4880E+00	8.009E+01%	3.95E+00
CO-60		2.0580E+02	2.0580E+02	1.241E+00%	4.50E-01
ZN-65	#A	3.5171E+00	3.5171E+00	9.458E+01%	1.11E+01
NB-94	#A	1.2300E+00	1.2300E+00	9.029E+01%	3.69E+00
ZR-95	#A	1.0265E+00	1.0265E+00	2.138E+02%	4.98E+00
NB-95	#A	1.8016E-01	1.8016E-01	5.478E+02%	3.35E+00
RU-103	#A	2.3579E+00	2.3579E+00	5.513E+01%	2.99E+00
RH-106	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.79E+01
AG-108M	#A	2.5419E-01	2.5419E-01	5.600E+02%	3.32E+00
AG-110M	#A	1.2884E+00	1.2884E+00	1.420E+02%	8.18E+00
SN-113	#A	-1.9981E+00	-1.9981E+00	9.418E+01%	6.65E+00
SB-124		1.8661E+00	1.8661E+00	3.556E+01%	1.66E+00
SB-125	#A	4.5090E+00	4.5090E+00	9.493E+01%	9.90E+00
I-131	#A	1.5479E-01	1.5479E-01	3.489E+02%	3.22E+00
Gd-153	#A	-2.5781E+00	-2.5781E+00	1.491E+02%	1.27E+01

Ga-68	#A	7.2065E+01	7.2188E+01	8.380E+01%	1.27E+02
Tc-99m	#A	-8.7931E-01	-8.7959E-01	1.390E+02%	4.05E+00
BA-133	#A	-9.5822E-01	-9.5822E-01	1.772E+02%	5.66E+00
CS-134	#A	7.7008E-01	7.7008E-01	7.830E+01%	5.83E+00
CS-137		3.7014E+02	3.7014E+02	1.168E+00%	3.24E+00
CE-139	#A	9.6919E-01	9.6919E-01	9.520E+01%	3.06E+00
Ba-140	#A	-1.9101E+00	-1.9101E+00	1.958E+02%	1.13E+01
La-140	#A	1.2757E+00	1.2757E+00	8.335E+01%	1.42E+00
CE-141	#A	1.5427E+00	1.5427E+00	1.462E+02%	7.47E+00
CE-144	#A	-6.6135E+00	-6.6135E+00	1.472E+02%	3.22E+01
PM-144	#A	1.2020E-02	1.2020E-02	1.598E+02%	3.95E+00
EU-152	#A	2.4402E+00	2.4402E+00	1.244E+02%	1.93E+01
EU-154	#A	5.4385E-01	5.4385E-01	1.015E+02%	3.62E+01
EU-155	#A	3.3851E+00	3.3851E+00	1.336E+02%	1.50E+01
HF-181	#A	-9.8050E-01	-9.8050E-01	1.818E+02%	5.94E+00
Ta-182	#A	-6.4394E+00	-6.4394E+00	7.210E+01%	1.54E+01
Hg-203	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.38E+00
TL-208	#A	2.4260E+00	2.4260E+00	5.171E+01%	2.90E+00
pm-146	#A	-4.4597E+00	-4.4597E+00	8.606E+01%	8.60E+00
y-88	#A	1.3738E+00	1.3738E+00	2.582E+01%	3.84E+00
Cd-113m	#A	-1.7016E+04	-1.7016E+04	1.156E+02%	6.52E+04
Cd-109	#A	2.0955E+01	2.0955E+01	1.712E+02%	1.19E+02
Cf-251	#A	-4.2730E+00	-4.2730E+00	1.056E+02%	1.14E+01
Cf-249	#A	1.2934E+00	1.2934E+00	1.425E+02%	6.13E+00
Sn-126	#A	-1.9347E+01	-1.9347E+01	2.179E+02%	1.39E+02
PB-210		9.8383E+03	9.8383E+03	9.256E-01%	1.77E+02
PB-212		8.3190E+00	8.3190E+00	2.023E+01%	4.16E+00
PB-214	#A	3.4182E+00	3.4182E+00	6.985E+01%	8.06E+00
BI-207	#A	-3.3678E-01	-3.3678E-01	2.543E+02%	2.89E+00
BI-212	#A	-2.1113E+01	-2.1113E+01	2.480E+02%	4.82E+01
BI-214		7.9509E+00	7.9509E+00	1.943E+01%	4.06E+00
BI-210M	#A	-2.0408E+00	-2.0408E+00	1.179E+02%	7.98E+00
AC-228	#A	8.3760E+00	8.3760E+00	5.831E+01%	1.29E+01
TH-227	#A	6.4956E+00	6.4956E+00	3.775E+02%	8.14E+01
TH-229	#A	6.6579E+00	6.6579E+00	2.790E+02%	4.70E+01
TH-234	A	3.1293E+01	3.1293E+01	6.855E+01%	5.68E+01
PA-231	#A	-3.7981E+01	-3.7981E+01	1.481E+02%	1.86E+02
PA-233	#A	2.9433E+00	2.9433E+00	1.621E+02%	1.58E+01
PA-234	#A	-4.0426E+00	-4.0426E+00	1.494E+02%	2.00E+01
PA-234M	#A	-3.1861E+02	-3.1861E+02	6.780E+01%	7.60E+02
U-235	#A	7.4577E+00	7.4577E+00	4.996E+01%	1.22E+01
AM-241		1.1885E+03	1.1885E+03	7.027E-01%	1.26E+01
Np-237	#A	-6.1108E+00	-6.1108E+00	1.747E+02%	3.53E+01
Ir-192	#A	1.7701E+00	1.7701E+00	8.932E+01%	6.06E+00
Cs-136	#A	1.6835E+00	1.6835E+00	5.909E+01%	4.28E+00
Np-239	#A	7.8311E-07	7.8314E-07	5.317E+08%	1.39E+01
Nd-147	#A	2.3987E+00	2.3988E+00	1.698E+02%	2.10E+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  1999.6 keV)     1.167E+04  Bq/Sample
Total Decayed Activity (   37.6 to  1999.6 keV) 1.1671118E+04  Bq/Sample
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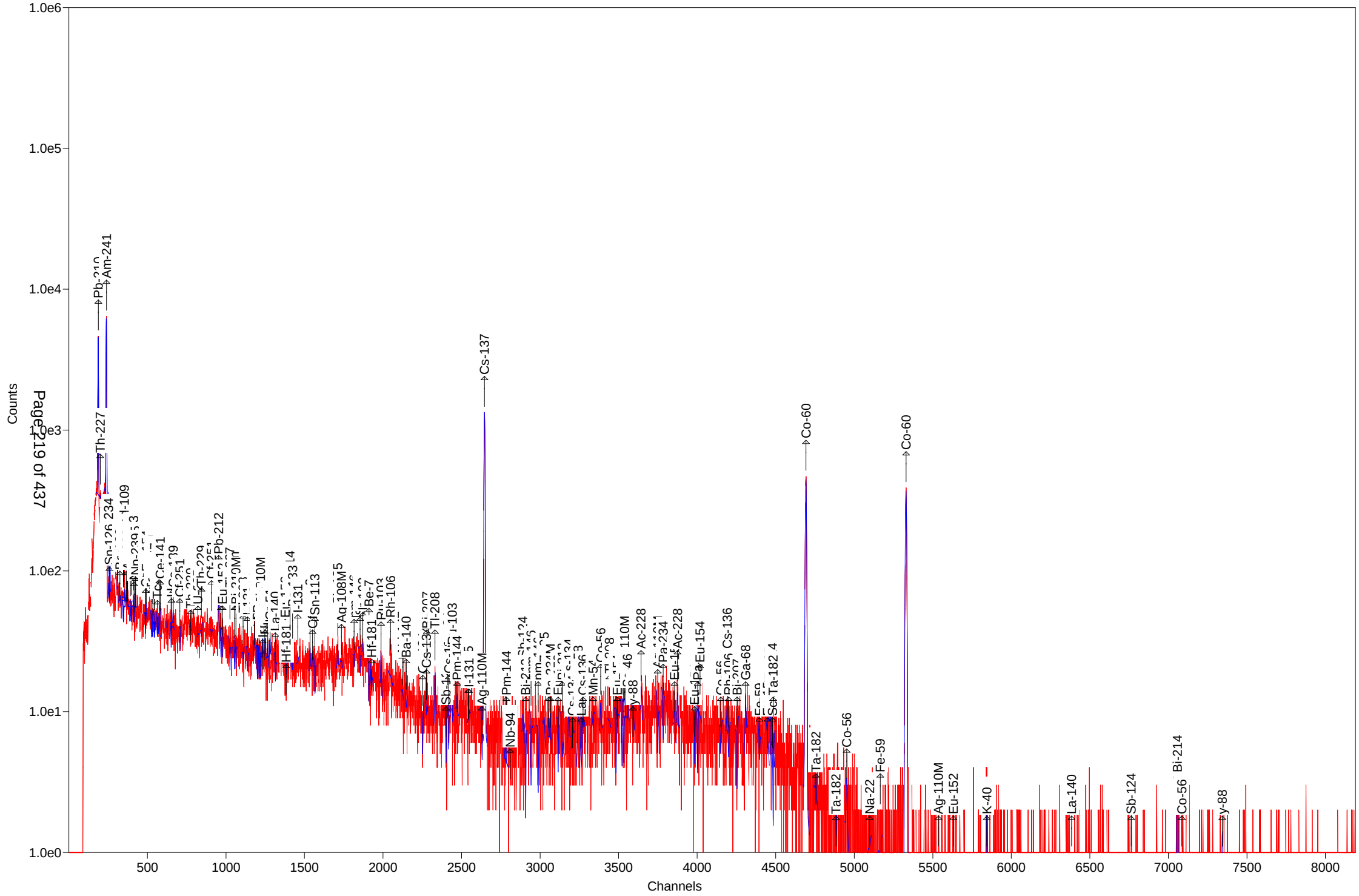
263537_Gamma_LCS 160-263537~2-A. 16_Gamma_20162040.spc.



Test America St. Louis Spectrum ID: 14_Gamma_20162190

Sample Description: 263537_Gamma_160-18426-A-1-B
Detector: Detector #14
Batch ID: 263537
Work Order Number: Gamma
Lot Number: 160-18426-A-1-B

Decay to Time: 8/25/2016 09:46 Live Time: 1800 sec
Acquisition Time: 8/25/2016 09:46:51 Real Time: 1806 sec
Analysis Time: 8/25/2016 10:17 Dead Time: 0.34 %
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	-4.133E-01	841.9	3.480E+00	3.480E+00	1.224E+01
NA-22	2.888E-01	150.0	4.331E-01	4.334E-01	1.541E+00
K-40	2.248E+02	5.9	1.327E+01	1.756E+01	9.895E+00
Sc-46	6.419E-01	99.5	6.387E-01	6.396E-01	2.159E+00
CR-51	-7.982E-02	4986.9	3.980E+00	3.980E+00	1.376E+01
MN-54	-9.360E-02	648.0	6.066E-01	6.066E-01	1.502E+00
FE-59	-1.820E+00	64.1	1.166E+00	1.170E+00	3.643E+00
Co-56	2.188E-01	135.9	2.973E-01	2.975E-01	1.626E+00
CO-57	-2.592E-03	13610.4	3.528E-01	3.528E-01	1.232E+00
CO-58	-7.339E-01	80.9	5.941E-01	5.953E-01	2.227E+00
CO-60	-8.254E-01	54.3	4.485E-01	4.504E-01	1.840E+00
ZN-65	-5.537E-01	322.3	1.784E+00	1.785E+00	6.160E+00
NB-94	-2.517E-01	458.8	1.155E+00	1.155E+00	1.518E+00
ZR-95	-2.020E-01	486.2	9.820E-01	9.821E-01	2.456E+00
NB-95	6.787E-01	83.1	5.641E-01	5.652E-01	1.889E+00
RU-103	-5.925E-01	101.0	5.986E-01	5.994E-01	1.481E+00
RH-106	-5.096E+00	202.3	1.031E+01	1.031E+01	3.893E+01
AG-108M	1.620E-01	320.1	5.184E-01	5.185E-01	1.165E+00
AG-110M	5.284E-01	88.2	4.658E-01	4.665E-01	3.331E+00
SN-113	4.974E-01	99.2	4.933E-01	4.939E-01	1.291E+00
SB-124	3.105E-01	310.4	9.637E-01	9.639E-01	3.263E+00
SB-125	1.954E+00	95.4	1.863E+00	1.866E+00	3.262E+00
I-131	1.013E+00	70.5	7.141E-01	7.161E-01	1.213E+00
Gd-153	-2.131E-01	496.8	1.059E+00	1.059E+00	3.590E+00
Ga-68	2.232E+00	1103.8	2.463E+01	2.463E+01	5.804E+01
Tc-99m	2.842E-01	134.5	3.822E-01	3.825E-01	1.282E+00
BA-133	-3.100E-01	206.5	6.402E-01	6.404E-01	3.815E+00
CS-134	3.524E-01	136.2	4.802E-01	4.805E-01	3.335E+00
CS-137	-8.674E-01	89.7	7.783E-01	7.796E-01	2.606E+00
CE-139	1.347E-01	314.0	4.228E-01	4.230E-01	1.433E+00
Ba-140	7.142E-01	119.0	8.496E-01	8.504E-01	4.503E+00
La-140	-7.949E-01	95.1	7.560E-01	7.572E-01	2.524E+00
CE-141	5.541E-01	132.9	7.363E-01	7.368E-01	2.467E+00

CE-144	0.000E+00	1.#INF	1.545E+00	1.545E+00	1.302E+01
PM-144	-8.598E-03	242.5	2.085E-02	2.085E-02	1.421E+00
EU-152	2.641E+00	97.2	2.568E+00	2.571E+00	5.733E+00
EU-154	5.260E+00	59.9	3.148E+00	3.160E+00	1.440E+01
EU-155	-3.420E-02	4127.5	1.412E+00	1.412E+00	5.985E+00
HF-181	6.939E-01	96.8	6.720E-01	6.730E-01	1.550E+00
Ta-182	2.086E+00	46.0	9.587E-01	9.644E-01	8.790E+00
Hg-203	-4.123E-01	114.8	4.734E-01	4.740E-01	1.593E+00
TL-208	9.645E+00	8.6	8.307E-01	9.697E-01	1.107E+00
pm-146	7.315E-01	91.9	6.725E-01	6.736E-01	3.348E+00
y-88	1.844E-01	205.5	3.790E-01	3.791E-01	1.472E+00
Cd-113m	-3.753E+03	146.3	5.491E+03	5.497E+03	1.863E+04
Cd-109	9.654E+00	158.3	1.529E+01	1.529E+01	5.095E+01
Cf-251	9.442E-01	202.1	1.908E+00	1.910E+00	5.179E+00
Cf-249	1.433E-01	363.5	5.208E-01	5.208E-01	2.347E+00
Sn-126	-4.483E+00	110.4	4.948E+00	4.953E+00	1.651E+01
PB-210	2.306E+01	50.4	1.163E+01	1.170E+01	3.194E+01
PB-212	4.648E-01	405.0	1.882E+00	1.883E+00	6.300E+00
PB-214	1.385E+01	10.7	1.476E+00	1.642E+00	2.782E+00
BI-207	3.071E-01	119.0	3.656E-01	3.659E-01	1.254E+00
BI-212	3.730E+01	17.2	6.398E+00	6.685E+00	1.023E+01
BI-214	1.858E+01	7.6	1.415E+00	1.713E+00	1.821E+00
BI-210M	-1.869E-01	948.7	1.773E+00	1.773E+00	2.322E+00
AC-228	2.666E+01	8.1	2.163E+00	2.555E+00	1.393E+00
TH-227	1.180E-01	618.3	7.296E-01	7.296E-01	1.783E+01
TH-229	-5.204E+00	163.4	8.505E+00	8.516E+00	2.269E+01
TH-234	2.218E+01	36.9	8.183E+00	8.265E+00	2.595E+01
PA-231	1.298E+01	106.5	1.382E+01	1.384E+01	6.291E+01
PA-233	1.600E+00	110.3	1.765E+00	1.768E+00	4.978E+00
PA-234	-1.560E+00	156.1	2.436E+00	2.438E+00	8.146E+00
PA-234M	9.846E+01	65.9	6.484E+01	6.503E+01	2.290E+02
U-235	2.401E+00	143.8	3.454E+00	3.456E+00	1.030E+01
AM-241	1.010E+00	129.9	1.311E+00	1.312E+00	3.713E+00
Np-237	0.000E+00	1.#INF	5.065E+00	5.066E+00	1.687E+01
Ir-192	-6.325E-02	718.4	4.544E-01	4.544E-01	1.564E+00
Cs-136	6.688E-01	90.0	6.016E-01	6.028E-01	2.292E+00
Np-239	4.815E-01	322.7	1.554E+00	1.554E+00	5.241E+00
Nd-147	6.282E-01	158.3	9.944E-01	9.951E-01	9.175E+00
Total	5.281E+02				

Analyst: Amanda Dick

Sample description
263537_Gamma_160-18426-A-1-B

Spectrum Filename: C:\User\SPC\Det14\14_Gamma_20162190.An1

Acquisition information

Start time:	8/25/2016 9:46:51 AM
Live time:	1800
Real time:	1806
Dead time:	0.34 %
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	8/25/2016 9:46:00 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. 29 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1468

***** 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
46.65	38.	50.42	0.97	2.171E-02	46.54	4.250	PBC<MDA	PB210
59.54	20.	129.86	0.76	3.065E-02	59.54	35.900	PBC<MDA	AM241
63.61	88.	25.61	1.55	3.298E-02	63.29	3.810	3.205E+01	TH234
					64.28	9.700	1.512E+01	Sn126
74.79	211.	11.96	0.78	3.813E-02				
77.12	354.	7.92	0.78	3.897E-02				
87.24	138.	17.01	1.41	4.179E-02	86.49	13.100	1.409E+01	Np237
					86.54	30.700	6.012E+00	EU155
					86.94	9.040	2.037E+01	Sn126
					87.57	37.500	4.895E+00	Sn126
					88.04	3.790	4.832E+01	Cd109
91.10	28.	158.30	0.79	4.255E-02	91.10	28.300	PBC<MDA	Nd147
92.58	45.	53.03	0.80	4.279E-02	92.59	5.584	PBC<MDA	TH234
93.34	28.	153.24	0.80	4.291E-02	93.35	5.561	PBC<MDA	AC228
99.50	7.	366.61	0.80	4.365E-02	99.50	15.000	PBC<MDA	Np239
106.13	9.	322.66	0.81	4.406E-02	106.13	22.700	PBC<MDA	Np239
127.50	30.	45.91	0.83	4.337E-02				
128.94	50.	29.97	0.83	4.324E-02				
140.51	19.	134.46	0.85	4.193E-02	140.51	89.300	PBC<MDA	Tc99m
143.89	17.	143.83	0.85	4.148E-02	143.79	10.960	PBC<MDA	U235
145.44	20.	132.89	0.85	4.125E-02	145.44	48.200	PBC<MDA	CE141
162.66	20.	118.96	0.87	3.853E-02	162.66	6.220	PBC<MDA	Ba140

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
163.38	5.	514.02	0.87	3.841E-02	163.38	5.080	PBC<MDA	U235
165.85	8.	313.97	0.87	3.872E-02	165.85	79.900	PBC<MDA	CE139
176.60	11.	202.06	0.88	3.692E-02	176.60	17.000	PBC<MDA	Cf251
185.68	84.	27.46	1.07	3.553E-02				
205.33	12.	163.01	0.91	3.290E-02	205.33	5.010	PBC<MDA	U235
227.00	17.	103.14	0.93	3.046E-02	227.00	6.300	PBC<MDA	Cf251
238.18	593.	5.02	1.11	2.936E-02	238.63	43.300	2.558E+01	PB212
242.01	19.	212.11	0.95	2.900E-02	242.00	7.430	PBC<MDA	PB214
244.69	20.	213.90	0.95	2.875E-02	244.69	7.580	PBC<MDA	EU152
255.08	2.	790.38	0.96	2.775E-02	256.24	7.000	PBC<MDA	TH227
277.07	42.	33.72	2.10	2.610E-02	277.28	6.310	1.434E+01	TL208
284.30	16.	107.13	0.99	2.560E-02	284.30	6.140	PBC<MDA	I131
294.90	201.	9.16	1.10	2.488E-02	295.09	19.300	2.281E+01	PB214
300.03	16.	142.29	1.01	2.455E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.509E+01	PA231
					300.18	6.200	5.988E+00	PA233
300.07	15.	146.40	1.01	2.455E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.402E+01	PA231
					300.18	6.200	5.564E+00	PA233
300.18	15.	150.78	1.01	2.454E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.402E+01	PA231
					300.18	6.200	5.566E+00	PA233
302.65	15.	154.70	1.01	2.438E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	1.900E+00	BA133
302.85	4.	599.65	1.01	2.437E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	4.986E-01	BA133
312.01	14.	161.15	1.02	2.381E-02	312.01	36.000	PBC<MDA	PA233
328.76	11.	140.95	1.03	2.286E-02	328.76	20.300	PBC<MDA	La140
333.44	4.	363.54	1.04	2.261E-02	333.44	15.510	PBC<MDA	Cf249
337.71	146.	11.95	1.13	2.238E-02	338.32	12.010	3.021E+01	AC228
340.57	19.	122.34	1.05	2.224E-02	340.57	46.900	PBC<MDA	Cs136
344.29	14.	126.58	1.05	2.205E-02	344.29	26.500	PBC<MDA	EU152
345.83	11.	206.54	1.05	2.197E-02	345.83	15.070	PBC<MDA	HF181
351.55	210.	10.23	1.19	2.169E-02	351.93	37.600	1.385E+01	PB214
364.48	9.	159.70	1.07	2.109E-02	364.48	81.700	PBC<MDA	I131
383.84	14.	115.47	1.09	2.025E-02	383.84	8.940	PBC<MDA	BA133
391.69	11.	99.18	1.09	1.993E-02	391.69	64.000	PBC<MDA	SN113
427.88	13.	95.37	1.13	1.859E-02	427.88	29.600	PBC<MDA	SB125
453.88	10.	113.00	1.15	1.774E-02	453.88	65.000	PBC<MDA	pm146
463.37	14.	100.11	1.16	1.745E-02	463.37	10.470	PBC<MDA	SB125
482.00	12.	96.84	1.18	1.691E-02	482.00	80.500	PBC<MDA	HF181
487.02	10.	115.18	1.18	1.677E-02	487.02	45.500	PBC<MDA	La140
511.86	54.	52.37	2.46	1.612E-02	511.86	20.000	9.275E+00	RH106
569.32	1.	806.23	1.26	1.481E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	4.575E-01	PA234
					569.70	97.740	3.839E-02	BI207
569.70	8.	119.02	1.26	1.481E-02	569.32	15.380	1.951E+00	CS134
					569.47	8.200	3.660E+00	PA234

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					569.70	97.740	3.071E-01	BI207
582.93	213.	8.61	1.30	1.454E-02	583.02	84.500	9.645E+00	TL208
600.50	8.	306.73	1.29	1.419E-02	600.50	17.860	PBC<MDA	SB125
602.73	8.	310.42	1.29	1.415E-02	602.73	98.260	PBC<MDA	SB124
604.71	8.	314.10	1.29	1.412E-02	604.71	97.620	PBC<MDA	CS134
609.07	216.	7.62	1.11	1.403E-02	609.31	46.090	1.858E+01	BI214
					610.30	5.750	1.491E+02	RU103
614.28	8.	320.09	1.30	1.394E-02	614.28	89.850	PBC<MDA	AG108M
618.06	8.	335.41	1.30	1.387E-02	618.06	99.100	PBC<MDA	PM144
636.97	9.	87.89	1.32	1.354E-02	636.97	7.170	PBC<MDA	I131
727.07	62.	17.15	0.93	1.217E-02	727.17	7.550	3.730E+01	BI212
735.72	11.	91.94	1.41	1.206E-02	735.72	22.500	PBC<MDA	pm146
747.16	1.	717.85	1.42	1.191E-02	747.16	34.000	PBC<MDA	pm146
765.79	14.	83.11	1.43	1.167E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	2.305E+02	PA234M
766.41	12.	78.59	1.43	1.167E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	1.978E+02	PA234M
785.68	35.	16.90	1.33	1.144E-02	785.42	1.280	1.328E+02	BI212
795.87	7.	136.25	1.46	1.131E-02	795.87	85.530	PBC<MDA	CS134
818.50	10.	131.90	1.48	1.106E-02	818.50	100.000	PBC<MDA	Cs136
860.37	40.	19.07	0.90	1.062E-02	860.56	12.420	1.692E+01	TL208
873.23	12.	83.80	1.52	1.049E-02	873.23	12.270	PBC<MDA	EU154
889.28	12.	99.50	1.54	1.034E-02	889.28	99.984	PBC<MDA	Sc46
898.04	1.	895.20	1.54	1.026E-02	898.04	93.700	PBC<MDA	y88
910.65	144.	8.33	1.75	1.014E-02	911.07	29.000	2.721E+01	AC228
964.11	10.	152.66	1.60	9.682E-03	964.11	14.605	PBC<MDA	EU152
968.69	78.	13.93	1.40	9.642E-03	968.97	17.460	2.574E+01	AC228
996.33	10.	85.47	1.62	9.425E-03	996.33	10.600	PBC<MDA	EU154
1001.00	9.	105.69	1.63	9.389E-03	1001.00	0.837	PBC<MDA	PA234M
1037.84	8.	135.87	1.65	9.116E-03	1037.84	14.130	PBC<MDA	Co56
1120.09	76.	11.60	1.94	8.562E-03	1120.29	15.100	3.273E+01	BI214
					1120.55	99.987	4.944E+00	Sc46
1173.24	10.	93.84	1.76	8.244E-03	1173.24	99.900	PBC<MDA	CO60
1221.41	19.	45.95	1.79	7.975E-03	1221.41	27.000	4.863E+00	Ta182
1274.53	4.	150.00	1.83	7.700E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	8.201E-01	EU154
1291.60	6.	93.88	1.84	7.616E-03	1291.60	43.200	PBC<MDA	FE59
1384.30	7.	88.15	1.91	7.192E-03	1384.30	24.290	PBC<MDA	AG110M
1408.00	5.	145.77	1.92	7.092E-03	1408.00	21.005	PBC<MDA	EU152
1460.71	297.	5.90	2.01	6.879E-03	1460.83	10.670	2.248E+02	K40
1764.69	39.	16.01	1.52	5.878E-03	1764.49	15.400	2.393E+01	BI214
1836.06	3.	205.48	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 Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
298.55	74.81	213.	211.	5.544E+03	11.96	0.777	- D
307.88	77.14	215.	354.	9.078E+03	7.92	0.780	- sD
509.33	127.52	82.	30.	7.002E+02	45.91	0.832	- sD
515.10	128.96	86.	50.	1.151E+03	29.97	0.833	- D
741.99	185.68	128.	84.	2.370E+03	27.46	1.066	- sM
952.00	238.18	118.	552.	1.880E+04	5.09	0.944	- D

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	186.00	46.65	117.	38.	0.021	50.42	0.967s
TH-227	199.98	50.14	165.	-1.	-0.001	950.96	0.751s
AM-241	237.55	59.54	231.	20.	0.011	129.86	0.761s
TH-234	252.55	63.29	143.	50.	0.028	36.89	0.765D
Sn-126	256.52	64.28	402.	-26.	-0.014	110.38	0.766s
BA-133	323.33	80.99	253.	-4.	-0.002	602.02	0.784s
Np-237	345.33	86.49	1222.	0.	0.000	171.24	0.789A
EU-155	345.54	86.54	1050.	-28.	-0.015	167.26	0.790s
Sn-126	347.13	86.94	969.	28.	0.015	81.40	0.790D
Sn-126	349.65	87.57	921.	28.	0.015	81.32	0.791D
Cd-109	351.53	88.04	943.	28.	0.015	158.33	0.791A
Nd-147	363.77	91.10	970.	28.	0.016	158.30	0.794s
TH-234	369.72	92.59	255.	45.	0.025	53.03	0.796D
AC-228	372.76	93.35	913.	28.	0.016	153.24	0.797s
Gd-153	389.36	97.50	306.	-5.	-0.003	496.79	0.801s
Np-239	397.36	99.50	295.	7.	0.004	366.61	0.803s
Gd-153	412.15	103.20	414.	-24.	-0.013	121.78	0.807s
Np-239	423.87	106.13	387.	9.	0.005	322.66	0.810
EU-152	486.43	121.78	280.	-19.	-0.011	123.56	0.826s
EU-154	491.73	123.10	326.	-21.	-0.011	126.47	0.828s
PA-234	524.50	131.29	565.	-22.	-0.012	156.13	0.836s
CE-144	533.47	133.54	542.	0.	0.000	1000.00	0.838
HF-181	544.52	136.30	542.	0.	0.000	1000.00	0.841s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-57	545.21	136.47	542.	0.	0.000	1000.00	0.841s
Tc-99m	561.35	140.51	303.	19.	0.010	134.46	0.845s
U-235	574.45	143.79	306.	17.	0.010	143.83	0.849s
CE-141	581.07	145.44	337.	20.	0.011	132.89	0.850s
Ba-140	649.93	162.66	276.	20.	0.011	118.96	0.868s
U-235	652.81	163.38	297.	5.	0.003	514.02	0.869
CE-139	662.70	165.85	274.	8.	0.004	313.97	0.871s
Cf-251	705.68	176.60	143.	11.	0.006	202.06	0.882s
TH-229	773.30	193.51	161.	-14.	-0.008	163.44	0.899
U-235	820.58	205.33	117.	12.	0.007	163.01	0.912
TH-229	842.65	210.85	160.	-15.	-0.008	152.27	0.917
Cf-251	907.23	227.00	87.	17.	0.009	103.14	0.933s
PB-212	953.75	238.63	919.	11.	0.006	404.95	0.945
PB-214	967.21	242.00	846.	19.	0.011	212.11	0.948s
EU-152	977.99	244.69	865.	20.	0.011	213.90	0.951s
TH-227	1024.17	256.24	107.	2.	0.001	790.38	0.962s
Cd-113m	1054.01	263.70	124.	-11.	-0.006	146.30	0.970s
BI-210M	1062.53	265.83	133.	-5.	-0.003	948.67	0.972s
TL-208	1107.48	277.07	42.	42.	0.024	33.72	2.098s
Hg-203	1115.99	279.20	154.	-16.	-0.009	114.81	0.985s
I-131	1136.39	284.30	81.	16.	0.009	107.13	0.990s
PB-214	1178.77	294.90	33.	197.	0.109	9.40	1.105s
PB-212	1199.30	300.03	264.	16.	0.009	142.29	1.006
PA-231	1199.46	300.07	241.	15.	0.008	146.40	1.006s
PA-233	1199.90	300.18	256.	15.	0.008	150.78	1.006s
PA-231	1209.78	302.65	272.	15.	0.008	154.70	1.008s
BA-133	1210.59	302.85	287.	4.	0.002	599.65	1.009s
Ba-140	1218.57	304.85	291.	0.	0.000	1000.00	1.011s
BI-210M	1218.76	304.90	291.	0.	0.000	1000.00	1.011s
Ir-192	1232.94	308.44	291.	0.	0.000	1000.00	1.014s
PA-233	1247.22	312.01	253.	14.	0.008	161.15	1.018s
Ir-192	1265.13	316.49	139.	-2.	-0.001	718.42	1.022s
La-140	1314.21	328.76	70.	11.	0.006	140.95	1.034s
Cf-249	1332.92	333.44	70.	4.	0.002	363.54	1.039s
AC-228	1352.44	338.32	238.	19.	0.010	118.18	1.043
Cs-136	1361.44	340.57	257.	19.	0.010	122.34	1.045s
EU-152	1376.30	344.29	153.	14.	0.008	126.58	1.049s
HF-181	1382.47	345.83	260.	11.	0.006	206.54	1.050
PB-214	1405.34	351.55	67.	203.	0.113	10.66	1.194
BA-133	1423.15	356.00	363.	-13.	-0.007	206.53	1.060s
I-131	1457.08	364.48	56.	9.	0.005	159.70	1.069
BA-133	1534.50	383.84	117.	14.	0.008	115.47	1.087s
SN-113	1565.90	391.69	33.	11.	0.006	99.18	1.095s
SB-125	1710.63	427.88	40.	13.	0.007	95.37	1.129s
pm-146	1814.64	453.88	33.	10.	0.006	113.00	1.154s
SB-125	1852.59	463.37	88.	14.	0.008	100.11	1.163s
Ir-192	1871.36	468.06	126.	-6.	-0.003	267.60	1.167s
BE-7	1909.50	477.60	62.	-1.	-0.001	841.87	1.176s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
HF-181	1927.10	482.00	57.	12.	0.006	96.84	1.180s
La-140	1947.19	487.02	32.	10.	0.006	115.18	1.185s
RU-103	1987.33	497.05	64.	-16.	-0.009	101.04	1.194s
RH-106	2046.57	511.86	114.	54.	0.030	52.37	2.458s
Nd-147	2123.11	531.00	44.	-3.	-0.002	436.74	1.225s
Ba-140	2148.15	537.26	36.	-2.	-0.001	591.61	1.231s
CS-134	2252.06	563.24	53.	-12.	-0.007	233.34	1.255s
CS-134	2276.40	569.32	32.	1.	0.001	806.23	1.260s
PA-234	2276.99	569.47	43.	-8.	-0.004	125.79	1.261s
BI-207	2277.92	569.70	41.	8.	0.004	119.02	1.261s
TL-208	2330.85	582.93	22.	213.	0.118	8.61	1.298
SB-125	2401.12	600.50	279.	8.	0.004	306.73	1.289s
SB-124	2410.04	602.73	287.	8.	0.004	310.42	1.291s
CS-134	2417.96	604.71	295.	8.	0.004	314.10	1.292s
BI-214	2435.38	609.07	16.	216.	0.120	7.62	1.114s
RU-103	2440.31	610.30	303.	8.	0.004	316.96	1.297s
AG-108M	2456.25	614.28	310.	8.	0.004	320.09	1.301s
PM-144	2471.37	618.06	319.	8.	0.004	335.41	1.304s
RH-106	2486.79	621.92	401.	-13.	-0.007	202.25	1.308s
SB-125	2542.69	635.89	40.	-8.	-0.004	117.26	1.320s
I-131	2547.03	636.97	28.	9.	0.005	87.89	1.321
AG-110M	2630.18	657.76	80.	-16.	-0.009	82.26	1.339s
CS-137	2645.77	661.66	114.	-17.	-0.010	89.72	1.343
PM-144	2785.32	696.54	39.	-7.	-0.004	350.28	1.374s
NB-94	2809.67	702.63	44.	-6.	-0.003	458.80	1.379s
SB-124	2890.31	722.79	119.	-13.	-0.007	123.38	1.396s
AG-108M	2890.91	722.94	106.	-10.	-0.006	144.67	1.397s
EU-154	2892.59	723.36	96.	0.	0.000	1000.00	1.397s
ZR-95	2895.96	724.20	96.	0.	0.000	1000.00	1.398s
BI-212	2907.45	727.07	9.	62.	0.034	17.15	0.931s
pm-146	2942.05	735.72	22.	11.	0.006	91.94	1.408s
pm-146	2987.81	747.16	22.	1.	0.001	717.85	1.417
ZR-95	3026.09	756.73	30.	-2.	-0.001	486.24	1.426s
AG-110M	3054.96	763.94	77.	-11.	-0.006	116.77	1.432s
NB-95	3062.34	765.79	63.	14.	0.008	83.11	1.433s
PA-234M	3064.83	766.41	40.	12.	0.007	78.59	1.434s
EU-152	3114.87	778.92	35.	-3.	-0.001	454.84	1.444s
BI-212	3141.91	785.68	0.	35.	0.019	16.90	1.333
CS-134	3182.67	795.87	22.	7.	0.004	136.25	1.459s
CS-134	3207.01	801.95	28.	-3.	-0.002	378.59	1.464s
CO-58	3242.31	810.77	80.	-15.	-0.008	80.95	1.471s
La-140	3262.30	815.77	94.	-2.	-0.001	902.08	1.475s
Cs-136	3273.22	818.50	85.	10.	0.006	131.90	1.478s
MN-54	3338.63	834.85	33.	-2.	-0.001	648.03	1.492
Co-56	3386.32	846.77	38.	-4.	-0.002	293.22	1.501s
TL-208	3440.72	860.37	4.	40.	0.022	19.07	0.899s
NB-94	3483.65	871.10	37.	-13.	-0.007	70.36	1.522s
EU-154	3492.19	873.23	43.	12.	0.007	83.80	1.523s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PA-234	3521.39	880.53	71.	-12.	-0.007	102.16	1.529s
PA-234	3532.24	883.24	83.	0.	0.000	1000.00	1.531s
AG-110M	3538.01	884.68	83.	0.	0.000	1000.00	1.533s
Sc-46	3556.40	889.28	65.	12.	0.007	99.50	1.536s
y-88	3591.45	898.04	24.	1.	0.001	895.20	1.543s
AC-228	3641.92	910.65	0.	144.	0.080	8.33	1.750s
AG-110M	3749.30	937.49	42.	-15.	-0.008	95.22	1.576
PA-234	3783.42	946.02	51.	-18.	-0.010	86.51	1.582s
EU-152	3855.80	964.11	103.	10.	0.005	152.66	1.597s
AC-228	3874.13	968.69	8.	78.	0.043	13.93	1.395
EU-154	3984.71	996.33	30.	10.	0.005	85.47	1.622s
PA-234M	4003.39	1001.00	41.	9.	0.005	105.69	1.626s
EU-154	4018.51	1004.77	93.	-15.	-0.008	94.61	1.629s
Co-56	4150.81	1037.84	20.	8.	0.004	135.87	1.655s
Cs-136	4191.74	1048.07	30.	0.	0.000	1000.00	1.663s
BI-207	4254.12	1063.66	30.	-5.	-0.003	199.33	1.675s
FE-59	4396.54	1099.25	40.	-16.	-0.009	64.10	1.702s
ZN-65	4461.74	1115.55	95.	-4.	-0.002	322.25	1.714s
BI-214	4479.92	1120.09	1.	76.	0.042	11.60	1.937
Sc-46	4481.77	1120.55	91.	0.	0.000	1000.00	1.718
CO-60	4692.60	1173.24	16.	10.	0.005	93.84	1.757s
Ta-182	4755.88	1189.05	40.	-17.	-0.009	85.31	1.769
Ta-182	4885.38	1221.41	11.	19.	0.010	45.95	1.792
Co-56	4952.89	1238.28	48.	-8.	-0.005	102.95	1.805s
NA-22	5097.96	1274.53	16.	4.	0.002	150.00	1.831
EU-154	5098.01	1274.54	20.	0.	0.000	1000.00	1.831
FE-59	5166.25	1291.60	6.	6.	0.003	93.88	1.843s
CO-60	5329.96	1332.50	22.	-11.	-0.006	54.34	1.871s
AG-110M	5537.26	1384.30	5.	7.	0.004	88.15	1.907s
EU-152	5632.13	1408.00	11.	5.	0.003	145.77	1.923s
K-40	5843.07	1460.71	5.	297.	0.165	5.90	2.009
La-140	6385.44	1596.21	29.	-14.	-0.008	127.74	2.044s
SB-124	6764.81	1690.98	6.	-4.	-0.002	160.96	2.102s
BI-214	7059.87	1764.69	0.	39.	0.022	16.01	1.520s
Co-56	7086.53	1771.35	68.	-13.	-0.007	94.56	2.149s
y-88	7345.59	1836.06	6.	3.	0.002	205.48	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	-4.1331E-01				5.31E+01	
			477.60	-4.133E-01	?(	1.224E+01 8.42E+02 1.05E+01	G
NA-22	C	2.8876E-01				9.50E+02	
			1274.53	2.888E-01	&(	1.541E+00 1.50E+02 9.99E+01	G
K-40	N	2.2485E+02				4.66E+11	
			1460.83	2.248E+02	(P	9.895E+00 5.90E+00 1.07E+01	G
Sc-46	F	6.4194E-01				8.38E+01	
			889.28	6.419E-01	?(	2.159E+00 9.95E+01 1.00E+02	G
			1120.55	0.000E+00	-	3.061E+00 1.00E+03 1.00E+02	G
CR-51	F	-7.9819E-02				2.77E+01	
			320.08	-7.982E-02	%(	1.376E+01 4.99E+03 9.94E+00	G
MN-54	C	-9.3600E-02				3.12E+02	
			834.85	-9.360E-02	?(P	1.502E+00 6.48E+02 1.00E+02	G
FE-59	F	-1.8198E+00				4.45E+01	
			1099.25	-1.820E+00	?(P	3.643E+00 6.41E+01 5.65E+01	G
			1291.60	1.053E+00	+ P	2.304E+00 9.39E+01 4.32E+01	G
Co-56	C	2.1879E-01				7.73E+01	
			846.77	-2.107E-01	?(P	1.626E+00 2.93E+02 9.99E+01	G
			1238.28	-9.049E-01	+ P	3.749E+00 1.03E+02 6.61E+01	G
			1037.84	3.256E+00	?(P	1.026E+01 1.36E+02 1.41E+01	G
			1771.35	-7.931E+00	+	2.528E+01 9.46E+01 1.55E+01	A
CO-57	C	-2.5919E-03				2.72E+02	
			122.06	-2.592E-03	%(P	1.232E+00 1.36E+04 8.56E+01	G
			136.47	0.000E+00	+	1.363E+01 1.00E+03 1.07E+01	G
CO-58	C	-7.3389E-01				7.09E+01	
			810.78	-7.339E-01	&(P	2.227E+00 8.09E+01 9.95E+01	G
CO-60	F	-8.2537E-01				1.93E+03	
			1332.50	-8.254E-01	?(P	1.840E+00 5.43E+01 1.00E+02	G
			1173.24	6.591E-01	+ P	1.433E+00 9.38E+01 9.99E+01	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
ZN-65	F	-5.5372E-01					2.44E+02	
			1115.55	-5.537E-01	?(	6.160E+00	3.22E+02	5.06E+01 G
NB-94	I	-2.5171E-01					7.41E+06	
			702.63	-2.517E-01	&(P	1.518E+00	4.59E+02	9.79E+01 G
			871.10	-7.052E-01	+	1.649E+00	7.04E+01	9.99E+01 G
ZR-95	I	-2.0197E-01					6.40E+01	
			756.73	-2.020E-01	&(	2.456E+00	4.86E+02	5.45E+01 G
			724.20	0.000E+00	+	4.984E+00	1.00E+03	4.42E+01 G
NB-95	I	6.7873E-01					6.40E+01	
			765.79	6.787E-01	?(P	1.889E+00	8.31E+01	9.98E+01 G
RU-103	I	-5.9248E-01					3.93E+01	
			497.05	-5.925E-01	?(	1.481E+00	1.01E+02	9.09E+01 G
			610.30	5.387E+00	?	5.777E+01	3.17E+02	5.75E+00 GA
RH-106	I	-5.0960E+00					3.74E+02	
			621.92	-5.096E+00	?(P	3.893E+01	2.02E+02	9.93E+00 G
			1050.36	-1.973E+00	%	1.155E+02	1.62E+03	1.56E+00 G
			511.86	9.275E+00	? P	9.045E+00	5.24E+01	2.00E+01 GA
AG-108M	C	1.6196E-01					1.53E+05	
			433.94	-2.227E-02	%(	1.165E+00	1.94E+03	9.05E+01 G
			722.94	-5.162E-01	+	2.539E+00	1.45E+02	9.08E+01 G
			614.28	3.475E-01	(	3.762E+00	3.20E+02	8.98E+01 G
AG-110M	F	5.2836E-01					2.50E+02	
			884.68	0.000E+00	?(	3.331E+00	1.00E+03	7.27E+01 G
			657.76	-7.178E-01	+	1.975E+00	8.23E+01	9.46E+01 G
			937.49	-2.449E+00	+	5.372E+00	9.52E+01	3.44E+01 G
			1384.30	2.109E+00	?(	4.284E+00	8.82E+01	2.43E+01 G
			763.94	-2.345E+00	+	9.296E+00	1.17E+02	2.23E+01 G
SN-113	F	4.9737E-01					1.15E+02	
			391.69	4.974E-01	*(	1.291E+00	9.92E+01	6.40E+01 G
SB-124	F	3.1047E-01					6.02E+01	
			602.73	3.105E-01	?(	3.263E+00	3.10E+02	9.83E+01 G
			1690.98	-6.998E-01	+	2.634E+00	1.61E+02	4.78E+01 G
			722.79	-5.398E+00	+	2.251E+01	1.23E+02	1.08E+01 G
SB-125	I	1.9536E+00					1.01E+03	
			427.88	1.315E+00	&(	3.262E+00	9.54E+01	2.96E+01 G
			600.50	1.700E+00	?(	1.766E+01	3.07E+02	1.79E+01 G
			635.89	-2.898E+00	+	1.166E+01	1.17E+02	1.13E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			463.37	4.191E+00	?(P	1.413E+01	1.00E+02	1.05E+01 G
I-131	I	1.0133E+00						8.02E+00
			364.48	2.883E-01	(P	1.213E+00	1.60E+02	8.17E+01 G
			284.30	5.704E+00	(P	1.575E+01	1.07E+02	6.14E+00 G
			636.97	5.258E+00	?(	1.566E+01	8.79E+01	7.17E+00 G
Gd-153	F	-2.1312E-01						2.42E+02
			97.50	-2.131E-01	(	3.590E+00	4.97E+02	3.00E+01 G
			103.20	-1.390E+00	+	5.656E+00	1.22E+02	2.18E+01 G
Ga-68	C	2.2315E+00						4.71E-02
			1077.40	2.232E+00	%(	5.804E+01	1.10E+03	3.30E+00 G
Tc-99m	I	2.8423E-01						2.51E-01
			140.51	2.842E-01	(	1.282E+00	1.34E+02	8.93E+01 G
BA-133	F	-3.0998E-01						3.85E+03
			356.00	-5.488E-01	(	3.815E+00	2.07E+02	6.20E+01 G
			302.85	4.986E-01	?(	1.015E+01	6.00E+02	1.83E+01 G
			383.84	4.183E+00	*	1.630E+01	1.15E+02	8.94E+00 GA
			80.99	-1.708E-01	+ P	3.119E+00	6.02E+02	3.41E+01 GA
CS-134	I	3.5244E-01						7.54E+02
			604.71	3.138E-01	(	3.335E+00	3.14E+02	9.76E+01 G
			795.87	4.161E-01	?(	1.401E+00	1.36E+02	8.55E+01 G
			569.32	2.439E-01	?(	7.089E+00	8.06E+02	1.54E+01 G
			801.95	-1.706E+00	+	1.556E+01	3.79E+02	8.69E+00 G
			563.24	-5.390E+00	+ P	1.633E+01	2.33E+02	8.35E+00 G
CS-137	I	-8.6744E-01						1.10E+04
			661.66	-8.674E-01	?(	2.606E+00	8.97E+01	8.52E+01 G
CE-139	F	1.3468E-01						1.38E+02
			165.85	1.347E-01	?(	1.433E+00	3.14E+02	7.99E+01 G
Ba-140	I	7.1422E-01						1.28E+01
			537.26	-2.936E-01	?(	4.503E+00	5.92E+02	2.44E+01 G
			162.66	4.666E+00	(P	1.859E+01	1.19E+02	6.22E+00 G
			304.85	0.000E+00	&	4.391E+01	1.00E+03	4.29E+00 G
La-140	I	-7.9491E-01						1.28E+01
			1596.21	-1.253E+00	?(P	2.524E+00	1.28E+02	9.54E+01 G
			487.02	7.279E-01	+	2.116E+00	1.15E+02	4.55E+01 G
			328.76	1.357E+00	&(	4.981E+00	1.41E+02	2.03E+01 G
			815.77	-3.292E-01	+	1.033E+01	9.02E+02	2.33E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CE-141	I	5.5407E-01					3.25E+01	
			145.44	5.541E-01	?(	2.467E+00	1.33E+02	4.82E+01 G
PM-144	C	-8.5978E-03					3.63E+02	
			696.54	-3.235E-01	?(P	1.421E+00	3.50E+02	9.90E+01 G
			618.06	3.060E-01	?(P	3.471E+00	3.35E+02	9.91E+01 G
EU-152	F	2.6407E+00					4.94E+03	
			344.29	1.343E+00	&(	5.733E+00	1.27E+02	2.65E+01 G
			1112.07	4.727E-01	%	2.320E+01	1.41E+03	1.36E+01 G
			121.78	-8.541E-01	- P	3.582E+00	1.24E+02	2.86E+01 G
			778.92	-9.944E-01	&	1.124E+01	4.55E+02	1.29E+01 G
			964.11	3.779E+00	?(	1.965E+01	1.53E+02	1.46E+01 G
			244.69	4.985E+00	(	3.563E+01	2.14E+02	7.58E+00 G
			1408.00	1.989E+00	?	6.687E+00	1.46E+02	2.10E+01 GA
EU-154	I	5.2603E+00					3.14E+03	
			873.23	5.110E+00	?(	1.440E+01	8.38E+01	1.23E+01 G
			123.10	-6.387E-01	&	2.705E+00	1.26E+02	4.08E+01 G
			1274.54	0.000E+00	&	4.828E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	-	1.087E+01	1.00E+03	2.02E+01 G
			1004.77	-4.940E+00	-	1.571E+01	9.46E+01	1.80E+01 G
			996.33	5.434E+00	?(	1.570E+01	8.55E+01	1.06E+01 G
EU-155	I	-3.4203E-02					1.81E+03	
			105.31	-3.420E-02	%(P	5.985E+00	4.13E+03	2.12E+01 G
			86.54	-1.199E+00	&	6.681E+00	1.67E+02	3.07E+01 G
HF-181	F	6.9394E-01					4.24E+01	
			482.00	4.735E-01	&(	1.550E+00	9.68E+01	8.05E+01 G
			133.02	-5.102E-02	%	3.336E+00	1.94E+03	4.33E+01 G
			345.83	1.872E+00	&(	1.306E+01	2.07E+02	1.51E+01 G
			136.30	0.000E+00	-	2.487E+01	1.00E+03	5.85E+00 G
Ta-182	F	2.0862E+00					1.14E+02	
			1121.30	-6.202E-02	%(	8.790E+00	4.06E+03	3.49E+01 G
			1221.41	4.863E+00	(P	4.714E+00	4.60E+01	2.70E+01 G
			1189.05	-7.150E+00	+	1.354E+01	8.53E+01	1.62E+01 G
Hg-203	F	-4.1230E-01					4.66E+01	
			279.20	-4.123E-01	?(	1.593E+00	1.15E+02	8.15E+01 G
TL-208	N	9.6446E+00					6.98E+02	
			583.02	9.645E+00	(P	1.107E+00	8.61E+00	8.45E+01 G
			277.28	1.434E+01	+	1.116E+01	3.37E+01	6.31E+00 G
			860.56	1.692E+01	+	4.984E+00	1.91E+01	1.24E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
pm-146	C	7.3153E-01					2.02E+03	
			747.16	1.830E-01	?(	3.348E+00	7.18E+02	3.40E+01 G
			735.72	2.241E+00	*(	4.997E+00	9.19E+01	2.25E+01 G
			453.88	4.959E-01	&(P	1.421E+00	1.13E+02	6.50E+01 G
y-88	F	1.8444E-01					1.07E+02	
			898.04	6.689E-02	?(P	1.472E+00	8.95E+02	9.37E+01 G
			1836.06	2.955E-01	?(	1.391E+00	2.05E+02	9.92E+01 G
Cd-113m		-3.7534E+03					5.33E+03	
			263.70	-3.753E+03	?(	1.863E+04	1.46E+02	6.00E-03 K
Cd-109	F	9.6539E+00					4.53E+02	
								Derived Ave Activity
			88.04	9.654E+00	}(	5.095E+01	1.58E+02	3.79E+00 G
Cf-251	T	9.4424E-01					3.28E+05	
			176.60	9.442E-01	*(	5.179E+00	2.02E+02	1.70E+01 G
			227.00	4.788E+00	&	1.334E+01	1.03E+02	6.30E+00 GA
Cf-249	T	1.4326E-01					1.28E+05	
			387.95	1.558E-02	%(	2.347E+00	4.35E+03	6.60E+01 G
			333.44	6.866E-01	?(	6.592E+00	3.64E+02	1.55E+01 G
Sn-126		-4.4827E+00					3.65E+07	
			87.57	9.773E-01	}	5.102E+00	8.13E+01	3.75E+01 GA
			64.28	-4.483E+00	?(	1.651E+01	1.10E+02	9.70E+00 G
			86.94	4.064E+00	}	2.176E+01	8.14E+01	9.04E+00 GA
PB-210	N	2.3056E+01					8.14E+03	
			46.54	2.306E+01	(P	3.194E+01	5.04E+01	4.25E+00 G
PB-212	N	4.6482E-01					6.98E+02	
			238.63	4.648E-01	(P	6.300E+00	4.05E+02	4.33E+01 G
			300.03	1.131E+01		5.411E+01	1.42E+02	3.28E+00 GA
PB-214	N	1.3849E+01					5.84E+05	
			351.93	1.385E+01	(P	2.782E+00	1.07E+01	3.76E+01 G
			295.09	2.281E+01	+ P	3.409E+00	9.40E+00	1.93E+01 G
			242.00	5.028E+00	&	3.564E+01	2.12E+02	7.43E+00 GA
BI-207	C	3.0714E-01					1.18E+04	
			569.70	3.071E-01	?(	1.254E+00	1.19E+02	9.77E+01 G
			1063.66	-4.311E-01	+ P	2.362E+00	1.99E+02	7.45E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-212	N	3.7299E+01					6.98E+02	
			727.17	3.730E+01	(P	1.023E+01	1.72E+01	7.55E+00 G
			785.42	1.328E+02	+	2.797E+01	1.69E+01	1.28E+00 GA
BI-214	N	1.8580E+01					5.84E+05	
			609.31	1.858E+01	*(P	1.821E+00	7.62E+00	4.61E+01 G
			1120.29	3.273E+01	+ P	3.167E+00	1.16E+01	1.51E+01 G
			1764.49	2.393E+01	+	4.523E+00	1.60E+01	1.54E+01 G
BI-210M	T	-1.8688E-01					1.10E+09	
			265.83	-1.869E-01	(P	2.322E+00	9.49E+02	5.00E+01 G
			304.90	0.000E+00	&	6.728E+00	1.00E+03	2.80E+01 G
AC-228	N	2.6657E+01					2.10E+03	
			911.07	2.721E+01	*(	1.393E+00	8.33E+00	2.90E+01 G
			968.97	2.574E+01	(	5.244E+00	1.39E+01	1.75E+01 G
			338.32	3.899E+00	&	1.545E+01	1.18E+02	1.20E+01 G
			93.35	6.542E+00	-	3.342E+01	1.53E+02	5.56E+00 XA
TH-227	N	1.1801E-01					7.95E+03	
			50.14	-3.628E-01	?(P	1.783E+01	9.51E+02	8.00E+00 G
			256.24	6.675E-01	&(	1.454E+01	7.90E+02	7.00E+00 G
TH-229	N	-5.2040E+00					2.68E+06	
			193.51	-5.204E+00	?(P	2.269E+01	1.63E+02	4.40E+00 G
			210.85	-8.645E+00	+	3.553E+01	1.52E+02	2.99E+00 G
TH-234	N	2.2181E+01					1.63E+12	
			63.29	2.218E+01	(P	2.595E+01	3.69E+01	3.81E+00 G
			92.59	1.038E+01	- P	1.793E+01	5.30E+01	5.58E+00 G
PA-231	N	1.2978E+01					1.20E+07	
			302.65	1.209E+01	?(	6.291E+01	1.55E+02	2.88E+00 G
			300.07	1.402E+01	&(	6.908E+01	1.46E+02	2.46E+00 G
PA-233	C	1.5999E+00					7.82E+08	
			312.01	9.169E-01	?(	4.978E+00	1.61E+02	3.60E+01 G
			300.18	5.566E+00	?(	2.824E+01	1.51E+02	6.20E+00 G
PA-234	N	-1.5604E+00					1.63E+12	
			131.29	-1.560E+00	&(	8.146E+00	1.56E+02	1.80E+01 G
			946.02	-7.695E+00	+	1.522E+01	8.65E+01	1.34E+01 G
			569.47	-3.507E+00	+	1.516E+01	1.26E+02	8.20E+00 G
			883.24	0.000E+00	+	2.518E+01	1.00E+03	9.60E+00 G
			880.53	-1.081E+01	+	3.733E+01	1.02E+02	6.00E+00 GA

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PA-234M  N   9.8457E+01                                      1.63E+12
                        1001.00 6.355E+01 &(P 2.290E+02 1.06E+02 8.37E-01 G
                         766.41 1.978E+02 ?(  5.210E+02 7.86E+01 2.94E-01 G

U-235    N   2.4012E+00                                      2.57E+11
                         143.79 2.134E+00 ?(P 1.030E+01 1.44E+02 1.10E+01 G
                         205.33 4.044E+00  (P 1.790E+01 1.63E+02 5.01E+00 G
                         163.38 1.357E+00  (P 2.365E+01 5.14E+02 5.08E+00 G

AM-241   T   1.0097E+00                                      1.58E+05
                          59.54 1.010E+00 *(  3.713E+00 1.30E+02 3.59E+01 G

Ir-192   F  -6.3246E-02                                      7.40E+01
                         316.49-6.325E-02  (  1.564E+00 7.18E+02 8.70E+01 G
                         468.06-3.722E-01 +   3.412E+00 2.68E+02 5.18E+01 G
                         308.44 0.000E+00 +   5.987E+00 1.00E+03 3.18E+01 G

Cs-136   F   6.6876E-01                                      1.30E+01
                         818.50 5.107E-01  (  2.292E+00 1.32E+02 1.00E+02 G
                        1048.07 0.000E+00 -   2.168E+00 1.00E+03 8.00E+01 G
                         340.57 1.006E+00 ?(  4.127E+00 1.22E+02 4.69E+01 G

Np-239   T   4.8148E-01                                      2.36E+00
                         103.70-1.427E-01 %   5.278E+00 1.09E+03 2.40E+01 X
                         106.13 4.815E-01 ?(  5.241E+00 3.23E+02 2.27E+01 G
                          99.50 5.658E-01     7.027E+00 3.67E+02 1.50E+01 X

Nd-147       6.2818E-01                                      1.11E+01
                         531.00-8.187E-01 ?(  9.175E+00 4.37E+02 1.30E+01 G
                          91.10 1.293E+00 ?(  6.821E+00 1.58E+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	
AM-241	59.54	231.	20.	0.011	129.86	1.010E+00	
BA-133	80.99	253.	-4.	-0.002	602.02	-1.708E-01	P
EU-155	86.54	1050.	-28.	-0.015	167.26	-1.199E+00	
Nd-147	91.10	970.	28.	0.016	158.30	1.293E+00	
Gd-153	97.50	306.	-5.	-0.003	496.79	-2.131E-01	
Np-239	99.50	295.	7.	0.004	366.61	5.658E-01	
Gd-153	103.20	414.	-24.	-0.013	121.78	-1.390E+00	
Np-239	106.13	387.	9.	0.005	322.66	4.815E-01	
EU-152	121.78	280.	-19.	-0.011	123.56	-8.541E-01	P
EU-154	123.10	326.	-21.	-0.011	126.47	-6.387E-01	
PA-234	131.29	565.	-22.	-0.012	156.13	-1.560E+00	
Tc-99m	140.51	303.	19.	0.010	134.46	2.842E-01	
CE-141	145.44	337.	20.	0.011	132.89	5.541E-01	
Ba-140	162.66	276.	20.	0.011	118.96	4.666E+00	P
CE-139	165.85	274.	8.	0.004	313.97	1.347E-01	
Cf-251	176.60	143.	11.	0.006	202.06	9.442E-01	
TH-229	193.51	161.	-14.	-0.008	163.44	-5.204E+00	P
TH-229	210.85	160.	-15.	-0.008	152.27	-8.645E+00	
Cf-251	227.00	87.	17.	0.009	103.14	4.788E+00	
EU-152	244.69	865.	20.	0.011	213.90	4.985E+00	
Cd-113m	263.70	124.	-11.	-0.006	146.30	-3.753E+03	
BI-210M	265.83	133.	-5.	-0.003	948.67	-1.869E-01	P
Hg-203	279.20	154.	-16.	-0.009	114.81	-4.123E-01	
I-131	284.30	81.	16.	0.009	107.13	5.704E+00	P
PA-231	300.07	241.	15.	0.008	146.40	1.402E+01	
PA-233	300.18	256.	15.	0.008	150.78	5.566E+00	
PA-231	302.65	272.	15.	0.008	154.70	1.209E+01	
BA-133	302.85	287.	4.	0.002	599.65	4.986E-01	
PA-233	312.01	253.	14.	0.008	161.15	9.169E-01	
Ir-192	316.49	139.	-2.	-0.001	718.42	-6.325E-02	
La-140	328.76	70.	11.	0.006	140.95	1.357E+00	
Cf-249	333.44	70.	4.	0.002	363.54	6.866E-01	
Cs-136	340.57	257.	19.	0.010	122.34	1.006E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	344.29	153.	14.	0.008	126.58	1.343E+00	
HF-181	345.83	260.	11.	0.006	206.54	1.872E+00	
BA-133	356.00	363.	-13.	-0.007	206.53	-5.488E-01	
I-131	364.48	56.	9.	0.005	159.70	2.883E-01	P
BA-133	383.84	117.	14.	0.008	115.47	4.183E+00	
SN-113	391.69	33.	11.	0.006	99.18	4.974E-01	
SB-125	427.88	40.	13.	0.007	95.37	1.315E+00	
pm-146	453.88	33.	10.	0.006	113.00	4.959E-01	P
SB-125	463.37	88.	14.	0.008	100.11	4.191E+00	P
Ir-192	468.06	126.	-6.	-0.003	267.60	-3.722E-01	
BE-7	477.60	62.	-1.	-0.001	841.87	-4.133E-01	
HF-181	482.00	57.	12.	0.006	96.84	4.735E-01	
La-140	487.02	32.	10.	0.006	115.18	7.279E-01	
RU-103	497.05	64.	-16.	-0.009	101.04	-5.925E-01	
RH-106	511.86	114.	54.	0.030	52.37	9.275E+00	P
Nd-147	531.00	44.	-3.	-0.002	436.74	-8.187E-01	
Ba-140	537.26	36.	-2.	-0.001	591.61	-2.936E-01	
CS-134	563.24	53.	-12.	-0.007	233.34	-5.390E+00	P
CS-134	569.32	32.	1.	0.001	806.23	2.439E-01	
PA-234	569.47	43.	-8.	-0.004	125.79	-3.507E+00	
BI-207	569.70	41.	8.	0.004	119.02	3.071E-01	
SB-125	600.50	279.	8.	0.004	306.73	1.700E+00	
SB-124	602.73	287.	8.	0.004	310.42	3.105E-01	
CS-134	604.71	295.	8.	0.004	314.10	3.138E-01	
RU-103	610.30	303.	8.	0.004	316.96	5.387E+00	
AG-108M	614.28	310.	8.	0.004	320.09	3.475E-01	
PM-144	618.06	319.	8.	0.004	335.41	3.060E-01	P
RH-106	621.92	401.	-13.	-0.007	202.25	-5.096E+00	P
SB-125	635.89	40.	-8.	-0.004	117.26	-2.898E+00	
I-131	636.97	28.	9.	0.005	87.89	5.258E+00	
AG-110M	657.76	80.	-16.	-0.009	82.26	-7.178E-01	
CS-137	661.66	114.	-17.	-0.010	89.72	-8.674E-01	
PM-144	696.54	39.	-7.	-0.004	350.28	-3.235E-01	P
NB-94	702.63	44.	-6.	-0.003	458.80	-2.517E-01	P
SB-124	722.79	119.	-13.	-0.007	123.38	-5.398E+00	
AG-108M	722.94	106.	-10.	-0.006	144.67	-5.162E-01	
pm-146	735.72	22.	11.	0.006	91.94	2.241E+00	
pm-146	747.16	22.	1.	0.001	717.85	1.830E-01	
ZR-95	756.73	30.	-2.	-0.001	486.24	-2.020E-01	
AG-110M	763.94	77.	-11.	-0.006	116.77	-2.345E+00	
NB-95	765.79	63.	14.	0.008	83.11	6.787E-01	P
PA-234M	766.41	40.	12.	0.007	78.59	1.978E+02	
EU-152	778.92	35.	-3.	-0.001	454.84	-9.944E-01	
CS-134	795.87	22.	7.	0.004	136.25	4.161E-01	
CS-134	801.95	28.	-3.	-0.002	378.59	-1.706E+00	
CO-58	810.77	80.	-15.	-0.008	80.95	-7.339E-01	P
La-140	815.77	94.	-2.	-0.001	902.08	-3.292E-01	
Cs-136	818.50	85.	10.	0.006	131.90	5.107E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
MN-54	834.85	33.	-2.	-0.001	648.03	-9.360E-02	P
Co-56	846.77	38.	-4.	-0.002	293.22	-2.107E-01	P
NB-94	871.10	37.	-13.	-0.007	70.36	-7.052E-01	
EU-154	873.23	43.	12.	0.007	83.80	5.110E+00	
PA-234	880.53	71.	-12.	-0.007	102.16	-1.081E+01	
Sc-46	889.28	65.	12.	0.007	99.50	6.419E-01	
y-88	898.04	24.	1.	0.001	895.20	6.689E-02	P
AG-110M	937.49	42.	-15.	-0.008	95.22	-2.449E+00	
PA-234	946.02	51.	-18.	-0.010	86.51	-7.695E+00	
EU-152	964.11	103.	10.	0.005	152.66	3.779E+00	
EU-154	996.33	30.	10.	0.005	85.47	5.434E+00	
PA-234M	1001.00	41.	9.	0.005	105.69	6.355E+01	P
EU-154	1004.77	93.	-15.	-0.008	94.61	-4.940E+00	
Co-56	1037.84	20.	8.	0.004	135.87	3.256E+00	P
BI-207	1063.66	30.	-5.	-0.003	199.33	-4.311E-01	P
FE-59	1099.25	40.	-16.	-0.009	64.10	-1.820E+00	P
ZN-65	1115.55	95.	-4.	-0.002	322.25	-5.537E-01	
CO-60	1173.24	16.	10.	0.005	93.84	6.591E-01	P
Ta-182	1189.05	40.	-17.	-0.009	85.31	-7.150E+00	
Ta-182	1221.41	11.	19.	0.010	45.95	4.863E+00	P
Co-56	1238.28	48.	-8.	-0.005	102.95	-9.049E-01	P
NA-22	1274.53	16.	4.	0.002	150.00	2.888E-01	
FE-59	1291.60	6.	6.	0.003	93.88	1.053E+00	P
CO-60	1332.50	22.	-11.	-0.006	54.34	-8.254E-01	P
AG-110M	1384.30	5.	7.	0.004	88.15	2.109E+00	
EU-152	1408.00	11.	5.	0.003	145.77	1.989E+00	
La-140	1596.21	29.	-14.	-0.008	127.74	-1.253E+00	P
SB-124	1690.98	6.	-4.	-0.002	160.96	-6.998E-01	
Co-56	1771.35	68.	-13.	-0.007	94.56	-7.931E+00	
y-88	1836.06	6.	3.	0.002	205.48	2.955E-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	-4.1330E-01	-4.1331E-01	8.419E+02%	1.22E+01
NA-22	#A	2.8876E-01	2.8876E-01	1.500E+02%	1.54E+00
K-40		2.2485E+02	2.2485E+02	5.902E+00%	9.89E+00
Sc-46	#A	6.4194E-01	6.4194E-01	9.950E+01%	2.16E+00
CR-51	#A	-7.9818E-02	-7.9819E-02	4.987E+03%	1.38E+01
MN-54	#A	-9.3600E-02	-9.3600E-02	6.480E+02%	1.50E+00
FE-59	#A	-1.8197E+00	-1.8198E+00	6.410E+01%	3.64E+00
Co-56	#A	2.1879E-01	2.1879E-01	1.359E+02%	1.63E+00
CO-57	#A	-2.5919E-03	-2.5919E-03	1.361E+04%	1.23E+00
CO-58	#A	-7.3389E-01	-7.3389E-01	8.095E+01%	2.23E+00

CO-60	#A	-8.2537E-01	-8.2537E-01	5.434E+01%	1.84E+00
ZN-65	#A	-5.5372E-01	-5.5372E-01	3.223E+02%	6.16E+00
NB-94	#A	-2.5171E-01	-2.5171E-01	4.588E+02%	1.52E+00
ZR-95	#A	-2.0197E-01	-2.0197E-01	4.862E+02%	2.46E+00
NB-95	#A	6.7873E-01	6.7873E-01	8.311E+01%	1.89E+00
RU-103	#A	-5.9248E-01	-5.9248E-01	1.010E+02%	1.48E+00
RH-106	#A	-5.0960E+00	-5.0960E+00	2.023E+02%	3.89E+01
AG-108M	#A	1.6196E-01	1.6196E-01	3.201E+02%	1.17E+00
AG-110M	#A	5.2836E-01	5.2836E-01	8.815E+01%	3.33E+00
SN-113	#A	4.9737E-01	4.9737E-01	9.918E+01%	1.29E+00
SB-124	#A	3.1047E-01	3.1047E-01	3.104E+02%	3.26E+00
SB-125	#A	1.9536E+00	1.9536E+00	9.537E+01%	3.26E+00
I-131	#A	1.0132E+00	1.0133E+00	7.048E+01%	1.21E+00
Gd-153	#A	-2.1312E-01	-2.1312E-01	4.968E+02%	3.59E+00
Ga-68	A	2.2122E+00	2.2315E+00	1.104E+03%	5.80E+01
Tc-99m	#A	2.8377E-01	2.8423E-01	1.345E+02%	1.28E+00
BA-133	#A	-3.0998E-01	-3.0998E-01	2.065E+02%	3.81E+00
CS-134	#A	3.5244E-01	3.5244E-01	1.362E+02%	3.34E+00
CS-137	#A	-8.6744E-01	-8.6744E-01	8.972E+01%	2.61E+00
CE-139	#A	1.3468E-01	1.3468E-01	3.140E+02%	1.43E+00
Ba-140	#A	7.1420E-01	7.1422E-01	1.190E+02%	4.50E+00
La-140	#A	-7.9489E-01	-7.9491E-01	9.511E+01%	2.52E+00
CE-141	#A	5.5407E-01	5.5407E-01	1.329E+02%	2.47E+00
CE-144	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.30E+01
PM-144	#A	-8.5978E-03	-8.5978E-03	2.425E+02%	1.42E+00
EU-152	#A	2.6407E+00	2.6407E+00	9.723E+01%	5.73E+00
EU-154	#A	5.2603E+00	5.2603E+00	5.985E+01%	1.44E+01
EU-155	#A	-3.4203E-02	-3.4203E-02	4.127E+03%	5.99E+00
HF-181	#A	6.9393E-01	6.9394E-01	9.684E+01%	1.55E+00
Ta-182	#A	2.0862E+00	2.0862E+00	4.595E+01%	8.79E+00
Hg-203	#A	-4.1229E-01	-4.1230E-01	1.148E+02%	1.59E+00
TL-208		9.6445E+00	9.6446E+00	8.613E+00%	1.11E+00
pm-146	#A	7.3153E-01	7.3153E-01	9.194E+01%	3.35E+00
y-88	#A	1.8444E-01	1.8444E-01	2.055E+02%	1.47E+00
Cd-113m	#A	-3.7534E+03	-3.7534E+03	1.463E+02%	1.86E+04
Cd-109	#A	9.6539E+00	9.6539E+00	1.583E+02%	5.09E+01
Cf-251	#A	9.4424E-01	9.4424E-01	2.021E+02%	5.18E+00
Cf-249	#A	1.4326E-01	1.4326E-01	3.635E+02%	2.35E+00
Sn-126	#A	-4.4827E+00	-4.4827E+00	1.104E+02%	1.65E+01
PB-210	#A	2.3056E+01	2.3056E+01	5.042E+01%	3.19E+01
PB-212	A	4.6482E-01	4.6482E-01	4.050E+02%	6.30E+00
PB-214		1.3849E+01	1.3849E+01	1.066E+01%	2.78E+00
BI-207	#A	3.0714E-01	3.0714E-01	1.190E+02%	1.25E+00
BI-212		3.7299E+01	3.7299E+01	1.715E+01%	1.02E+01
BI-214		1.8580E+01	1.8580E+01	7.616E+00%	1.82E+00
BI-210M	#A	-1.8688E-01	-1.8688E-01	9.487E+02%	2.32E+00
AC-228		2.6657E+01	2.6657E+01	8.115E+00%	1.39E+00
TH-227	#A	1.1801E-01	1.1801E-01	6.183E+02%	1.78E+01
TH-229	#A	-5.2040E+00	-5.2040E+00	1.634E+02%	2.27E+01

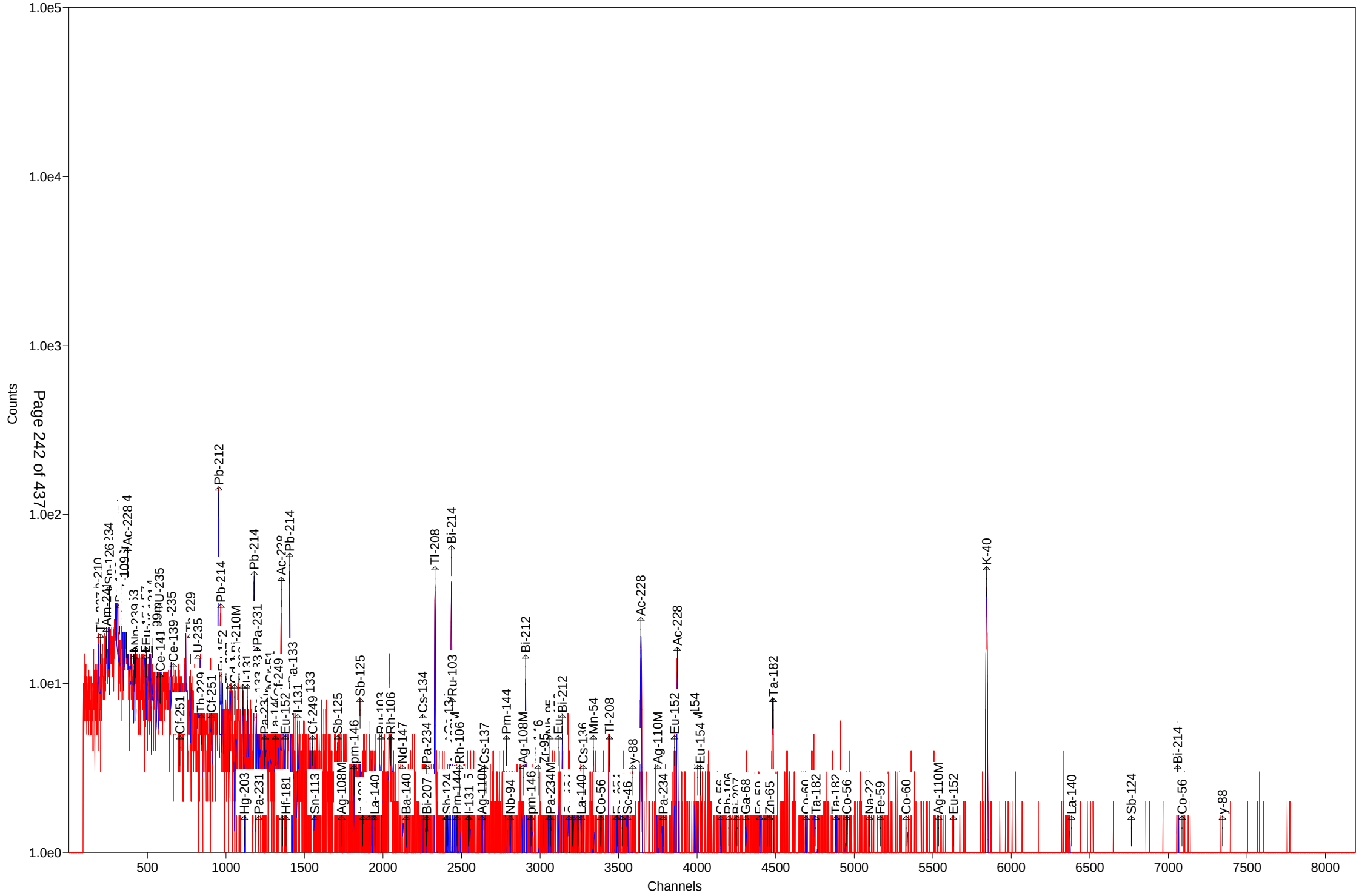
TH-234 #A	2.2181E+01	2.2181E+01	3.689E+01%		2.60E+01
PA-231 #A	1.2978E+01	1.2978E+01	1.065E+02%		6.29E+01
PA-233 #A	1.5999E+00	1.5999E+00	1.103E+02%		4.98E+00
PA-234 #A	-1.5604E+00	-1.5604E+00	1.561E+02%		8.15E+00
PA-234M#A	9.8457E+01	9.8457E+01	6.585E+01%		2.29E+02
U-235 A	2.4012E+00	2.4012E+00	1.438E+02%		1.03E+01
AM-241 #A	1.0097E+00	1.0097E+00	1.299E+02%		3.71E+00
Np-237 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.69E+01
Ir-192 #A	-6.3245E-02	-6.3246E-02	7.184E+02%		1.56E+00
Cs-136 #A	6.6874E-01	6.6876E-01	8.995E+01%		2.29E+00
Np-239 #A	4.8140E-01	4.8148E-01	3.227E+02%		5.24E+00
Nd-147 #A	6.2816E-01	6.2818E-01	1.583E+02%		9.18E+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) 3.761E+02 Bq/Sample
Total Decayed Activity (37.6 to 1999.5 keV) 3.7611505E+02 Bq/Sample

263537_Gamma_160-18426-A-1-B. 14_Gamma_20162190.spc.



Test America St. Louis Spectrum ID: 12_Gamma_20161803

Sample Description: 263537_Gamma_160-18426-A-1-C DU
Detector: Detector #12
Batch ID: 263537
Work Order Number: Gamma
Lot Number: 160-18426-A-1-C DU

Decay to Time: 8/25/2016 10:25 Live Time: 1800 sec
Acquisition Time: 8/25/2016 10:25:31 Real Time: 1810 sec
Analysis Time: 8/25/2016 10:56 Dead Time: 0.56 %
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	3.565E+00	106.6	3.801E+00	3.806E+00	1.283E+01
NA-22	3.105E-01	96.8	3.007E-01	3.011E-01	1.044E+00
K-40	2.561E+02	5.2	1.331E+01	1.868E+01	1.153E+01
Sc-46	7.863E-02	81.8	6.431E-02	6.444E-02	1.925E+00
CR-51	4.305E+00	155.2	6.682E+00	6.686E+00	2.237E+01
MN-54	2.016E-03	30290.4	6.106E-01	6.106E-01	1.457E+00
FE-59	9.736E-01	91.4	8.901E-01	8.914E-01	1.976E+00
Co-56	4.007E-01	88.4	3.541E-01	3.547E-01	1.164E+00
CO-57	2.342E-01	154.5	3.619E-01	3.621E-01	1.216E+00
CO-58	2.482E-01	184.1	4.568E-01	4.570E-01	1.580E+00
CO-60	-7.899E-01	103.3	8.158E-01	8.167E-01	1.803E+00
ZN-65	-1.213E-01	1237.5	1.501E+00	1.501E+00	5.212E+00
NB-94	7.825E-01	29.4	2.300E-01	2.336E-01	9.774E-01
ZR-95	4.225E-01	93.2	3.937E-01	3.943E-01	2.107E+00
NB-95	9.216E-02	582.9	5.372E-01	5.372E-01	1.866E+00
RU-103	-8.423E-02	599.3	5.048E-01	5.048E-01	1.232E+00
RH-106	9.073E-01	426.0	3.865E+00	3.865E+00	9.654E+00
AG-108M	1.152E-01	394.8	4.547E-01	4.548E-01	1.152E+00
AG-110M	5.181E-01	137.0	7.098E-01	7.103E-01	2.182E+00
SN-113	5.045E-01	120.0	6.055E-01	6.061E-01	2.045E+00
SB-124	-4.175E-01	237.8	9.930E-01	9.932E-01	3.340E+00
SB-125	1.743E-01	833.7	1.453E+00	1.453E+00	3.683E+00
I-131	8.857E-01	84.1	7.445E-01	7.459E-01	1.066E+00
Gd-153	-1.153E+00	133.9	1.544E+00	1.545E+00	5.148E+00
Ga-68	-2.411E+01	127.5	3.073E+01	3.076E+01	6.644E+01
Tc-99m	-4.371E-01	161.1	7.043E-01	7.047E-01	2.345E+00
BA-133	-6.698E-01	173.3	1.161E+00	1.162E+00	3.890E+00
CS-134	2.141E-01	126.0	2.698E-01	2.700E-01	3.322E+00
CS-137	5.325E-01	107.7	5.737E-01	5.744E-01	1.938E+00
CE-139	4.149E-01	109.2	4.531E-01	4.548E-01	1.513E+00
Ba-140	-2.450E+00	71.5	1.751E+00	1.756E+00	5.204E+00
La-140	-1.565E+00	80.9	1.265E+00	1.268E+00	2.550E+00
CE-141	-8.131E-01	165.0	1.342E+00	1.342E+00	4.466E+00

CE-144	-3.339E+00	155.0	5.177E+00	5.179E+00	1.724E+01
PM-144	3.034E-01	162.8	4.941E-01	4.943E-01	1.164E+00
EU-152	2.168E+00	110.4	2.394E+00	2.397E+00	7.376E+00
EU-154	-1.988E+00	242.6	4.822E+00	4.823E+00	1.294E+01
EU-155	0.000E+00	1.#INF	9.983E-01	9.983E-01	7.377E+00
HF-181	-2.247E-01	256.6	5.768E-01	5.769E-01	1.973E+00
Ta-182	2.351E+00	72.8	1.712E+00	1.716E+00	5.697E+00
Hg-203	-5.213E-01	98.3	5.122E-01	5.131E-01	1.712E+00
TL-208	9.415E+00	8.5	7.965E-01	9.343E-01	1.110E+00
pm-146	2.294E-02	125.6	2.881E-02	2.883E-02	3.549E+00
y-88	-8.075E-01	80.0	6.456E-01	6.469E-01	1.611E+00
Cd-113m	6.687E+03	72.5	4.848E+03	4.867E+03	1.609E+04
Cd-109	1.112E+01	135.3	1.504E+01	1.506E+01	5.008E+01
Cf-251	-2.363E+00	103.5	2.445E+00	2.454E+00	6.214E+00
Cf-249	8.782E-01	76.7	6.733E-01	6.749E-01	1.949E+00
Sn-126	-5.576E+00	130.6	7.285E+00	7.290E+00	2.425E+01
PB-210	-4.131E+00	406.0	1.677E+01	1.677E+01	5.695E+01
PB-212	2.293E+01	4.9	1.134E+00	1.867E+00	2.114E+00
PB-214	2.008E+01	6.8	1.375E+00	1.726E+00	2.190E+00
BI-207	2.972E-01	106.6	3.168E-01	3.172E-01	1.080E+00
BI-212	7.441E+00	78.6	5.846E+00	5.859E+00	1.954E+01
BI-214	1.920E+01	7.4	1.412E+00	1.729E+00	1.880E+00
BI-210M	-2.130E-01	325.6	6.935E-01	6.936E-01	2.367E+00
AC-228	2.535E+01	6.8	1.711E+00	2.145E+00	2.330E+00
TH-227	4.940E+00	93.1	4.601E+00	4.609E+00	2.448E+01
TH-229	-9.375E+00	102.0	9.562E+00	9.592E+00	2.432E+01
TH-234	-4.956E+00	320.4	1.588E+01	1.588E+01	5.367E+01
PA-231	7.397E+00	155.9	1.153E+01	1.154E+01	7.413E+01
PA-233	-7.687E-01	146.7	1.127E+00	1.128E+00	6.691E+00
PA-234	5.779E-01	89.4	5.167E-01	5.175E-01	1.023E+01
PA-234M	6.829E+01	98.0	6.694E+01	6.703E+01	2.096E+02
U-235	-1.469E+00	106.6	1.565E+00	1.567E+00	1.891E+01
AM-241	-7.271E-01	261.2	1.899E+00	1.900E+00	6.362E+00
Np-237	0.000E+00	1.#INF	5.026E+00	5.026E+00	1.673E+01
Ir-192	-8.009E-02	87.0	6.971E-02	6.987E-02	2.817E+00
Cs-136	1.273E-02	103.7	1.320E-02	1.322E-02	1.769E+00
Np-239	1.272E+00	157.5	2.004E+00	2.006E+00	6.694E+00
Nd-147	1.396E+00	118.3	1.651E+00	1.653E+00	7.368E+00
Total	7.164E+03				

Analyst: Amanda Dick

Sample description
263537_Gamma_160-18426-A-1-C DU

Spectrum Filename: C:\User\SPC\Det12\12_Gamma_20161803.An1

Acquisition information
Start time: 8/25/2016 10:25:31 AM
Live time: 1800
Real time: 1810
Dead time: 0.56 %
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	8/25/2016 10:25:00 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: 0.0795

***** 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	42.	43.15	0.60	2.225E-02	46.54	4.250	PBC<MDA	PB210
50.14	23.	114.47	0.89	2.496E-02	50.14	8.000	PBC<MDA	TH227
63.29	-11.	320.36	0.91	3.338E-02	63.29	3.810	PBC<MDA	TH234
67.52	40.	49.53	0.49	3.558E-02				
74.85	269.	9.85	0.92	3.878E-02				
77.24	355.	7.47	0.92	3.967E-02				
87.32	154.	14.03	0.93	4.263E-02	86.49	13.100	1.541E+01	Np237
					86.54	30.700	6.575E+00	EU155
					86.94	9.040	2.228E+01	Sn126
					87.57	37.500	5.352E+00	Sn126
					88.04	3.790	5.283E+01	Cd109
89.86	83.	24.04	0.93	4.318E-02				
91.10	24.	186.62	0.93	4.341E-02	91.10	28.300	PBC<MDA	Nd147
92.59	-30.	148.62	0.93	4.369E-02	92.59	5.584	PBC<MDA	TH234
93.18	95.	22.33	0.93	4.382E-02	93.35	5.561	2.164E+01	AC228
106.13	24.	157.53	0.95	4.521E-02	106.13	22.700	PBC<MDA	Np239
122.18	16.	154.52	0.96	4.526E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	2.342E-01	CO57
165.85	24.	109.21	1.00	4.089E-02	165.85	79.900	PBC<MDA	CE139
205.33	14.	172.13	1.04	3.557E-02	205.33	5.010	PBC<MDA	U235
238.58	556.	5.91	1.04	3.220E-02	238.63	43.300	2.216E+01	PB212
241.98	81.	22.42	1.07	3.189E-02	242.00	7.430	1.889E+01	PB214

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
256.24	13.	146.92	1.09	3.069E-02	256.24	7.000	PBC<MDA	TH227
263.70	22.	72.50	1.09	3.010E-02	263.70	0.006	PBC<MDA	Cd113m
277.46	48.	40.38	0.36	2.910E-02	277.28	6.310	1.464E+01	TL208
284.30	9.	190.54	1.11	2.861E-02	284.30	6.140	PBC<MDA	I131
295.15	178.	12.12	1.05	2.788E-02	295.09	19.300	1.840E+01	PB214
299.85	30.	62.40	0.54	2.759E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	2.495E+01	PA231
					300.18	6.200	9.903E+00	PA233
320.08	20.	155.20	1.15	2.638E-02	320.08	9.940	PBC<MDA	CR51
328.76	17.	95.84	1.15	2.589E-02	328.76	20.300	PBC<MDA	La140
333.44	18.	102.95	1.16	2.564E-02	333.44	15.510	PBC<MDA	Cf249
338.28	149.	13.84	1.57	2.538E-02	338.32	12.010	2.709E+01	AC228
340.57	17.	149.12	1.17	2.527E-02	340.57	46.900	PBC<MDA	Cs136
344.29	15.	173.23	1.17	2.508E-02	344.29	26.500	PBC<MDA	EU152
351.92	350.	6.85	1.26	2.470E-02	351.93	37.600	2.094E+01	PB214
364.48	11.	132.60	1.19	2.410E-02	364.48	81.700	PBC<MDA	I131
383.84	14.	107.51	1.20	2.325E-02	383.84	8.940	PBC<MDA	BA133
387.95	14.	113.65	1.21	2.307E-02	387.95	66.000	PBC<MDA	Cf249
391.69	13.	120.03	1.21	2.292E-02	391.69	64.000	PBC<MDA	SN113
427.88	2.	833.67	1.24	2.153E-02	427.88	29.600	PBC<MDA	SB125
433.94	4.	394.76	1.25	2.132E-02	433.94	90.480	PBC<MDA	AG108M
453.88	10.	140.03	1.27	2.065E-02	453.88	65.000	PBC<MDA	pm146
468.06	14.	92.74	1.28	2.020E-02	468.06	51.750	PBC<MDA	Ir192
477.60	13.	106.63	1.29	1.991E-02	477.60	10.520	PBC<MDA	BE7
487.02	14.	108.00	1.30	1.964E-02	487.02	45.500	PBC<MDA	La140
511.86	112.	26.08	2.57	1.895E-02	511.86	20.000	1.637E+01	RH106
531.00	9.	145.51	1.34	1.845E-02	531.00	13.000	PBC<MDA	Nd147
569.70	9.	106.61	1.37	1.753E-02	569.32	15.380	1.888E+00	CS134
					569.47	8.200	3.541E+00	PA234
					569.70	97.740	2.972E-01	BI207
583.18	247.	8.46	1.37	1.724E-02	583.02	84.500	9.415E+00	TL208
609.42	266.	7.35	1.22	1.669E-02	609.31	46.090	1.920E+01	BI214
					610.30	5.750	1.541E+02	RU103
621.92	3.	426.01	1.42	1.644E-02	621.92	9.930	PBC<MDA	RH106
636.97	12.	98.52	1.43	1.616E-02	636.97	7.170	PBC<MDA	I131
661.66	13.	107.74	1.45	1.571E-02	661.66	85.210	PBC<MDA	CS137
696.54	8.	162.84	1.48	1.513E-02	696.54	99.000	PBC<MDA	PM144
702.63	10.	107.08	1.49	1.503E-02	702.63	97.900	PBC<MDA	NB94
724.20	14.	93.18	1.50	1.469E-02	724.20	44.150	PBC<MDA	ZR95
727.41	15.	78.57	1.51	1.465E-02	727.17	7.550	PBC<MDA	BI212
765.79	2.	582.92	1.54	1.410E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
766.41	14.	98.02	1.54	1.409E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
795.87	10.	125.99	1.56	1.369E-02	795.87	85.530	PBC<MDA	CS134
810.78	6.	184.09	1.58	1.351E-02	810.78	99.460	PBC<MDA	CO58
858.20	16.	86.27	1.62	1.291E-02	860.56	12.420	PBC<MDA	TL208
871.10	27.	29.40	1.63	1.279E-02	871.10	99.890	1.174E+00	NB94

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
880.53	13.	84.74	1.63	1.269E-02	880.53	6.000	PBC<MDA	PA234
883.24	3.	437.30	1.64	1.266E-02	883.24	9.600	PBC<MDA	PA234
884.68	8.	137.01	1.64	1.264E-02	884.68	72.680	PBC<MDA	AG110M
911.40	160.	8.65	1.19	1.237E-02	911.07	29.000	2.479E+01	AC228
946.02	10.	89.40	1.69	1.202E-02	946.02	13.400	PBC<MDA	PA234
964.11	12.	136.95	1.70	1.184E-02	964.11	14.605	PBC<MDA	EU152
969.07	93.	12.00	0.88	1.180E-02	968.97	17.460	2.508E+01	AC228
1001.00	5.	212.64	1.73	1.151E-02	1001.00	0.837	PBC<MDA	PA234M
1004.77	2.	647.15	1.74	1.148E-02	1004.77	18.010	PBC<MDA	EU154
1037.84	3.	332.78	1.76	1.119E-02	1037.84	14.130	PBC<MDA	Co56
1099.25	11.	91.43	1.81	1.071E-02	1099.25	56.500	PBC<MDA	FE59
1120.52	9.	121.33	1.83	1.055E-02	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	PBC<MDA	Ta182
1120.55	9.	81.79	1.83	1.055E-02	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	4.734E-01	Sc46
					1121.30	34.900	1.357E+00	Ta182
1121.04	16.	72.81	1.83	1.055E-02	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	8.202E-01	Sc46
					1121.30	34.900	2.351E+00	Ta182
1238.28	15.	88.38	1.92	9.765E-03	1238.28	66.070	PBC<MDA	Co56
1274.53	5.	96.82	1.95	9.547E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	8.819E-01	EU154
1384.30	3.	302.33	2.03	8.948E-03	1384.30	24.290	PBC<MDA	AG110M
1460.92	422.	5.20	2.21	8.576E-03	1460.83	10.670	2.561E+02	K40
1764.58	48.	18.12	2.30	7.376E-03	1764.49	15.400	2.330E+01	BI214
1771.35	1.	957.67	2.30	7.354E-03	1771.35	15.480	PBC<MDA	Co56
1836.06	8.	35.36	2.35	7.144E-03	1836.06	99.200	6.271E-01	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
269.66	67.52	141.	40.	1.124E+03	49.53	0.494	- sM
298.96	74.85	215.	269.	6.929E+03	9.85	0.917	- sD
308.51	77.23	174.	355.	8.953E+03	7.47	0.919	- D
358.48	89.92	153.	92.	2.132E+03	21.65	0.931	- 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	185.80	46.54	410.	-7.	-0.004	406.03	0.889s
TH-227	200.19	50.14	335.	23.	0.013	114.47	0.893
AM-241	237.74	59.54	727.	-15.	-0.008	261.23	0.902s
TH-234	252.73	63.29	665.	-11.	-0.006	320.36	0.905
Sn-126	256.70	64.28	914.	-33.	-0.018	130.64	0.906
BA-133	323.48	80.99	1442.	-34.	-0.019	78.91	0.922s
Np-237	345.47	86.49	1248.	0.	0.000	158.41	0.928A
EU-155	345.68	86.54	1200.	-32.	-0.018	152.28	0.928s
Sn-126	347.27	86.94	1092.	-32.	-0.018	145.34	0.928A
Sn-126	349.78	87.57	915.	32.	0.018	75.02	0.929D
Cd-109	351.66	88.04	948.	32.	0.018	135.35	0.929A
Nd-147	363.89	91.10	980.	24.	0.013	186.62	0.932s
TH-234	369.85	92.59	1007.	-30.	-0.017	148.62	0.934s
AC-228	372.88	93.35	177.	95.	0.053	22.33	0.934D
Gd-153	389.47	97.50	672.	-28.	-0.015	133.94	0.938s
Np-239	397.47	99.50	700.	-13.	-0.007	281.55	0.940s
Gd-153	412.25	103.20	713.	0.	0.000	1000.00	0.944s
Np-239	414.25	103.70	713.	0.	0.000	1000.00	0.944s
EU-155	420.70	105.31	713.	0.	0.000	1000.00	0.946s
Np-239	423.96	106.13	674.	24.	0.013	157.53	0.946s
EU-152	486.50	121.78	316.	-10.	-0.006	245.39	0.961s
CO-57	487.64	122.06	310.	16.	0.009	154.52	0.962s
EU-154	491.79	123.10	305.	-28.	-0.015	90.91	0.963s
PA-234	524.55	131.29	974.	-28.	-0.016	158.69	0.970s
HF-181	531.46	133.02	1004.	-30.	-0.016	152.32	0.972s
CE-144	533.51	133.54	1042.	-30.	-0.016	155.03	0.973s
HF-181	544.55	136.30	1071.	-30.	-0.017	156.77	0.975s
CO-57	545.24	136.47	1112.	-30.	-0.017	159.66	0.975s
Tc-99m	561.38	140.51	1141.	-30.	-0.017	161.13	0.979s
U-235	574.47	143.79	1166.	-36.	-0.020	125.66	0.982s
CE-141	581.09	145.44	1248.	-30.	-0.017	165.00	0.984s
Ba-140	649.91	162.66	424.	-28.	-0.016	104.14	1.000s
U-235	652.79	163.38	453.	-29.	-0.016	153.27	1.001s
CE-139	662.68	165.85	343.	24.	0.014	109.21	1.003s
Cf-251	705.64	176.60	238.	-28.	-0.016	103.47	1.013s
TH-229	773.22	193.51	216.	-27.	-0.015	102.00	1.029s
U-235	820.49	205.33	166.	14.	0.008	172.13	1.040s
TH-229	842.54	210.85	224.	-28.	-0.016	100.39	1.046s
Cf-251	907.10	227.00	169.	-20.	-0.011	125.58	1.061s
PB-212	953.60	238.63	117.	575.	0.320	4.95	1.071D
PB-214	967.05	242.00	122.	81.	0.045	22.42	1.075D
TH-227	1023.99	256.24	95.	13.	0.007	146.92	1.088s
Cd-113m	1053.81	263.70	113.	22.	0.012	72.50	1.095s
BI-210M	1062.33	265.83	172.	-6.	-0.003	325.58	1.097s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
TL-208	1108.81	277.46	75.	48.	0.027	40.38	0.356s
Hg-203	1115.78	279.20	226.	-22.	-0.012	98.26	1.109s
I-131	1136.16	284.30	74.	9.	0.005	190.54	1.114s
PB-214	1179.53	295.15	72.	178.	0.099	12.12	1.053
PB-212	1199.05	300.03	438.	19.	0.011	155.59	1.128s
PA-231	1199.21	300.07	457.	20.	0.011	155.90	1.128s
PA-233	1199.65	300.18	477.	8.	0.005	373.79	1.128s
PA-231	1209.52	302.65	485.	0.	0.000	1000.00	1.131s
BA-133	1210.33	302.85	494.	-17.	-0.009	188.28	1.131s
BI-210M	1218.50	304.90	477.	0.	0.000	1000.00	1.133s
Ir-192	1232.67	308.44	619.	-24.	-0.013	149.93	1.136s
PA-233	1246.95	312.01	595.	-24.	-0.013	146.67	1.139s
Ir-192	1264.85	316.49	605.	-24.	-0.013	147.32	1.143s
CR-51	1279.22	320.08	487.	20.	0.011	155.20	1.147s
La-140	1313.91	328.76	130.	17.	0.010	95.84	1.155
Cf-249	1332.62	333.44	155.	18.	0.010	102.95	1.159s
AC-228	1351.98	338.28	63.	149.	0.083	13.84	1.565s
Cs-136	1361.13	340.57	320.	17.	0.010	149.12	1.165
EU-152	1375.98	344.29	337.	15.	0.008	173.23	1.169s
HF-181	1382.15	345.83	352.	0.	0.000	1000.00	1.170s
PB-214	1406.49	351.92	53.	350.	0.194	6.85	1.260
BA-133	1422.81	356.00	496.	-18.	-0.010	173.33	1.180
I-131	1456.73	364.48	57.	11.	0.006	132.60	1.187s
BA-133	1534.13	383.84	104.	14.	0.008	107.51	1.205s
Cf-249	1550.56	387.95	118.	14.	0.008	113.65	1.209
SN-113	1565.51	391.69	121.	13.	0.007	120.03	1.212s
SB-125	1710.19	427.88	72.	2.	0.001	833.67	1.245s
AG-108M	1734.43	433.94	64.	4.	0.002	394.76	1.250s
pm-146	1814.18	453.88	48.	10.	0.006	140.03	1.268s
SB-125	1852.11	463.37	128.	-7.	-0.004	205.18	1.277s
Ir-192	1870.88	468.06	78.	14.	0.008	92.74	1.281s
BE-7	1909.00	477.60	96.	13.	0.007	106.63	1.289s
HF-181	1926.61	482.00	133.	-6.	-0.004	256.63	1.293s
La-140	1946.69	487.02	100.	14.	0.008	108.00	1.298s
RU-103	1986.82	497.05	61.	-3.	-0.001	599.35	1.307s
RH-106	2046.04	511.86	113.	112.	0.062	26.08	2.570s
Nd-147	2122.56	531.00	39.	9.	0.005	145.51	1.337s
Ba-140	2147.60	537.26	70.	-20.	-0.011	71.48	1.342s
CS-134	2251.48	563.24	65.	-7.	-0.004	196.94	1.365s
CS-134	2275.81	569.32	48.	-3.	-0.001	371.23	1.370s
PA-234	2276.41	569.47	50.	0.	0.000	1000.00	1.370s
BI-207	2277.34	569.70	43.	9.	0.005	106.61	1.371s
TL-208	2331.22	583.18	32.	247.	0.137	8.46	1.371
SB-125	2400.51	600.50	445.	-15.	-0.008	206.35	1.398s
SB-124	2409.43	602.73	430.	-12.	-0.007	237.84	1.399s
BI-214	2436.16	609.42	25.	266.	0.148	7.35	1.222
RU-103	2439.69	610.30	445.	-15.	-0.008	205.12	1.406s
AG-108M	2455.62	614.28	430.	-12.	-0.007	239.51	1.410

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RH-106	2486.16	621.92	30.	3.	0.001	426.01	1.416s
I-131	2546.39	636.97	31.	12.	0.007	98.52	1.429s
AG-110M	2629.52	657.76	91.	-14.	-0.008	100.00	1.447s
CS-137	2645.12	661.66	89.	13.	0.007	107.74	1.451s
PM-144	2784.64	696.54	38.	8.	0.005	162.84	1.481s
NB-94	2808.99	702.63	25.	10.	0.006	107.08	1.486s
SB-124	2889.61	722.79	110.	-14.	-0.007	113.43	1.503s
AG-108M	2890.22	722.94	97.	0.	0.000	1000.00	1.503s
EU-154	2891.89	723.36	97.	0.	0.000	1000.00	1.503s
ZR-95	2895.26	724.20	76.	14.	0.008	93.18	1.504s
BI-212	2907.15	727.17	60.	15.	0.008	78.57	1.507
pm-146	2941.34	735.72	51.	-12.	-0.007	126.48	1.514s
pm-146	2987.11	747.16	37.	-6.	-0.004	208.48	1.524s
ZR-95	3025.38	756.73	33.	-3.	-0.002	399.82	1.532s
AG-110M	3054.24	763.94	80.	-8.	-0.004	142.96	1.538s
NB-95	3061.63	765.79	91.	2.	0.001	582.92	1.539s
PA-234M	3064.12	766.41	81.	14.	0.008	98.02	1.540s
EU-152	3114.15	778.92	42.	-5.	-0.003	278.57	1.550s
BI-212	3140.15	785.42	61.	-15.	-0.008	19.40	1.556s
CS-134	3181.95	795.87	69.	10.	0.005	125.99	1.565s
CS-134	3206.28	801.95	122.	-20.	-0.011	82.63	1.570s
CO-58	3241.58	810.78	58.	6.	0.003	184.09	1.577s
La-140	3261.56	815.77	64.	0.	0.000	1000.00	1.581
Cs-136	3272.49	818.50	74.	-9.	-0.005	144.12	1.583s
Co-56	3385.58	846.77	28.	-7.	-0.004	164.75	1.607s
TL-208	3440.76	860.56	38.	16.	0.009	86.27	1.619s
NB-94	3482.90	871.10	18.	27.	0.015	29.40	1.627
EU-154	3491.44	873.23	53.	-6.	-0.003	242.60	1.629s
PA-234	3520.64	880.53	52.	13.	0.007	84.74	1.635s
PA-234	3531.48	883.24	64.	3.	0.001	437.30	1.637s
AG-110M	3537.26	884.68	51.	8.	0.004	137.01	1.638s
Sc-46	3555.65	889.28	77.	-7.	-0.004	177.32	1.642s
y-88	3590.70	898.04	45.	-17.	-0.009	79.95	1.649s
AC-228	3644.15	911.40	7.	160.	0.089	8.65	1.194s
AG-110M	3748.54	937.49	60.	-20.	-0.011	66.96	1.682s
PA-234	3782.66	946.02	15.	10.	0.006	89.40	1.688s
EU-152	3855.05	964.11	126.	12.	0.007	136.95	1.703s
AC-228	3874.90	969.07	7.	93.	0.052	12.00	0.880s
EU-154	3983.96	996.33	63.	-4.	-0.002	285.04	1.729s
PA-234M	4002.64	1001.00	52.	5.	0.003	212.64	1.733s
EU-154	4017.76	1004.77	57.	2.	0.001	647.15	1.736s
Co-56	4150.07	1037.84	20.	3.	0.002	332.78	1.762s
Cs-136	4191.00	1048.07	44.	-8.	-0.005	118.19	1.771s
RH-106	4200.17	1050.36	67.	-10.	-0.006	117.96	1.772s
BI-207	4253.39	1063.66	30.	-5.	-0.003	200.31	1.783s
Ga-68	4308.37	1077.40	53.	-13.	-0.007	127.48	1.794s
FE-59	4395.81	1099.25	16.	11.	0.006	91.43	1.811s
EU-152	4447.13	1112.07	118.	-14.	-0.008	111.82	1.821s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-214	4480.00	1120.29	50.	9.	0.005	121.33	1.827s
Sc-46	4481.05	1120.55	23.	9.	0.005	81.79	1.828s
Ta-182	4484.05	1121.30	57.	16.	0.009	72.81	1.828s
Ta-182	4755.20	1189.05	48.	-13.	-0.007	124.27	1.881
Ta-182	4884.72	1221.41	43.	-5.	-0.003	321.51	1.906
Co-56	4952.24	1238.28	33.	15.	0.008	88.38	1.919s
NA-22	5097.34	1274.53	11.	5.	0.003	96.82	1.946s
EU-154	5097.39	1274.54	16.	0.	0.000	1000.00	1.946s
CO-60	5329.39	1332.50	34.	-13.	-0.007	103.27	1.990s
AG-110M	5536.74	1384.30	11.	3.	0.001	302.33	2.029s
EU-152	5631.64	1408.00	28.	-6.	-0.004	201.07	2.046s
K-40	5843.52	1460.92	12.	422.	0.234	5.20	2.211
La-140	6385.21	1596.21	48.	-21.	-0.012	80.86	2.182s
SB-124	6764.73	1690.98	6.	-1.	-0.001	600.00	2.247s
BI-214	7059.14	1764.49	13.	48.	0.026	18.12	2.297
Co-56	7086.61	1771.35	62.	1.	0.001	957.67	2.302s
y-88	7345.80	1836.06	0.	8.	0.004	35.36	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	3.5650E+00					5.31E+01	
			477.60	3.565E+00	?(	1.283E+01	1.07E+02	1.05E+01 G
NA-22	C	3.1054E-01					9.50E+02	
			1274.53	3.105E-01	?(	1.044E+00	9.68E+01	9.99E+01 G
K-40	N	2.5610E+02					4.66E+11	
			1460.83	2.561E+02	(P	1.153E+01	5.20E+00	1.07E+01 G
Sc-46	F	7.8626E-02					8.38E+01	
			889.28	-3.162E-01	?(	1.925E+00	1.77E+02	1.00E+02 G
			1120.55	4.734E-01	?(	1.308E+00	8.18E+01	1.00E+02 G
CR-51	F	4.3053E+00					2.77E+01	
			320.08	4.305E+00	(	2.237E+01	1.55E+02	9.94E+00 G
MN-54	C	2.0158E-03					3.12E+02	
			834.85	2.016E-03	&(P	1.457E+00	3.03E+04	1.00E+02 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
FE-59	F	9.7355E-01					4.45E+01	
			1099.25	9.736E-01	?(P	1.976E+00	9.14E+01	5.65E+01 G
			1291.60	4.537E-02	&	3.389E+00	3.35E+03	4.32E+01 G
Co-56	C	4.0070E-01					7.73E+01	
			846.77	-2.977E-01	?(	1.164E+00	1.65E+02	9.99E+01 G
			1238.28	1.317E+00	&(P	2.540E+00	8.84E+01	6.61E+01 G
			1037.84	1.054E+00	?(	8.271E+00	3.33E+02	1.41E+01 G
			1771.35	5.694E-01	?	1.921E+01	9.58E+02	1.55E+01 A
CO-57	C	2.3419E-01					2.72E+02	
			122.06	2.342E-01	?(	1.216E+00	1.55E+02	8.56E+01 G
			136.47	-3.499E+00	&	1.861E+01	1.60E+02	1.07E+01 G
CO-58	C	2.4816E-01					7.09E+01	
			810.78	2.482E-01	&(	1.580E+00	1.84E+02	9.95E+01 G
CO-60	F	-7.8993E-01					1.93E+03	
			1332.50	-7.899E-01	?(P	1.803E+00	1.03E+02	1.00E+02 G
			1173.24	6.067E-02	% P	1.468E+00	1.06E+03	9.99E+01 G
ZN-65	F	-1.2127E-01					2.44E+02	
			1115.55	-1.213E-01	&(	5.212E+00	1.24E+03	5.06E+01 G
NB-94	I	7.8248E-01					7.41E+06	
			702.63	3.833E-01	*(P	9.774E-01	1.07E+02	9.79E+01 G
			871.10	1.174E+00	?(	9.773E-01	2.94E+01	9.99E+01 G
ZR-95	I	4.2250E-01					6.40E+01	
			756.73	-1.953E-01	?(P	2.107E+00	4.00E+02	5.45E+01 G
			724.20	1.185E+00	(	3.715E+00	9.32E+01	4.42E+01 G
NB-95	I	9.2159E-02					6.40E+01	
			765.79	9.216E-02	?(	1.866E+00	5.83E+02	9.98E+01 G
RU-103	I	-8.4226E-02					3.93E+01	
			497.05	-8.423E-02	?(	1.232E+00	5.99E+02	9.09E+01 G
			610.30	-8.497E+00	+	5.853E+01	2.05E+02	5.75E+00 GA
RH-106	I	9.0725E-01					3.74E+02	
			621.92	9.073E-01	?(	9.654E+00	4.26E+02	9.93E+00 G
			1050.36	-3.264E+01	+	1.310E+02	1.18E+02	1.56E+00 G
			511.86	1.637E+01	?	7.671E+00	2.61E+01	2.00E+01 GA
AG-108M	C	1.1520E-01					1.53E+05	
			433.94	1.152E-01	&(	1.152E+00	3.95E+02	9.05E+01 G
			722.94	0.000E+00	&	2.020E+00	1.00E+03	9.08E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		614.28	-4.597E-01	+	3.703E+00	2.40E+02	8.98E+01 G
AG-110M F	5.1811E-01					2.50E+02	
		884.68	4.635E-01	?(	2.182E+00	1.37E+02	7.27E+01 G
		657.76	-5.208E-01	+	1.754E+00	1.00E+02	9.46E+01 G
		937.49	-2.720E+00	+ P	5.189E+00	6.70E+01	3.44E+01 G
		1384.30	6.816E-01	?(	4.703E+00	3.02E+02	2.43E+01 G
		763.94	-1.350E+00	+ P	7.822E+00	1.43E+02	2.23E+01 G
SN-113 F	5.0451E-01					1.15E+02	
		391.69	5.045E-01	(	2.045E+00	1.20E+02	6.40E+01 G
SB-124 F	-4.1750E-01					6.02E+01	
		602.73	-4.175E-01	?(	3.340E+00	2.38E+02	9.83E+01 G
		1690.98	-1.523E-01	+	2.151E+00	6.00E+02	4.78E+01 G
		722.79	-4.715E+00	&	1.805E+01	1.13E+02	1.08E+01 G
SB-125 I	1.7432E-01					1.01E+03	
		427.88	1.743E-01	(	3.683E+00	8.34E+02	2.96E+01 G
		600.50	-2.687E+00	+	1.862E+01	2.06E+02	1.79E+01 G
		635.89	-1.012E-01	%	1.116E+01	3.10E+03	1.13E+01 G
		463.37	-1.776E+00	+ P	1.445E+01	2.05E+02	1.05E+01 G
I-131 I	8.8571E-01					8.02E+00	
		364.48	3.209E-01	?(P	1.066E+00	1.33E+02	8.17E+01 G
		284.30	2.716E+00	?(P	1.357E+01	1.91E+02	6.14E+00 G
		636.97	5.755E+00	?(	1.367E+01	9.85E+01	7.17E+00 G
Gd-153 F	-1.1525E+00					2.42E+02	
		97.50	-1.153E+00	&(	5.148E+00	1.34E+02	3.00E+01 G
		103.20	0.000E+00	+	7.198E+00	1.00E+03	2.18E+01 G
Ga-68 C	-2.4109E+01					4.71E-02	
		1077.40	-2.411E+01	?(	6.644E+01	1.27E+02	3.30E+00 G
Tc-99m I	-4.3708E-01					2.51E-01	
		140.51	-4.371E-01	&(	2.345E+00	1.61E+02	8.93E+01 G
BA-133 F	-6.6985E-01					3.85E+03	
		356.00	-6.698E-01	(	3.890E+00	1.73E+02	6.20E+01 G
		302.85	-1.862E+00	+	1.176E+01	1.88E+02	1.83E+01 G
		383.84	3.712E+00	&	1.346E+01	1.08E+02	8.94E+00 GA
		80.99	-1.343E+00	+ P	7.164E+00	7.89E+01	3.41E+01 GA
CS-134 I	2.1411E-01					7.54E+02	
		604.71	-5.173E-07	%(	3.322E+00	1.89E+08	9.76E+01 G
		795.87	4.585E-01	&(	1.969E+00	1.26E+02	8.55E+01 G
		569.32	-5.491E-01	+	7.183E+00	3.71E+02	1.54E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			801.95	-9.238E+00	&	2.547E+01	8.26E+01	8.69E+00 G
			563.24	-2.692E+00	+ P	1.518E+01	1.97E+02	8.35E+00 G
CS-137	I	5.3254E-01					1.10E+04	
			661.66	5.325E-01	&(	1.938E+00	1.08E+02	8.52E+01 G
CE-139	F	4.1489E-01					1.38E+02	
			165.85	4.149E-01	(	1.513E+00	1.09E+02	7.99E+01 G
Ba-140	I	-2.4497E+00					1.28E+01	
			537.26	-2.450E+00	?(P	5.204E+00	7.15E+01	2.44E+01 G
			162.66	-6.238E+00	+	2.165E+01	1.04E+02	6.22E+00 G
			304.85	-1.811E-06	%	4.961E+01	8.10E+08	4.29E+00 G
La-140	I	-1.5645E+00					1.28E+01	
			1596.21	-1.565E+00	?(	2.550E+00	8.09E+01	9.54E+01 G
			487.02	8.414E-01	+	3.066E+00	1.08E+02	4.55E+01 G
			328.76	1.841E+00	+ P	5.912E+00	9.58E+01	2.03E+01 G
			815.77	0.000E+00	+	7.099E+00	1.00E+03	2.33E+01 G
CE-141	I	-8.1310E-01					3.25E+01	
			145.44	-8.131E-01	?(	4.466E+00	1.65E+02	4.82E+01 G
CE-144	I	-3.3392E+00					2.85E+02	
			133.54	-3.339E+00	&(	1.724E+01	1.55E+02	1.11E+01 G
PM-144	C	3.0341E-01					3.63E+02	
			696.54	3.034E-01	?(P	1.164E+00	1.63E+02	9.90E+01 G
			618.06	-5.178E-07	%	3.325E+00	1.89E+08	9.91E+01 G
EU-152	F	2.1682E+00					4.94E+03	
			344.29	1.267E+00	(	7.376E+00	1.73E+02	2.65E+01 G
			1112.07	-5.433E+00	+	2.049E+01	1.12E+02	1.36E+01 G
			121.78	-4.436E-01	-	3.675E+00	2.45E+02	2.86E+01 G
			778.92	-1.542E+00	+	1.015E+01	2.79E+02	1.29E+01 G
			964.11	3.804E+00	?(	1.765E+01	1.37E+02	1.46E+01 G
			244.69	3.696E-01	%	3.502E+01	2.83E+03	7.58E+00 G
			1408.00	-1.897E+00	+	8.243E+00	2.01E+02	2.10E+01 GA
EU-154	I	-1.9877E+00					3.14E+03	
			873.23	-1.988E+00	?(P	1.294E+01	2.43E+02	1.23E+01 G
			123.10	-8.367E-01	+	2.533E+00	9.09E+01	4.08E+01 G
			1274.54	0.000E+00	+	3.531E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	+	9.080E+00	1.00E+03	2.02E+01 G
			1004.77	4.480E-01	+	1.021E+01	6.47E+02	1.80E+01 G
			996.33	-1.815E+00	+	1.801E+01	2.85E+02	1.06E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
HF-181	F	-2.2475E-01					4.24E+01	
			482.00	-2.247E-01	?(	1.973E+00	2.57E+02	8.05E+01 G
			133.02	-8.537E-01	&	4.332E+00	1.52E+02	4.33E+01 G
			345.83	0.000E+00	+	1.329E+01	1.00E+03	1.51E+01 G
			136.30	-6.385E+00	&	3.334E+01	1.57E+02	5.85E+00 G
Ta-182	F	2.3511E+00					1.14E+02	
			1121.30	2.351E+00	?(	5.697E+00	7.28E+01	3.49E+01 G
			1221.41	-9.729E-01	-	6.911E+00	3.22E+02	2.70E+01 G
			1189.05	-4.424E+00	-	1.191E+01	1.24E+02	1.62E+01 G
Hg-203	F	-5.2132E-01					4.66E+01	
			279.20	-5.213E-01	&(	1.712E+00	9.83E+01	8.15E+01 G
TL-208	N	9.4153E+00					6.98E+02	
			583.02	9.415E+00	(P	1.110E+00	8.46E+00	8.45E+01 G
			277.28	1.464E+01	+ P	1.300E+01	4.04E+01	6.31E+00 G
			860.56	5.451E+00	& P	1.083E+01	8.63E+01	1.24E+01 G
pm-146	C	2.2940E-02					2.02E+03	
			747.16	-7.208E-01	?(	3.549E+00	2.08E+02	3.40E+01 G
			735.72	-2.097E+00	&	6.137E+00	1.26E+02	2.25E+01 G
			453.88	4.120E-01	?(P	1.449E+00	1.40E+02	6.50E+01 G
y-88	F	-8.0748E-01					1.07E+02	
			898.04	-8.075E-01	?(P	1.611E+00	8.00E+01	9.37E+01 G
			1836.06	6.271E-01	+	5.777E-01	3.54E+01	9.92E+01 G
Cd-113m		6.6867E+03					5.33E+03	
			263.70	6.687E+03	&(	1.609E+04	7.25E+01	6.00E-03 K
Cd-109	F	1.1116E+01					4.53E+02	
								Derived Ave Activity
			88.04	1.112E+01	}(	5.008E+01	1.35E+02	3.79E+00 G
Cf-251	T	-2.3626E+00					3.28E+05	
			176.60	-2.363E+00	&(	6.214E+00	1.03E+02	1.70E+01 G
			227.00	-5.210E+00	+	1.675E+01	1.26E+02	6.30E+00 GA
Cf-249	T	8.7816E-01					1.28E+05	
			387.95	5.082E-01	&(	1.949E+00	1.14E+02	6.60E+01 G
			333.44	2.452E+00	?(	8.471E+00	1.03E+02	1.55E+01 G
Sn-126		-5.5762E+00					3.65E+07	
			87.57	1.126E+00	}	4.989E+00	7.50E+01	3.75E+01 GA
			64.28	-5.576E+00	(	2.425E+01	1.31E+02	9.70E+00 G
			86.94	-4.682E+00	}	2.265E+01	1.45E+02	9.04E+00 GA

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PB-210   N  -4.1309E+00                                     8.14E+03
                          46.54-4.131E+00 ?(P 5.695E+01 4.06E+02 4.25E+00 G

PB-212   N   2.2929E+01                                     6.98E+02
                         238.63 2.293E+01  (P 2.114E+00 4.95E+00 4.33E+01 G
                         300.03 1.181E+01 - P 6.156E+01 1.56E+02 3.28E+00 GA

PB-214   N   2.0079E+01                                     5.84E+05
                         351.93 2.094E+01  (P 2.190E+00 6.85E+00 3.76E+01 G
                         295.09 1.840E+01  (P 4.355E+00 1.21E+01 1.93E+01 G
                         242.00 1.889E+01   P 1.272E+01 2.24E+01 7.43E+00 GA

BI-207   C   2.9718E-01                                     1.18E+04
                         569.70 2.972E-01  (  1.080E+00 1.07E+02 9.77E+01 G
                        1063.66-3.561E-01 + P 1.924E+00 2.00E+02 7.45E+01 G

BI-212   N   7.4405E+00                                     6.98E+02
                         727.17 7.441E+00 ?(  1.954E+01 7.86E+01 7.55E+00 G
                         785.42-4.667E+01 + P 1.226E+02 1.94E+01 1.28E+00 GA

BI-214   N   1.9203E+01                                     5.84E+05
                         609.31 1.920E+01  (P 1.880E+00 7.35E+00 4.61E+01 G
                        1120.29 3.000E+00 - P 1.242E+01 1.21E+02 1.51E+01 G
                        1764.49 2.330E+01 + P 9.652E+00 1.81E+01 1.54E+01 G

BI-210M  T  -2.1301E-01                                     1.10E+09
                         265.83-2.130E-01  (  2.367E+00 3.26E+02 5.00E+01 G
                         304.90 0.000E+00 +   7.602E+00 1.00E+03 2.80E+01 G

AC-228   N   2.5347E+01                                     2.10E+03
                         911.07 2.479E+01  (  2.330E+00 8.65E+00 2.90E+01 G
                         968.97 2.508E+01  (  4.056E+00 1.20E+01 1.75E+01 G
                         338.32 2.709E+01  (  7.252E+00 1.38E+01 1.20E+01 G
                          93.35 2.164E+01     1.476E+01 2.23E+01 5.56E+00 XA

TH-227   N   4.9405E+00                                     7.95E+03
                          50.14 6.397E+00 ?(  2.448E+01 1.14E+02 8.00E+00 G
                         256.24 3.275E+00 *(  1.247E+01 1.47E+02 7.00E+00 G

TH-229   N  -9.3748E+00                                     2.68E+06
                         193.51-9.375E+00 &(  2.432E+01 1.02E+02 4.40E+00 G
                         210.85-1.508E+01 &   3.848E+01 1.00E+02 2.99E+00 G

TH-234   N  -4.9563E+00                                     1.63E+12
                          63.29-4.956E+00  (P 5.367E+01 3.20E+02 3.81E+00 G
                          92.59-6.832E+00 + P 3.429E+01 1.49E+02 5.58E+00 G
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Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
PA-231	N	7.3965E+00						1.20E+07	
			302.65	0.000E+00	&(7.413E+01		1.00E+03	2.88E+00	G
			300.07	1.606E+01	?(8.383E+01		1.56E+02	2.46E+00	G
PA-233	C	-7.6869E-01						7.82E+08	
			312.01	-1.366E+00	?(6.691E+00		1.47E+02	3.60E+01	G
			300.18	2.697E+00	?(3.396E+01		3.74E+02	6.20E+00	G
PA-234	N	5.7792E-01						1.63E+12	
			131.29	-1.935E+00	?(1.023E+01		1.59E+02	1.80E+01	G
			946.02	3.509E+00	&(7.162E+00		8.94E+01	1.34E+01	G
			569.47	0.000E+00	- 1.382E+01		1.00E+03	8.20E+00	G
			883.24	1.198E+00	?(1.833E+01		4.37E+02	9.60E+00	G
			880.53	9.275E+00	? 2.642E+01		8.47E+01	6.00E+00	GA
PA-234M	N	6.8293E+01						1.63E+12	
			1001.00	2.840E+01	?(P 2.096E+02		2.13E+02	8.37E-01	G
			766.41	1.819E+02	&(P 6.005E+02		9.80E+01	2.94E-01	G
U-235	N	-1.4688E+00						2.57E+11	
			143.79	-4.157E+00	*(P 1.891E+01		1.26E+02	1.10E+01	G
			205.33	4.412E+00	?(P 1.955E+01		1.72E+02	5.01E+00	G
			163.38	-7.859E+00	+ P 2.745E+01		1.53E+02	5.08E+00	G
AM-241	T	-7.2708E-01						1.58E+05	
			59.54	-7.271E-01	&(6.362E+00		2.61E+02	3.59E+01	G
Ir-192	F	-8.0092E-02						7.40E+01	
			316.49	-5.724E-01	?(2.817E+00		1.47E+02	8.70E+01	G
			468.06	7.480E-01	?(2.333E+00		9.27E+01	5.18E+01	G
			308.44	-1.532E+00	+ 7.671E+00		1.50E+02	3.18E+01	G
Cs-136	F	1.2728E-02						1.30E+01	
			818.50	-3.591E-01	?(1.769E+00		1.44E+02	1.00E+02	G
			1048.07	-5.209E-01	+ 2.109E+00		1.18E+02	8.00E+01	G
			340.57	8.055E-01	&(4.033E+00		1.49E+02	4.69E+01	G
Np-239	T	1.2722E+00						2.36E+00	
			103.70	0.000E+00	- 6.533E+00		1.00E+03	2.40E+01	X
			106.13	1.272E+00	&(6.694E+00		1.58E+02	2.27E+01	G
			99.50	-1.107E+00	+ 1.045E+01		2.82E+02	1.50E+01	X
Nd-147		1.3958E+00						1.11E+01	
			531.00	2.085E+00	?(7.368E+00		1.46E+02	1.30E+01	G
			91.10	1.079E+00	?(6.720E+00		1.87E+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	

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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	410.	-7.	-0.004	406.03	-4.131E+00	P
TH-227	50.14	335.	23.	0.013	114.47	6.397E+00	
AM-241	59.54	727.	-15.	-0.008	261.23	-7.271E-01	
TH-234	63.29	665.	-11.	-0.006	320.36	-4.956E+00	P
BA-133	80.99	1442.	-34.	-0.019	78.91	-1.343E+00	P
EU-155	86.54	1200.	-32.	-0.018	152.28	-1.381E+00	
Nd-147	91.10	980.	24.	0.013	186.62	1.079E+00	
TH-234	92.59	1007.	-30.	-0.017	148.62	-6.832E+00	P
Gd-153	97.50	672.	-28.	-0.015	133.94	-1.153E+00	
Np-239	99.50	700.	-13.	-0.007	281.55	-1.107E+00	
Np-239	106.13	674.	24.	0.013	157.53	1.272E+00	
EU-152	121.78	316.	-10.	-0.006	245.39	-4.436E-01	
EU-154	123.10	305.	-28.	-0.015	90.91	-8.367E-01	
PA-234	131.29	974.	-28.	-0.016	158.69	-1.935E+00	
HF-181	133.02	1004.	-30.	-0.016	152.32	-8.537E-01	
CE-144	133.54	1042.	-30.	-0.016	155.03	-3.339E+00	
HF-181	136.30	1071.	-30.	-0.017	156.77	-6.385E+00	
Tc-99m	140.51	1141.	-30.	-0.017	161.13	-4.371E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
U-235	143.79	1166.	-36.	-0.020	125.66	-4.157E+00	P
CE-141	145.44	1248.	-30.	-0.017	165.00	-8.131E-01	
Ba-140	162.66	424.	-28.	-0.016	104.14	-6.238E+00	
U-235	163.38	453.	-29.	-0.016	153.27	-7.859E+00	P
CE-139	165.85	343.	24.	0.014	109.21	4.149E-01	
Cf-251	176.60	238.	-28.	-0.016	103.47	-2.363E+00	
TH-229	193.51	216.	-27.	-0.015	102.00	-9.375E+00	
U-235	205.33	166.	14.	0.008	172.13	4.412E+00	P
TH-229	210.85	224.	-28.	-0.016	100.39	-1.508E+01	
Cf-251	227.00	169.	-20.	-0.011	125.58	-5.210E+00	
TH-227	256.24	95.	13.	0.007	146.92	3.275E+00	
Cd-113m	263.70	113.	22.	0.012	72.50	6.687E+03	
BI-210M	265.83	172.	-6.	-0.003	325.58	-2.130E-01	
Hg-203	279.20	226.	-22.	-0.012	98.26	-5.213E-01	
I-131	284.30	74.	9.	0.005	190.54	2.716E+00	P
PA-231	300.07	457.	20.	0.011	155.90	1.606E+01	
PA-233	300.18	477.	8.	0.005	373.79	2.697E+00	
BA-133	302.85	494.	-17.	-0.009	188.28	-1.862E+00	
Ir-192	308.44	619.	-24.	-0.013	149.93	-1.532E+00	
PA-233	312.01	595.	-24.	-0.013	146.67	-1.366E+00	
Ir-192	316.49	605.	-24.	-0.013	147.32	-5.724E-01	
CR-51	320.08	487.	20.	0.011	155.20	4.305E+00	
La-140	328.76	130.	17.	0.010	95.84	1.841E+00	P
Cf-249	333.44	155.	18.	0.010	102.95	2.452E+00	
Cs-136	340.57	320.	17.	0.010	149.12	8.055E-01	
EU-152	344.29	337.	15.	0.008	173.23	1.267E+00	
BA-133	356.00	496.	-18.	-0.010	173.33	-6.698E-01	
I-131	364.48	57.	11.	0.006	132.60	3.209E-01	P
BA-133	383.84	104.	14.	0.008	107.51	3.712E+00	
Cf-249	387.95	118.	14.	0.008	113.65	5.082E-01	
SN-113	391.69	121.	13.	0.007	120.03	5.045E-01	
SB-125	427.88	72.	2.	0.001	833.67	1.743E-01	
AG-108M	433.94	64.	4.	0.002	394.76	1.152E-01	
pm-146	453.88	48.	10.	0.006	140.03	4.120E-01	P
SB-125	463.37	128.	-7.	-0.004	205.18	-1.776E+00	P
Ir-192	468.06	78.	14.	0.008	92.74	7.480E-01	
BE-7	477.60	96.	13.	0.007	106.63	3.565E+00	
HF-181	482.00	133.	-6.	-0.004	256.63	-2.247E-01	
La-140	487.02	100.	14.	0.008	108.00	8.414E-01	
RU-103	497.05	61.	-3.	-0.001	599.35	-8.423E-02	
RH-106	511.86	113.	112.	0.062	26.08	1.637E+01	
Nd-147	531.00	39.	9.	0.005	145.51	2.085E+00	
Ba-140	537.26	70.	-20.	-0.011	71.48	-2.450E+00	P
CS-134	563.24	65.	-7.	-0.004	196.94	-2.692E+00	P
CS-134	569.32	48.	-3.	-0.001	371.23	-5.491E-01	
BI-207	569.70	43.	9.	0.005	106.61	2.972E-01	
SB-125	600.50	445.	-15.	-0.008	206.35	-2.687E+00	
SB-124	602.73	430.	-12.	-0.007	237.84	-4.175E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RU-103	610.30	445.	-15.	-0.008	205.12	-8.497E+00	
AG-108M	614.28	430.	-12.	-0.007	239.51	-4.597E-01	
RH-106	621.92	30.	3.	0.001	426.01	9.073E-01	
I-131	636.97	31.	12.	0.007	98.52	5.755E+00	
AG-110M	657.76	91.	-14.	-0.008	100.00	-5.208E-01	
CS-137	661.66	89.	13.	0.007	107.74	5.325E-01	
PM-144	696.54	38.	8.	0.005	162.84	3.034E-01	P
NB-94	702.63	25.	10.	0.006	107.08	3.833E-01	P
SB-124	722.79	110.	-14.	-0.007	113.43	-4.715E+00	
ZR-95	724.20	76.	14.	0.008	93.18	1.185E+00	
pm-146	735.72	51.	-12.	-0.007	126.48	-2.097E+00	
pm-146	747.16	37.	-6.	-0.004	208.48	-7.208E-01	
ZR-95	756.73	33.	-3.	-0.002	399.82	-1.953E-01	P
AG-110M	763.94	80.	-8.	-0.004	142.96	-1.350E+00	P
NB-95	765.79	91.	2.	0.001	582.92	9.216E-02	
PA-234M	766.41	81.	14.	0.008	98.02	1.819E+02	P
EU-152	778.92	42.	-5.	-0.003	278.57	-1.542E+00	
CS-134	795.87	69.	10.	0.005	125.99	4.585E-01	
CS-134	801.95	122.	-20.	-0.011	82.63	-9.238E+00	
CO-58	810.78	58.	6.	0.003	184.09	2.482E-01	
Cs-136	818.50	74.	-9.	-0.005	144.12	-3.591E-01	
Co-56	846.77	28.	-7.	-0.004	164.75	-2.977E-01	
NB-94	871.10	18.	27.	0.015	29.40	1.174E+00	
EU-154	873.23	53.	-6.	-0.003	242.60	-1.988E+00	P
PA-234	880.53	52.	13.	0.007	84.74	9.275E+00	
PA-234	883.24	64.	3.	0.001	437.30	1.198E+00	
AG-110M	884.68	51.	8.	0.004	137.01	4.635E-01	
Sc-46	889.28	77.	-7.	-0.004	177.32	-3.162E-01	
y-88	898.04	45.	-17.	-0.009	79.95	-8.075E-01	P
AG-110M	937.49	60.	-20.	-0.011	66.96	-2.720E+00	P
PA-234	946.02	15.	10.	0.006	89.40	3.509E+00	
EU-152	964.11	126.	12.	0.007	136.95	3.804E+00	
EU-154	996.33	63.	-4.	-0.002	285.04	-1.815E+00	
PA-234M	1001.00	52.	5.	0.003	212.64	2.840E+01	P
EU-154	1004.77	57.	2.	0.001	647.15	4.480E-01	
Co-56	1037.84	20.	3.	0.002	332.78	1.054E+00	
Cs-136	1048.07	44.	-8.	-0.005	118.19	-5.209E-01	
RH-106	1050.36	67.	-10.	-0.006	117.96	-3.264E+01	
BI-207	1063.66	30.	-5.	-0.003	200.31	-3.561E-01	P
Ga-68	1077.40	53.	-13.	-0.007	127.48	-2.411E+01	
FE-59	1099.25	16.	11.	0.006	91.43	9.736E-01	P
EU-152	1112.07	118.	-14.	-0.008	111.82	-5.433E+00	
Sc-46	1120.55	23.	9.	0.005	81.79	4.734E-01	
Ta-182	1121.30	57.	16.	0.009	72.81	2.351E+00	
Ta-182	1189.05	48.	-13.	-0.007	124.27	-4.424E+00	
Ta-182	1221.41	43.	-5.	-0.003	321.51	-9.729E-01	
Co-56	1238.28	33.	15.	0.008	88.38	1.317E+00	P
NA-22	1274.53	11.	5.	0.003	96.82	3.105E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-60	1332.50	34.	-13.	-0.007	103.27	-7.899E-01	P
AG-110M	1384.30	11.	3.	0.001	302.33	6.816E-01	
EU-152	1408.00	28.	-6.	-0.004	201.07	-1.897E+00	
La-140	1596.21	48.	-21.	-0.012	80.86	-1.565E+00	
SB-124	1690.98	6.	-1.	-0.001	600.00	-1.523E-01	
Co-56	1771.35	62.	1.	0.001	957.67	5.694E-01	
y-88	1836.06	0.	8.	0.004	35.36	6.271E-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 *****

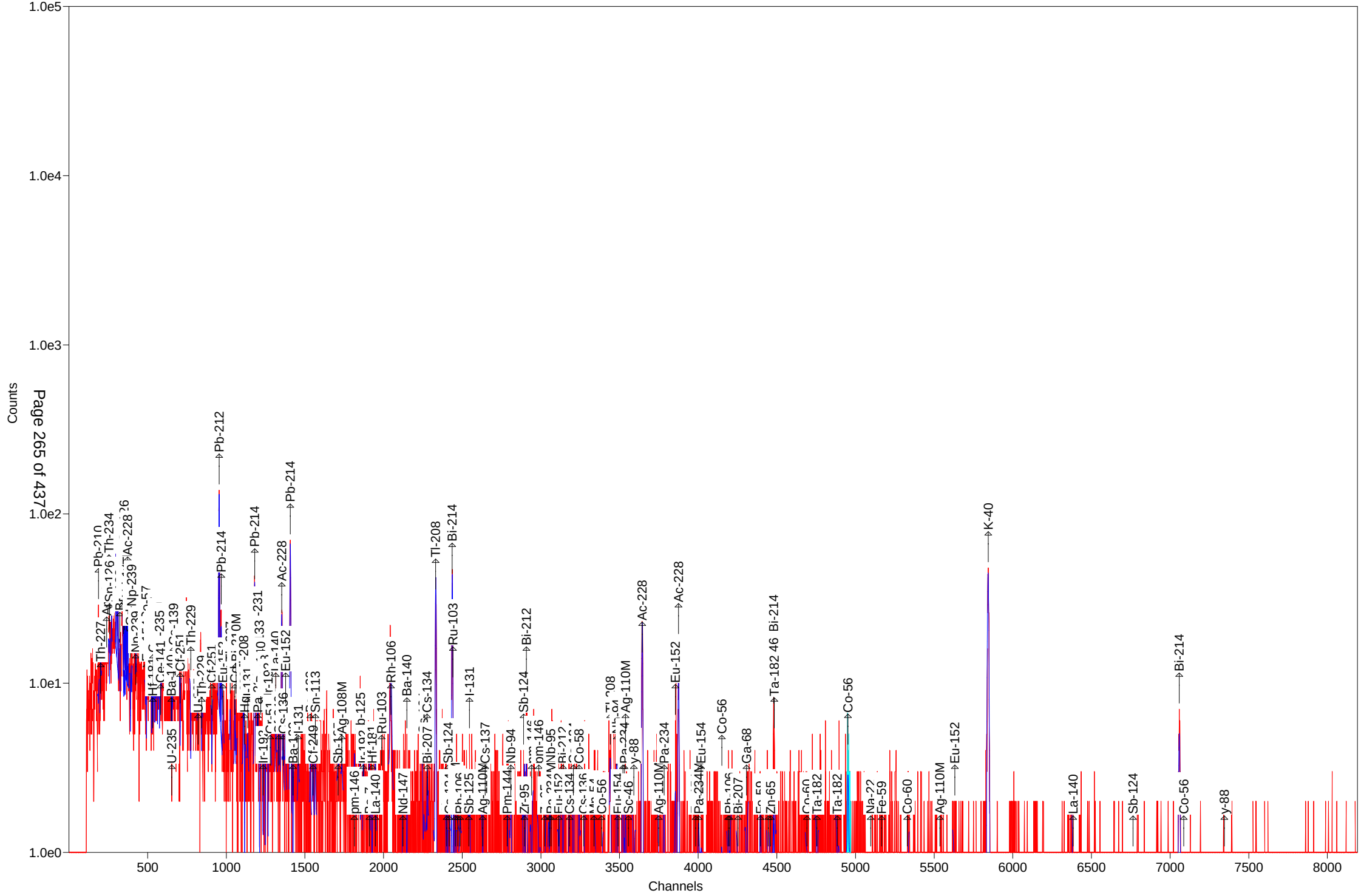
Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	3.5650E+00	3.5650E+00	1.066E+02%	1.28E+01
NA-22	#A	3.1054E-01	3.1054E-01	9.682E+01%	1.04E+00
K-40		2.5610E+02	2.5610E+02	5.198E+00%	1.15E+01
Sc-46	#A	7.8626E-02	7.8626E-02	8.179E+01%	1.93E+00
CR-51	#A	4.3052E+00	4.3053E+00	1.552E+02%	2.24E+01
MN-54	#A	2.0158E-03	2.0158E-03	3.029E+04%	1.46E+00
FE-59	#A	9.7355E-01	9.7355E-01	9.143E+01%	1.98E+00
Co-56	#A	4.0069E-01	4.0070E-01	8.838E+01%	1.16E+00
CO-57	#A	2.3419E-01	2.3419E-01	1.545E+02%	1.22E+00
CO-58	#A	2.4816E-01	2.4816E-01	1.841E+02%	1.58E+00
CO-60	#A	-7.8993E-01	-7.8993E-01	1.033E+02%	1.80E+00
ZN-65	#A	-1.2127E-01	-1.2127E-01	1.238E+03%	5.21E+00
NB-94	#A	7.8248E-01	7.8248E-01	2.940E+01%	9.77E-01
ZR-95	#A	4.2250E-01	4.2250E-01	9.318E+01%	2.11E+00
NB-95	#A	9.2158E-02	9.2159E-02	5.829E+02%	1.87E+00
RU-103	#A	-8.4225E-02	-8.4226E-02	5.993E+02%	1.23E+00
RH-106	#A	9.0725E-01	9.0725E-01	4.260E+02%	9.65E+00
AG-108M	#A	1.1520E-01	1.1520E-01	3.948E+02%	1.15E+00
AG-110M	#A	5.1811E-01	5.1811E-01	1.370E+02%	2.18E+00
SN-113	#A	5.0451E-01	5.0451E-01	1.200E+02%	2.05E+00
SB-124	#A	-4.1750E-01	-4.1750E-01	2.378E+02%	3.34E+00
SB-125	#A	1.7432E-01	1.7432E-01	8.337E+02%	3.68E+00
I-131	#A	8.8569E-01	8.8571E-01	8.406E+01%	1.07E+00
Gd-153	#A	-1.1525E+00	-1.1525E+00	1.339E+02%	5.15E+00
Ga-68	#A	-2.3982E+01	-2.4109E+01	1.275E+02%	6.64E+01
Tc-99m	#A	-4.3665E-01	-4.3708E-01	1.611E+02%	2.35E+00
BA-133	#A	-6.6985E-01	-6.6985E-01	1.733E+02%	3.89E+00
CS-134	#A	2.1411E-01	2.1411E-01	1.260E+02%	3.32E+00
CS-137	#A	5.3254E-01	5.3254E-01	1.077E+02%	1.94E+00
CE-139	#A	4.1489E-01	4.1489E-01	1.092E+02%	1.51E+00
Ba-140	#A	-2.4496E+00	-2.4497E+00	7.148E+01%	5.20E+00
La-140	#A	-1.5645E+00	-1.5645E+00	8.086E+01%	2.55E+00
CE-141	#A	-8.1309E-01	-8.1310E-01	1.650E+02%	4.47E+00

CE-144 #A	-3.3392E+00	-3.3392E+00	1.550E+02%	1.72E+01
PM-144 #A	3.0341E-01	3.0341E-01	1.628E+02%	1.16E+00
EU-152 #A	2.1682E+00	2.1682E+00	1.104E+02%	7.38E+00
EU-154 #A	-1.9877E+00	-1.9877E+00	2.426E+02%	1.29E+01
EU-155 #A	0.0000E+00	0.0000E+00	1.000E+03%	7.38E+00
HF-181 #A	-2.2475E-01	-2.2475E-01	2.566E+02%	1.97E+00
Ta-182 #A	2.3511E+00	2.3511E+00	7.281E+01%	5.70E+00
Hg-203 #A	-5.2132E-01	-5.2132E-01	9.826E+01%	1.71E+00
TL-208	9.4153E+00	9.4153E+00	8.459E+00%	1.11E+00
pm-146 #A	2.2940E-02	2.2940E-02	1.256E+02%	3.55E+00
y-88 #A	-8.0747E-01	-8.0748E-01	7.995E+01%	1.61E+00
Cd-113m#A	6.6867E+03	6.6867E+03	7.250E+01%	1.61E+04
Cd-109 #A	1.1116E+01	1.1116E+01	1.353E+02%	5.01E+01
Cf-251 #A	-2.3626E+00	-2.3626E+00	1.035E+02%	6.21E+00
Cf-249 #A	8.7816E-01	8.7816E-01	7.668E+01%	1.95E+00
Sn-126 #A	-5.5762E+00	-5.5762E+00	1.306E+02%	2.42E+01
PB-210 #A	-4.1309E+00	-4.1309E+00	4.060E+02%	5.69E+01
PB-212	2.2929E+01	2.2929E+01	4.946E+00%	2.11E+00
PB-214	2.0079E+01	2.0079E+01	6.846E+00%	2.19E+00
BI-207 #A	2.9718E-01	2.9718E-01	1.066E+02%	1.08E+00
BI-212 #A	7.4405E+00	7.4405E+00	7.857E+01%	1.95E+01
BI-214	1.9203E+01	1.9203E+01	7.354E+00%	1.88E+00
BI-210M#A	-2.1301E-01	-2.1301E-01	3.256E+02%	2.37E+00
AC-228	2.5347E+01	2.5347E+01	6.751E+00%	2.33E+00
TH-227 #A	4.9405E+00	4.9405E+00	9.313E+01%	2.45E+01
TH-229 #A	-9.3748E+00	-9.3748E+00	1.020E+02%	2.43E+01
TH-234 #A	-4.9563E+00	-4.9563E+00	3.204E+02%	5.37E+01
PA-231 #A	7.3965E+00	7.3965E+00	1.559E+02%	7.41E+01
PA-233 #A	-7.6869E-01	-7.6869E-01	1.467E+02%	6.69E+00
PA-234 #A	5.7792E-01	5.7792E-01	8.940E+01%	1.02E+01
PA-234M#A	6.8293E+01	6.8293E+01	9.802E+01%	2.10E+02
U-235 #A	-1.4688E+00	-1.4688E+00	1.066E+02%	1.89E+01
AM-241 #A	-7.2708E-01	-7.2708E-01	2.612E+02%	6.36E+00
Np-237 #A	0.0000E+00	0.0000E+00	1.000E+03%	1.67E+01
Ir-192 #A	-8.0092E-02	-8.0092E-02	8.704E+01%	2.82E+00
Cs-136 #A	1.2727E-02	1.2728E-02	1.037E+02%	1.77E+00
Np-239 #A	1.2721E+00	1.2722E+00	1.575E+02%	6.69E+00
Nd-147 #A	1.3958E+00	1.3958E+00	1.183E+02%	7.37E+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

```
-----------------------------   S U M M A R Y   -----------------------------
Total Activity (   37.6 to  1999.4 keV)     3.531E+02  Bq/Sample
Total Decayed Activity (   37.6 to  1999.4 keV) 3.5307312E+02  Bq/Sample
```

263537_Gamma_160-18426-A-1-C DU. 12_Gamma_20161803.spc.



Test America St. Louis Spectrum ID: 12_Gamma_20161802

Sample Description: 263537_Gamma_160-18426-A-2-B
Detector: Detector #12
Batch ID: 263537
Work Order Number: Gamma
Lot Number: 160-18426-A-2-B

Decay to Time: 8/25/2016 09:50 Live Time: 1800 sec
Acquisition Time: 8/25/2016 09:50:41 Real Time: 1810 sec
Analysis Time: 8/25/2016 10:21 Dead Time: 0.53 %
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	-4.155E+00	104.3	4.334E+00	4.339E+00	1.457E+01
NA-22	9.704E-02	399.5	3.877E-01	3.877E-01	1.411E+00
K-40	2.429E+02	5.1	1.233E+01	1.751E+01	8.496E+00
Sc-46	1.985E-01	363.5	7.215E-01	7.216E-01	2.477E+00
CR-51	0.000E+00	1.#INF	8.476E-01	8.476E-01	2.182E+01
MN-54	4.086E-01	120.2	4.913E-01	4.917E-01	1.156E+00
FE-59	1.110E+00	40.2	4.461E-01	4.496E-01	1.976E+00
Co-56	4.066E-01	123.8	5.033E-01	5.038E-01	9.716E-01
CO-57	0.000E+00	1.#INF	1.721E-01	1.721E-01	1.102E+00
CO-58	-5.790E-01	80.2	4.643E-01	4.652E-01	1.554E+00
CO-60	8.373E-01	27.1	2.270E-01	2.309E-01	4.442E-01
ZN-65	-1.471E+00	103.9	1.528E+00	1.530E+00	5.149E+00
NB-94	-2.793E-01	180.6	5.045E-01	5.047E-01	1.435E+00
ZR-95	4.915E-01	147.3	7.238E-01	7.242E-01	2.107E+00
NB-95	2.728E-01	210.2	5.733E-01	5.735E-01	1.965E+00
RU-103	-3.158E-02	1475.4	4.660E-01	4.660E-01	1.147E+00
RH-106	3.795E+00	79.5	3.018E+00	3.024E+00	1.202E+01
AG-108M	7.200E-01	37.2	2.676E-01	2.701E-01	6.149E-01
AG-110M	1.499E-01	87.6	1.313E-01	1.315E-01	3.215E+00
SN-113	-6.578E-01	109.0	7.173E-01	7.181E-01	2.408E+00
SB-124	-5.662E-01	166.7	9.442E-01	9.446E-01	3.169E+00
SB-125	4.404E+00	26.9	1.187E+00	1.208E+00	3.050E+00
I-131	-4.126E-01	164.6	6.794E-01	6.797E-01	1.286E+00
Gd-153	-9.981E-01	139.1	1.388E+00	1.389E+00	4.637E+00
Ga-68	1.957E+01	89.5	1.751E+01	1.754E+01	3.867E+01
Tc-99m	-1.195E-01	514.0	6.142E-01	6.142E-01	2.059E+00
BA-133	-3.715E-01	269.1	9.997E-01	9.999E-01	3.371E+00
CS-134	7.688E-01	26.5	2.038E-01	2.076E-01	3.129E+00
CS-137	-4.150E-02	1126.9	4.676E-01	4.676E-01	1.647E+00
CE-139	3.654E-01	108.6	3.969E-01	3.985E-01	1.328E+00
Ba-140	-1.620E+00	114.9	1.861E+00	1.863E+00	4.008E+00
La-140	-9.590E-03	104.0	9.970E-03	9.983E-03	1.638E+00
CE-141	3.115E-02	3582.4	1.116E+00	1.116E+00	3.748E+00

CE-144	-2.972E+00	152.4	4.529E+00	4.532E+00	1.511E+01
PM-144	3.782E-01	118.2	4.470E-01	4.474E-01	1.164E+00
EU-152	3.547E-01	207.5	7.361E-01	7.363E-01	6.964E+00
EU-154	3.949E-01	76.8	3.032E-01	3.039E-01	1.132E+01
EU-155	0.000E+00	1.#INF	9.499E-01	9.499E-01	6.233E+00
HF-181	3.782E-01	142.3	5.383E-01	5.386E-01	2.027E+00
Ta-182	4.214E-01	143.7	6.056E-01	6.059E-01	6.925E+00
Hg-203	2.307E-01	162.8	3.755E-01	3.757E-01	1.277E+00
TL-208	6.549E+00	8.7	5.674E-01	6.614E-01	7.980E-01
pm-146	1.054E+00	52.6	5.546E-01	5.572E-01	3.115E+00
y-88	1.410E-01	336.0	4.738E-01	4.739E-01	1.118E+00
Cd-113m	-7.177E+02	947.7	6.802E+03	6.802E+03	2.319E+04
Cd-109	3.795E+00	354.0	1.343E+01	1.344E+01	4.503E+01
Cf-251	-8.879E-01	222.3	1.974E+00	1.976E+00	5.096E+00
Cf-249	4.405E-01	170.7	7.518E-01	7.521E-01	2.094E+00
Sn-126	4.755E+00	118.3	5.625E+00	5.631E+00	1.876E+01
PB-210	-4.871E+00	282.3	1.375E+01	1.375E+01	4.706E+01
PB-212	2.134E+01	4.9	1.054E+00	1.737E+00	1.784E+00
PB-214	1.441E+01	8.8	1.265E+00	1.470E+00	2.451E+00
BI-207	9.182E-02	298.1	2.737E-01	2.738E-01	1.055E+00
BI-212	3.215E+01	18.8	6.027E+00	6.254E+00	1.072E+01
BI-214	1.239E+01	10.1	1.251E+00	1.407E+00	2.051E+00
BI-210M	0.000E+00	1.#INF	3.598E-01	3.598E-01	2.785E+00
AC-228	1.792E+01	9.6	1.722E+00	1.950E+00	2.375E+00
TH-227	-6.847E+00	113.7	7.783E+00	7.792E+00	2.599E+01
TH-229	-3.300E+00	236.6	7.807E+00	7.811E+00	2.019E+01
TH-234	3.314E+00	407.5	1.350E+01	1.351E+01	4.543E+01
PA-231	-1.355E+01	154.0	2.086E+01	2.087E+01	6.988E+01
PA-233	0.000E+00	1.#INF	4.946E-01	4.946E-01	5.920E+00
PA-234	1.414E+00	158.0	2.233E+00	2.234E+00	8.689E+00
PA-234M	-1.272E+02	47.0	5.983E+01	6.018E+01	3.186E+02
U-235	1.678E+00	105.8	1.774E+00	1.776E+00	1.653E+01
AM-241	-3.388E-01	528.6	1.790E+00	1.791E+00	6.019E+00
Np-237	0.000E+00	1.#INF	4.192E+00	4.192E+00	1.409E+01
Ir-192	0.000E+00	1.#INF	1.556E-01	1.556E-01	2.473E+00
Cs-136	4.685E-01	74.1	3.470E-01	3.480E-01	1.637E+00
Np-239	-9.384E-01	186.6	1.751E+00	1.752E+00	5.868E+00
Nd-147	7.103E-01	141.3	1.003E+00	1.004E+00	6.572E+00
Total	4.014E+02				

Analyst: Amanda Dick

Sample description
263537_Gamma_160-18426-A-2-B

Spectrum Filename: C:\User\SPC\Det12\12_Gamma_20161802.An1

Acquisition information
Start time: 8/25/2016 9:50:41 AM
Live time: 1800
Real time: 1810
Dead time: 0.53 %
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	8/25/2016 9:50:00 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. 24 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.1125

***** 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	-8.	282.31	0.89	2.229E-02	46.54	4.250	PBC<MDA	PB210
63.29	8.	407.47	0.91	3.338E-02	63.29	3.810	PBC<MDA	TH234
64.29	28.	118.29	0.91	3.392E-02	64.28	9.700	PBC<MDA	Sn126
74.74	159.	14.95	0.92	3.874E-02				
77.19	338.	7.87	0.92	3.965E-02				
80.99	28.	172.14	0.92	4.091E-02	80.99	34.060	PBC<MDA	BA133
87.33	148.	17.30	1.08	4.262E-02	86.49	13.100	1.480E+01	Np237
					86.54	30.700	6.312E+00	EU155
					86.94	9.040	2.139E+01	Sn126
					87.57	37.500	5.138E+00	Sn126
					88.04	3.790	5.071E+01	Cd109
91.10	28.	141.27	0.93	4.341E-02	91.10	28.300	PBC<MDA	Nd147
93.25	137.	19.98	0.85	4.380E-02	92.59	5.584	PBC<MDA	TH234
					93.35	5.561	3.124E+01	AC228
99.83	38.	40.33	0.39	4.470E-02	99.50	15.000	3.193E+00	Np239
123.10	12.	179.05	0.96	4.522E-02	123.10	40.790	PBC<MDA	EU154
131.29	24.	157.98	0.97	4.468E-02	131.29	18.000	PBC<MDA	PA234
165.85	21.	108.64	1.00	4.089E-02	165.85	79.900	PBC<MDA	CE139
205.33	21.	105.77	1.04	3.557E-02	205.33	5.010	PBC<MDA	U235
238.60	531.	5.30	1.13	3.220E-02	238.63	43.300	2.115E+01	PB212
241.94	82.	19.65	1.07	3.189E-02	242.00	7.430	1.930E+01	PB214
256.24	10.	191.68	1.09	3.069E-02	256.24	7.000	PBC<MDA	TH227

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
270.17	56.	30.78	0.80	2.961E-02				
276.93	16.	94.66	1.11	2.910E-02	277.28	6.310	PBC<MDA	TL208
279.20	10.	162.78	1.11	2.896E-02	279.20	81.460	PBC<MDA	Hg203
295.25	143.	14.35	0.76	2.788E-02	295.09	19.300	1.478E+01	PB214
299.90	48.	29.34	1.36	2.757E-02	300.03	3.280	2.926E+01	PB212
					300.07	2.460	3.901E+01	PA231
					300.18	6.200	PBC<MDA	PA233
333.44	10.	178.46	1.16	2.564E-02	333.44	15.510	PBC<MDA	Cf249
338.25	130.	14.44	1.43	2.538E-02	338.32	12.010	2.369E+01	AC228
345.83	16.	142.32	1.17	2.500E-02	345.83	15.070	PBC<MDA	HF181
351.89	238.	10.12	0.99	2.470E-02	351.93	37.600	1.421E+01	PB214
387.95	6.	290.97	1.21	2.307E-02	387.95	66.000	PBC<MDA	Cf249
427.88	10.	139.28	1.24	2.153E-02	427.88	29.600	PBC<MDA	SB125
433.94	25.	37.17	1.25	2.132E-02	433.94	90.480	7.200E-01	AG108M
453.88	23.	52.63	1.27	2.065E-02	453.88	65.000	PBC<MDA	pm146
463.37	55.	26.94	1.28	2.035E-02	463.37	10.470	1.439E+01	SB125
487.02	14.	111.36	1.30	1.964E-02	487.02	45.500	PBC<MDA	La140
511.86	110.	22.82	2.57	1.895E-02	511.86	20.000	1.613E+01	RH106
563.24	6.	222.24	1.36	1.768E-02	563.24	8.350	PBC<MDA	CS134
569.32	12.	68.39	1.37	1.754E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	4.507E+00	PA234
					569.70	97.740	3.783E-01	BI207
569.47	2.	377.83	1.37	1.754E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	9.011E-01	PA234
					569.70	97.740	7.562E-02	BI207
583.22	172.	8.66	1.07	1.724E-02	583.02	84.500	6.549E+00	TL208
609.39	172.	10.10	1.17	1.669E-02	609.31	46.090	1.239E+01	BI214
					610.30	5.750	9.944E+01	RU103
618.06	16.	118.18	1.41	1.652E-02	618.06	99.100	PBC<MDA	PM144
657.76	2.	761.58	1.45	1.578E-02	657.76	94.640	PBC<MDA	AG110M
696.54	6.	214.33	1.48	1.513E-02	696.54	99.000	PBC<MDA	PM144
724.20	6.	218.60	1.50	1.469E-02	724.20	44.150	PBC<MDA	ZR95
727.03	64.	18.75	1.69	1.465E-02	727.17	7.550	3.215E+01	BI212
747.16	11.	106.41	1.52	1.436E-02	747.16	34.000	PBC<MDA	pm146
756.73	6.	197.37	1.53	1.422E-02	756.73	54.460	PBC<MDA	ZR95
765.79	7.	210.15	1.54	1.410E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
766.41	11.	124.97	1.54	1.409E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
785.85	4.	298.28	1.56	1.383E-02	785.42	1.280	PBC<MDA	BI212
795.87	39.	26.50	1.56	1.369E-02	795.87	85.530	1.866E+00	CS134
818.50	12.	95.07	1.58	1.341E-02	818.50	100.000	PBC<MDA	Cs136
834.85	10.	120.23	1.60	1.321E-02	834.85	99.980	PBC<MDA	MN54
860.51	3.	492.28	1.62	1.291E-02	860.56	12.420	PBC<MDA	TL208
871.10	1.	700.00	1.63	1.279E-02	871.10	99.890	PBC<MDA	NB94
889.28	4.	363.45	1.64	1.260E-02	889.28	99.984	PBC<MDA	Sc46
898.04	3.	336.01	1.65	1.250E-02	898.04	93.700	PBC<MDA	y88
911.48	116.	10.58	1.26	1.237E-02	911.07	29.000	1.792E+01	AC228

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
964.11	6.	234.08	1.70	1.184E-02	964.11	14.605	PBC<MDA	EU152
968.87	66.	16.04	1.57	1.180E-02	968.97	17.460	1.793E+01	AC228
1004.77	13.	103.75	1.74	1.148E-02	1004.77	18.010	PBC<MDA	EU154
1048.07	7.	113.58	1.77	1.111E-02	1048.07	80.000	PBC<MDA	Cs136
1050.36	9.	79.52	1.77	1.109E-02	1050.36	1.560	PBC<MDA	RH106
1063.66	4.	298.11	1.78	1.099E-02	1063.66	74.500	PBC<MDA	BI207
1077.40	11.	89.47	1.79	1.088E-02	1077.40	3.300	PBC<MDA	Ga68
1099.25	2.	544.70	1.81	1.071E-02	1099.25	56.500	PBC<MDA	FE59
1120.42	55.	14.53	2.33	1.055E-02	1120.29	15.100	1.913E+01	BI214
					1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	8.285E+00	Ta182
1221.41	5.	143.71	1.91	9.870E-03	1221.41	27.000	PBC<MDA	Ta182
1238.28	12.	123.78	1.92	9.765E-03	1238.28	66.070	PBC<MDA	Co56
1274.53	2.	399.50	1.95	9.547E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	2.756E-01	EU154
1291.60	17.	40.18	1.96	9.448E-03	1291.60	43.200	2.359E+00	FE59
1332.50	14.	27.12	1.99	9.220E-03	1332.50	99.980	8.373E-01	CO60
1384.30	7.	87.59	2.03	8.948E-03	1384.30	24.290	PBC<MDA	AG110M
1408.00	17.	24.25	2.05	8.829E-03	1408.00	21.005	5.093E+00	EU152
1460.94	400.	5.08	1.65	8.575E-03	1460.83	10.670	2.429E+02	K40
1762.69	5.	117.05	2.30	7.376E-03	1764.49	15.400	PBC<MDA	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	
298.49	74.73	203.	159.	4.107E+03	14.95	0.916	-	sD
308.31	77.18	184.	338.	8.517E+03	7.87	0.919	-	D
398.79	99.83	72.	38.	8.612E+02	40.33	0.389	-	s
1079.66	270.17	52.	56.	1.874E+03	30.78	0.799	-	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	277.	-8.	-0.005	282.31	0.889
TH-227	200.19	50.14	379.	-25.	-0.014	113.67	0.893s
AM-241	237.74	59.54	649.	-7.	-0.004	528.56	0.902s
TH-234	252.73	63.29	473.	8.	0.004	407.47	0.905s
Sn-126	256.70	64.28	541.	28.	0.016	118.29	0.906s
BA-133	323.48	80.99	1130.	28.	0.015	172.14	0.922s
Np-237	345.47	86.49	879.	0.	0.000	1000.00	0.928A
EU-155	345.68	86.54	900.	-28.	-0.016	151.19	0.928s
Sn-126	347.27	86.94	815.	22.	0.012	100.13	0.928D
Sn-126	349.78	87.57	735.	94.	0.052	21.54	0.929D
Cd-109	351.66	88.04	763.	11.	0.006	354.01	0.929A
Nd-147	363.89	91.10	791.	28.	0.016	141.27	0.932s
TH-234	369.85	92.59	850.	-28.	-0.016	145.08	0.934
AC-228	372.50	93.25	153.	137.	0.076	19.98	0.846
Gd-153	389.47	97.50	542.	-24.	-0.013	139.06	0.938s
Np-239	397.47	99.50	519.	-16.	-0.009	208.60	0.940s
Gd-153	412.25	103.20	505.	0.	0.000	1000.00	0.944s
Np-239	414.25	103.70	505.	0.	0.000	1000.00	0.944s
EU-155	420.70	105.31	505.	0.	0.000	1000.00	0.946s
Np-239	423.96	106.13	514.	-17.	-0.010	186.59	0.946s
EU-152	486.50	121.78	240.	-13.	-0.007	170.80	0.961s
CO-57	487.64	122.06	253.	0.	0.000	1000.00	0.962
EU-154	491.79	123.10	212.	12.	0.006	179.05	0.963s
PA-234	524.55	131.29	697.	24.	0.013	157.98	0.970s
HF-181	531.46	133.02	831.	-26.	-0.015	155.80	0.972s
CE-144	533.51	133.54	796.	-26.	-0.015	152.40	0.973s
HF-181	544.55	136.30	822.	-26.	-0.015	154.45	0.975s
CO-57	545.24	136.47	848.	-26.	-0.015	156.88	0.975s
Tc-99m	561.38	140.51	875.	-8.	-0.005	513.96	0.979s
U-235	574.47	143.79	887.	-4.	-0.002	996.63	0.982s
Ba-140	649.91	162.66	304.	-24.	-0.013	104.44	1.000s
U-235	652.79	163.38	329.	-17.	-0.009	246.81	1.001s
CE-139	662.68	165.85	262.	21.	0.012	108.64	1.003
Cf-251	705.64	176.60	158.	-11.	-0.006	222.35	1.013
TH-229	773.22	193.51	147.	-10.	-0.005	236.58	1.029s
U-235	820.49	205.33	129.	21.	0.011	105.77	1.040s
Cf-251	907.10	227.00	110.	-3.	-0.002	656.59	1.061s
PB-212	953.60	238.63	81.	536.	0.298	4.94	1.071D
PB-214	967.05	242.00	89.	82.	0.046	19.65	1.074D
EU-152	977.83	244.69	895.	-22.	-0.012	195.07	1.077s
TH-227	1023.99	256.24	95.	10.	0.005	191.68	1.088s
Cd-113m	1053.81	263.70	243.	-2.	-0.001	947.72	1.095s
BI-210M	1062.33	265.83	241.	0.	0.000	1000.00	1.097
TL-208	1108.11	277.28	108.	16.	0.009	94.66	1.107

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Hg-203	1115.78	279.20	122.	10.	0.005	162.78	1.109s
I-131	1136.16	284.30	104.	-22.	-0.012	21.92	1.114s
PB-214	1179.94	295.25	65.	143.	0.080	14.35	0.760s
PB-212	1198.51	299.90	40.	48.	0.026	29.34	1.358s
PA-231	1199.21	300.07	468.	-19.	-0.011	160.92	1.128s
PA-233	1199.65	300.18	449.	-19.	-0.011	157.62	1.128s
PA-231	1209.52	302.65	430.	-19.	-0.011	153.97	1.131s
BA-133	1210.33	302.85	430.	-19.	-0.011	153.99	1.131s
Ba-140	1218.32	304.85	449.	-14.	-0.008	214.37	1.133s
BI-210M	1218.50	304.90	463.	0.	0.000	1000.00	1.133s
Ir-192	1232.67	308.44	463.	0.	0.000	1000.00	1.136s
PA-233	1246.95	312.01	463.	0.	0.000	1000.00	1.139s
Ir-192	1264.85	316.49	463.	0.	0.000	1000.00	1.143
CR-51	1279.22	320.08	463.	0.	0.000	1000.00	1.147s
La-140	1313.91	328.76	147.	-3.	-0.002	501.24	1.155s
Cf-249	1332.62	333.44	160.	10.	0.006	178.46	1.159s
AC-228	1351.87	338.25	46.	130.	0.072	14.44	1.434s
Cs-136	1361.13	340.57	320.	-18.	-0.010	145.20	1.165s
EU-152	1375.98	344.29	299.	-7.	-0.004	342.70	1.169s
HF-181	1382.15	345.83	260.	16.	0.009	142.32	1.170s
PB-214	1406.40	351.89	67.	238.	0.132	10.12	0.985
BA-133	1422.81	356.00	369.	-10.	-0.006	269.10	1.180s
I-131	1456.73	364.48	85.	-15.	-0.008	164.64	1.187s
BA-133	1534.13	383.84	171.	-18.	-0.010	106.77	1.205s
Cf-249	1550.56	387.95	138.	6.	0.003	290.97	1.209
SN-113	1565.51	391.69	171.	-17.	-0.010	109.05	1.212
SB-125	1710.19	427.88	48.	10.	0.006	139.28	1.245s
AG-108M	1734.43	433.94	16.	25.	0.014	37.17	1.250s
pm-146	1814.18	453.88	32.	23.	0.013	52.63	1.268s
SB-125	1852.11	463.37	83.	55.	0.031	26.94	1.277
Ir-192	1870.88	468.06	156.	-17.	-0.009	108.79	1.281s
BE-7	1909.00	477.60	126.	-16.	-0.009	104.30	1.289s
HF-181	1926.61	482.00	141.	0.	0.000	1000.00	1.293s
La-140	1946.69	487.02	119.	14.	0.008	111.36	1.298s
RH-106	2046.04	511.86	80.	110.	0.061	22.82	2.570s
Nd-147	2122.56	531.00	30.	-2.	-0.001	486.24	1.337s
Ba-140	2147.60	537.26	40.	-13.	-0.007	114.87	1.342s
CS-134	2251.48	563.24	39.	6.	0.003	222.24	1.365s
CS-134	2275.81	569.32	26.	12.	0.006	68.39	1.370s
PA-234	2276.41	569.47	38.	2.	0.001	377.83	1.370s
BI-207	2277.34	569.70	41.	-1.	-0.001	911.04	1.371s
TL-208	2331.41	583.22	15.	172.	0.095	8.66	1.067
SB-125	2400.51	600.50	407.	-17.	-0.009	171.30	1.398s
SB-124	2409.43	602.73	386.	-17.	-0.009	166.75	1.399s
CS-134	2417.34	604.71	369.	-17.	-0.009	162.95	1.401s
BI-214	2436.08	609.39	30.	172.	0.095	10.10	1.171
RU-103	2439.69	610.30	353.	-17.	-0.009	158.71	1.406s
PM-144	2470.74	618.06	161.	16.	0.009	118.18	1.413s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
SB-125	2542.05	635.89	46.	-14.	-0.008	70.84	1.428s
I-131	2546.39	636.97	80.	-12.	-0.006	113.54	1.429s
AG-110M	2629.52	657.76	64.	2.	0.001	761.58	1.447s
PM-144	2784.64	696.54	38.	6.	0.003	214.33	1.481s
NB-94	2808.99	702.63	57.	-7.	-0.004	180.61	1.486s
SB-124	2889.61	722.79	116.	-14.	-0.007	116.30	1.503s
AG-108M	2890.22	722.94	103.	0.	0.000	1000.00	1.503s
ZR-95	2895.26	724.20	93.	6.	0.004	218.60	1.504s
BI-212	2906.57	727.03	16.	64.	0.036	18.75	1.687
pm-146	2941.34	735.72	42.	-4.	-0.002	347.31	1.514s
pm-146	2987.11	747.16	28.	11.	0.006	106.41	1.524s
ZR-95	3025.38	756.73	33.	6.	0.003	197.37	1.532s
AG-110M	3054.24	763.94	114.	-24.	-0.013	51.31	1.538s
NB-95	3061.63	765.79	102.	7.	0.004	210.15	1.539s
PA-234M	3064.12	766.41	87.	11.	0.006	124.97	1.540s
EU-152	3114.15	778.92	37.	-5.	-0.003	246.86	1.550
BI-212	3140.15	785.42	33.	4.	0.002	298.28	1.556s
CS-134	3181.95	795.87	35.	39.	0.022	26.50	1.565
CS-134	3206.28	801.95	74.	0.	0.000	1000.00	1.570s
CO-58	3241.58	810.78	56.	-14.	-0.008	80.18	1.577s
La-140	3261.56	815.77	70.	0.	0.000	1000.00	1.581s
Cs-136	3272.49	818.50	62.	12.	0.007	95.07	1.583s
MN-54	3337.89	834.85	28.	10.	0.005	120.23	1.597s
TL-208	3440.76	860.56	42.	3.	0.002	492.28	1.619s
NB-94	3482.90	871.10	24.	1.	0.001	700.00	1.627s
EU-154	3491.44	873.23	39.	-12.	-0.007	113.22	1.629s
PA-234	3520.64	880.53	72.	-9.	-0.005	132.96	1.635s
PA-234	3531.48	883.24	99.	-18.	-0.010	81.77	1.637s
AG-110M	3537.26	884.68	117.	-7.	-0.004	233.04	1.638s
Sc-46	3555.65	889.28	132.	4.	0.002	363.45	1.642s
y-88	3590.70	898.04	20.	3.	0.002	336.01	1.649s
AC-228	3644.46	911.48	7.	116.	0.064	10.58	1.260s
AG-110M	3748.54	937.49	35.	-3.	-0.002	323.19	1.682s
PA-234	3782.66	946.02	20.	-1.	-0.001	988.26	1.688s
EU-152	3855.05	964.11	112.	6.	0.004	234.08	1.703
AC-228	3874.08	968.87	10.	66.	0.037	16.04	1.574
EU-154	3983.96	996.33	105.	-19.	-0.011	79.58	1.729s
PA-234M	4002.64	1001.00	127.	-22.	-0.012	47.04	1.733s
EU-154	4017.76	1004.77	91.	13.	0.007	103.75	1.736s
Co-56	4150.07	1037.84	50.	-9.	-0.005	175.92	1.762s
Cs-136	4191.00	1048.07	25.	7.	0.004	113.58	1.771s
RH-106	4200.17	1050.36	20.	9.	0.005	79.52	1.772s
BI-207	4253.39	1063.66	25.	4.	0.002	298.11	1.783s
Ga-68	4308.37	1077.40	16.	11.	0.006	89.47	1.794s
FE-59	4395.81	1099.25	16.	2.	0.001	544.70	1.811s
EU-152	4447.13	1112.07	116.	-14.	-0.008	110.62	1.821s
ZN-65	4461.03	1115.55	102.	-14.	-0.008	103.89	1.824s
BI-214	4480.54	1120.42	4.	55.	0.030	14.53	2.332s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Sc-46	4481.05	1120.55	87.	-2.	-0.001	573.92	1.828s
CO-60	4691.91	1173.24	38.	-8.	-0.004	106.12	1.869s
Ta-182	4755.20	1189.05	59.	-22.	-0.012	83.18	1.881
Ta-182	4884.72	1221.41	11.	5.	0.003	143.71	1.906
Co-56	4952.24	1238.28	38.	12.	0.006	123.78	1.919s
NA-22	5097.34	1274.53	21.	2.	0.001	399.50	1.946s
EU-154	5097.39	1274.54	23.	0.	0.000	1000.00	1.946s
FE-59	5165.65	1291.60	6.	17.	0.010	40.18	1.959s
CO-60	5329.39	1332.50	0.	14.	0.008	27.12	1.990s
AG-110M	5536.74	1384.30	6.	7.	0.004	87.59	2.029s
EU-152	5631.64	1408.00	0.	17.	0.009	24.25	2.046
K-40	5843.60	1460.94	6.	400.	0.222	5.08	1.650
La-140	6385.21	1596.21	18.	-6.	-0.003	175.59	2.182s
SB-124	6764.73	1690.98	12.	-6.	-0.003	145.30	2.247s
BI-214	7059.14	1764.49	13.	5.	0.003	117.05	2.297s
Co-56	7086.61	1771.35	8.	0.	0.000	1000.00	2.302s
y-88	7345.80	1836.06	0.	0.	0.000	1000.00	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	-4.1549E+00				5.31E+01	
			477.60	-4.155E+00	*(	1.457E+01 1.04E+02 1.05E+01	G
NA-22	C	9.7043E-02				9.50E+02	
			1274.53	9.704E-02	?(	1.411E+00 3.99E+02 9.99E+01	G
K-40	N	2.4294E+02				4.66E+11	
			1460.83	2.429E+02	(P	8.496E+00 5.08E+00 1.07E+01	G
Sc-46	F	1.9852E-01				8.38E+01	
			889.28	1.985E-01	?(	2.477E+00 3.63E+02 1.00E+02	G
			1120.55	-1.220E-01	+	2.435E+00 5.74E+02 1.00E+02	G
MN-54	C	4.0860E-01				3.12E+02	
			834.85	4.086E-01	?(P	1.156E+00 1.20E+02 1.00E+02	G
FE-59	F	1.1104E+00				4.45E+01	
			1099.25	1.555E-01	?(P	1.976E+00 5.45E+02 5.65E+01	G
			1291.60	2.359E+00	?(	1.879E+00 4.02E+01 4.32E+01	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Co-56	C 4.0663E-01					7.73E+01	
		846.77	1.418E-02	%(	9.716E-01	2.75E+03	9.99E+01 G
		1238.28	1.000E+00	(P	2.720E+00	1.24E+02	6.61E+01 G
		1037.84	-3.161E+00	+	1.252E+01	1.76E+02	1.41E+01 G
		1771.35	0.000E+00	-	7.754E+00	1.00E+03	1.55E+01 A
CO-58	C -5.7904E-01					7.09E+01	
		810.78	-5.790E-01	?(	1.554E+00	8.02E+01	9.95E+01 G
CO-60	F 8.3728E-01					1.93E+03	
		1332.50	8.373E-01	?(P	4.442E-01	2.71E+01	1.00E+02 G
		1173.24	-4.126E-01	- P	1.708E+00	1.06E+02	9.99E+01 G
ZN-65	F -1.4708E+00					2.44E+02	
		1115.55	-1.471E+00	&(	5.149E+00	1.04E+02	5.06E+01 G
NB-94	I -2.7934E-01					7.41E+06	
		702.63	-2.793E-01	?(P	1.435E+00	1.81E+02	9.79E+01 G
		871.10	4.347E-02	+	1.110E+00	7.00E+02	9.99E+01 G
ZR-95	I 4.9150E-01					6.40E+01	
		756.73	4.503E-01	&(P	2.107E+00	1.97E+02	5.45E+01 G
		724.20	5.423E-01	?(	4.073E+00	2.19E+02	4.42E+01 G
NB-95	I 2.7283E-01					6.40E+01	
		765.79	2.728E-01	?(	1.965E+00	2.10E+02	9.98E+01 G
RU-103	I -3.1585E-02					3.93E+01	
		497.05	-3.158E-02	&(	1.147E+00	1.48E+03	9.09E+01 G
		610.30	-9.812E+00	+	5.228E+01	1.59E+02	5.75E+00 GA
RH-106	I 3.7954E+00					3.74E+02	
		621.92	-5.261E-03	%(	1.202E+01	6.40E+04	9.93E+00 G
		1050.36	2.799E+01	&(	7.505E+01	7.95E+01	1.56E+00 G
		511.86	1.613E+01	?	6.508E+00	2.28E+01	2.00E+01 GA
AG-108M	C 7.1998E-01					1.53E+05	
		433.94	7.200E-01	&(	6.149E-01	3.72E+01	9.05E+01 G
		722.94	0.000E+00	-	2.078E+00	1.00E+03	9.08E+01 G
		614.28	-2.542E-02	%	3.282E+00	3.80E+03	8.98E+01 G
AG-110M	F 1.4991E-01					2.50E+02	
		884.68	-4.030E-01	?(	3.215E+00	2.33E+02	7.27E+01 G
		657.76	5.580E-02	+	1.493E+00	7.62E+02	9.46E+01 G
		937.49	-4.141E-01	+ P	4.051E+00	3.23E+02	3.44E+01 G
		1384.30	1.804E+00	?(	3.528E+00	8.76E+01	2.43E+01 G
		763.94	-4.276E+00	+ P	9.251E+00	5.13E+01	2.23E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SN-113	F -6.5780E-01					1.15E+02	
		391.69	-6.578E-01	&(	2.408E+00	1.09E+02	6.40E+01 G
SB-124	F -5.6622E-01					6.02E+01	
		602.73	-5.662E-01	&(	3.169E+00	1.67E+02	9.83E+01 G
		1690.98	-9.138E-01	+	2.871E+00	1.45E+02	4.78E+01 G
		722.79	-4.715E+00	+	1.851E+01	1.16E+02	1.08E+01 G
SB-125	I 4.4042E+00					1.01E+03	
		427.88	8.716E-01	&(	3.050E+00	1.39E+02	2.96E+01 G
		600.50	-3.103E+00	+	1.784E+01	1.71E+02	1.79E+01 G
		635.89	-4.402E+00	+	1.037E+01	7.08E+01	1.13E+01 G
		463.37	1.439E+01	(P	1.177E+01	2.69E+01	1.05E+01 G
I-131	I -4.1264E-01					8.02E+00	
		364.48	-4.126E-01	?(P	1.286E+00	1.65E+02	8.17E+01 G
		284.30	-6.819E+00	+ P	1.587E+01	2.19E+01	6.14E+00 G
		636.97	-5.515E+00	+	2.122E+01	1.14E+02	7.17E+00 G
Gd-153	F -9.9811E-01					2.42E+02	
		97.50	-9.981E-01	?(	4.637E+00	1.39E+02	3.00E+01 G
		103.20	0.000E+00	+	6.082E+00	1.00E+03	2.18E+01 G
Ga-68	C 1.9571E+01					4.71E-02	
		1077.40	1.957E+01	?(	3.867E+01	8.95E+01	3.30E+00 G
Tc-99m	I -1.1951E-01					2.51E-01	
		140.51	-1.195E-01	@(	2.059E+00	5.14E+02	8.93E+01 G
BA-133	F -3.7149E-01					3.85E+03	
		356.00	-3.715E-01	?(	3.371E+00	2.69E+02	6.20E+01 G
		302.85	-2.129E+00	+	1.099E+01	1.54E+02	1.83E+01 G
		383.84	-4.749E+00	&	1.701E+01	1.07E+02	8.94E+00 GA
		80.99	1.108E+00	? P	6.354E+00	1.72E+02	3.41E+01 GA
CS-134	I 7.6881E-01					7.54E+02	
		604.71	-5.720E-01	?(	3.129E+00	1.63E+02	9.76E+01 G
		795.87	1.866E+00	&(	1.430E+00	2.65E+01	8.55E+01 G
		569.32	2.403E+00	?(	5.451E+00	6.84E+01	1.54E+01 G
		801.95	0.000E+00	-	2.009E+01	1.00E+03	8.69E+00 G
		563.24	2.200E+00	(P	1.199E+01	2.22E+02	8.35E+00 G
CS-137	I -4.1496E-02					1.10E+04	
		661.66	-4.150E-02	%(	1.647E+00	1.13E+03	8.52E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CE-139	F	3.6536E-01					1.38E+02	
			165.85	3.654E-01	(	1.328E+00	1.09E+02	7.99E+01 G
Ba-140	I	-1.6203E+00					1.28E+01	
			537.26	-1.620E+00	?(P	4.008E+00	1.15E+02	2.44E+01 G
			162.66	-5.280E+00	+	1.842E+01	1.04E+02	6.22E+00 G
			304.85	-6.689E+00	&	4.817E+01	2.14E+02	4.29E+00 G
La-140	I	-9.5899E-03					1.28E+01	
			1596.21	-4.372E-01	?(	1.638E+00	1.76E+02	9.54E+01 G
			487.02	8.869E-01	?(	3.330E+00	1.11E+02	4.55E+01 G
			328.76	-2.965E-01	+ P	6.254E+00	5.01E+02	2.03E+01 G
			815.77	0.000E+00	&	7.403E+00	1.00E+03	2.33E+01 G
CE-141	I	3.1146E-02					3.25E+01	
			145.44	3.115E-02	&(	3.748E+00	3.58E+03	4.82E+01 G
CE-144	I	-2.9721E+00					2.85E+02	
			133.54	-2.972E+00	?(	1.511E+01	1.52E+02	1.11E+01 G
PM-144	C	3.7821E-01					3.63E+02	
			696.54	2.292E-01	?(P	1.164E+00	2.14E+02	9.90E+01 G
			618.06	5.271E-01	?(	2.097E+00	1.18E+02	9.91E+01 G
EU-152	F	3.5472E-01					4.94E+03	
			344.29	-6.002E-01	?(	6.964E+00	3.43E+02	2.65E+01 G
			1112.07	-5.433E+00	+	2.026E+01	1.11E+02	1.36E+01 G
			121.78	-5.581E-01	&	3.216E+00	1.71E+02	2.86E+01 G
			778.92	-1.645E+00	+	9.620E+00	2.47E+02	1.29E+01 G
			964.11	2.087E+00	(	1.674E+01	2.34E+02	1.46E+01 G
			244.69	-5.052E+00	&	3.290E+01	1.95E+02	7.58E+00 G
			1408.00	5.093E+00		2.208E+00	2.43E+01	2.10E+01 GA
EU-154	I	3.9494E-01					3.14E+03	
			873.23	-4.351E+00	?(P	1.132E+01	1.13E+02	1.23E+01 G
			123.10	3.514E-01	&	2.127E+00	1.79E+02	4.08E+01 G
			1274.54	0.000E+00	+	4.144E+00	1.00E+03	3.52E+01 G
			723.36	3.113E-02	%	9.291E+00	8.57E+03	2.02E+01 G
			1004.77	3.629E+00	?(	1.270E+01	1.04E+02	1.80E+01 G
			996.33	-8.629E+00	+	2.290E+01	7.96E+01	1.06E+01 G
HF-181	F	3.7821E-01					4.24E+01	
			482.00	0.000E+00	*(	2.027E+00	1.00E+03	8.05E+01 G
			133.02	-7.599E-01	&	3.949E+00	1.56E+02	4.33E+01 G
			345.83	2.398E+00	&(	1.148E+01	1.42E+02	1.51E+01 G
			136.30	-5.683E+00	&	2.928E+01	1.54E+02	5.85E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ta-182	F	4.2139E-01					1.14E+02	
			1121.30	-1.258E-01	%(	6.925E+00	1.58E+03	3.49E+01 G
			1221.41	1.129E+00	(	3.738E+00	1.44E+02	2.70E+01 G
			1189.05	-7.373E+00	+	1.307E+01	8.32E+01	1.62E+01 G
Hg-203	F	2.3066E-01					4.66E+01	
			279.20	2.307E-01	&(	1.277E+00	1.63E+02	8.15E+01 G
TL-208	N	6.5487E+00					6.98E+02	
			583.02	6.549E+00	(P	7.980E-01	8.66E+00	8.45E+01 G
			277.28	4.868E+00	- P	1.546E+01	9.47E+01	6.31E+00 G
			860.56	9.759E-01	- P	1.142E+01	4.92E+02	1.24E+01 G
pm-146	C	1.0537E+00					2.02E+03	
			747.16	1.252E+00	&(	3.115E+00	1.06E+02	3.40E+01 G
			735.72	-6.800E-01	-	5.595E+00	3.47E+02	2.25E+01 G
			453.88	9.500E-01	&(P	1.204E+00	5.26E+01	6.50E+01 G
y-88	F	1.4102E-01					1.07E+02	
			898.04	1.410E-01	?(P	1.118E+00	3.36E+02	9.37E+01 G
			1836.06	0.000E+00	-	5.777E-01	1.00E+03	9.92E+01 G
Cd-113m		-7.1768E+02					5.33E+03	
			263.70	-7.177E+02	*(	2.319E+04	9.48E+02	6.00E-03 K
Cd-109	F	3.7948E+00					4.53E+02	
							Derived Ave Activity	
			88.04	3.795E+00	}(	4.503E+01	3.54E+02	3.79E+00 G
Cf-251	T	-8.8791E-01					3.28E+05	
			176.60	-8.879E-01	(	5.096E+00	2.22E+02	1.70E+01 G
			227.00	-7.948E-01	+	1.367E+01	6.57E+02	6.30E+00 GA
Cf-249	T	4.4051E-01					1.28E+05	
			387.95	2.103E-01	(	2.094E+00	2.91E+02	6.60E+01 G
			333.44	1.420E+00	?(	8.600E+00	1.78E+02	1.55E+01 G
Sn-126		4.7554E+00					3.65E+07	
			87.57	3.270E+00	}	4.479E+00	2.15E+01	3.75E+01 GA
			64.28	4.755E+00	?(	1.876E+01	1.18E+02	9.70E+00 G
			86.94	3.213E+00	}	1.961E+01	1.00E+02	9.04E+00 GA
PB-210	N	-4.8708E+00					8.14E+03	
			46.54	-4.871E+00	(P	4.706E+01	2.82E+02	4.25E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-212	N	2.1342E+01					6.98E+02	
			238.63	2.134E+01	(P	1.784E+00	4.94E+00	4.33E+01 G
			300.03	2.926E+01	+ P	1.985E+01	2.93E+01	3.28E+00 GA
PB-214	N	1.4407E+01					5.84E+05	
			351.93	1.421E+01	(P	2.451E+00	1.01E+01	3.76E+01 G
			295.09	1.478E+01	(P	4.151E+00	1.44E+01	1.93E+01 G
			242.00	1.930E+01	+ P	1.096E+01	1.96E+01	7.43E+00 GA
BI-207	C	9.1815E-02					1.18E+04	
			569.70	-3.242E-02	?(	1.055E+00	9.11E+02	9.77E+01 G
			1063.66	2.548E-01	?(P	1.773E+00	2.98E+02	7.45E+01 G
BI-212	N	3.2145E+01					6.98E+02	
			727.17	3.215E+01	(	1.072E+01	1.88E+01	7.55E+00 G
			785.42	1.296E+01	- P	9.235E+01	2.98E+02	1.28E+00 GA
BI-214	N	1.2391E+01					5.84E+05	
			609.31	1.239E+01	(P	2.051E+00	1.01E+01	4.61E+01 G
			1120.29	1.913E+01	+ P	4.237E+00	1.45E+01	1.51E+01 G
			1764.49	2.354E+00	& P	9.652E+00	1.17E+02	1.54E+01 G
AC-228	N	1.7924E+01					2.10E+03	
			911.07	1.792E+01	(	2.375E+00	1.06E+01	2.90E+01 G
			968.97	1.793E+01	(	4.803E+00	1.60E+01	1.75E+01 G
			338.32	2.369E+01	+	6.253E+00	1.44E+01	1.20E+01 G
			93.35	3.124E+01	+	1.376E+01	2.00E+01	5.56E+00 XA
TH-227	N	-6.8469E+00					7.95E+03	
			50.14	-6.847E+00	&(	2.599E+01	1.14E+02	8.00E+00 G
			256.24	2.500E+00	&	1.247E+01	1.92E+02	7.00E+00 G
TH-229	N	-3.2999E+00					2.68E+06	
			193.51	-3.300E+00	?(	2.019E+01	2.37E+02	4.40E+00 G
			210.85	-8.859E-01	%	3.464E+01	1.51E+03	2.99E+00 G
TH-234	N	3.3143E+00					1.63E+12	
			63.29	3.314E+00	*(P	4.543E+01	4.07E+02	3.81E+00 G
			92.59	-6.427E+00	+ P	3.156E+01	1.45E+02	5.58E+00 G
PA-231	N	-1.3547E+01					1.20E+07	
			302.65	-1.355E+01	?(	6.988E+01	1.54E+02	2.88E+00 G
			300.07	-1.573E+01	+	8.479E+01	1.61E+02	2.46E+00 G
PA-234	N	1.4135E+00					1.63E+12	
			131.29	1.647E+00	(	8.689E+00	1.58E+02	1.80E+01 G
			946.02	-3.450E-01	-	8.125E+00	9.88E+02	1.34E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments
                          569.47 9.011E-01 ?(  1.210E+01 3.78E+02 8.20E+00 G
                          883.24-8.228E+00 +   2.247E+01 8.18E+01 9.60E+00 G
                          880.53-6.810E+00 &   3.090E+01 1.33E+02 6.00E+00 GA

PA-234M  N  -1.2721E+02                                      1.63E+12
                         1001.00-1.272E+02 ?(P 3.186E+02 4.70E+01 8.37E-01 G
                          766.41 1.461E+02 + P 6.198E+02 1.25E+02 2.94E-01 G

U-235    N   1.6775E+00                                      2.57E+11
                          143.79-4.815E-01  (P 1.653E+01 9.97E+02 1.10E+01 G
                          205.33 6.401E+00  (P 1.735E+01 1.06E+02 5.01E+00 G
                          163.38-4.484E+00 + P 2.348E+01 2.47E+02 5.08E+00 G

AM-241   T  -3.3875E-01                                      1.58E+05
                           59.54-3.388E-01 &(  6.019E+00 5.29E+02 3.59E+01 G

Cs-136   F   4.6854E-01                                      1.30E+01
                          818.50 5.100E-01 ?(  1.637E+00 9.51E+01 1.00E+02 G
                         1048.07 4.167E-01 ?(  1.635E+00 1.14E+02 8.00E+01 G
                          340.57-8.276E-01 +   4.033E+00 1.45E+02 4.69E+01 G

Np-239   T  -9.3839E-01                                      2.36E+00
                          103.70 0.000E+00 +   5.520E+00 1.00E+03 2.40E+01 X
                          106.13-9.384E-01 *(  5.868E+00 1.87E+02 2.27E+01 G
                           99.50-1.290E+00 +   9.025E+00 2.09E+02 1.50E+01 X

Nd-147       7.1027E-01                                      1.11E+01
                          531.00-5.405E-01 ?(  6.572E+00 4.86E+02 1.30E+01 G
                           91.10 1.285E+00 ?(  6.050E+00 1.41E+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

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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	277.	-8.	-0.005	282.31	-4.871E+00	P
TH-227	50.14	379.	-25.	-0.014	113.67	-6.847E+00	
AM-241	59.54	649.	-7.	-0.004	528.56	-3.388E-01	
TH-234	63.29	473.	8.	0.004	407.47	3.314E+00	P
BA-133	80.99	1130.	28.	0.015	172.14	1.108E+00	P
EU-155	86.54	900.	-28.	-0.016	151.19	-1.206E+00	
Nd-147	91.10	791.	28.	0.016	141.27	1.285E+00	
TH-234	92.59	850.	-28.	-0.016	145.08	-6.427E+00	P
Gd-153	97.50	542.	-24.	-0.013	139.06	-9.981E-01	
Np-239	99.50	519.	-16.	-0.009	208.60	-1.290E+00	
Np-239	106.13	514.	-17.	-0.010	186.59	-9.384E-01	
EU-154	123.10	212.	12.	0.006	179.05	3.514E-01	
PA-234	131.29	697.	24.	0.013	157.98	1.647E+00	
HF-181	133.02	831.	-26.	-0.015	155.80	-7.599E-01	
CE-144	133.54	796.	-26.	-0.015	152.40	-2.972E+00	
HF-181	136.30	822.	-26.	-0.015	154.45	-5.683E+00	
CO-57	136.47	848.	-26.	-0.015	156.88	-3.114E+00	
Tc-99m	140.51	875.	-8.	-0.005	513.96	-1.195E-01	
U-235	143.79	887.	-4.	-0.002	996.63	-4.815E-01	P
Ba-140	162.66	304.	-24.	-0.013	104.44	-5.280E+00	
U-235	163.38	329.	-17.	-0.009	246.81	-4.484E+00	P
CE-139	165.85	262.	21.	0.012	108.64	3.654E-01	
Cf-251	176.60	158.	-11.	-0.006	222.35	-8.879E-01	
TH-229	193.51	147.	-10.	-0.005	236.58	-3.300E+00	
U-235	205.33	129.	21.	0.011	105.77	6.401E+00	P
Cf-251	227.00	110.	-3.	-0.002	656.59	-7.948E-01	
TH-227	256.24	95.	10.	0.005	191.68	2.500E+00	
Cd-113m	263.70	243.	-2.	-0.001	947.72	-7.177E+02	
Hg-203	279.20	122.	10.	0.005	162.78	2.307E-01	
I-131	284.30	104.	-22.	-0.012	21.92	-6.819E+00	P
PA-231	300.07	468.	-19.	-0.011	160.92	-1.573E+01	
PA-233	300.18	449.	-19.	-0.011	157.62	-6.245E+00	
PA-231	302.65	430.	-19.	-0.011	153.97	-1.355E+01	
BA-133	302.85	430.	-19.	-0.011	153.99	-2.129E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ba-140	304.85	449.	-14.	-0.008	214.37	-6.689E+00	
La-140	328.76	147.	-3.	-0.002	501.24	-2.965E-01	P
Cf-249	333.44	160.	10.	0.006	178.46	1.420E+00	
Cs-136	340.57	320.	-18.	-0.010	145.20	-8.276E-01	
HF-181	345.83	260.	16.	0.009	142.32	2.398E+00	
BA-133	356.00	369.	-10.	-0.006	269.10	-3.715E-01	
I-131	364.48	85.	-15.	-0.008	164.64	-4.126E-01	P
BA-133	383.84	171.	-18.	-0.010	106.77	-4.749E+00	
Cf-249	387.95	138.	6.	0.003	290.97	2.103E-01	
SN-113	391.69	171.	-17.	-0.010	109.05	-6.578E-01	
pm-146	453.88	32.	23.	0.013	52.63	9.500E-01	P
Ir-192	468.06	156.	-17.	-0.009	108.79	-8.851E-01	
BE-7	477.60	126.	-16.	-0.009	104.30	-4.155E+00	
La-140	487.02	119.	14.	0.008	111.36	8.869E-01	
RH-106	511.86	80.	110.	0.061	22.82	1.613E+01	
Nd-147	531.00	30.	-2.	-0.001	486.24	-5.405E-01	
Ba-140	537.26	40.	-13.	-0.007	114.87	-1.620E+00	P
CS-134	563.24	39.	6.	0.003	222.24	2.200E+00	P
CS-134	569.32	26.	12.	0.006	68.39	2.403E+00	
PA-234	569.47	38.	2.	0.001	377.83	9.011E-01	
BI-207	569.70	41.	-1.	-0.001	911.04	-3.242E-02	
SB-124	602.73	386.	-17.	-0.009	166.75	-5.662E-01	
CS-134	604.71	369.	-17.	-0.009	162.95	-5.720E-01	
RU-103	610.30	353.	-17.	-0.009	158.71	-9.812E+00	
PM-144	618.06	161.	16.	0.009	118.18	5.271E-01	
I-131	636.97	80.	-12.	-0.006	113.54	-5.515E+00	
AG-110M	657.76	64.	2.	0.001	761.58	5.580E-02	
PM-144	696.54	38.	6.	0.003	214.33	2.292E-01	P
NB-94	702.63	57.	-7.	-0.004	180.61	-2.793E-01	P
SB-124	722.79	116.	-14.	-0.007	116.30	-4.715E+00	
ZR-95	724.20	93.	6.	0.004	218.60	5.423E-01	
pm-146	735.72	42.	-4.	-0.002	347.31	-6.800E-01	
pm-146	747.16	28.	11.	0.006	106.41	1.252E+00	
ZR-95	756.73	33.	6.	0.003	197.37	4.503E-01	P
AG-110M	763.94	114.	-24.	-0.013	51.31	-4.276E+00	P
NB-95	765.79	102.	7.	0.004	210.15	2.728E-01	
PA-234M	766.41	87.	11.	0.006	124.97	1.461E+02	P
CS-134	795.87	35.	39.	0.022	26.50	1.866E+00	
CO-58	810.78	56.	-14.	-0.008	80.18	-5.790E-01	
Cs-136	818.50	62.	12.	0.007	95.07	5.100E-01	
MN-54	834.85	28.	10.	0.005	120.23	4.086E-01	P
NB-94	871.10	24.	1.	0.001	700.00	4.347E-02	
EU-154	873.23	39.	-12.	-0.007	113.22	-4.351E+00	P
PA-234	880.53	72.	-9.	-0.005	132.96	-6.810E+00	
PA-234	883.24	99.	-18.	-0.010	81.77	-8.228E+00	
AG-110M	884.68	117.	-7.	-0.004	233.04	-4.030E-01	
Sc-46	889.28	132.	4.	0.002	363.45	1.985E-01	
y-88	898.04	20.	3.	0.002	336.01	1.410E-01	P

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
AG-110M	937.49	35.	-3.	-0.002	323.19	-4.141E-01		P
PA-234	946.02	20.	-1.	-0.001	988.26	-3.450E-01		
EU-154	996.33	105.	-19.	-0.011	79.58	-8.629E+00		
PA-234M	1001.00	127.	-22.	-0.012	47.04	-1.272E+02		P
EU-154	1004.77	91.	13.	0.007	103.75	3.629E+00		
Co-56	1037.84	50.	-9.	-0.005	175.92	-3.161E+00		
Cs-136	1048.07	25.	7.	0.004	113.58	4.167E-01		
RH-106	1050.36	20.	9.	0.005	79.52	2.799E+01		
BI-207	1063.66	25.	4.	0.002	298.11	2.548E-01		P
Ga-68	1077.40	16.	11.	0.006	89.47	1.957E+01		
FE-59	1099.25	16.	2.	0.001	544.70	1.555E-01		P
ZN-65	1115.55	102.	-14.	-0.008	103.89	-1.471E+00		
Sc-46	1120.55	87.	-2.	-0.001	573.92	-1.220E-01		
Ta-182	1189.05	59.	-22.	-0.012	83.18	-7.373E+00		
Ta-182	1221.41	11.	5.	0.003	143.71	1.129E+00		
Co-56	1238.28	38.	12.	0.006	123.78	1.000E+00		P
NA-22	1274.53	21.	2.	0.001	399.50	9.704E-02		
FE-59	1291.60	6.	17.	0.010	40.18	2.359E+00		
AG-110M	1384.30	6.	7.	0.004	87.59	1.804E+00		
La-140	1596.21	18.	-6.	-0.003	175.59	-4.372E-01		
SB-124	1690.98	12.	-6.	-0.003	145.30	-9.138E-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	-4.1549E+00	-4.1549E+00	1.043E+02%	1.46E+01
NA-22	#A	9.7043E-02	9.7043E-02	3.995E+02%	1.41E+00
K-40		2.4294E+02	2.4294E+02	5.076E+00%	8.50E+00
Sc-46	#A	1.9852E-01	1.9852E-01	3.635E+02%	2.48E+00
CR-51	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.18E+01
MN-54	#A	4.0860E-01	4.0860E-01	1.202E+02%	1.16E+00
FE-59	#A	1.1104E+00	1.1104E+00	4.018E+01%	1.98E+00
Co-56	#A	4.0663E-01	4.0663E-01	1.238E+02%	9.72E-01
CO-57	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.10E+00
CO-58	#A	-5.7904E-01	-5.7904E-01	8.018E+01%	1.55E+00
CO-60	#	8.3728E-01	8.3728E-01	2.712E+01%	4.44E-01
ZN-65	#A	-1.4708E+00	-1.4708E+00	1.039E+02%	5.15E+00
NB-94	#A	-2.7934E-01	-2.7934E-01	1.806E+02%	1.44E+00
ZR-95	#A	4.9150E-01	4.9150E-01	1.473E+02%	2.11E+00
NB-95	#A	2.7282E-01	2.7283E-01	2.102E+02%	1.97E+00
RU-103	#A	-3.1584E-02	-3.1585E-02	1.475E+03%	1.15E+00
RH-106	#A	3.7954E+00	3.7954E+00	7.952E+01%	1.20E+01
AG-108M	#	7.1998E-01	7.1998E-01	3.717E+01%	6.15E-01
AG-110M	#A	1.4991E-01	1.4991E-01	8.759E+01%	3.22E+00

SN-113	#A	-6.5780E-01	-6.5780E-01	1.090E+02%	2.41E+00
SB-124	#A	-5.6621E-01	-5.6622E-01	1.667E+02%	3.17E+00
SB-125	#C	4.4042E+00	4.4042E+00	2.694E+01%	3.05E+00
I-131	#A	-4.1262E-01	-4.1264E-01	1.646E+02%	1.29E+00
Gd-153	#A	-9.9811E-01	-9.9811E-01	1.391E+02%	4.64E+00
Ga-68	#A	1.9435E+01	1.9571E+01	8.947E+01%	3.87E+01
Tc-99m	#A	-1.1935E-01	-1.1951E-01	5.140E+02%	2.06E+00
BA-133	#A	-3.7149E-01	-3.7149E-01	2.691E+02%	3.37E+00
CS-134	#A	7.6881E-01	7.6881E-01	2.650E+01%	3.13E+00
CS-137	#A	-4.1496E-02	-4.1496E-02	1.127E+03%	1.65E+00
CE-139	#A	3.6536E-01	3.6536E-01	1.086E+02%	1.33E+00
Ba-140	#A	-1.6203E+00	-1.6203E+00	1.149E+02%	4.01E+00
La-140	#A	-9.5897E-03	-9.5899E-03	1.040E+02%	1.64E+00
CE-141	#A	3.1146E-02	3.1146E-02	3.582E+03%	3.75E+00
CE-144	#A	-2.9721E+00	-2.9721E+00	1.524E+02%	1.51E+01
PM-144	#A	3.7821E-01	3.7821E-01	1.182E+02%	1.16E+00
EU-152	A	3.5472E-01	3.5472E-01	2.075E+02%	6.96E+00
EU-154	#A	3.9494E-01	3.9494E-01	7.678E+01%	1.13E+01
EU-155	#A	0.0000E+00	0.0000E+00	1.000E+03%	6.23E+00
HF-181	#A	3.7820E-01	3.7821E-01	1.423E+02%	2.03E+00
Ta-182	#A	4.2139E-01	4.2139E-01	1.437E+02%	6.93E+00
Hg-203	#A	2.3066E-01	2.3066E-01	1.628E+02%	1.28E+00
TL-208		6.5487E+00	6.5487E+00	8.665E+00%	7.98E-01
pm-146	#A	1.0537E+00	1.0537E+00	5.263E+01%	3.11E+00
y-88	#A	1.4102E-01	1.4102E-01	3.360E+02%	1.12E+00
Cd-113m	#A	-7.1768E+02	-7.1768E+02	9.477E+02%	2.32E+04
Cd-109	#A	3.7947E+00	3.7948E+00	3.540E+02%	4.50E+01
Cf-251	#A	-8.8791E-01	-8.8791E-01	2.223E+02%	5.10E+00
Cf-249	#A	4.4051E-01	4.4051E-01	1.707E+02%	2.09E+00
Sn-126	#A	4.7554E+00	4.7554E+00	1.183E+02%	1.88E+01
PB-210	#A	-4.8708E+00	-4.8708E+00	2.823E+02%	4.71E+01
PB-212		2.1342E+01	2.1342E+01	4.939E+00%	1.78E+00
PB-214		1.4407E+01	1.4407E+01	8.781E+00%	2.45E+00
BI-207	#A	9.1815E-02	9.1815E-02	2.981E+02%	1.06E+00
BI-212		3.2145E+01	3.2145E+01	1.875E+01%	1.07E+01
BI-214		1.2391E+01	1.2391E+01	1.010E+01%	2.05E+00
BI-210M	#A	0.0000E+00	0.0000E+00	7.071E+02%	2.79E+00
AC-228		1.7924E+01	1.7924E+01	9.608E+00%	2.37E+00
TH-227	#A	-6.8469E+00	-6.8469E+00	1.137E+02%	2.60E+01
TH-229	#A	-3.2999E+00	-3.2999E+00	2.366E+02%	2.02E+01
TH-234	#A	3.3143E+00	3.3143E+00	4.075E+02%	4.54E+01
PA-231	#A	-1.3547E+01	-1.3547E+01	1.540E+02%	6.99E+01
PA-233	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.92E+00
PA-234	#A	1.4135E+00	1.4135E+00	1.580E+02%	8.69E+00
PA-234M	#A	-1.2721E+02	-1.2721E+02	4.704E+01%	3.19E+02
U-235	#A	1.6775E+00	1.6775E+00	1.058E+02%	1.65E+01
AM-241	#A	-3.3875E-01	-3.3875E-01	5.286E+02%	6.02E+00
Np-237	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.41E+01
Ir-192	#A	0.0000E+00	0.0000E+00	7.071E+02%	2.47E+00

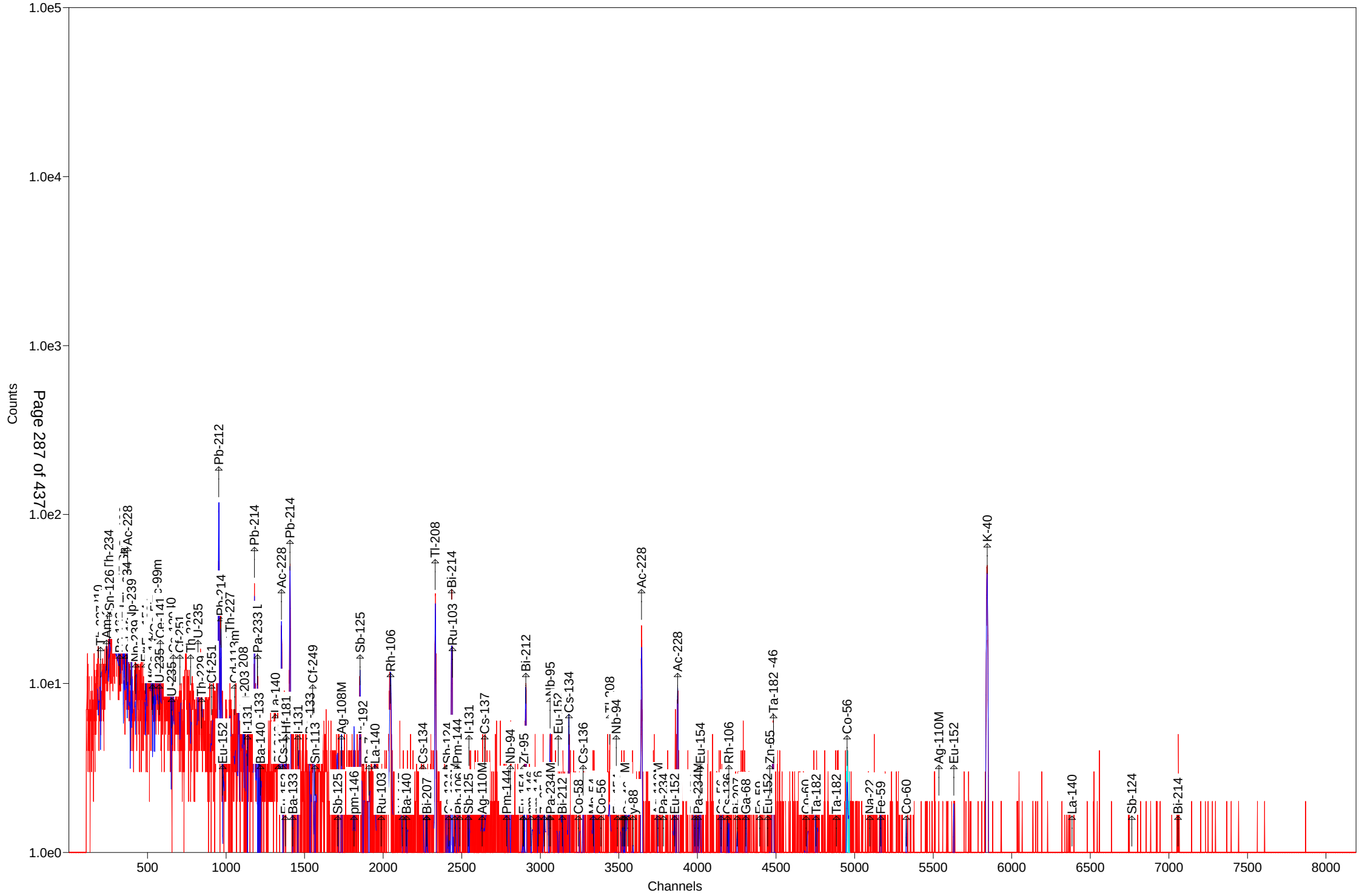
Cs-136 #A	4.6853E-01	4.6854E-01	7.406E+01%	1.64E+00
Np-239 #A	-9.3826E-01	-9.3839E-01	1.866E+02%	5.87E+00
Nd-147 #A	7.1025E-01	7.1027E-01	1.413E+02%	6.57E+00

- 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 1999.4 keV) 3.477E+02 Bq/Sample
Total Decayed Activity (37.6 to 1999.4 keV) 3.4770193E+02 Bq/Sample

263537_Gamma_160-18426-A-2-B. 12_Gamma_20161802.spc.



Test America St. Louis Spectrum ID: 9_Gamma_20161560

Sample Description: 263537_Gamma_160-18426-A-3-B
Detector: Detector # 9
Batch ID: 263537
Work Order Number: Gamma
Lot Number: 160-18426-A-3-B

Decay to Time: 8/25/2016 09:51 Live Time: 1800 sec
Acquisition Time: 8/25/2016 09:52:08 Real Time: 1804 sec
Analysis Time: 8/25/2016 10:22 Dead Time: 0.19 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 9_Soil_TunaCan.Clb
Efficiency Cal Desc: 9_Soil_TunaCan_90099_050312
Efficiency Cal Date: 6/14/2012 10:19
Energy Cal Date: 3/1/2012 13:57
Library: Client_Long_Rev11.lib
Bkgd Correction File: 9_2016-08-07_0421.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	-5.115E+00	65.9	3.370E+00	3.380E+00	1.700E+01
NA-22	-3.065E-01	143.4	4.394E-01	4.396E-01	1.526E+00
K-40	2.622E+02	4.6	1.204E+01	1.802E+01	8.554E+00
Sc-46	-6.117E-01	90.3	5.522E-01	5.531E-01	1.852E+00
CR-51	1.992E-01	1495.8	2.980E+00	2.980E+00	1.029E+01
MN-54	-4.762E-01	128.4	6.116E-01	6.121E-01	1.365E+00
FE-59	-1.524E+00	51.6	7.856E-01	7.893E-01	2.674E+00
Co-56	1.363E+00	46.7	6.364E-01	6.402E-01	8.856E-01
CO-57	3.521E-01	168.1	5.917E-01	5.920E-01	1.096E+00
CO-58	4.320E-01	95.7	4.136E-01	4.142E-01	1.397E+00
CO-60	2.407E-01	96.7	2.327E-01	2.330E-01	1.160E+00
ZN-65	-5.078E-01	291.8	1.482E+00	1.482E+00	5.077E+00
NB-94	5.411E-01	87.4	4.729E-01	4.737E-01	1.584E+00
ZR-95	7.848E-01	78.6	6.172E-01	6.185E-01	1.635E+00
NB-95	4.360E-01	76.1	3.319E-01	3.327E-01	1.110E+00
RU-103	-3.918E-01	121.5	4.760E-01	4.765E-01	1.135E+00
RH-106	-6.409E+00	138.6	8.886E+00	8.893E+00	2.973E+01
AG-108M	-5.630E-01	30.0	1.688E-01	1.712E-01	1.204E+00
AG-110M	5.081E-01	110.3	5.603E-01	5.609E-01	2.076E+00
SN-113	1.600E-01	484.0	7.745E-01	7.745E-01	2.628E+00
SB-124	-6.261E-01	152.9	9.571E-01	9.577E-01	3.201E+00
SB-125	1.825E+00	35.9	6.553E-01	6.619E-01	2.939E+00
I-131	2.928E-01	187.4	5.487E-01	5.489E-01	9.482E-01
Gd-153	-1.349E+00	135.3	1.825E+00	1.827E+00	6.067E+00
Ga-68	-2.067E+01	124.3	2.569E+01	2.572E+01	5.565E+01
Tc-99m	-4.181E-01	141.7	5.924E-01	5.928E-01	1.971E+00
BA-133	-1.358E-01	122.6	1.665E-01	1.667E-01	3.418E+00
CS-134	-6.324E-01	149.6	9.463E-01	9.469E-01	3.165E+00
CS-137	-5.936E-02	983.8	5.839E-01	5.839E-01	1.489E+00
CE-139	-4.282E-01	91.4	3.914E-01	3.935E-01	1.303E+00
Ba-140	6.925E-01	182.0	1.261E+00	1.261E+00	3.762E+00
La-140	-3.211E-01	209.8	6.735E-01	6.737E-01	1.444E+00
CE-141	-7.611E-01	137.7	1.048E+00	1.049E+00	3.488E+00

CE-144	2.745E+00	49.9	1.371E+00	1.378E+00	4.448E+00
PM-144	-5.693E-01	92.1	5.246E-01	5.255E-01	1.757E+00
EU-152	1.920E+00	90.5	1.738E+00	1.740E+00	7.806E+00
EU-154	3.158E+00	90.0	2.843E+00	2.848E+00	9.609E+00
EU-155	-1.760E+00	157.8	2.778E+00	2.779E+00	9.235E+00
HF-181	4.634E-01	115.7	5.361E-01	5.366E-01	1.805E+00
Ta-182	3.461E+00	24.9	8.633E-01	8.804E-01	6.867E+00
Hg-203	-2.912E-01	136.2	3.966E-01	3.970E-01	1.337E+00
TL-208	7.861E+00	8.6	6.780E-01	7.912E-01	9.504E-01
pm-146	2.351E-01	98.9	2.325E-01	2.328E-01	3.086E+00
y-88	1.559E-01	188.9	2.945E-01	2.946E-01	8.747E-01
Cd-113m	-6.369E+03	117.0	7.449E+03	7.461E+03	2.489E+04
Cd-109	0.000E+00	1.#INF	1.662E+01	1.662E+01	5.527E+01
Cf-251	9.579E-01	178.3	1.708E+00	1.710E+00	4.399E+00
Cf-249	-7.752E-01	103.2	7.998E-01	8.008E-01	2.670E+00
Sn-126	4.330E+00	112.0	4.851E+00	4.857E+00	1.616E+01
PB-210	1.113E+01	93.6	1.042E+01	1.044E+01	3.481E+01
PB-212	2.177E+01	4.3	9.394E-01	1.693E+00	1.299E+00
PB-214	1.644E+01	7.6	1.254E+00	1.517E+00	1.855E+00
BI-207	1.733E-01	187.6	3.250E-01	3.252E-01	1.122E+00
BI-212	2.675E+01	14.9	3.976E+00	4.212E+00	7.847E+00
BI-214	1.333E+01	7.6	1.006E+00	1.222E+00	1.522E+00
BI-210M	-7.698E-01	111.5	8.580E-01	8.592E-01	2.866E+00
AC-228	2.269E+01	6.6	1.494E+00	1.890E+00	2.763E+00
TH-227	-2.619E+00	231.9	6.072E+00	6.073E+00	2.049E+01
TH-229	3.829E+00	197.2	7.550E+00	7.556E+00	1.859E+01
TH-234	7.945E+00	102.5	8.147E+00	8.158E+00	3.821E+01
PA-231	1.191E+01	134.4	1.601E+01	1.602E+01	7.152E+01
PA-233	6.370E-01	190.2	1.212E+00	1.212E+00	6.096E+00
PA-234	2.746E-01	128.7	3.533E-01	3.536E-01	8.062E+00
PA-234M	-1.962E+00	3979.2	7.806E+01	7.806E+01	2.133E+02
U-235	-1.348E+00	119.2	1.608E+00	1.609E+00	1.531E+01
AM-241	1.146E+00	117.1	1.342E+00	1.343E+00	4.475E+00
Np-237	0.000E+00	1.#INF	5.002E+00	5.002E+00	1.664E+01
Ir-192	4.725E-01	76.8	3.627E-01	3.638E-01	1.240E+00
Cs-136	2.744E-01	114.9	3.152E-01	3.156E-01	1.548E+00
Np-239	-1.695E+00	158.7	2.690E+00	2.692E+00	8.939E+00
Nd-147	2.546E-01	126.6	3.224E-01	3.227E-01	8.328E+00
Total	4.343E+02				

Analyst: Amanda Dick

Sample description
263537_Gamma_160-18426-A-3-B

Spectrum Filename: C:\User\SPC\Det9\9_Gamma_20161560.An1

Acquisition information
Start time: 8/25/2016 9:52:08 AM
Live time: 1800
Real time: 1804
Dead time: 0.19 %
Detector ID: 9

Detector system
Ge9 S/N100228730

Calibration
Filename: 9_Soil_TunaCan.Clb
9_Soil_TunaCan_90099_050312

Energy Calibration
Created: 3/1/2012 1:57:17 PM
Zero offset: 0.074 keV
Gain: 0.250 keV/channel
Quadratic: -2.269E-08 keV/channel^2

Efficiency Calibration
Created: 6/14/2012 10:19:51 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.30 %
Log(Eff): -8.079856E-01 + (-2.367265E-01*Log(E)) + (-3.950640E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.42 %
Log(Eff): -2.387916E+01 + (8.875647E+00*Log(E)) + (-9.401100E-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 (37.59keV)
Stop channel: 8000 (1999.34keV)
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	8/25/2016 9:51:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	9_2016-08-07_0421.PBC 8/7/2016 4:21:32 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 31 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1480

***** 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	22.	93.64	1.00	2.577E-02	46.54	4.250	PBC<MDA	PB210
59.54	27.	117.12	1.01	3.659E-02	59.54	35.900	PBC<MDA	AM241
63.55	28.	109.31	1.01	3.921E-02	63.29	3.810	PBC<MDA	TH234
64.54	30.	112.04	1.02	3.987E-02	64.28	9.700	PBC<MDA	Sn126
74.80	246.	10.15	1.03	4.573E-02				
77.17	428.	6.43	1.03	4.679E-02				
87.30	142.	16.69	1.04	5.031E-02	86.49	13.100	1.202E+01	Np237
					86.54	30.700	5.129E+00	EU155
					86.94	9.040	1.738E+01	Sn126
					87.57	37.500	4.175E+00	Sn126
					88.04	3.790	4.121E+01	Cd109
91.10	32.	172.97	1.04	5.124E-02	91.10	28.300	PBC<MDA	Nd147
93.31	133.	18.61	0.99	5.170E-02	92.59	5.584	2.573E+01	TH234
					93.35	5.561	2.576E+01	AC228
99.50	32.	170.54	1.05	5.266E-02	99.50	15.000	PBC<MDA	Np239
121.55	8.	331.19	1.07	5.303E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	9.791E-02	CO57
123.10	10.	253.18	1.07	5.296E-02	123.10	40.790	PBC<MDA	EU154
133.54	28.	49.94	1.08	5.189E-02	133.02	43.300	PBC<MDA	HF181
					133.54	11.090	2.745E+00	CE144
136.47	24.	168.06	1.08	5.150E-02	136.30	5.850	PBC<MDA	HF181
					136.47	10.680	2.389E+00	CO57

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
162.81	13.	194.88	1.11	4.676E-02	162.66	6.220	PBC<MDA	Ba140
					163.38	5.080	2.963E+00	U235
176.60	13.	178.30	1.12	4.549E-02	176.60	17.000	PBC<MDA	Cf251
193.51	13.	197.17	1.14	4.287E-02	193.51	4.400	PBC<MDA	TH229
238.49	555.	6.21	0.90	3.733E-02	238.63	43.300	1.908E+01	PB212
241.90	105.	18.09	1.18	3.697E-02	242.00	7.430	2.131E+01	PB214
244.69	15.	293.29	1.18	3.670E-02	244.69	7.580	PBC<MDA	EU152
270.33	80.	24.48	1.45	3.431E-02				
277.48	48.	33.58	1.65	3.372E-02	277.28	6.310	1.262E+01	TL208
284.30	6.	315.47	1.22	3.315E-02	284.30	6.140	PBC<MDA	I131
295.17	158.	14.10	1.20	3.231E-02	295.09	19.300	1.404E+01	PB214
300.07	18.	187.31	1.24	3.195E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.288E+01	PA231
					300.18	6.200	5.111E+00	PA233
300.10	41.	29.37	1.24	3.195E-02	300.03	3.280	2.187E+01	PB212
					300.07	2.460	2.916E+01	PA231
					300.18	6.200	1.157E+01	PA233
300.18	18.	190.22	1.24	3.194E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.288E+01	PA231
					300.18	6.200	5.111E+00	PA233
302.65	18.	192.74	1.24	3.176E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	1.742E+00	BA133
302.85	18.	195.52	1.24	3.175E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	1.743E+00	BA133
304.85	18.	198.02	1.24	3.160E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	1.148E+00	BI210M
316.49	17.	105.84	1.25	3.080E-02	316.49	87.040	PBC<MDA	Ir192
338.37	171.	12.64	1.26	2.940E-02	338.32	12.010	2.696E+01	AC228
351.88	318.	7.62	1.33	2.861E-02	351.93	37.600	1.644E+01	PB214
364.48	8.	202.28	1.29	2.791E-02	364.48	81.700	PBC<MDA	I131
391.69	5.	483.99	1.32	2.653E-02	391.69	64.000	PBC<MDA	SN113
453.88	15.	98.90	1.37	2.388E-02	453.88	65.000	PBC<MDA	pm146
463.37	38.	35.92	1.38	2.352E-02	463.37	10.470	PBC<MDA	SB125
468.06	15.	111.24	1.38	2.335E-02	468.06	51.750	PBC<MDA	Ir192
482.00	15.	115.69	1.40	2.286E-02	482.00	80.500	PBC<MDA	HF181
511.86	111.	25.93	2.67	2.188E-02	511.86	20.000	1.409E+01	RH106
569.70	6.	187.60	1.47	2.023E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.065E+00	PA234
					569.70	97.740	1.733E-01	BI207
583.19	238.	8.62	1.44	1.988E-02	583.02	84.500	7.861E+00	TL208
609.42	205.	8.31	1.16	1.924E-02	609.31	46.090	1.286E+01	BI214
					610.30	5.750	1.032E+02	RU103
614.42	6.	123.97	1.51	1.913E-02	614.28	89.850	PBC<MDA	AG108M
702.63	16.	87.40	1.58	1.730E-02	702.63	97.900	PBC<MDA	NB94
724.20	15.	83.19	1.60	1.691E-02	724.20	44.150	PBC<MDA	ZR95
727.44	61.	14.87	1.60	1.686E-02	727.17	7.550	2.675E+01	BI212
756.73	9.	133.50	1.62	1.635E-02	756.73	54.460	PBC<MDA	ZR95
763.94	9.	110.27	1.63	1.624E-02	763.94	22.280	PBC<MDA	AG110M

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
765.79	13.	76.13	1.63	1.621E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	1.481E+02	PA234M
778.92	13.	90.50	1.64	1.600E-02	778.92	12.940	PBC<MDA	EU152
784.13	11.	92.22	1.65	1.590E-02	785.42	1.280	PBC<MDA	BI212
810.78	12.	95.74	1.67	1.551E-02	810.78	99.460	PBC<MDA	CO58
818.50	8.	148.55	1.67	1.540E-02	818.50	100.000	PBC<MDA	Cs136
846.77	11.	94.14	1.70	1.501E-02	846.77	99.935	PBC<MDA	Co56
860.82	58.	15.06	1.28	1.482E-02	860.56	12.420	1.756E+01	TL208
873.23	10.	90.04	1.72	1.465E-02	873.23	12.270	PBC<MDA	EU154
880.53	12.	82.35	1.72	1.456E-02	880.53	6.000	PBC<MDA	PA234
883.24	7.	146.85	1.72	1.453E-02	883.24	9.600	PBC<MDA	PA234
898.04	3.	290.01	1.74	1.434E-02	898.04	93.700	PBC<MDA	y88
911.46	158.	9.76	1.47	1.418E-02	911.07	29.000	2.141E+01	AC228
937.49	9.	126.60	1.77	1.387E-02	937.49	34.360	PBC<MDA	AG110M
964.11	12.	129.74	1.79	1.357E-02	964.11	14.605	PBC<MDA	EU152
968.87	93.	11.63	1.88	1.352E-02	968.97	17.460	2.189E+01	AC228
1037.84	11.	92.58	1.84	1.281E-02	1037.84	14.130	PBC<MDA	Co56
1048.07	4.	175.24	1.85	1.271E-02	1048.07	80.000	PBC<MDA	Cs136
1120.49	82.	14.05	1.82	1.206E-02	1120.29	15.100	2.492E+01	BI214
					1120.55	99.987	PBC<MDA	Sc46
1121.44	12.	126.22	1.90	1.205E-02	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	1.607E+00	Ta182
1173.24	10.	96.67	1.94	1.163E-02	1173.24	99.900	PBC<MDA	CO60
1221.41	32.	24.94	1.97	1.126E-02	1221.41	27.000	5.857E+00	Ta182
1238.28	32.	46.70	1.98	1.114E-02	1238.28	66.070	2.405E+00	Co56
1408.00	13.	52.27	2.10	1.004E-02	1408.00	21.005	PBC<MDA	EU152
1460.88	491.	4.59	2.47	9.749E-03	1460.83	10.670	2.622E+02	K40
1764.30	42.	20.13	2.31	8.350E-03	1764.49	15.400	1.824E+01	BI214
1836.06	3.	242.22	2.35	8.079E-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	
298.80	74.81	189.	246.	5.379E+03	10.15	1.025	-	sD
308.29	77.18	165.	428.	9.137E+03	6.43	1.027	-	sD
1080.73	270.33	66.	80.	2.317E+03	24.48	1.450	-	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	200.	22.	0.012	93.64	0.998s
TH-227	200.20	50.14	316.	-11.	-0.006	231.85	1.001s
AM-241	237.77	59.54	489.	27.	0.015	117.12	1.010s
TH-234	252.77	63.29	461.	28.	0.016	109.31	1.014s
Sn-126	256.74	64.28	555.	30.	0.017	112.04	1.015
BA-133	323.56	80.99	1379.	-34.	-0.019	155.40	1.031s
Np-237	345.55	86.49	1729.	0.	0.000	184.51	1.036A
EU-155	345.76	86.54	1655.	-32.	-0.018	180.56	1.036A
Sn-126	347.35	86.94	217.	35.	0.020	112.08	1.037A
Sn-126	349.87	87.57	1498.	106.	0.059	21.48	1.037D
Cd-109	351.75	88.04	1623.	0.	0.000	178.58	1.038A
Nd-147	363.99	91.10	1530.	32.	0.018	172.97	1.041s
TH-234	369.94	92.59	1544.	32.	0.018	173.54	1.042
AC-228	372.98	93.35	1468.	32.	0.018	169.12	1.043s
Gd-153	389.58	97.50	1314.	-38.	-0.021	135.33	1.047s
Np-239	397.58	99.50	1510.	32.	0.018	170.54	1.049
Gd-153	412.37	103.20	1683.	-36.	-0.020	163.63	1.052s
Np-239	414.37	103.70	1632.	-36.	-0.020	161.12	1.053s
EU-155	420.82	105.31	1571.	-36.	-0.020	157.84	1.054s
Np-239	424.09	106.13	1692.	-37.	-0.020	158.70	1.055s
EU-152	486.65	121.78	328.	-27.	-0.015	96.79	1.070s
CO-57	487.80	122.06	347.	8.	0.004	331.19	1.070s
EU-154	491.95	123.10	284.	10.	0.005	253.18	1.071s
PA-234	524.72	131.29	821.	-19.	-0.011	211.30	1.079s
CE-144	533.69	133.54	87.	28.	0.016	49.94	1.081D
HF-181	544.74	136.30	802.	0.	0.000	1000.00	1.084s
CO-57	545.43	136.47	778.	24.	0.013	168.06	1.084s
Tc-99m	561.57	140.51	1088.	-33.	-0.018	141.68	1.088
U-235	574.67	143.79	1029.	-33.	-0.018	137.45	1.091
CE-141	581.29	145.44	1022.	-33.	-0.018	137.70	1.092s
Ba-140	650.15	162.66	290.	-21.	-0.012	116.74	1.108s
U-235	653.03	163.38	298.	13.	0.007	194.88	1.109s
CE-139	662.92	165.85	341.	-29.	-0.016	91.42	1.111s
Cf-251	705.90	176.60	158.	13.	0.007	178.30	1.122s
TH-229	773.52	193.51	168.	13.	0.007	197.17	1.137s
U-235	820.80	205.33	192.	-10.	-0.006	305.91	1.148
PB-212	953.97	238.63	57.	633.	0.352	4.31	1.179D
PB-214	967.43	242.00	129.	105.	0.059	18.09	1.182D
EU-152	978.21	244.69	999.	15.	0.008	293.29	1.185s
TH-227	1024.40	256.24	140.	-17.	-0.009	111.94	1.195s
Cd-113m	1054.23	263.70	382.	-24.	-0.013	116.96	1.202s
BI-210M	1062.75	265.83	347.	-24.	-0.013	111.46	1.204s
TL-208	1109.35	277.48	59.	48.	0.027	33.58	1.651s
Hg-203	1116.22	279.20	183.	-14.	-0.008	136.18	1.216s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
I-131	1136.61	284.30	101.	6.	0.003	315.47	1.221s
PB-214	1179.77	295.09	72.	149.	0.083	11.49	1.231D
PB-212	1199.52	300.03	53.	41.	0.023	29.37	1.235D
PA-231	1199.68	300.07	573.	18.	0.010	187.31	1.235s
PA-233	1200.12	300.18	591.	18.	0.010	190.22	1.235s
PA-231	1210.00	302.65	609.	18.	0.010	192.74	1.237s
BA-133	1210.81	302.85	628.	18.	0.010	195.52	1.238s
Ba-140	1218.80	304.85	646.	18.	0.010	198.02	1.240s
BI-210M	1218.99	304.90	703.	-19.	-0.011	195.96	1.240s
Ir-192	1233.16	308.44	684.	-19.	-0.011	192.81	1.243s
Ir-192	1265.35	316.49	150.	17.	0.009	105.84	1.250
La-140	1314.43	328.76	553.	-23.	-0.013	72.83	1.261s
Cf-249	1333.15	333.44	530.	-18.	-0.010	180.52	1.265s
AC-228	1352.87	338.37	62.	171.	0.095	12.64	1.262
Cs-136	1361.66	340.57	512.	0.	0.000	1000.00	1.272
HF-181	1382.70	345.83	88.	-6.	-0.003	353.16	1.276s
PB-214	1406.89	351.88	51.	318.	0.177	7.62	1.329s
BA-133	1423.37	356.00	514.	-22.	-0.012	147.95	1.285
I-131	1457.31	364.48	60.	8.	0.004	202.28	1.293s
BA-133	1534.73	383.84	285.	-25.	-0.014	99.43	1.310s
Cf-249	1551.17	387.95	310.	-25.	-0.014	103.17	1.314s
SN-113	1566.12	391.69	277.	5.	0.003	483.99	1.317
SB-125	1710.86	427.88	61.	-8.	-0.004	210.50	1.349s
AG-108M	1735.10	433.94	96.	-23.	-0.013	29.98	1.354s
pm-146	1814.87	453.88	48.	15.	0.008	98.90	1.372s
SB-125	1852.82	463.37	75.	38.	0.021	35.92	1.380
Ir-192	1871.59	468.06	128.	15.	0.008	111.24	1.384s
BE-7	1909.73	477.60	235.	-22.	-0.012	65.89	1.392s
HF-181	1927.34	482.00	150.	15.	0.009	115.69	1.396s
La-140	1947.43	487.02	175.	-20.	-0.011	73.38	1.400s
RU-103	1987.56	497.05	69.	-14.	-0.008	121.49	1.409s
RH-106	2046.81	511.86	105.	111.	0.062	25.93	2.672s
Nd-147	2123.35	531.00	69.	-9.	-0.005	185.03	1.438s
Ba-140	2148.39	537.26	48.	-5.	-0.003	305.52	1.444s
CS-134	2252.30	563.24	71.	-10.	-0.005	152.82	1.466s
PA-234	2277.24	569.47	71.	0.	0.000	1000.00	1.471s
BI-207	2278.16	569.70	64.	6.	0.003	187.60	1.471s
TL-208	2332.11	583.19	31.	238.	0.132	8.62	1.443
SB-125	2401.36	600.50	573.	-23.	-0.013	90.86	1.497s
SB-124	2410.29	602.73	529.	-21.	-0.012	152.87	1.499s
CS-134	2418.21	604.71	507.	-22.	-0.012	149.63	1.500s
BI-214	2436.61	609.31	21.	213.	0.118	7.55	1.505D
RU-103	2440.56	610.30	486.	-22.	-0.012	146.03	1.505s
AG-108M	2456.49	614.28	26.	6.	0.003	123.97	1.509D
PM-144	2471.62	618.06	464.	-22.	-0.012	142.21	1.512s
RH-106	2487.04	621.92	442.	-22.	-0.012	138.65	1.515s
SB-125	2542.94	635.89	65.	-3.	-0.002	384.42	1.526s
AG-110M	2630.43	657.76	68.	-2.	-0.001	754.52	1.544s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CS-137	2646.03	661.66	69.	-2.	-0.001	983.77	1.548
PM-144	2785.58	696.54	124.	-18.	-0.010	92.14	1.576s
NB-94	2809.93	702.63	96.	16.	0.009	87.40	1.581s
SB-124	2890.57	722.79	169.	-20.	-0.011	94.43	1.598s
AG-108M	2891.17	722.94	144.	-20.	-0.011	87.61	1.598s
EU-154	2892.85	723.36	124.	-6.	-0.003	268.86	1.598s
ZR-95	2896.22	724.20	68.	15.	0.008	83.19	1.599s
BI-212	2908.11	727.17	11.	61.	0.034	14.87	1.601D
pm-146	2988.08	747.16	37.	-3.	-0.002	392.68	1.617s
ZR-95	3026.36	756.73	25.	9.	0.005	133.50	1.625s
AG-110M	3055.23	763.94	41.	9.	0.005	110.27	1.631
NB-95	3062.61	765.79	40.	13.	0.007	76.13	1.632s
EU-152	3115.14	778.92	25.	13.	0.007	90.50	1.643s
BI-212	3141.15	785.42	50.	11.	0.006	92.22	1.648s
CS-134	3182.95	795.87	79.	-16.	-0.009	83.19	1.656s
CS-134	3207.29	801.95	133.	-21.	-0.012	81.29	1.661s
CO-58	3242.59	810.78	60.	12.	0.007	95.74	1.668s
La-140	3262.58	815.77	79.	-16.	-0.009	80.17	1.672s
Cs-136	3273.50	818.50	74.	8.	0.005	148.55	1.674s
MN-54	3338.91	834.85	55.	-13.	-0.007	128.45	1.687
Co-56	3386.61	846.77	21.	11.	0.006	94.14	1.696s
TL-208	3442.82	860.82	4.	58.	0.032	15.06	1.283s
NB-94	3483.94	871.10	50.	-18.	-0.010	60.35	1.715s
EU-154	3492.47	873.23	37.	10.	0.006	90.04	1.717s
PA-234	3521.68	880.53	43.	12.	0.007	82.35	1.722s
PA-234	3532.53	883.24	55.	7.	0.004	146.85	1.724s
AG-110M	3538.30	884.68	62.	0.	0.000	1000.00	1.725s
Sc-46	3556.69	889.28	95.	-16.	-0.009	90.27	1.729s
y-88	3591.74	898.04	16.	3.	0.002	290.01	1.736s
AC-228	3645.44	911.46	15.	158.	0.088	9.76	1.473
AG-110M	3749.60	937.49	25.	9.	0.005	126.60	1.766s
PA-234	3783.72	946.02	30.	-10.	-0.006	124.50	1.772s
EU-152	3856.11	964.11	124.	12.	0.007	129.74	1.786
AC-228	3875.14	968.87	6.	93.	0.052	11.63	1.880
EU-154	3985.03	996.33	64.	-8.	-0.004	145.77	1.810s
EU-154	4018.82	1004.77	53.	-18.	-0.010	93.51	1.816s
Co-56	4151.13	1037.84	17.	11.	0.006	92.58	1.841s
Cs-136	4192.07	1048.07	27.	4.	0.002	175.24	1.848s
RH-106	4201.23	1050.36	38.	-7.	-0.004	140.58	1.850s
BI-207	4254.46	1063.66	32.	-5.	-0.003	261.02	1.860s
Ga-68	4309.44	1077.40	48.	-13.	-0.007	124.27	1.870s
FE-59	4396.88	1099.25	43.	-19.	-0.011	51.56	1.886s
EU-152	4448.20	1112.07	145.	-15.	-0.008	118.59	1.895s
ZN-65	4462.09	1115.55	131.	-6.	-0.003	291.81	1.897s
BI-214	4481.87	1120.49	10.	82.	0.045	14.05	1.816
Sc-46	4482.12	1120.55	125.	0.	0.000	1000.00	1.901
Ta-182	4485.12	1121.30	112.	12.	0.007	126.22	1.901
CO-60	4692.96	1173.24	17.	10.	0.006	96.67	1.938

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ta-182	4756.25	1189.05	45.	-6.	-0.004	151.14	1.949
Ta-182	4885.75	1221.41	6.	32.	0.018	24.94	1.972
Co-56	4953.27	1238.28	35.	32.	0.018	46.70	1.984
NA-22	5098.35	1274.53	34.	-6.	-0.003	143.37	2.008s
EU-154	5098.40	1274.54	40.	0.	0.000	1000.00	2.008s
CO-60	5330.37	1332.50	17.	0.	0.000	1000.00	2.047s
AG-110M	5537.69	1384.30	17.	-3.	-0.002	327.45	2.082s
EU-152	5632.56	1408.00	6.	13.	0.007	52.27	2.097s
K-40	5844.24	1460.88	8.	491.	0.273	4.59	2.471s
La-140	6385.95	1596.21	18.	-5.	-0.003	209.76	2.215s
SB-124	6765.35	1690.98	13.	-2.	-0.001	535.91	2.272s
BI-214	7059.65	1764.49	15.	42.	0.023	20.13	2.314s
y-88	7346.20	1836.06	6.	3.	0.001	242.22	2.354s

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	-5.1146E+00				5.31E+01	
			477.60	-5.115E+00	?(P	1.700E+01 6.59E+01 1.05E+01	G
NA-22	C	-3.0646E-01				9.50E+02	
			1274.53	-3.065E-01	?(	1.526E+00 1.43E+02 9.99E+01	G
K-40	N	2.6216E+02				4.66E+11	
			1460.83	2.622E+02	@(P	8.554E+00 4.59E+00 1.07E+01	G
Sc-46	F	-6.1175E-01				8.38E+01	
			889.28	-6.117E-01	?(	1.852E+00 9.03E+01 1.00E+02	G
			1120.55	0.000E+00	+	2.525E+00 1.00E+03 1.00E+02	G
CR-51	F	1.9922E-01				2.77E+01	
			320.08	1.992E-01	%(P	1.029E+01 1.50E+03 9.94E+00	G
MN-54	C	-4.7617E-01				3.12E+02	
			834.85	-4.762E-01	?(	1.365E+00 1.28E+02 1.00E+02	G
FE-59	F	-1.5236E+00				4.45E+01	
			1099.25	-1.524E+00	?(P	2.674E+00 5.16E+01 5.65E+01	G
			1291.60	-7.372E-02	% P	2.660E+00 2.42E+03 4.32E+01	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Co-56	C 1.3632E+00					7.73E+01	
		846.77	4.116E-01	?(P	8.856E-01	9.41E+01	9.99E+01 G
		1238.28	2.405E+00	(P	2.290E+00	4.67E+01	6.61E+01 G
		1037.84	3.223E+00	?(P	6.657E+00	9.26E+01	1.41E+01 G
		1771.35	-2.156E-01	%	1.640E+01	2.15E+03	1.55E+01 A
CO-57	C 3.5209E-01					2.72E+02	
		122.06	9.791E-02	?(	1.096E+00	3.31E+02	8.56E+01 G
		136.47	2.389E+00	&(	1.341E+01	1.68E+02	1.07E+01 G
CO-58	C 4.3203E-01					7.09E+01	
		810.78	4.320E-01	?(	1.397E+00	9.57E+01	9.95E+01 G
CO-60	F 2.4070E-01					1.93E+03	
		1332.50	0.000E+00	?(	1.160E+00	1.00E+03	1.00E+02 G
		1173.24	4.816E-01	&(P	1.047E+00	9.67E+01	9.99E+01 G
ZN-65	F -5.0783E-01					2.44E+02	
		1115.55	-5.078E-01	?(	5.077E+00	2.92E+02	5.06E+01 G
NB-94	I 5.4109E-01					7.41E+06	
		702.63	5.411E-01	?(	1.584E+00	8.74E+01	9.79E+01 G
		871.10	-6.819E-01	-	1.351E+00	6.03E+01	9.99E+01 G
ZR-95	I 7.8478E-01					6.40E+01	
		756.73	5.336E-01	?(P	1.635E+00	1.33E+02	5.45E+01 G
		724.20	1.095E+00	&(	3.051E+00	8.32E+01	4.42E+01 G
NB-95	I 4.3598E-01					6.40E+01	
		765.79	4.360E-01	?(	1.110E+00	7.61E+01	9.98E+01 G
RU-103	I -3.9184E-01					3.93E+01	
		497.05	-3.918E-01	?(	1.135E+00	1.21E+02	9.09E+01 G
		610.30	-1.085E+01	+	5.298E+01	1.46E+02	5.75E+00 GA
RH-106	I -6.4093E+00					3.74E+02	
		621.92	-6.409E+00	?(	2.973E+01	1.39E+02	9.93E+00 G
		1050.36	-1.824E+01	+	8.875E+01	1.41E+02	1.56E+00 G
		511.86	1.409E+01	?	6.405E+00	2.59E+01	2.00E+01 GA
AG-108M	C -5.6298E-01					1.53E+05	
		433.94	-5.630E-01	?(P	1.204E+00	3.00E+01	9.05E+01 G
		722.94	-7.236E-01	+	2.118E+00	8.76E+01	9.08E+01 G
		614.28	1.983E-01	+	8.535E-01	1.24E+02	8.98E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AG-110M	F	5.0807E-01					2.50E+02	
			884.68	0.000E+00	?(	2.076E+00	1.00E+03	7.27E+01 G
			657.76	-6.900E-02	+ P	1.330E+00	7.55E+02	9.46E+01 G
			937.49	1.049E+00	?(	3.032E+00	1.27E+02	3.44E+01 G
			1384.30	-6.738E-01	+	4.924E+00	3.27E+02	2.43E+01 G
			763.94	1.331E+00	&(	5.017E+00	1.10E+02	2.23E+01 G
SN-113	F	1.6001E-01					1.15E+02	
			391.69	1.600E-01	?(P	2.628E+00	4.84E+02	6.40E+01 G
SB-124	F	-6.2608E-01					6.02E+01	
			602.73	-6.261E-01	&(	3.201E+00	1.53E+02	9.83E+01 G
			1690.98	-2.240E-01	+	2.593E+00	5.36E+02	4.78E+01 G
			722.79	-6.079E+00	+	1.920E+01	9.44E+01	1.08E+01 G
SB-125	I	1.8246E+00					1.01E+03	
			427.88	-5.777E-01	?(	2.939E+00	2.10E+02	2.96E+01 G
			600.50	-3.617E+00	+ P	1.827E+01	9.09E+01	1.79E+01 G
			635.89	-7.904E-01	+	1.061E+01	3.84E+02	1.13E+01 G
			463.37	8.616E+00	(	9.715E+00	3.59E+01	1.05E+01 G
I-131	I	2.9282E-01					8.02E+00	
			364.48	1.862E-01	*(P	9.482E-01	2.02E+02	8.17E+01 G
			284.30	1.712E+00	?(P	1.351E+01	3.15E+02	6.14E+00 G
			636.97	2.774E-01	%	1.762E+01	1.81E+03	7.17E+00 G
Gd-153	F	-1.3486E+00					2.42E+02	
			97.50	-1.349E+00	&(	6.067E+00	1.35E+02	3.00E+01 G
			103.20	-1.713E+00	+	9.317E+00	1.64E+02	2.18E+01 G
Ga-68	C	-2.0674E+01					4.71E-02	
			1077.40	-2.067E+01	&(	5.565E+01	1.24E+02	3.30E+00 G
Tc-99m	I	-4.1810E-01					2.51E-01	
			140.51	-4.181E-01	&(	1.971E+00	1.42E+02	8.93E+01 G
BA-133	F	-1.3582E-01					3.85E+03	
			356.00	-6.907E-01	?(	3.418E+00	1.48E+02	6.20E+01 G
			302.85	1.743E+00	?(	1.141E+01	1.96E+02	1.83E+01 G
			383.84	-5.665E+00	&	1.880E+01	9.94E+01	8.94E+00 GA
			80.99	-1.148E+00	+	5.934E+00	1.55E+02	3.41E+01 GA
CS-134	I	-6.3243E-01					7.54E+02	
			604.71	-6.324E-01	?(	3.165E+00	1.50E+02	9.76E+01 G
			795.87	-6.535E-01	+	1.820E+00	8.32E+01	8.55E+01 G
			569.32	-1.785E-01	%	7.442E+00	1.19E+03	1.54E+01 G
			801.95	-8.509E+00	+	2.305E+01	8.13E+01	8.69E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			563.24	-3.162E+00	+ P	1.366E+01	1.53E+02	8.35E+00 G
CS-137	I	-5.9357E-02					1.10E+04	
			661.66	-5.936E-02	(P	1.489E+00	9.84E+02	8.52E+01 G
CE-139	F	-4.2818E-01					1.38E+02	
			165.85	-4.282E-01	(	1.303E+00	9.14E+01	7.99E+01 G
Ba-140	I	6.9254E-01					1.28E+01	
			537.26	-5.033E-01	&(	3.762E+00	3.06E+02	2.44E+01 G
			162.66	-3.999E+00	+	1.563E+01	1.17E+02	6.22E+00 G
			304.85	7.491E+00	&(	4.965E+01	1.98E+02	4.29E+00 G
La-140	I	-3.2109E-01					1.28E+01	
			1596.21	-3.211E-01	&(	1.444E+00	2.10E+02	9.54E+01 G
			487.02	-1.082E+00	+ P	3.468E+00	7.34E+01	4.55E+01 G
			328.76	-2.053E+00	+ P	1.024E+01	7.28E+01	2.03E+01 G
			815.77	-2.541E+00	+	6.806E+00	8.02E+01	2.33E+01 G
CE-141	I	-7.6110E-01					3.25E+01	
			145.44	-7.611E-01	?(	3.488E+00	1.38E+02	4.82E+01 G
CE-144	I	2.7446E+00					2.85E+02	
			133.54	2.745E+00	(	4.448E+00	4.99E+01	1.11E+01 G
PM-144	C	-5.6935E-01					3.63E+02	
			696.54	-5.693E-01	&(	1.757E+00	9.21E+01	9.90E+01 G
			618.06	-6.379E-01	+	3.035E+00	1.42E+02	9.91E+01 G
EU-152	F	1.9200E+00					4.94E+03	
			344.29	-1.682E-03	%(P	7.806E+00	9.30E+04	2.65E+01 G
			1112.07	-4.946E+00	+	1.976E+01	1.19E+02	1.36E+01 G
			121.78	-9.893E-01	+	3.192E+00	9.68E+01	2.86E+01 G
			778.92	3.428E+00	?(	6.980E+00	9.05E+01	1.29E+01 G
			964.11	3.482E+00	(	1.528E+01	1.30E+02	1.46E+01 G
			244.69	3.055E+00	?(	2.995E+01	2.93E+02	7.58E+00 G
			1408.00	3.384E+00	? P	3.757E+00	5.23E+01	2.10E+01 GA
EU-154	I	3.1577E+00					3.14E+03	
			873.23	3.158E+00	?(P	9.609E+00	9.00E+01	1.23E+01 G
			123.10	2.443E-01	&	2.091E+00	2.53E+02	4.08E+01 G
			1274.54	0.000E+00	-	4.668E+00	1.00E+03	3.52E+01 G
			723.36	-9.620E-01	&	8.862E+00	2.69E+02	2.02E+01 G
			1004.77	-4.304E+00	+	8.625E+00	9.35E+01	1.80E+01 G
			996.33	-3.170E+00	-	1.585E+01	1.46E+02	1.06E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
EU-155	I	-1.7598E+00					1.81E+03	
			105.31	-1.760E+00	?(	9.235E+00	1.58E+02	2.12E+01 G
			86.54	-1.156E+00	}	6.945E+00	1.81E+02	3.07E+01 G
HF-181	F	4.6340E-01					4.24E+01	
			482.00	4.634E-01	?(	1.805E+00	1.16E+02	8.05E+01 G
			133.02	1.884E-07	%	3.326E+00	5.25E+08	4.33E+01 G
			345.83	-7.827E-01	+ P	5.915E+00	3.53E+02	1.51E+01 G
			136.30	0.000E+00	&	2.482E+01	1.00E+03	5.85E+00 G
Ta-182	F	3.4608E+00					1.14E+02	
			1121.30	1.607E+00	(	6.867E+00	1.26E+02	3.49E+01 G
			1221.41	5.857E+00	(P	2.572E+00	2.49E+01	2.70E+01 G
			1189.05	-1.926E+00	- P	1.017E+01	1.51E+02	1.62E+01 G
Hg-203	F	-2.9125E-01					4.66E+01	
			279.20	-2.912E-01	?(	1.337E+00	1.36E+02	8.15E+01 G
TL-208	N	7.8608E+00					6.98E+02	
			583.02	7.861E+00	(P	9.504E-01	8.62E+00	8.45E+01 G
			277.28	1.262E+01	+	1.003E+01	3.36E+01	6.31E+00 G
			860.56	1.756E+01	+	3.572E+00	1.51E+01	1.24E+01 G
pm-146	C	2.3505E-01					2.02E+03	
			747.16	-3.298E-01	?(	3.086E+00	3.93E+02	3.40E+01 G
			735.72	4.977E-02	& P	4.627E+00	3.86E+03	2.25E+01 G
			453.88	5.305E-01	?(P	1.255E+00	9.89E+01	6.50E+01 G
y-88	F	1.5587E-01					1.07E+02	
			898.04	1.252E-01	?(P	8.747E-01	2.90E+02	9.37E+01 G
			1836.06	1.848E-01	?(	1.001E+00	2.42E+02	9.92E+01 G
Cd-113m		-6.3691E+03					5.33E+03	
			263.70	-6.369E+03	&(	2.489E+04	1.17E+02	6.00E-03 K
Cf-251	T	9.5793E-01					3.28E+05	
			176.60	9.579E-01	?(	4.399E+00	1.78E+02	1.70E+01 G
			227.00	2.285E-01	&	1.358E+01	2.38E+03	6.30E+00 GA
Cf-249	T	-7.7522E-01					1.28E+05	
			387.95	-7.752E-01	?(	2.670E+00	1.03E+02	6.60E+01 G
			333.44	-2.194E+00	+	1.327E+01	1.81E+02	1.55E+01 G
Sn-126		4.3302E+00					3.65E+07	
			87.57	3.111E+00	}	5.383E+00	2.15E+01	3.75E+01 GA
			64.28	4.330E+00	&(	1.616E+01	1.12E+02	9.70E+00 G
			86.94	4.330E+00	}	8.729E+00	1.12E+02	9.04E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-210	N	1.1128E+01					8.14E+03	
			46.54	1.113E+01	(	3.481E+01	9.36E+01	4.25E+00 G
PB-212	N	2.1772E+01					6.98E+02	
			238.63	2.177E+01	(	1.299E+00	4.31E+00	4.33E+01 G
			300.03	2.187E+01		1.938E+01	2.94E+01	3.28E+00 GA
PB-214	N	1.6441E+01					5.84E+05	
			351.93	1.644E+01	@(P	1.855E+00	7.62E+00	3.76E+01 G
			295.09	1.328E+01	- P	3.761E+00	1.15E+01	1.93E+01 G
			242.00	2.131E+01	+ P	1.124E+01	1.81E+01	7.43E+00 GA
BI-207	C	1.7326E-01					1.18E+04	
			569.70	1.733E-01	?(	1.122E+00	1.88E+02	9.77E+01 G
			1063.66	-2.967E-01	+	1.725E+00	2.61E+02	7.45E+01 G
BI-212	N	2.6747E+01					6.98E+02	
			727.17	2.675E+01	(P	7.847E+00	1.49E+01	7.55E+00 G
			785.42	3.129E+01	&	9.746E+01	9.22E+01	1.28E+00 GA
BI-214	N	1.3328E+01					5.84E+05	
			609.31	1.333E+01	(P	1.522E+00	7.55E+00	4.61E+01 G
			1120.29	2.492E+01	+ P	5.393E+00	1.40E+01	1.51E+01 G
			1764.49	1.824E+01	+ P	8.908E+00	2.01E+01	1.54E+01 G
BI-210M	T	-7.6979E-01					1.10E+09	
			265.83	-7.698E-01	?(	2.866E+00	1.11E+02	5.00E+01 G
			304.90	-1.210E+00	&	7.930E+00	1.96E+02	2.80E+01 G
AC-228	N	2.2695E+01					2.10E+03	
			911.07	2.141E+01	(P	2.763E+00	9.76E+00	2.90E+01 G
			968.97	2.189E+01	(	3.325E+00	1.16E+01	1.75E+01 G
			338.32	2.696E+01	(P	6.181E+00	1.26E+01	1.20E+01 G
			93.35	6.224E+00	-	3.502E+01	1.69E+02	5.56E+00 XA
TH-227	N	-2.6188E+00					7.95E+03	
			50.14	-2.619E+00	?(	2.049E+01	2.32E+02	8.00E+00 G
			256.24	-3.802E+00	& P	1.291E+01	1.12E+02	7.00E+00 G
TH-229	N	3.8292E+00					2.68E+06	
			193.51	3.829E+00	&(	1.859E+01	1.97E+02	4.40E+00 G
			210.85	9.171E-01	%	3.294E+01	1.45E+03	2.99E+00 G
TH-234	N	7.9448E+00					1.63E+12	
			63.29	1.048E+01	?(	3.821E+01	1.09E+02	3.81E+00 G
			92.59	6.212E+00	&(	3.586E+01	1.74E+02	5.58E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PA-231	N	1.1910E+01					1.20E+07	
			302.65	1.108E+01	?(	7.152E+01	1.93E+02	2.88E+00 G
			300.07	1.288E+01	@(	8.077E+01	1.87E+02	2.46E+00 G
PA-233	C	6.3705E-01					7.82E+08	
			312.01	-1.334E-01	%(	6.096E+00	1.36E+03	3.60E+01 G
			300.18	5.111E+00	@(	3.255E+01	1.90E+02	6.20E+00 G
PA-234	N	2.7462E-01					1.63E+12	
			131.29	-1.142E+00	?(	8.062E+00	2.11E+02	1.80E+01 G
			946.02	-3.010E+00	+	8.499E+00	1.24E+02	1.34E+01 G
			569.47	0.000E+00	+	1.405E+01	1.00E+03	8.20E+00 G
			883.24	2.930E+00	?(	1.480E+01	1.47E+02	9.60E+00 G
			880.53	7.617E+00	?	2.108E+01	8.24E+01	6.00E+00 GA
PA-234M	N	-1.9618E+00					1.63E+12	
			1001.00	-1.962E+00	%(P	2.133E+02	3.98E+03	8.37E-01 G
			766.41	-8.064E+00	%	5.015E+02	1.77E+03	2.94E-01 G
U-235	N	-1.3482E+00					2.57E+11	
			143.79	-3.346E+00	&(	1.531E+01	1.37E+02	1.10E+01 G
			205.33	-2.792E+00	+ P	1.811E+01	3.06E+02	5.01E+00 G
			163.38	2.963E+00	&(	1.946E+01	1.95E+02	5.08E+00 G
AM-241	T	1.1457E+00					1.58E+05	
			59.54	1.146E+00	*(P	4.475E+00	1.17E+02	3.59E+01 G
Ir-192	F	4.7250E-01					7.40E+01	
			316.49	3.488E-01	?(	1.240E+00	1.06E+02	8.70E+01 G
			468.06	6.806E-01	*(	2.550E+00	1.11E+02	5.18E+01 G
			308.44	-1.078E+00	&	6.954E+00	1.93E+02	3.18E+01 G
Cs-136	F	2.7442E-01					1.30E+01	
			818.50	3.046E-01	?(	1.548E+00	1.49E+02	1.00E+02 G
			1048.07	2.367E-01	?(	1.463E+00	1.75E+02	8.00E+01 G
			340.57	0.000E+00	-	4.378E+00	1.00E+03	4.69E+01 G
Np-239	T	-1.6947E+00					2.36E+00	
			103.70	-1.556E+00	&	8.332E+00	1.61E+02	2.40E+01 X
			106.13	-1.695E+00	&(	8.939E+00	1.59E+02	2.27E+01 G
			99.50	2.279E+00		1.293E+01	1.71E+02	1.50E+01 X
Nd-147		2.5457E-01					1.11E+01	
			531.00	-1.872E+00	&(	8.328E+00	1.85E+02	1.30E+01 G
			91.10	1.232E+00	?(	7.087E+00	1.73E+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	

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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	200.	22.	0.012	93.64	1.113E+01	
TH-227	50.14	316.	-11.	-0.006	231.85	-2.619E+00	
AM-241	59.54	489.	27.	0.015	117.12	1.146E+00	P
BA-133	80.99	1379.	-34.	-0.019	155.40	-1.148E+00	
EU-155	86.54	1655.	-32.	-0.018	180.56	-1.156E+00	
Nd-147	91.10	1530.	32.	0.018	172.97	1.232E+00	
Gd-153	97.50	1314.	-38.	-0.021	135.33	-1.349E+00	
Gd-153	103.20	1683.	-36.	-0.020	163.63	-1.713E+00	
EU-155	105.31	1571.	-36.	-0.020	157.84	-1.760E+00	
EU-152	121.78	328.	-27.	-0.015	96.79	-9.893E-01	
EU-154	123.10	284.	10.	0.005	253.18	2.443E-01	
PA-234	131.29	821.	-19.	-0.011	211.30	-1.142E+00	
Tc-99m	140.51	1088.	-33.	-0.018	141.68	-4.181E-01	
CE-141	145.44	1022.	-33.	-0.018	137.70	-7.611E-01	
Ba-140	162.66	290.	-21.	-0.012	116.74	-3.999E+00	
CE-139	165.85	341.	-29.	-0.016	91.42	-4.282E-01	
Cf-251	176.60	158.	13.	0.007	178.30	9.579E-01	
TH-229	193.51	168.	13.	0.007	197.17	3.829E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	244.69	999.	15.	0.008	293.29	3.055E+00	
TH-227	256.24	140.	-17.	-0.009	111.94	-3.802E+00	P
Cd-113m	263.70	382.	-24.	-0.013	116.96	-6.369E+03	
BI-210M	265.83	347.	-24.	-0.013	111.46	-7.698E-01	
Hg-203	279.20	183.	-14.	-0.008	136.18	-2.912E-01	
I-131	284.30	101.	6.	0.003	315.47	1.712E+00	P
PA-231	300.07	573.	18.	0.010	187.31	1.288E+01	
PA-233	300.18	591.	18.	0.010	190.22	5.111E+00	
PA-231	302.65	609.	18.	0.010	192.74	1.108E+01	
BA-133	302.85	628.	18.	0.010	195.52	1.743E+00	
Ba-140	304.85	646.	18.	0.010	198.02	7.491E+00	
BI-210M	304.90	703.	-19.	-0.011	195.96	-1.210E+00	
Ir-192	308.44	684.	-19.	-0.011	192.81	-1.078E+00	
Ir-192	316.49	150.	17.	0.009	105.84	3.488E-01	
La-140	328.76	553.	-23.	-0.013	72.83	-2.053E+00	P
Cf-249	333.44	530.	-18.	-0.010	180.52	-2.194E+00	
HF-181	345.83	88.	-6.	-0.003	353.16	-7.827E-01	P
BA-133	356.00	514.	-22.	-0.012	147.95	-6.907E-01	
I-131	364.48	60.	8.	0.004	202.28	1.862E-01	P
BA-133	383.84	285.	-25.	-0.014	99.43	-5.665E+00	
Cf-249	387.95	310.	-25.	-0.014	103.17	-7.752E-01	
SN-113	391.69	277.	5.	0.003	483.99	1.600E-01	P
SB-125	427.88	61.	-8.	-0.004	210.50	-5.777E-01	
pm-146	453.88	48.	15.	0.008	98.90	5.305E-01	P
SB-125	463.37	75.	38.	0.021	35.92	8.616E+00	
Ir-192	468.06	128.	15.	0.008	111.24	6.806E-01	
BE-7	477.60	235.	-22.	-0.012	65.89	-5.115E+00	P
HF-181	482.00	150.	15.	0.009	115.69	4.634E-01	
La-140	487.02	175.	-20.	-0.011	73.38	-1.082E+00	P
RU-103	497.05	69.	-14.	-0.008	121.49	-3.918E-01	
RH-106	511.86	105.	111.	0.062	25.93	1.409E+01	
Nd-147	531.00	69.	-9.	-0.005	185.03	-1.872E+00	
Ba-140	537.26	48.	-5.	-0.003	305.52	-5.033E-01	
CS-134	563.24	71.	-10.	-0.005	152.82	-3.162E+00	P
BI-207	569.70	64.	6.	0.003	187.60	1.733E-01	
SB-125	600.50	573.	-23.	-0.013	90.86	-3.617E+00	P
SB-124	602.73	529.	-21.	-0.012	152.87	-6.261E-01	
CS-134	604.71	507.	-22.	-0.012	149.63	-6.324E-01	
RU-103	610.30	486.	-22.	-0.012	146.03	-1.085E+01	
PM-144	618.06	464.	-22.	-0.012	142.21	-6.379E-01	
RH-106	621.92	442.	-22.	-0.012	138.65	-6.409E+00	
SB-125	635.89	65.	-3.	-0.002	384.42	-7.904E-01	
AG-110M	657.76	68.	-2.	-0.001	754.52	-6.900E-02	P
CS-137	661.66	69.	-2.	-0.001	983.77	-5.936E-02	P
PM-144	696.54	124.	-18.	-0.010	92.14	-5.693E-01	
NB-94	702.63	96.	16.	0.009	87.40	5.411E-01	
SB-124	722.79	169.	-20.	-0.011	94.43	-6.079E+00	
EU-154	723.36	124.	-6.	-0.003	268.86	-9.620E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
ZR-95	724.20	68.	15.	0.008	83.19	1.095E+00		
pm-146	747.16	37.	-3.	-0.002	392.68	-3.298E-01		
ZR-95	756.73	25.	9.	0.005	133.50	5.336E-01		P
AG-110M	763.94	41.	9.	0.005	110.27	1.331E+00		
NB-95	765.79	40.	13.	0.007	76.13	4.360E-01		
EU-152	778.92	25.	13.	0.007	90.50	3.428E+00		
CS-134	795.87	79.	-16.	-0.009	83.19	-6.535E-01		
CS-134	801.95	133.	-21.	-0.012	81.29	-8.509E+00		
CO-58	810.78	60.	12.	0.007	95.74	4.320E-01		
La-140	815.77	79.	-16.	-0.009	80.17	-2.541E+00		
Cs-136	818.50	74.	8.	0.005	148.55	3.046E-01		
MN-54	834.85	55.	-13.	-0.007	128.45	-4.762E-01		
NB-94	871.10	50.	-18.	-0.010	60.35	-6.819E-01		
EU-154	873.23	37.	10.	0.006	90.04	3.158E+00		P
PA-234	880.53	43.	12.	0.007	82.35	7.617E+00		
PA-234	883.24	55.	7.	0.004	146.85	2.930E+00		
Sc-46	889.28	95.	-16.	-0.009	90.27	-6.117E-01		
y-88	898.04	16.	3.	0.002	290.01	1.252E-01		P
AG-110M	937.49	25.	9.	0.005	126.60	1.049E+00		
PA-234	946.02	30.	-10.	-0.006	124.50	-3.010E+00		
EU-152	964.11	124.	12.	0.007	129.74	3.482E+00		
EU-154	996.33	64.	-8.	-0.004	145.77	-3.170E+00		
EU-154	1004.77	53.	-18.	-0.010	93.51	-4.304E+00		
Cs-136	1048.07	27.	4.	0.002	175.24	2.367E-01		
RH-106	1050.36	38.	-7.	-0.004	140.58	-1.824E+01		
BI-207	1063.66	32.	-5.	-0.003	261.02	-2.967E-01		
Ga-68	1077.40	48.	-13.	-0.007	124.27	-2.067E+01		
FE-59	1099.25	43.	-19.	-0.011	51.56	-1.524E+00		P
EU-152	1112.07	145.	-15.	-0.008	118.59	-4.946E+00		
ZN-65	1115.55	131.	-6.	-0.003	291.81	-5.078E-01		
Ta-182	1121.30	112.	12.	0.007	126.22	1.607E+00		
CO-60	1173.24	17.	10.	0.006	96.67	4.816E-01		P
Ta-182	1189.05	45.	-6.	-0.004	151.14	-1.926E+00		P
Ta-182	1221.41	6.	32.	0.018	24.94	5.857E+00		P
NA-22	1274.53	34.	-6.	-0.003	143.37	-3.065E-01		
AG-110M	1384.30	17.	-3.	-0.002	327.45	-6.738E-01		
EU-152	1408.00	6.	13.	0.007	52.27	3.384E+00		P
La-140	1596.21	18.	-5.	-0.003	209.76	-3.211E-01		
SB-124	1690.98	13.	-2.	-0.001	535.91	-2.240E-01		
y-88	1836.06	6.	3.	0.001	242.22	1.848E-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	-5.1146E+00	-5.1146E+00	6.589E+01%	1.70E+01
NA-22	#A	-3.0646E-01	-3.0646E-01	1.434E+02%	1.53E+00
K-40	#	2.6216E+02	2.6216E+02	4.591E+00%	8.55E+00
Sc-46	#A	-6.1175E-01	-6.1175E-01	9.027E+01%	1.85E+00
CR-51	#A	1.9922E-01	1.9922E-01	1.496E+03%	1.03E+01
MN-54	#A	-4.7616E-01	-4.7617E-01	1.284E+02%	1.37E+00
FE-59	#A	-1.5236E+00	-1.5236E+00	5.156E+01%	2.67E+00
Co-56	#	1.3632E+00	1.3632E+00	4.668E+01%	8.86E-01
CO-57	#A	3.5209E-01	3.5209E-01	1.681E+02%	1.10E+00
CO-58	#A	4.3203E-01	4.3203E-01	9.574E+01%	1.40E+00
CO-60	#A	2.4070E-01	2.4070E-01	9.667E+01%	1.16E+00
ZN-65	#A	-5.0783E-01	-5.0783E-01	2.918E+02%	5.08E+00
NB-94	#A	5.4109E-01	5.4109E-01	8.740E+01%	1.58E+00
ZR-95	#A	7.8477E-01	7.8478E-01	7.865E+01%	1.64E+00
NB-95	#A	4.3597E-01	4.3598E-01	7.613E+01%	1.11E+00
RU-103	#A	-3.9184E-01	-3.9184E-01	1.215E+02%	1.13E+00
RH-106	#A	-6.4093E+00	-6.4093E+00	1.386E+02%	2.97E+01
AG-108M	A	-5.6298E-01	-5.6298E-01	2.998E+01%	1.20E+00
AG-110M	#A	5.0807E-01	5.0807E-01	1.103E+02%	2.08E+00
SN-113	#A	1.6001E-01	1.6001E-01	4.840E+02%	2.63E+00
SB-124	#A	-6.2608E-01	-6.2608E-01	1.529E+02%	3.20E+00
SB-125	#A	1.8246E+00	1.8246E+00	3.592E+01%	2.94E+00
I-131	#A	2.9280E-01	2.9282E-01	1.874E+02%	9.48E-01
Gd-153	#A	-1.3486E+00	-1.3486E+00	1.353E+02%	6.07E+00
Ga-68	#A	-2.0436E+01	-2.0674E+01	1.243E+02%	5.57E+01
Tc-99m	#A	-4.1719E-01	-4.1810E-01	1.417E+02%	1.97E+00
BA-133	#A	-1.3582E-01	-1.3582E-01	1.226E+02%	3.42E+00
CS-134	#A	-6.3242E-01	-6.3243E-01	1.496E+02%	3.17E+00
CS-137	#A	-5.9357E-02	-5.9357E-02	9.838E+02%	1.49E+00
CE-139	#A	-4.2818E-01	-4.2818E-01	9.142E+01%	1.30E+00
Ba-140	#A	6.9251E-01	6.9254E-01	1.820E+02%	3.76E+00
La-140	#A	-3.2108E-01	-3.2109E-01	2.098E+02%	1.44E+00
CE-141	#A	-7.6109E-01	-7.6110E-01	1.377E+02%	3.49E+00
CE-144	A	2.7446E+00	2.7446E+00	4.994E+01%	4.45E+00
PM-144	#A	-5.6935E-01	-5.6935E-01	9.214E+01%	1.76E+00
EU-152	#A	1.9200E+00	1.9200E+00	9.050E+01%	7.81E+00
EU-154	#A	3.1577E+00	3.1577E+00	9.004E+01%	9.61E+00
EU-155	#A	-1.7598E+00	-1.7598E+00	1.578E+02%	9.23E+00
HF-181	#A	4.6340E-01	4.6340E-01	1.157E+02%	1.80E+00
Ta-182	#A	3.4608E+00	3.4608E+00	2.494E+01%	6.87E+00
Hg-203	#A	-2.9124E-01	-2.9125E-01	1.362E+02%	1.34E+00
TL-208		7.8607E+00	7.8608E+00	8.625E+00%	9.50E-01
pm-146	#A	2.3505E-01	2.3505E-01	9.890E+01%	3.09E+00

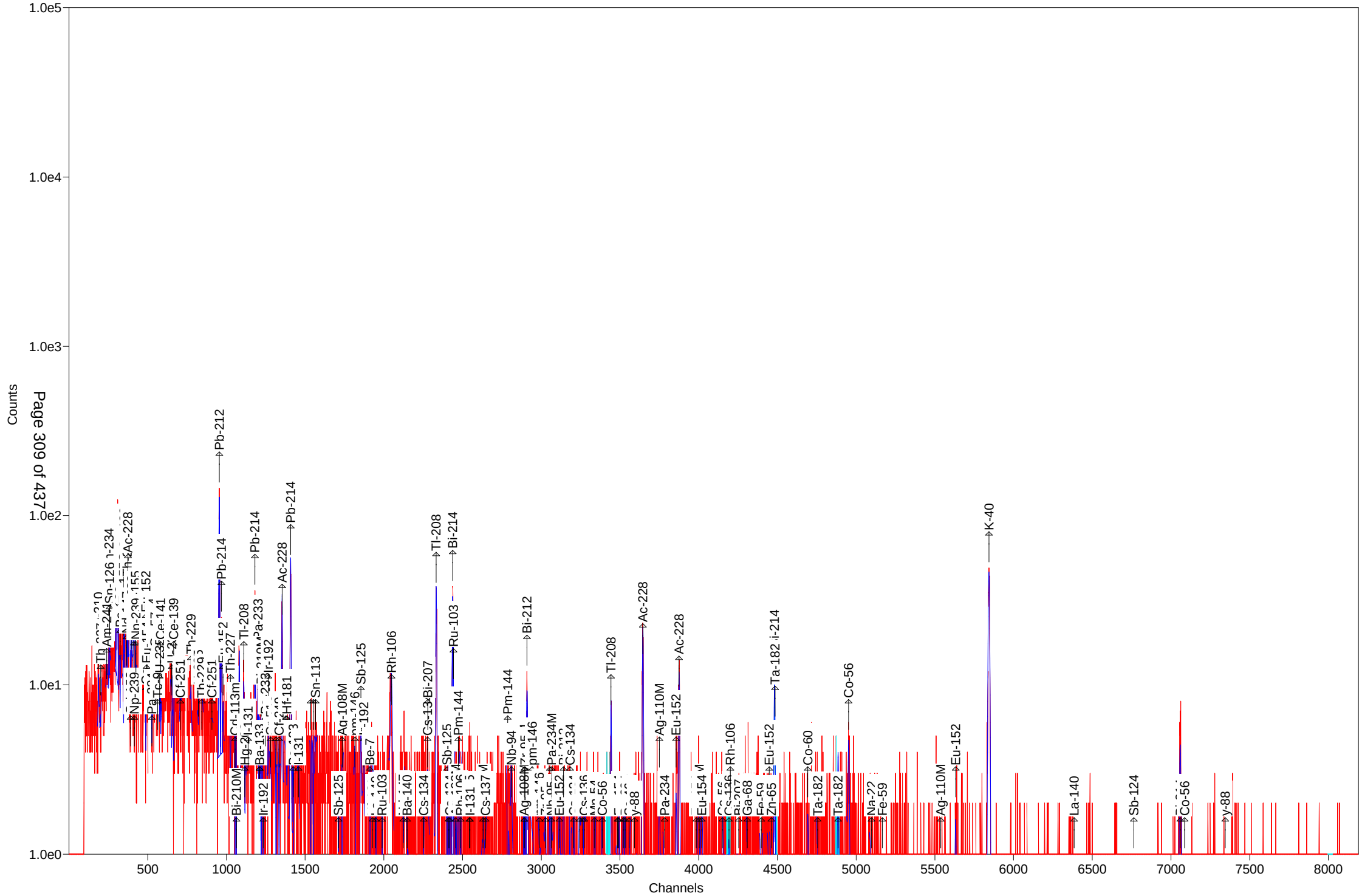
y-88 #A	1.5587E-01	1.5587E-01	1.889E+02%		8.75E-01
Cd-113m#A	-6.3691E+03	-6.3691E+03	1.170E+02%		2.49E+04
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%		5.53E+01
Cf-251 #A	9.5793E-01	9.5793E-01	1.783E+02%		4.40E+00
Cf-249 #A	-7.7522E-01	-7.7522E-01	1.032E+02%		2.67E+00
Sn-126 A	4.3302E+00	4.3302E+00	1.120E+02%		1.62E+01
PB-210 #A	1.1128E+01	1.1128E+01	9.364E+01%		3.48E+01
PB-212	2.1772E+01	2.1772E+01	4.315E+00%		1.30E+00
PB-214	1.6441E+01	1.6441E+01	7.625E+00%		1.85E+00
BI-207 #A	1.7326E-01	1.7326E-01	1.876E+02%		1.12E+00
BI-212	2.6747E+01	2.6747E+01	1.487E+01%		7.85E+00
BI-214	1.3328E+01	1.3328E+01	7.552E+00%		1.52E+00
BI-210M#A	-7.6979E-01	-7.6979E-01	1.115E+02%		2.87E+00
AC-228	2.2694E+01	2.2695E+01	6.584E+00%		2.76E+00
TH-227 #A	-2.6188E+00	-2.6188E+00	2.319E+02%		2.05E+01
TH-229 #A	3.8292E+00	3.8292E+00	1.972E+02%		1.86E+01
TH-234 A	7.9448E+00	7.9448E+00	1.025E+02%		3.82E+01
PA-231 #A	1.1910E+01	1.1910E+01	1.344E+02%		7.15E+01
PA-233 #A	6.3705E-01	6.3705E-01	1.902E+02%		6.10E+00
PA-234 #A	2.7462E-01	2.7462E-01	1.287E+02%		8.06E+00
PA-234M#A	-1.9618E+00	-1.9618E+00	3.979E+03%		2.13E+02
U-235 #A	-1.3482E+00	-1.3482E+00	1.192E+02%		1.53E+01
AM-241 #A	1.1457E+00	1.1457E+00	1.171E+02%		4.48E+00
Np-237 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.66E+01
Ir-192 #A	4.7249E-01	4.7250E-01	7.677E+01%		1.24E+00
Cs-136 #A	2.7440E-01	2.7442E-01	1.149E+02%		1.55E+00
Np-239 A	-1.6943E+00	-1.6947E+00	1.587E+02%		8.94E+00
Nd-147 #A	2.5456E-01	2.5457E-01	1.266E+02%		8.33E+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 1999.3 keV) 3.737E+02 Bq/Sample
Total Decayed Activity (37.6 to 1999.3 keV) 3.7374564E+02 Bq/Sample

263537_Gamma_160-18426-A-3-B. 9_Gamma_20161560.spc.



Daily Checks

Test America
St. Louis
Background Check

Spectrum: 9_20160825001_BG
Description: Background Contamination Check
Acquired: 8/25/2016 1:24:22 AM
Detector: Detector # 9
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	1.89	1.53	1.65	1.76	2.14	2.26	PASS

Analyst: Aaron Schroder Reviewer: Aaron Schroder

Test America
St. Louis
Quality Control Check

Spectrum: 9_20160825002_QCAsLeft
Description: Quality control Check (QC Source 'E') Post Stabilization
Acquired: 8/25/2016 2:43:18 AM
Detector: Detector # 9
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	59.61	59.79	60.04	PASS
FWHM	1.08	0.00	0.00	0.94	2.18	2.28	PASS
ActivityDiff	649.44	-5.00	-4.00	-1.06	4.00	5.00	PASS
QA-662							
FWHM	1.62	0.00	0.00	1.48	3.32	3.42	PASS
ActivityDiff	607.56	-5.00	-4.00	-0.73	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	1332.56	1333.01	1333.26	PASS
FWHM	2.12	0.00	0.00	2.07	4.32	4.42	PASS
ActivityDiff	1191.31	-5.00	-4.00	1.83	4.00	5.00	PASS

Analyst: Aaron Schroder Reviewer: Aaron Schroder

Test America
St. Louis
Background Check

Spectrum: 12_20160825001_BG
Description: Background Contamination Check
Acquired: 8/25/2016 12:45:00 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	2.09	2.18	2.23	PASS

Analyst: Aaron Schroder Reviewer: Aaron Schroder

Test America
St. Louis
Quality Control Check

Spectrum: 12_20160825002_QCAsLeft
Description: Quality control Check (QC Source 'H') Post Stabilization
Acquired: 8/25/2016 1:52:34 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	238.10	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.65	59.79	60.04	PASS
FWHM	0.90	0.00	0.00	0.90	2.00	2.10	PASS
ActivityDiff	691.00	-5.00	-4.00	2.21	4.00	5.00	PASS
QA-662							
FWHM	1.48	0.00	0.00	1.40	3.18	3.28	PASS
ActivityDiff	659.00	-5.00	-4.00	2.51	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.20	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.71	1333.01	1333.26	PASS
FWHM	2.00	0.00	0.00	1.94	4.20	4.30	PASS
ActivityDiff	1274.00	-5.00	-4.00	1.30	4.00	5.00	PASS

Analyst: Aaron Schroder Reviewer: Aaron Schroder

Test America
St. Louis
Quality Control Check

Spectrum: 14_20160825001_QCAsLeft
Description: Quality control Check (QC Source 'E') Post Stabilization
Acquired: 8/25/2016 1:01:31 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	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.64	59.79	60.04	PASS
FWHM	0.76	0.00	0.00	0.89	1.86	1.96	PASS
ActivityDiff	671.90	-5.00	-4.00	-2.25	4.00	5.00	PASS
QA-662							
FWHM	1.35	0.00	0.00	1.48	3.05	3.15	PASS
ActivityDiff	628.85	-5.00	-4.00	-1.08	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	1.99	4.11	4.21	PASS
ActivityDiff	1224.59	-5.00	-4.00	-1.18	4.00	5.00	PASS

Analyst: Aaron Schroder Reviewer: Aaron Schroder

Test America
St. Louis
Background Check

Spectrum: 14_20160825002_BG
Description: Background Contamination Check
Acquired: 8/25/2016 1:21:28 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	1.81	1.90	1.94	PASS

Analyst: Aaron Schroder Reviewer: Aaron Schroder

Test America
St. Louis
Quality Control Check

Spectrum: 16_20160825001_QCAsLeft
Description: Quality control Check (QC Source 'G') Post Stabilization
Acquired: 8/25/2016 1:03:20 AM
Detector: Detector #16
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	0.96	0.00	0.00	0.99	2.06	2.16	PASS
ActivityDiff	602.10	-5.00	-4.00	1.55	4.00	5.00	PASS
QA-662							
FWHM	1.53	0.00	0.00	1.51	3.23	3.33	PASS
ActivityDiff	571.13	-5.00	-4.00	-0.06	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.60	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.76	1333.01	1333.26	PASS
FWHM	2.09	0.00	0.00	1.98	4.29	4.39	PASS
ActivityDiff	1139.05	-5.00	-4.00	1.84	4.00	5.00	PASS

Analyst: Aaron Schroder Reviewer: Aaron Schroder

Test America
St. Louis
Background Check

Spectrum: 16_20160825002_BG
Description: Background Contamination Check
Acquired: 8/25/2016 1:22:22 AM
Detector: Detector #16
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	2.68	2.51	2.56	2.69	2.80	2.86	PASS

Analyst: Aaron Schroder Reviewer: Aaron Schroder

Initial Calibrations

Gamma Verification per Geometry

Detector:	Ge9
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	14240	95.4
Am-241	2037	418	0.3590	1163	1244.5	107.0
Cd-109	2881	591	0.0361	16363	15902	97.2
Co-57	1511	310	0.8560	362	347.48	96.0
Ce-139	2139	439	0.7990	549	535.87	97.6
Hg-203	4651	954	0.8146	1171	1216.7	103.9
Sn-113	3015	618	0.6400	966	970.65	100.5
Cs-137	1938	397	0.8510	467	466.58	99.9
Y-88	7264	1489	0.9370	1589	1552.5	97.7
Co-60	3580	734	0.9997	734	727.12	99.0
Co-60	3581	734	0.9999	734	719.75	98.0
Y-88	7690	1577	0.9920	1589	1638.8	103.1

Reviewed By: Jody Watson

Date: 6/14/2012

Calibration Data from file: 9_Soil_TunaCan.Clb
Energy Calibration Date: 6/14/2012 Time: 10:19:40 AM
Efficiency Calibration Date: 6/14/2012 Time: 10:19:51 AM

Calibration Description:
9_Soil_TunaCan_90099_050312

Energy Calibration Fit
Energy = 0.0875 +0.250109*Channel -2.0385e-008*Channel**2
FWHM (ch) = 4.1690 +0.000934*Channel -2.36522e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.85	46.54	46.57	-0.06%	1.07	1.09	-1.37%
237.85	59.54	59.58	-0.06%	1.08	1.10	-1.96%
351.79	88.03	88.07	-0.05%	1.12	1.12	-0.18%
487.79	122.06	122.08	-0.02%	1.14	1.16	-1.17%
662.64	165.85	165.81	0.02%	1.23	1.19	2.51%
1115.53	279.17	279.07	0.04%	1.30	1.30	0.44%
1565.74	391.69	391.64	0.01%	1.43	1.39	2.81%
2645.81	661.66	661.69	-0.00%	1.60	1.62	-0.83%
3591.21	898.02	898.02	0.00%	1.80	1.80	-0.02%
4692.44	1173.24	1173.26	-0.00%	2.01	2.01	0.18%
5329.80	1332.50	1332.54	-0.00%	2.09	2.12	-1.38%
7344.77	1836.01	1835.98	0.00%	2.45	2.44	0.55%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.3038 %
Ln(Eff) = -0.8080 -0.236727*Ln(Eng) -0.0395064*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.4241 %
Ln(Eff) = -23.8792 +8.875647*Ln(Eng) -0.94011*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.4596E-002	2.5767E-002	-4.76%
59.54	3.8891E-002	3.6589E-002	5.92%
88.03	4.9059E-002	5.0504E-002	-2.95%
122.06	5.0886E-002	5.3031E-002	-4.22%
165.85	========== Knee ==========		
165.85	4.6197E-002	4.7361E-002	-2.52%
279.17	3.4900E-002	3.3566E-002	3.82%
391.69	2.6668E-002	2.6526E-002	0.53%
661.66	1.8125E-002	1.8099E-002	0.14%
898.02	1.4012E-002	1.4341E-002	-2.34%
1173.24	1.1507E-002	1.1627E-002	-1.05%
1332.50	1.0296E-002	1.0501E-002	-2.00%
1836.01	8.3305E-003	8.0796E-003	3.01%

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  6/14/2012 10:20:07 AM
TestAmerica, Inc                Spectrum name: 9_TunaCan_20120147.An1

Sample description
     9_TunaCan_90099_050312


Spectrum Filename: C:\User\SPC\Det9\9_TunaCan_20120147.An1

Acquisition information
       Start time:                 5/3/2012 1:37:42 PM
       Live time:               3600
       Real time:               3661
       Dead time:                  1.65 %
       Detector ID:                   9

Detector system
     Ge 9 SN/100113


Calibration
       Filename:                   9_Soil_TunaCan.Clb
     9_Soil_TunaCan_90099_050312


       Energy Calibration
            Created:               6/14/2012 10:19:40 AM
            Zero offset:           0.088 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -2.039E-08 keV/channel^2

       Efficiency Calibration
            Created:               6/14/2012 10:19:51 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.30 %
            Log(Eff):             -8.079856E-01 + (-2.367265E-01*Log(E) ) +
                                   ( -3.950640E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.42 %
            Log(Eff):             -2.387916E+01 + ( 8.875647E+00*Log(E) ) +
                                   ( -9.401100E-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 (    37.60keV )
       Stop channel:            8000 (  1999.66keV )
       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 6/14/2012 10:20:07 AM
TestAmerica, Inc Spectrum name: 9_TunaCan_20120147.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: 0.0265

***** 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
46.57	55553.	0.67	1.07	2.579E-02	46.54	4.250	1.424E+04	Pb210
59.56	58492.	0.66	1.08	3.660E-02	59.54	35.700	1.245E+03	AM241
88.07	86792.	0.48	1.12	5.052E-02	88.03	3.610	1.590E+04	CD109
122.08	41484.	0.73	1.14	5.303E-02	122.06	85.600	3.475E+02	CO57
136.48	5266.	4.55	1.22	5.150E-02				
165.81	39272.	0.74	1.23	4.626E-02	165.85	79.900	5.359E+02	Ce139
279.06	19221.	1.24	1.30	3.358E-02	279.17	81.500	1.217E+03	Hg203
391.64	28263.	0.86	1.43	2.653E-02	391.69	64.000	9.707E+02	SN113
661.69	25703.	0.90	1.61	1.810E-02	661.66	85.210	4.666E+02	CS137
898.02	33728.	0.69	1.80	1.434E-02	898.02	93.700	1.552E+03	Y898
1173.24	29087.	0.72	2.01	1.163E-02	1173.24	99.900	7.271E+02	Co1173
1332.54	26026.	0.70	2.09	1.050E-02	1332.50	99.982	7.198E+02	Co1332
1835.94	21237.	0.73	2.46	8.080E-03	1836.01	99.200	1.639E+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
545.34	136.48	10776.	5266.	1.023E+05	4.55	1.225	-

ORTEC g v - i (1087) Env32 G53W4.25 6/14/2012 10:20:07 AM
TestAmerica, Inc Spectrum name: 9_TunaCan_20120147.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	185.85	46.57	18837.	55553.	15.431	0.67	1.071
AM-241	237.79	59.56	19448.	58492.	16.248	0.66	1.078
CD-109	351.79	88.07	19261.	86792.	24.109	0.48	1.122
CO-57	487.79	122.08	11232.	41484.	11.523	0.73	1.142
Ce-139	662.64	165.81	9084.	39272.	10.909	0.74	1.225
Hg-203	1115.51	279.06	6250.	19221.	5.339	1.24	1.302
SN-113	1565.73	391.64	4864.	28263.	7.851	0.86	1.434
CS-137	2645.81	661.69	4037.	25703.	7.140	0.90	1.605
Y-898	3591.21	898.02	2958.	33728.	9.369	0.69	1.803
Co-1173	4692.36	1173.24	1710.	29087.	8.080	0.72	2.014
Co-1332	5329.80	1332.54	1048.	26026.	7.229	0.70	2.088
Y-1836	7344.62	1835.94	304.	21237.	5.899	0.73	2.457

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	1.4240E+04					8.15E+03		
			46.54	1.424E+04	(	1.646E+02	6.67E-01	4.25E+00	G
AM-241		1.2445E+03					1.58E+05		
			59.54	1.245E+03	(	1.388E+01	6.60E-01	3.57E+01	G
CD-109		1.5902E+04					4.63E+02		
			88.03	1.590E+04	(	1.190E+02	4.84E-01	3.61E+00	G
CO-57		3.4748E+02					2.72E+02		
			122.06	3.475E+02	(	4.159E+00	7.31E-01	8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 6/14/2012 10:20:07 AM
TestAmerica, Inc Spectrum name: 9_TunaCan_20120147.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ce-139	5.3587E+02					1.38E+02	
		165.85	5.359E+02	(	6.097E+00	7.41E-01	7.99E+01 G
Hg-203	1.2167E+03					4.66E+01	
		279.17	1.217E+03	(	2.349E+01	1.24E+00	8.15E+01 G
SN-113	9.7065E+02					1.15E+02	
		391.69	9.707E+02	(	1.125E+01	8.60E-01	6.40E+01 G
CS-137	4.6658E+02					1.10E+04	
		661.66	4.666E+02	(	5.424E+00	8.98E-01	8.52E+01 G
Y-898	1.5525E+03					1.07E+02	
		898.02	1.552E+03	(	1.179E+01	6.92E-01	9.37E+01 G
Co-1173	7.2712E+02					1.93E+03	
		1173.24	7.271E+02	(	4.884E+00	7.20E-01	9.99E+01 G
Co-1332	7.1975E+02					1.93E+03	
		1332.50	7.198E+02	(	4.248E+00	6.98E-01	1.00E+02 G
Y-1836	1.6388E+03					1.07E+02	
		1836.01	1.639E+03	(	6.479E+00	7.29E-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 6/14/2012 10:20:07 AM
TestAmerica, Inc Spectrum name: 9_TunaCan_20120147.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	1.4091E+04	1.4240E+04	6.667E-01%	1.65E+02
AM-241	1.2439E+03	1.2445E+03	6.605E-01%	1.39E+01
CD-109	1.3223E+04	1.5902E+04	4.843E-01%	1.19E+02
CO-57	2.5385E+02	3.4748E+02	7.313E-01%	4.16E+00
Ce-139	2.8828E+02	5.3587E+02	7.410E-01%	6.10E+00
Hg-203	1.9517E+02	1.2167E+03	1.239E+00%	2.35E+01
SN-113	4.6244E+02	9.7065E+02	8.599E-01%	1.13E+01
CS-137	4.6297E+02	4.6658E+02	8.981E-01%	5.42E+00
Y-898	6.9723E+02	1.5525E+03	6.917E-01%	1.18E+01
Co-1173	6.9559E+02	7.2712E+02	7.204E-01%	4.88E+00
Co-1332	6.8854E+02	7.1975E+02	6.982E-01%	4.25E+00
Y-1836	7.3602E+02	1.6388E+03	7.291E-01%	6.48E+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 1999.7 keV) 3.304E+04 Bq
Total Decayed Activity (37.6 to 1999.7 keV) 3.9561668E+04 Bq

Analyzed by: _____
admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica, Inc

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

ORTEC g v - i (1087) Env32 G53W4.25 10/4/2012 9:11:35 AM
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:	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

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     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	Peak 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:	Ge16
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	14377	96.3
Am-241	2037	418	0.3590	1163	1228.5	105.6
Cd-109	2881	591	0.0361	16363	16032	98.0
Co-57	1511	310	0.8560	362	349.8	96.7
Ce-139	2139	439	0.7990	549	538.18	98.0
Sn-113	3015	618	0.6400	966	969.68	100.4
Cs-137	1938	397	0.8510	467	468.24	100.3
Y-88	7264	1489	0.9370	1589	1552.4	97.7
Co-60	3580	734	0.9997	734	725.6	98.8
Co-60	3581	734	0.9999	734	726.23	98.9
Y-88	7690	1577	0.9920	1589	1629.1	102.5

Reviewed By: Jody Watson

Date: 7/13/2012

Calibration Data from file: 16_Soil_TunaCan.Clb
Energy Calibration Date: 7/13/2012 Time: 9:47:11 AM
Efficiency Calibration Date: 7/13/2012 Time: 9:47:24 AM

Calibration Description:
16_TunaCan_90099_071012

Energy Calibration Fit
Energy = 0.1106 +0.250095*Channel -1.95476e-008*Channel**2
FWHM (ch) = 3.6339 +0.000937*Channel -2.1273e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.57	46.54	46.52	0.04%	0.97	0.95	1.52%
237.71	59.54	59.56	-0.03%	0.95	0.96	-1.11%
351.71	88.03	88.07	-0.05%	1.00	0.99	0.52%
487.80	122.06	122.10	-0.04%	1.03	1.02	1.07%
662.91	165.85	165.89	-0.03%	1.08	1.06	1.71%
1115.49	279.17	279.06	0.04%	1.13	1.16	-3.06%
1565.59	391.69	391.61	0.02%	1.25	1.26	-0.74%
2645.84	661.66	661.68	-0.00%	1.44	1.49	-3.61%
3591.32	898.02	898.03	-0.00%	1.74	1.68	3.44%
4692.55	1173.24	1173.26	-0.00%	1.94	1.89	2.70%
5329.87	1332.50	1332.53	-0.00%	1.95	2.01	-2.97%
7344.93	1836.01	1835.99	0.00%	2.34	2.34	0.11%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.0068 %
Ln(Eff) = 0.0148 -0.551427*Ln(Eng) -0.0144348*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.1708 %
Ln(Eff) = -24.0844 +8.948554*Ln(Eng) -0.95136*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.2670E-002	2.3523E-002	-3.76%
59.54	3.4907E-002	3.3268E-002	4.69%
88.03	4.4561E-002	4.5501E-002	-2.11%
122.06	4.5678E-002	4.7288E-002	-3.52%
165.85	========== Knee ==========		
165.85	4.0710E-002	4.1557E-002	-2.08%
279.17	2.9697E-002	2.8765E-002	3.14%
391.69	2.2647E-002	2.2549E-002	0.43%
661.66	1.5445E-002	1.5368E-002	0.50%
898.02	1.1965E-002	1.2246E-002	-2.35%
1173.24	9.8925E-003	1.0017E-002	-1.26%
1332.50	8.9987E-003	9.0965E-003	-1.09%
1836.01	7.2985E-003	7.1212E-003	2.43%

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  7/13/2012 9:50:48 AM
TestAmerica, Inc.                Spectrum name: 16_Soil_TunaCan_90099_20120752.A

Sample description
     16_Soil_TunaCan_90099_071012


Spectrum Filename: C:\User\SPC\Det16\16_Soil_TunaCan_90099_20120752.A

Acquisition information
       Start time:                 7/10/2012 10:35:34 AM
       Live time:               3600
       Real time:               3674
       Dead time:                  2.03 %
       Detector ID:                   16

Detector system
     Ge16 SN/11012217


Calibration
       Filename:                   16_Soil_TunaCan.Clb
     16_TunaCan_90099_071012


       Energy Calibration
            Created:               7/13/2012 9:47:11 AM
            Zero offset:           0.111 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -1.955E-08 keV/channel^2

       Efficiency Calibration
            Created:               7/13/2012 9:47:24 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.01 %
            Log(Eff):              1.477416E-02 + (-5.514266E-01*Log(E) ) +
                                   ( -1.443482E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.17 %
            Log(Eff):             -2.408438E+01 + ( 8.948554E+00*Log(E) ) +
                                   ( -9.513599E-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 (    37.62keV )
       Stop channel:            8000 (  1999.62keV )
       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 7/13/2012 9:50:48 AM
TestAmerica, Inc. Spectrum name: 16_Soil_TunaCan_90099_20120752.A

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: 0.0309

***** 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	50908.	0.67	0.97	2.351E-02	46.54	4.250	1.438E+04	Pb210
59.56	52484.	0.66	0.95	3.328E-02	59.54	35.700	1.229E+03	AM241
88.07	71211.	0.52	1.00	4.551E-02	88.03	3.610	1.603E+04	CD109
122.10	31320.	0.80	1.03	4.728E-02	122.06	85.600	3.498E+02	CO57
136.55	3896.	3.92	1.12	4.572E-02				
165.89	24588.	0.86	1.08	4.155E-02	165.85	79.900	5.382E+02	Ce139
279.05	6035.	2.82	1.13	2.877E-02	279.17	81.500	1.223E+03	Hg203
391.61	15948.	1.14	1.25	2.255E-02	391.69	64.000	9.697E+02	SN113
661.68	21809.	0.83	1.44	1.537E-02	661.66	85.210	4.682E+02	CS137
898.03	18524.	0.90	1.74	1.225E-02	898.02	93.700	1.552E+03	Y898
1173.26	24403.	0.75	1.94	1.002E-02	1173.24	99.900	7.256E+02	Co1173
1332.53	22198.	0.75	1.95	9.096E-03	1332.50	99.982	7.262E+02	Co1332
1835.98	11967.	0.97	2.34	7.121E-03	1836.01	99.200	1.629E+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
545.57	136.55	5299.	3896.	8.521E+04	3.92	1.117	-

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	185.57	46.52	16008.	50908.	14.141	0.67	0.967
AM-241	237.71	59.56	16109.	52484.	14.579	0.66	0.954
CD-109	351.71	88.07	14747.	71211.	19.781	0.52	0.996
CO-57	487.80	122.10	7590.	31320.	8.700	0.80	1.033
Ce-139	662.91	165.89	4947.	24588.	6.830	0.86	1.080
Hg-203	1115.49	279.06	4192.	5963.	1.656	2.79	1.129
SN-113	1565.60	391.61	3105.	15948.	4.430	1.14	1.253
CS-137	2645.84	661.68	2129.	21809.	6.058	0.83	1.439
Y-898	3591.32	898.03	1720.	18524.	5.145	0.90	1.741
Co-1173	4692.53	1173.26	1220.	24403.	6.779	0.75	1.944
Co-1332	5329.86	1332.53	680.	22198.	6.166	0.75	1.948
Y-1836	7344.92	1835.98	144.	11967.	3.324	0.97	2.344

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	1.4377E+04						8.15E+03	
			46.54	1.438E+04	(	1.673E+02	6.66E-01	4.25E+00	G
AM-241		1.2285E+03						1.58E+05	
			59.54	1.229E+03	(	1.391E+01	6.59E-01	3.57E+01	G
CD-109		1.6032E+04						4.63E+02	
			88.03	1.603E+04	(	1.280E+02	5.16E-01	3.61E+00	G
CO-57		3.4980E+02						2.72E+02	
			122.06	3.498E+02	(	4.565E+00	8.01E-01	8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 7/13/2012 9:50:48 AM
TestAmerica, Inc. Spectrum name: 16_Soil_TunaCan_90099_20120752.A

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ce-139	5.3818E+02					1.38E+02	
		165.85	5.382E+02	(	7.233E+00	8.57E-01	7.99E+01 G
Hg-203	1.2081E+03					4.66E+01	
		279.17	1.208E+03	(	6.167E+01	2.79E+00	8.15E+01 G
SN-113	9.6968E+02					1.15E+02	
		391.69	9.697E+02	(	1.595E+01	1.14E+00	6.40E+01 G
CS-137	4.6824E+02					1.10E+04	
		661.66	4.682E+02	(	4.675E+00	8.31E-01	8.52E+01 G
Y-898	1.5524E+03					1.07E+02	
		898.02	1.552E+03	(	1.643E+01	8.98E-01	9.37E+01 G
Co-1173	7.2560E+02					1.93E+03	
		1173.24	7.256E+02	(	4.920E+00	7.53E-01	9.99E+01 G
Co-1332	7.2623E+02					1.93E+03	
		1332.50	7.262E+02	(	4.064E+00	7.46E-01	1.00E+02 G
Y-1836	1.6291E+03					1.07E+02	
		1836.01	1.629E+03	(	7.981E+00	9.68E-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 7/13/2012 9:50:48 AM
TestAmerica, Inc. Spectrum name: 16_Soil_TunaCan_90099_20120752.A

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	1.4145E+04	1.4377E+04	6.660E-01%	1.67E+02
AM-241	1.2275E+03	1.2285E+03	6.589E-01%	1.39E+01
CD-109	1.2043E+04	1.6032E+04	5.162E-01%	1.28E+02
CO-57	2.1493E+02	3.4980E+02	8.011E-01%	4.56E+00
Ce-139	2.0570E+02	5.3818E+02	8.567E-01%	7.23E+00
Hg-203	7.0659E+01	1.2081E+03	2.787E+00%	6.17E+01
SN-113	3.0697E+02	9.6968E+02	1.140E+00%	1.60E+01
CS-137	4.6263E+02	4.6824E+02	8.306E-01%	4.67E+00
Y-898	4.4842E+02	1.5524E+03	8.985E-01%	1.64E+01
Co-1173	6.7738E+02	7.2560E+02	7.529E-01%	4.92E+00
Co-1332	6.7797E+02	7.2623E+02	7.458E-01%	4.06E+00
Y-1836	4.7056E+02	1.6291E+03	9.676E-01%	7.98E+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 1999.6 keV) 3.095E+04 Bq
Total Decayed Activity (37.6 to 1999.6 keV) 3.9805016E+04 Bq

Analyzed by: _____
403135

Reviewed by: _____
Supervisor

Laboratory: TestAmerica, Inc.

Initial Calibration Verifications

2nd Source Verification

Detector:	Ge9
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	1169.4	100.4
Cs-137	1926	396	0.851	465	444.52	95.6
Co-60	3611	742	0.99974	742	687.72	92.7
Co-60	3612	742	0.999856	742	692.56	93.3

Reviewed By: Jody Watson

Date: 6/14/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  6/14/2012 1:20:45 PM    Page  1
TestAmerica, Inc                Spectrum name: 9_TunaCan_20120371.An1

Sample description
     9_TunaCan_90099_061412


Spectrum Filename: C:\User\SPC\Det9\9_TunaCan_20120371.An1

Acquisition information
       Start time:                 6/14/2012 10:54:15 AM
       Live time:               3600
       Real time:               3629
       Dead time:                  0.81 %
       Detector ID:                    9

Detector system
     Ge 9 SN/100113


Calibration
       Filename:                   9_Soil_TunaCan.Clb
     9_Soil_TunaCan_90099_050312


       Energy Calibration
            Created:               6/14/2012 10:19:40 AM
            Zero offset:           0.088 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -2.039E-08 keV/channel^2

       Efficiency Calibration
            Created:               6/14/2012 10:19:51 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.30 %
            Log(Eff):             -8.079856E-01 + (-2.367265E-01*Log(E) ) +
                                   ( -3.950640E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.42 %
            Log(Eff):             -2.387916E+01 + ( 8.875647E+00*Log(E) ) +
                                   ( -9.401100E-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 (    37.60keV )
       Stop channel:            8000 (  1999.66keV )
       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  6/14/2012 1:20:45 PM    Page  2
TestAmerica, Inc                Spectrum name: 9_TunaCan_20120371.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	9_2012-05-27_0502.PBC 5/27/2012 5:02:59 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0390

***** 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
36.54	860.	12.66	1.34	1.634E-02				
46.62	48876.	0.54	1.09	2.580E-02	46.54	4.250	1.338E+04	Pb210
50.03	116.	122.12	1.09	2.886E-02				
59.57	54776.	0.62	1.11	3.661E-02	59.54	35.700	1.169E+03	AM241
63.90	47.	193.18	0.35	3.962E-02				
88.09	26880.	0.87	1.14	5.052E-02	88.03	3.610	1.566E+04	CD109
122.10	5522.	2.86	1.15	5.303E-02	122.06	85.600	3.312E+02	CO57
136.38	729.	11.64	1.25	5.151E-02				
165.67	814.	10.74	1.30	4.629E-02	165.85	79.900	5.417E+02	Ce139
295.46	252.	33.13	0.56	3.229E-02				
316.16	66.	75.82	0.25	3.082E-02				
356.41	45.	97.50	1.36	2.835E-02				
358.68	42.	110.02	1.37	2.822E-02				
379.76	37.	75.05	0.46	2.711E-02				
391.75	310.	24.80	1.08	2.652E-02	391.69	64.000	1.113E+03	SN113
454.98	83.	53.05	0.37	2.383E-02				
568.66	103.	37.41	0.47	2.026E-02				
626.42	84.	49.00	0.45	1.885E-02				
661.66	23324.	0.76	1.61	1.810E-02	661.66	85.210	4.445E+02	CS137
821.54	239.	27.43	0.39	1.536E-02				
876.16	66.	52.19	0.61	1.462E-02				
898.25	346.	23.61	1.52	1.434E-02	898.02	93.700	2.406E+03	Y898
937.90	34.	79.64	0.44	1.387E-02				
1071.41	38.	61.01	0.57	1.249E-02				
1085.31	68.	35.74	1.00	1.237E-02				
1098.64	14.	140.33	0.47	1.225E-02				
1173.23	20836.	0.81	2.05	1.163E-02	1173.24	99.900	6.877E+02	Co1173
1332.49	18966.	0.75	2.11	1.050E-02	1332.50	99.982	6.926E+02	Co1332
1835.90	150.	10.23	1.72	8.080E-03	1836.01	99.200	1.745E+03	Y1836

9_TunaCan_20120371

********** 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
145.76	36.54	3297.	860.	5.262E+04	12.66	1.336	- s
199.48	49.98	8660.	956.	3.313E+04	18.50	0.958	- sM
255.13	63.90	2893.	47.	1.186E+03	193.18	0.347	- sc
544.97	136.38	1941.	729.	1.415E+04	11.64	1.247	-

ORTEC g v - i (3263) Env32 G53W4.25 6/14/2012 1:20:45 PM Page 3

TestAmerica, Inc Spectrum name: 9_TunaCan_20120371.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
1181.07	295.46	1550.	252.	7.804E+03	33.13	0.562	- s
1263.87	316.16	856.	66.	2.136E+03	75.82	0.245	- sc
1424.84	356.47	930.	45.	1.579E+03	97.50	1.363	- sc
1433.89	358.73	1025.	42.	1.473E+03	110.02	1.365	- sc
1518.22	379.76	367.	37.	1.365E+03	75.05	0.460	- sc
1819.03	454.98	702.	83.	3.496E+03	53.05	0.375	- s
2273.73	568.66	433.	103.	5.068E+03	37.41	0.468	- s
2504.73	626.42	460.	84.	4.455E+03	49.00	0.451	- s
3285.25	821.54	812.	239.	1.556E+04	27.43	0.391	- s
3503.76	876.16	400.	66.	4.538E+03	52.19	0.608	- s
3750.76	937.90	332.	34.	2.488E+03	79.64	0.436	- sc
4284.91	1071.41	226.	38.	3.015E+03	61.01	0.571	- s
4340.51	1085.31	224.	68.	5.498E+03	35.74	1.000	- s
4393.86	1098.64	186.	14.	1.143E+03	140.33	0.472	- sc

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	185.86	46.57	13300.	51041.	14.178	0.65	1.116
AM-241	237.82	59.57	11784.	54776.	15.216	0.62	1.111
CD-109	351.87	88.09	5995.	26880.	7.467	0.87	1.137
CO-57	487.85	122.10	3767.	5522.	1.534	2.86	1.155
Ce-139	662.09	165.67	1864.	814.	0.226	10.74	1.299
Hg-203	1120.44	280.29	2362.	-52.	-0.014	133.84	1.296s
SN-113	1565.85	391.67	1962.	266.	0.074	24.38	1.393
CS-137	2645.72	661.66	1258.	23324.	6.479	0.76	1.614
Y-898	3592.12	898.25	1148.	346.	0.096	23.61	1.524s
Co-1173	4692.30	1173.23	840.	20836.	5.788	0.81	2.049
Co-1332	5329.58	1332.49	131.	18966.	5.268	0.75	2.109
Y-1836	7344.43	1835.90	14.	150.	0.042	10.23	1.719s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (3263) Env32 G53W4.25 6/14/2012 1:20:45 PM Page 4

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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
 ____________________________________________________________________________

Pb-210   N   1.3971E+04                                     8.15E+03
                            46.54 1.397E+04  (  1.478E+02 6.46E-01 4.25E+00 G

AM-241       1.1694E+03                                     1.58E+05
                            59.54 1.169E+03  (  1.086E+01 6.16E-01 3.57E+01 G

CD-109       1.5657E+04                                     4.63E+02
                            88.03 1.566E+04  (  2.117E+02 8.71E-01 3.61E+00 G

CO-57        3.3118E+02                                     2.72E+02
                           122.06 3.312E+02  (  1.731E+01 2.86E+00 8.56E+01 G

Ce-139       5.4173E+02                                     1.38E+02
                           165.85 5.417E+02  (  1.357E+02 1.07E+01 7.99E+01 G

Hg-203      -5.2429E-01                                     4.66E+01
                           279.17-5.243E-01 ?(  2.327E+00 1.34E+02 8.15E+01 G

SN-113       9.5260E+02                                     1.15E+02
                           391.69 9.526E+02 ?(  7.503E+02 2.44E+01 6.40E+01 G

CS-137       4.4452E+02                                     1.10E+04
                           661.66 4.445E+02  (  3.202E+00 7.63E-01 8.52E+01 G

Y-898        2.4057E+03                                     1.07E+02
                           898.02 2.406E+03 @(  1.118E+03 2.36E+01 9.37E+01 G

Co-1173      6.8772E+02                                     1.93E+03
                          1173.24 6.877E+02  (  4.547E+00 8.09E-01 9.99E+01 G

Co-1332      6.9256E+02                                     1.93E+03
                          1332.50 6.926E+02  (  2.044E+00 7.49E-01 1.00E+02 G

Y-1836       1.7452E+03                                     1.07E+02
                          1836.01 1.745E+03  (  2.388E+02 1.02E+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:                        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 %
_____________________________________________________________________________
Hg-203     280.29      2362.       -52.    -0.014   133.84   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   *****
        Time of Count  Time Corrected  Uncertainty  1 Sigma
Nuclide     Activity       Activity       Counting                    MDA
               Bq/Sample     Bq/Sample                                Bq/Sample

_____________________________________________________________________________
Pb-210       1.2947E+04    1.3971E+04    6.459E-01%                 1.48E+02
AM-241       1.1648E+03    1.1694E+03    6.156E-01%                 1.09E+01
CD-109       4.0954E+03    1.5657E+04    8.713E-01%                 2.12E+02
CO-57        3.3792E+01    3.3118E+02    2.862E+00%                 1.73E+01
Ce-139       5.9752E+00    5.4173E+02    1.074E+01%                 1.36E+02
Hg-203 #A   -5.2429E-01 >12 Halflives   1.3384E+02%   2.3272E+00
SN-113 #     4.3447E+00    9.5260E+02    2.438E+01%                 7.50E+02
CS-137       4.2011E+02    4.4452E+02    7.635E-01%                 3.20E+00
Y-898  #     7.1422E+00    2.4057E+03    2.361E+01%                 1.12E+03
Co-1173      4.9827E+02    6.8772E+02    8.087E-01%                 4.55E+00
Co-1332      5.0178E+02    6.9256E+02    7.487E-01%                 2.04E+00
Y-1836       5.1813E+00    1.7452E+03    1.023E+01%                 2.39E+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 (  379.7 to  1999.7 keV)     1.968E+04  Bq/Sample
Total Decayed Activity (  379.7 to  1999.7 keV) 3.8598309E+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:	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	-	

ORTEC g v - i (3263) Env32 G53W4.25 7/6/2012 9:20:28 AM Page 3
TestAmerica, Inc. Spectrum name: 14_TunaCan2nd_20120390.An1

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.

ORTEC g v - i (3263) Env32 G53W4.25 7/6/2012 9:20:28 AM Page 4
TestAmerica, Inc. Spectrum name: 14_TunaCan2nd_20120390.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   1.3845E+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:	Ge16
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	1175.5	101.0
Cs-137	1926	396	0.851	465	456.26	98.1
Co-60	3611	742	0.99974	742	696.55	93.8
Co-60	3612	742	0.999856	742	694.91	93.6

Reviewed By: Jody Watson

Date: 7/17/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  7/17/2012 12:43:11 PM   Page  1
TestAmerica, Inc.               Spectrum name: 16_TunaCan2nd_81427_071712.An1

Sample description
     16_Soil_TunaCan2nd_81427


Spectrum Filename: C:\User\SPC\Det16\16_TunaCan2nd_81427_071712.An1

Acquisition information
       Start time:                 7/17/2012 11:27:38 AM
       Live time:               3600
       Real time:               3637
       Dead time:                  1.01 %
       Detector ID:                   16

Detector system
     Ge16 SN/11012217


Calibration
       Filename:                   16_Soil_TunaCan.Clb
     16_TunaCan_90099_071012


       Energy Calibration
            Created:               7/13/2012 9:47:11 AM
            Zero offset:           0.111 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -1.955E-08 keV/channel^2

       Efficiency Calibration
            Created:               7/13/2012 9:47:24 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.01 %
            Log(Eff):              1.477416E-02 + (-5.514266E-01*Log(E) ) +
                                   ( -1.443482E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.17 %
            Log(Eff):             -2.408438E+01 + ( 8.948554E+00*Log(E) ) +
                                   ( -9.513599E-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 (    37.62keV )
       Stop channel:            8000 (  1999.62keV )
       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  7/17/2012 12:43:11 PM   Page  2
TestAmerica, Inc.               Spectrum name: 16_TunaCan2nd_81427_071712.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	16_2012-07-01_0410.PBC 7/1/2012 4:10:46 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0735

***** 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	662.	16.00	0.95	1.502E-02				
46.61	44788.	0.57	0.95	2.354E-02	46.54	4.250	1.344E+04	Pb210
49.73	846.	14.98	0.96	2.615E-02				
51.93	67.	175.93	0.96	2.781E-02				
59.60	50058.	0.62	0.95	3.331E-02	59.54	35.700	1.176E+03	AM241
67.02	327.	40.04	0.43	3.772E-02				
77.05	248.	35.16	0.66	4.226E-02				
88.11	23229.	0.97	1.00	4.552E-02	88.03	3.610	1.578E+04	CD109
92.72	154.	41.19	0.62	4.641E-02				
102.49	234.	36.86	0.72	4.751E-02				
122.18	4603.	2.65	1.08	4.728E-02	122.06	85.600	3.368E+02	CO57
136.63	690.	11.63	1.03	4.571E-02				
165.89	573.	14.69	0.88	4.155E-02	165.85	79.900	5.132E+02	Ce139
279.05	48.	131.87	1.16	2.876E-02	279.17	81.500	HL>Cutoff	Hg203
383.49	28.	109.64	0.60	2.290E-02				
391.47	391.	21.81	0.93	2.256E-02	391.69	64.000	2.012E+03	SN113
416.76	115.	47.52	0.73	2.156E-02				
454.44	148.	42.64	0.71	2.024E-02				
470.03	138.	36.11	1.33	1.974E-02				
471.50	87.	46.19	1.33	1.970E-02				
609.23	184.	25.35	0.44	1.633E-02				
661.72	20285.	0.80	1.52	1.537E-02	661.66	85.210	4.563E+02	CS137
688.53	70.	44.77	0.67	1.492E-02				
756.44	34.	63.94	0.34	1.392E-02				
891.54	148.	42.73	0.38	1.231E-02				
898.03	342.	24.68	0.43	1.225E-02	898.02	93.700	3.456E+03	Y898
1092.88	180.	35.97	0.46	1.057E-02				
1173.34	17966.	0.81	1.90	1.002E-02	1173.24	99.900	6.965E+02	Co1173
1332.62	16290.	0.80	2.05	9.096E-03	1332.50	99.982	6.949E+02	Co1332
1836.30	109.	12.59	1.70	7.121E-03	1836.01	99.200	1.789E+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
145.94	36.61	3330.	662.	4.407E+04	16.00	0.954	-
198.40	49.77	7608.	846.	3.236E+04	14.98	0.955	- D
206.87	51.89	6455.	301.	1.081E+04	38.23	0.957	- D

ORTEC g v - i (3263) Env32 G53W4.25 7/17/2012 12:43:11 PM Page 3
TestAmerica, Inc. Spectrum name: 16_TunaCan2nd_81427_071712.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
267.54	67.02	4805.	327.	8.670E+03	40.04	0.431	- s
307.65	77.05	2954.	248.	5.881E+03	35.16	0.659	- s
370.31	92.72	1548.	154.	3.319E+03	41.19	0.623	- s
409.40	102.49	2168.	234.	4.932E+03	36.86	0.719	- s
545.90	136.63	1724.	690.	1.509E+04	11.63	1.033	-
1533.12	383.49	438.	28.	1.245E+03	109.64	0.596	- c
1666.20	416.76	856.	115.	5.319E+03	47.52	0.732	- s
1816.90	454.44	1051.	148.	7.328E+03	42.64	0.711	- s
1879.23	470.27	1171.	138.	6.985E+03	36.11	1.330	- D
1885.13	471.75	760.	87.	4.406E+03	46.19	1.331	- D
2436.00	609.23	541.	184.	1.125E+04	25.35	0.437	- s
2753.21	688.53	304.	70.	4.691E+03	44.77	0.673	- s
3024.88	756.44	198.	34.	2.419E+03	63.94	0.336	- s
3565.37	891.54	821.	148.	1.199E+04	42.73	0.382	- sM
4370.93	1092.88	734.	180.	1.708E+04	35.97	0.458	- 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	185.74	46.56	12987.	46638.	12.955	0.67	0.934
AM-241	237.89	59.60	10773.	50058.	13.905	0.62	0.952
CD-109	351.86	88.11	5903.	23229.	6.452	0.97	0.996
CO-57	488.11	122.18	2577.	4603.	1.279	2.65	1.080
Ce-139	662.88	165.89	1776.	573.	0.159	14.69	0.876
Hg-203	1115.44	279.05	1953.	48.	0.013	131.87	1.164s
SN-113	1566.59	391.86	1251.	282.	0.078	26.27	0.890s
CS-137	2645.99	661.72	1025.	20285.	5.635	0.80	1.515
Y-898	3591.33	898.03	1130.	342.	0.095	24.68	0.434s
Co-1173	4692.85	1173.34	496.	17966.	4.991	0.81	1.896
Co-1332	5330.25	1332.62	94.	16290.	4.525	0.80	2.052
Y-1836	7346.21	1836.30	14.	109.	0.030	12.59	1.698s

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	1.4024E+04				8.15E+03	
			46.54	1.402E+04	(P	1.605E+02 6.71E-01 4.25E+00	G
AM-241		1.1755E+03				1.58E+05	
			59.54	1.176E+03	(	1.142E+01 6.21E-01 3.57E+01	G
CD-109		1.5779E+04				4.63E+02	
			88.03	1.578E+04	(	2.451E+02 9.70E-01 3.61E+00	G
CO-57		3.3677E+02				2.72E+02	
			122.06	3.368E+02	(	1.751E+01 2.65E+00 8.56E+01	G
Ce-139		5.1324E+02				1.38E+02	
			165.85	5.132E+02	(	1.783E+02 1.47E+01 7.99E+01	G
Hg-203		5.6505E-01				4.66E+01	
			279.17	5.651E-01	*(	2.473E+00 1.32E+02 8.15E+01	G
SN-113		1.4529E+03				1.15E+02	
			391.69	1.453E+03	(	8.626E+02 2.63E+01 6.40E+01	G
CS-137		4.5626E+02				1.10E+04	
			661.66	4.563E+02	(	3.417E+00 8.02E-01 8.52E+01	G
Y-898		3.4565E+03				1.07E+02	
			898.02	3.456E+03	*(	1.611E+03 2.47E+01 9.37E+01	G
Co-1173		6.9655E+02				1.93E+03	
			1173.24	6.965E+02	(	4.129E+00 8.09E-01 9.99E+01	G
Co-1332		6.9491E+02				1.93E+03	
			1332.50	6.949E+02	(	2.043E+00 8.03E-01 1.00E+02	G
Y-1836		1.7894E+03				1.07E+02	
			1836.01	1.789E+03	(	3.307E+02 1.26E+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
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	279.05	1953.	48.	0.013	131.87	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	1.2959E+04	1.4024E+04	6.724E-01%	1.60E+02
AM-241	1.1708E+03	1.1755E+03	6.214E-01%	1.14E+01
CD-109	3.9282E+03	1.5779E+04	9.701E-01%	2.45E+02
CO-57	3.1587E+01	3.3677E+02	2.653E+00%	1.75E+01
Ce-139	4.7936E+00	5.1324E+02	1.469E+01%	1.78E+02
Hg-203 #A	5.6505E-01	>12 Halflives	1.3187E+02%	2.4725E+00
SN-113	5.4311E+00	1.4529E+03	2.627E+01%	8.63E+02
CS-137	4.3030E+02	4.5626E+02	8.015E-01%	3.42E+00
Y-898 #	8.2791E+00	3.4565E+03	2.468E+01%	1.61E+03
Co-1173	4.9870E+02	6.9655E+02	8.087E-01%	4.13E+00
Co-1332	4.9753E+02	6.9491E+02	8.032E-01%	2.04E+00
Y-1836	4.2861E+00	1.7894E+03	1.259E+01%	3.31E+02

ORTEC g v - i (3263) Env32 G53W4.25 7/17/2012 12:43:11 PM Page 6
TestAmerica, Inc. Spectrum name: 16_TunaCan2nd_81427_071712.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 (609.2 to 1999.6 keV) 1.954E+04 Bq/Sample
Total Decayed Activity (609.2 to 1999.6 keV) 4.0374930E+04 Bq/Sample

Annual Calibration Verifications

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANNUAL CALIBRATION VERIFICATION

Detector ID: **Detector # 9**
SpectrumID: 9_20160122003_EffVerif
Analysis Description: ACVTop-776670;TunaCan2006
Calibration: 9_Soil_TunaCan_90099_050312
Detector: Ge9 S/N100228730

Verification Date: 2016-01-22 13:21
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	4.36E+02	2.9%
Cs-137	661.66	400	3.87E+02	3.2%
Co-1332	1332.5	777	7.27E+02	6.4%

Comments:

Perforn _____Amanda Dick 01/22/2016___ Revie ___Amanda Dick 01/22/2016_____

C:\User\CRpt\9_20160122003_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge9 S/N100228730
Source Date: 10/1/2006 11:00
Acquired: 1/22/2016 13:21:35
Analyzed: 2/3/2016 15:04

Analyst: Jody Watson

Efficiency: 9_Soil_TunaCan_90099_050312
Library: DET_EfficiencyVerification.lib

Nuclide	Activity uCi/Source	Uncertainty %
AM-241	4.360E+02	0.41
CS-137	3.871E+02	0.54
Co-1332	7.274E+02	0.81
Total	1.551E+03	

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det9\9_20160122003_EffVerif.An1

Acquisition information
Start time: 1/22/2016 1:21:35 PM
Live time: 7200
Real time: 7243
Dead time: 0.59 %
Detector ID: 9

Detector system
Ge9 S/N100228730

Calibration
Filename: 9_Soil_TunaCan.Clb
9_Soil_TunaCan_90099_050312

Energy Calibration
Created: 3/1/2012 1:57:17 PM
Zero offset: 0.074 keV
Gain: 0.250 keV/channel
Quadratic: -2.269E-08 keV/channel^2

Efficiency Calibration
Created: 6/14/2012 10:19:51 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.30 %
Log(Eff): -8.079856E-01 + (-2.367265E-01*Log(E)) +
(-3.950640E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.42 %
Log(Eff): -2.387916E+01 + (8.875647E+00*Log(E)) +
(-9.401100E-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 (37.59keV)
Stop channel: 8000 (1999.34keV)
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:       0.0668
```

***** 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
36.55	1436.	9.60	1.09	1.635E-02				
46.56	83904.	0.41	1.00	2.575E-02				
59.53	113158.	0.41	0.98	3.658E-02	59.54	100.000	4.360E+02	AM241
87.88	1564.	8.33	1.04	5.046E-02				
661.55	40702.	0.54	1.51	1.810E-02	661.66	100.000	3.871E+02	CS137
1173.01	17970.	0.83	1.93	1.163E-02				
1332.27	16170.	0.81	2.02	1.050E-02	1332.50	100.000	7.274E+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
145.84	36.55	5276.	1436.	8.786E+04	9.60	1.089	-
185.74	46.52	21582.	84830.	3.294E+06	0.49	0.946	-
351.09	87.88	4203.	1564.	3.100E+04	8.33	1.037	-
4692.04	1173.01	526.	17970.	1.545E+06	0.83	1.934	-

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	237.73	59.53	20524.	113158.	15.716	0.41	0.979
CS-137	2645.58	661.55	1216.	40702.	5.653	0.54	1.512
Co-1332	5329.44	1332.27	150.	16170.	2.246	0.81	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 uCi/Source	Peak Energy keV	Peak Activity uCi/Source	Code	MDA Value uCi/Source	COMMENTS
AM-241		4.3599E+02				1.58E+05	
			59.54	4.360E+02	(	2.583E+00 4.07E-01 1.00E+02 G	
CS-137		3.8711E+02				1.10E+04	
			661.66	3.871E+02	(	1.571E+00 5.42E-01 1.00E+02 G	
Co-1332		7.2740E+02				1.93E+03	
			1332.50	7.274E+02	(	2.685E+00 8.13E-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	4.2954E+02	4.3599E+02	4.072E-01%	2.58E+00
CS-137	3.1235E+02	3.8711E+02	5.416E-01%	1.57E+00
Co-1332	2.1385E+02	7.2740E+02	8.132E-01%	2.69E+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 1999.3 keV) 9.557E+02 uCi/Source
Total Decayed Activity (37.6 to 1999.3 keV) 1.5505026E+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 #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 Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. uCi/Sour	Nuc
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 Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected 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 #16**
SpectrumID: 16_20160122005_EffVerif
Analysis Description: ACVTop-776670;TunaCan2006
Calibration: 16_TunaCan_90099_071012
Detector: Ge16 SN/11012217

Verification Date: 2016-01-22 10:56
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	4.42E+02	1.6%
Cs-137	661.66	400	3.99E+02	0.2%
Co-1332	1332.5	777	7.69E+02	1.0%

Comments:

Perforn Amanda Dick 01/22/2016

Revie' Jody Watson 01/22/2016

C:\User\CRpt\16_20160122005_EffVerif.xls

Sample Description: ACVTop-776670;TunaCan2006
Detector: Ge16 SN/11012217
Source Date: 10/1/2006 11:00
Acquired: 1/22/2016 10:56:41
Analyzed: 2/3/2016 14:54

Analyst: Jody Watson

Efficiency: 16_TunaCan_90099_071012
Library: DET_EfficiencyVerification.lib

Nuclide	Activity uCi/Source	Uncertainty %
AM-241	4.416E+02	0.43
CS-137	3.993E+02	0.57
Co-1332	7.690E+02	0.84
Total	1.610E+03	

Sample description
ACVTop-776670;TunaCan2006

Spectrum Filename: C:\User\SPC\Det16\16_20160122005_EffVerif.An1

Acquisition information
Start time: 1/22/2016 10:56:41 AM
Live time: 7200
Real time: 7636
Dead time: 5.70 %
Detector ID: 16

Detector system
Ge16 SN/11012217

Calibration
Filename: 16_Soil_TunaCan.Clb
16_TunaCan_90099_071012

Energy Calibration
Created: 2/28/2012 9:35:31 AM
Zero offset: 0.050 keV
Gain: 0.250 keV/channel
Quadratic: -2.285E-08 keV/channel^2

Efficiency Calibration
Created: 7/13/2012 9:47:24 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.01 %
Log(Eff): 1.477416E-02 + (-5.514266E-01*Log(E)) +
(-1.443482E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.17 %
Log(Eff): -2.408438E+01 + (8.948554E+00*Log(E)) +
(-9.513599E-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 (1999.63keV)
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:       0.0291
```

***** 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
36.50	1362.	9.86	0.91	1.492E-02				
46.55	73583.	0.45	0.96	2.349E-02				
59.54	104212.	0.43	0.98	3.327E-02	59.54	100.000	4.416E+02	AM241
238.61	855.	9.53	1.14	3.217E-02				
661.72	35644.	0.57	1.53	1.537E-02	661.66	100.000	3.992E+02	CS137
1173.34	16190.	0.90	1.97	1.002E-02				
1332.60	14808.	0.84	2.11	9.096E-03	1332.50	100.000	7.690E+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	
145.72	36.50	4998.	1362.	9.127E+04	9.86	0.911	-	s
185.73	46.51	21549.	77213.	3.286E+06	0.52	0.970	-	
953.82	238.61	1829.	855.	2.659E+04	9.53	1.137	-	
4692.71	1173.34	609.	16190.	1.616E+06	0.90	1.966	-	

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	237.84	59.54	19873.	104212.	14.474	0.43	0.978
CS-137	2645.94	661.72	925.	35644.	4.951	0.57	1.529
Co-1332	5330.01	1332.60	89.	14808.	2.057	0.84	2.112

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		4.4160E+02				1.58E+05	
			59.54	4.416E+02	(	2.795E+00 4.26E-01 1.00E+02 G	
CS-137		3.9925E+02				1.10E+04	
			661.66	3.992E+02	(	1.618E+00 5.70E-01 1.00E+02 G	
Co-1332		7.6901E+02				1.93E+03	
			1332.50	7.690E+02	(	2.422E+00 8.41E-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	4.3507E+02	4.4160E+02	4.259E-01%	2.80E+00
CS-137	3.2214E+02	3.9925E+02	5.705E-01%	1.62E+00
Co-1332	2.2610E+02	7.6901E+02	8.409E-01%	2.42E+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 1999.6 keV) 9.833E+02 uCi/Source
Total Decayed Activity (37.6 to 1999.6 keV) 1.6098567E+03 uCi/Source

Monthly Backgrounds

Test America
St. Louis
Background Check

Spectrum: 9_20160709003_BGLong
Description: Background Long PBC Count
Acquired: 7/9/2016 6:01:21 PM
Detector: Detector # 9
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	1.89	1.53	1.65	1.78	2.14	2.26	PASS

Analyst: Aaron Schroder Reviewer:

(Page 1 of 6)

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det9\9_20160709003_BGLong.An1

Acquisition information
Start time: 7/9/2016 6:01:21 PM
Live time: 43200
Real time: 43265
Dead time: 0.15 %
Detector ID: 9

Detector system
Ge9 S/N100228730

Calibration
Filename: 9_QC.Clb
9_QC-E_79670-334_060211

Energy Calibration
Created: 3/1/2012 1:57:17 PM
Zero offset: 0.074 keV
Gain: 0.250 keV/channel
Quadratic: -2.269E-08 keV/channel^2

Efficiency Calibration
Created: 6/3/2011 12:03:10 PM
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 (37.59keV)
Stop channel: 8000 (1999.34keV)
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. 12 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0352

***** 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
238.56	140.	24.98	1.40	1.228E-01	238.63	43.300	6.107E-02	PB212
294.96	165.	23.43	1.07	1.047E-01	295.09	19.300	1.892E-01	PB214
351.94	191.	17.08	1.09	8.640E-02	351.93	37.600	1.359E-01	PB214
609.47	216.	19.48	1.49	5.258E-02	609.31	46.090	2.060E-01	BI214
					610.30	5.750	1.654E+00	RU103
1121.01	112.	19.12	1.59	2.761E-02	1120.29	15.100	6.218E-01	BI214
					1121.30	34.900	2.692E-01	Ta182
					1120.55	99.987	9.392E-02	Sc46
1460.72	227.	10.06	2.13	2.339E-02	1460.83	10.670	2.105E+00	K40
1764.39	104.	15.86	1.69	2.159E-02	1764.49	15.400	7.239E-01	BI214

No unknown peaks passed sensitivity test.

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-212	953.68	238.56	327.	140.	0.003	24.98	1.402s
PB-214	1179.25	294.96	320.	165.	0.004	23.43	1.065
PB-214	1407.15	351.94	237.	191.	0.004	17.08	1.093
BI-214	2437.24	609.47	290.	216.	0.005	19.48	1.489
BI-214	4483.95	1121.01	63.	112.	0.003	19.12	1.589
K-40	5843.59	1460.72	42.	227.	0.005	10.06	2.135
BI-214	7059.23	1764.39	24.	104.	0.002	15.86	1.689s

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 DPS	Value	COMMENTS
K-40	N	2.1052E+00					4.66E+11	
			1460.83	2.105E+00	(	3.052E-01	1.01E+01	1.07E+01 G
PB-212	N	6.1069E-02					6.98E+02	
			238.63	6.107E-02	(	3.783E-02	2.50E+01	4.33E+01 G
			300.03	0.000E+00	%	6.158E-01	0.00E+00	3.28E+00 GA
PB-214	N	1.5396E-01					5.84E+05	
			351.93	1.359E-01	(	5.308E-02	1.71E+01	3.76E+01 G
			295.09	1.892E-01	?(	9.859E-02	2.34E+01	1.93E+01 G
			242.00	0.000E+00		2.316E-01	0.00E+00	7.43E+00 GA
BI-214	N	2.0600E-01					5.84E+05	
			609.31	2.060E-01	?(	7.843E-02	1.95E+01	4.61E+01 G
			1120.29	6.218E-01	+	2.204E-01	1.91E+01	1.51E+01 G
			1764.49	7.239E-01	+	1.778E-01	1.59E+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:
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 DPS	Uncertainty 1 Sigma Counting	MDA
BE-7	<	2.2268E-01		
NA-22	<	1.2110E-02		
K-40		2.1052E+00	1.0055E+01%	3.052E-01
Sc-46	<	2.6318E-02		
CR-51	<	1.4588E-01		
MN-54	<	2.4441E-02		
FE-59	<	4.5821E-02		
Co-56	<	2.9348E-02		
CO-57	<	2.0043E-02		
CO-58	<	2.4324E-02		
CO-60	<	2.3788E-02		
ZN-65	<	7.9526E-02		
NB-94	<	3.7012E-02		
ZR-95	<	3.2868E-02		
NB-95	<	1.9570E-02		
RU-103	<	1.7752E-02		
RH-106	<	1.9929E-01		
AG-108M	<	1.6493E-02		
AG-110M	<	3.4346E-02		
SN-113	<	2.6553E-02		
SB-124	<	2.2455E-02		
SB-125	<	5.1317E-02		
I-131	<	2.0901E-02		
BA-133	<	4.1689E-02		
CS-134	<	2.7899E-02		
CS-137	<	4.2037E-02		
CE-139	<	1.7482E-02		
Ba-140	<	6.7492E-02		
La-140	<	2.5388E-02		
CE-141	<	1.4059E-02		
CE-144	<	1.1506E-01		

PM-144	<	2.4457E-02		
EU-152	<	6.0789E-02		
EU-154	<	1.8309E-01		
EU-155	<	4.1044E-02		
HF-181	<	3.1483E-02		
Ta-182	<	1.3983E-01		
Hg-203	<	2.3837E-02		
TL-208	<	2.2425E-02		
pm-146	<	6.2153E-02		
y-88	<	2.9777E-02		
PB-210	<	6.3478E-01		
PB-212	#	6.1069E-02	2.4984E+01%	3.783E-02
PB-214		1.5396E-01	1.4499E+01%	5.308E-02
BI-207	<	2.8178E-02		
BI-212	<	2.7698E-01		
BI-214		2.0600E-01	1.9475E+01%	7.843E-02
BI-210M	<	2.1006E-02		
RA-224	<	4.4244E-01		
AC-228	<	9.0554E-02		
TH-227	<	6.1717E-02		
TH-229	<	2.3436E-01		
TH-234	<	3.2100E-01		
PA-231	<	5.0862E-01		
PA-233	<	3.2817E-02		
PA-234	<	5.2016E-02		
PA-234M	<	5.1064E+00		
Ra-226	<	4.2726E-01		
U-235	<	1.2786E-01		
AM-241	<	6.0971E-02		
Np-237	<	6.0170E-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 1999.3 keV) 2.526E+00 DPS

(Page 6 of 6)

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

(Page 2 of 8)

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
```

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
```

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

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

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********** 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 Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

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: 16_20160806005_BGLong
Description: Background Long PBC Count
Acquired: 8/6/2016 5:37:18 PM
Detector: Detector #16
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	2.68	2.51	2.56	2.63	2.80	2.86	PASS

Analyst: Mike Aldridge Reviewer: Aaron Schroder

(Page 1 of 8)

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det16\16_20160806005_BGLong.An1

Acquisition information
Start time: 8/6/2016 5:37:18 PM
Live time: 43200
Real time: 43514
Dead time: 0.72 %
Detector ID: 16

Detector system
Ge16 SN/11012217

Calibration
Filename: 16_QC.Clb
16_QC-G_081311

Energy Calibration
Created: 2/28/2012 9:35:31 AM
Zero offset: 0.050 keV
Gain: 0.250 keV/channel
Quadratic: -2.285E-08 keV/channel^2

Efficiency Calibration
Created: 8/14/2011 1:15:14 PM
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 (1999.64keV)
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:	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. 19 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1377

***** 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
46.52	972.	5.40	1.01	7.070E-02	46.54	4.250	1.060E+01	PB210
59.64	255.	16.30	0.97	8.973E-02	59.54	35.900	1.873E-01	AM241
63.27	602.	7.67	0.97	9.499E-02	63.29	3.810	3.851E+00	TH234
74.84	330.	12.81	0.99	1.118E-01				
77.12	219.	19.80	0.99	1.151E-01				
84.48	284.	20.38	0.59	1.257E-01				
92.62	896.	8.70	1.00	1.312E-01	92.59	5.584	2.832E+00	TH234
					93.35	5.561	1.097E+01	AC228
185.66	500.	13.03	1.01	1.130E-01	185.72	54.000	1.895E-01	U235
					185.99	3.280	3.138E+00	Ra226
238.51	323.	14.79	1.15	9.905E-02	238.63	43.300	1.015E+01	PB212
352.11	258.	16.70	1.27	6.901E-02	351.93	37.600	2.310E-01	PB214
					351.93	37.600	2.310E-01	PB214
583.62	170.	23.16	1.73	4.377E-02	583.02	84.500	6.194E+00	TL208
609.56	220.	16.57	1.50	4.174E-02	609.31	46.090	2.660E-01	BI214
					610.30	5.750	HL>Cutoff	RU103
728.17	88.	29.28	1.95	3.465E-02	727.17	7.550	4.558E+01	BI212
1001.53	95.	27.68	1.50	2.469E-02	1001.00	0.837	1.068E+01	PA234M
1120.12	76.	28.69	2.47	2.235E-02	1120.29	15.100	5.205E-01	BI214
					1120.55	99.987	HL>Cutoff	Sc46
					1121.30	34.900	HL>Cutoff	Ta182
1461.37	248.	10.23	2.45	1.797E-02	1460.83	10.670	2.988E+00	K40
1765.11	73.	18.16	2.16	1.550E-02	1764.49	15.400	7.113E-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
299.03	74.89	730.	330.	2.957E+03	12.81	0.986	- sD
308.14	77.17	828.	219.	1.900E+03	19.80	0.988	- sD
337.54	84.48	872.	284.	2.256E+03	20.38	0.593	- 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
PB-210	185.79	46.52	563.	972.	0.022	5.40	1.011
AM-241	237.83	59.54	663.	253.	0.006	15.71	0.971D
TH-234	252.82	63.29	766.	602.	0.014	7.67	0.975D
TH-234	370.57	92.74	1210.	985.	0.023	8.01	1.030s
Ra-226	742.12	185.66	863.	500.	0.012	13.03	1.014s
PB-212	953.41	238.51	560.	323.	0.007	14.79	1.153
PB-214	1407.68	352.11	383.	258.	0.006	16.70	1.271
TL-208	2333.56	583.62	276.	170.	0.004	23.16	1.730s
BI-214	2437.30	609.56	266.	220.	0.005	16.57	1.500
BI-212	2911.74	728.17	130.	88.	0.002	29.28	1.955s
PA-234M	4005.29	1001.53	113.	95.	0.002	27.68	1.505
BI-214	4479.76	1120.12	88.	76.	0.002	28.69	2.471s
K-40	5845.32	1461.37	60.	248.	0.006	10.23	2.449
BI-214	7061.10	1765.11	22.	73.	0.002	18.16	2.157

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	2.9884E+00				4.66E+11	
			1460.83	2.988E+00	?(	4.704E-01 1.02E+01 1.07E+01	G

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```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

TL-208   N   6.1940E+00                                      6.98E+02
                          583.02 6.194E+00 @(  2.919E+00 2.32E+01 8.45E+01 G
                          277.28 0.000E+00 &   1.516E+01 1.00E+03 6.31E+00 G
                          860.56 0.000E+00 %   1.595E+01 4.08E+01 1.24E+01 G

PB-210   N   1.0599E+01                                      8.14E+03
                           46.54 1.060E+01  (  1.236E+00 5.40E+00 4.25E+00 G

PB-212   N   1.0153E+01                                      6.98E+02
                          238.63 1.015E+01  (  3.551E+00 1.48E+01 4.33E+01 G
                          300.03 0.000E+00 %   2.951E+01 7.78E+02 3.28E+00 GA

PB-214   N   2.3096E-01                                      5.84E+05
                          351.93 2.310E-01  (  8.414E-02 1.67E+01 3.76E+01 G

BI-212   N   4.5584E+01                                      6.98E+02
                          727.17 4.558E+01 &(  2.871E+01 2.93E+01 7.55E+00 G
                          785.42 0.000E+00 %   1.331E+02 1.02E+02 1.28E+00 GA

BI-214   N   2.6599E-01                                      5.84E+05
                          609.31 2.660E-01 ?(  9.517E-02 1.66E+01 4.61E+01 G
                         1120.29 5.205E-01 +   3.192E-01 2.87E+01 1.51E+01 G
                         1764.49 7.113E-01 +   2.394E-01 1.82E+01 1.54E+01 G

TH-234   N   3.8501E+00                                      1.63E+12
                           63.29 3.850E+00  (  8.423E-01 7.67E+00 3.81E+00 G
                           92.59 3.112E+00 -   5.207E-01 8.01E+00 5.58E+00 G

PA-234M  N   1.0679E+01                                      1.63E+12
                         1001.00 1.068E+01  (  5.844E+00 2.77E+01 8.37E-01 G
                          766.41 0.000E+00 &   9.438E+00 1.18E+02 2.94E-01 G

Ra-226       3.1375E+00                                      5.84E+05
                          185.99 3.138E+00 @(  8.768E-01 1.30E+01 3.28E+00 G

AM-241   T   1.8542E-01                                      1.58E+05
                           59.54 1.854E-01  (  8.996E-02 1.57E+01 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	Time Corrected Activity DPS	Uncertainty Counting 1 Sigma	MDA
BE-7			>12 Halflives		
NA-22	<	3.0357E-02	5.9966E-01		
K-40	#	2.9884E+00	2.9884E+00	1.023E+01%	4.70E-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	<	3.3600E-02	1.4653E-01		
ZN-65			>12 Halflives		
NB-94	<	4.4994E-02	4.5011E-02		
ZR-95			>12 Halflives		
NB-95			>12 Halflives		
RU-103			>12 Halflives		
RH-106	<	3.0330E-01	5.9952E+02		
AG-108M	<	2.4546E-02	2.5006E-02		

AG-110M		>12 Halflives			
SN-113		>12 Halflives			
SB-124		>12 Halflives			
SB-125	<	7.8184E-02	1.3043E+00		
I-131		>12 Halflives			
BA-133	<	3.8631E-02	8.0685E-02		
CS-134	<	1.8334E-02	7.8703E-01		
CS-137	<	3.5977E-02	4.6601E-02		
CE-139		>12 Halflives			
Ba-140		>12 Halflives			
La-140		>12 Halflives			
CE-141		>12 Halflives			
CE-144		>12 Halflives			
PM-144	<	4.3929E-02	1.0835E+02		
EU-152	<	6.5184E-02	1.1566E-01		
EU-154	<	2.7755E-01	6.8497E-01		
EU-155	<	7.0831E-02	3.3878E-01		
HF-181		>12 Halflives			
Ta-182		>12 Halflives			
Hg-203		>12 Halflives			
TL-208	#	1.0639E-01	6.1940E+00	2.316E+01%	2.92E+00
pm-146	<	8.5016E-02	3.4605E-01		
y-88		>12 Halflives			
PB-210		7.4832E+00	1.0599E+01	5.402E+00%	1.24E+00
PB-212		1.7439E-01	1.0153E+01	1.479E+01%	3.55E+00
PB-214	#	2.2985E-01	2.3096E-01	1.670E+01%	8.41E-02
BI-207	<	4.6789E-02	5.9545E-02		
BI-212	#	7.8297E-01	4.5584E+01	2.928E+01%	2.87E+01
BI-214		2.6470E-01	2.6599E-01	1.657E+01%	9.52E-02
BI-210M	<	3.2298E-02	3.2298E-02		
RA-224	<	5.9769E-01	3.4797E+01		
AC-228	<	1.9620E-01	7.5685E-01		
TH-227	<	1.5253E-01	2.1788E-01		
TH-229	<	3.5694E-01	3.5732E-01		
TH-234		3.8501E+00	3.8501E+00	7.675E+00%	8.42E-01
PA-231	<	7.3042E-01	7.3059E-01		
PA-233	<	4.4685E-02	4.4685E-02		
PA-234	<	1.3657E-01	1.3657E-01		
PA-234M		1.0679E+01	1.0679E+01	2.768E+01%	5.84E+00
Ra-226	#	3.1224E+00	3.1375E+00	1.303E+01%	8.77E-01
U-235	<	1.3493E-01	1.3493E-01		
AM-241		1.8213E-01	1.8542E-01	1.571E+01%	9.00E-02
Np-237	<	1.7913E-01	1.7936E-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  1999.6 keV)     2.986E+01  DPS
Total Decayed Activity (   37.6 to  1999.6 keV) 9.3867340E+01  DPS
```

Run Logs

Gamma Spectroscopy Run Log

Detector: GV9

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/03/12 13:37		IC 160-12326/1		12326			JLW
06/14/12 10:54		ICV 160-12326/2		12326			JLW
01/22/16 13:21		ACVTOP 160-235884/1		235884			PS
07/09/16 18:01		ICB 160-259828/1		259828			RTM
08/25/16 01:24		CCB 160-266525/1		266525			RTM
08/25/16 02:18		CCV 160-266525/2		266525			
08/25/16 02:43		CCV 160-266525/3		266525			RTM
08/25/16 04:29	30	ZZZZZ		266525			
08/25/16 07:28	30	ZZZZZ		266525			
08/25/16 08:01	30	ZZZZZ		266525			
08/25/16 08:34	30	ZZZZZ		266525			
08/25/16 09:09	30	ZZZZZ		266525			
08/25/16 09:52	30	160-18426-3	WR111-SP-021-C-P-00	266525	263537	901.1	RTM
08/25/16 10:26	30	MB 160-263537/1-A		266525	263537	901.1	RTM
08/25/16 10:58	60	ZZZZZ		266525			
08/25/16 12:07	60	ZZZZZ		266525			
08/25/16 13:09	60	ZZZZZ		266525			
08/25/16 14:13	60	ZZZZZ		266525			
08/25/16 15:27	60	ZZZZZ		266525			
08/25/16 16:57	30	ZZZZZ		266525			
08/25/16 17:39	60	ZZZZZ		266525			
08/25/16 19:11	30	ZZZZZ		266525			
08/25/16 20:05	30	ZZZZZ		266525			
08/25/16 20:46	30	ZZZZZ		266525			
08/25/16 21:20	30	ZZZZZ		266525			
08/25/16 21:53	30	ZZZZZ		266525			
08/25/16 22:36	120	ZZZZZ		266525			

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
08/25/16 00:45		CCB 160-266526/1		266526			RTM
08/25/16 01:23		CCV 160-266526/2		266526			
08/25/16 01:52		CCV 160-266526/3		266526			RTM
08/25/16 02:16	120	ZZZZZ		266526			
08/25/16 04:30	120	ZZZZZ		266526			
08/25/16 07:27	30	ZZZZZ		266526			
08/25/16 08:00	30	ZZZZZ		266526			
08/25/16 08:32	30	ZZZZZ		266526			
08/25/16 09:10	30	ZZZZZ		266526			
08/25/16 09:50	30	160-18426-2	WR111-SP-020-C-P-00	266526	263537	901.1	RTM
08/25/16 10:25	30	160-18426-1 DU	WR111-SP-019-C-P-00 DU	266526	263537	901.1	RTM
08/25/16 11:01	60	ZZZZZ		266526			
08/25/16 12:09	60	ZZZZZ		266526			
08/25/16 13:13	120	ZZZZZ		266526			
08/25/16 15:30	120	ZZZZZ		266526			
08/25/16 17:32	120	ZZZZZ		266526			
08/25/16 20:07	120	ZZZZZ		266526			

Gamma Spectroscopy Run Log

Detector: GV12 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/25/16 22:37	120	ZZZZZ		266526			

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
08/25/16 00:37		CCV 160-266451/1		266451			
08/25/16 01:01		CCV 160-266451/2		266451			RTM
08/25/16 01:21		CCB 160-266451/3		266451			RTM
08/25/16 02:10	120	ZZZZZ		266451			
08/25/16 04:31	120	ZZZZZ		266451			
08/25/16 07:25	30	ZZZZZ		266451			
08/25/16 07:58	30	ZZZZZ		266451			
08/25/16 08:29	30	ZZZZZ		266451			
08/25/16 09:09	30	ZZZZZ		266451			
08/25/16 09:46	30	160-18426-1	WR111-SP-019-C-P-00	266451	263537	901.1	RTM
08/25/16 10:23	60	ZZZZZ		266451			
08/25/16 11:29	60	ZZZZZ		266451			
08/25/16 13:07	120	ZZZZZ		266451			
08/25/16 15:12	120	ZZZZZ		266451			
08/25/16 17:18	120	ZZZZZ		266451			
08/25/16 20:07	120	ZZZZZ		266451			
08/25/16 22:37	120	ZZZZZ		266451			

Detector: GV16

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/10/12 10:35		IC 160-12382/1		12382			JLW
07/17/12 11:27		ICV 160-12382/2		12382			JLW
01/22/16 10:56		ACVTOP 160-235879/1		235879			PS
08/06/16 17:37		ICB 160-263719/1		263719			ALS
08/25/16 00:39		CCV 160-266452/1		266452			
08/25/16 01:03		CCV 160-266452/2		266452			ALS
08/25/16 01:22		CCB 160-266452/3		266452			ALS
08/25/16 02:11	30	ZZZZZ		266452			
08/25/16 03:59	30	ZZZZZ		266452			
08/25/16 04:32	30	ZZZZZ		266452			
08/25/16 07:25	30	ZZZZZ		266452			
08/25/16 07:57	30	ZZZZZ		266452			
08/25/16 08:31	30	ZZZZZ		266452			
08/25/16 09:07	30	ZZZZZ		266452			
08/25/16 09:46	30	LCS 160-263537/2-A		266452	263537	901.1	ALS
08/25/16 10:24	60	ZZZZZ		266452			
08/25/16 11:27	60	ZZZZZ		266452			
08/25/16 13:08	60	ZZZZZ		266452			
08/25/16 14:15	60	ZZZZZ		266452			
08/25/16 15:30	60	ZZZZZ		266452			
08/25/16 16:57	30	ZZZZZ		266452			
08/25/16 17:38	60	ZZZZZ		266452			
08/25/16 19:08	30	ZZZZZ		266452			

Gamma Spectroscopy Run Log

Detector: GV16 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/25/16 20:08	30	ZZZZZ		266452			
08/25/16 20:47	30	ZZZZZ		266452			
08/25/16 21:20	30	ZZZZZ		266452			
08/25/16 21:54	120	ZZZZZ		266452			
08/25/16 23:58	120	ZZZZZ		266452			

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

Regulatory Program: ☐DW ☐NPDES ☐RCRA ☐Other:

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Greg Bright	Site Contact: Bachir Badaoui	Date: 7/29/2016	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:
WR111-SP-019-C-P-00	7/29/2016	1200		S	1			X	X	
WR111-SP-020-C-P-00	7/29/2016	1220		S	1			X	X	
WR111-SP-021-C-P-00	7/29/2016	1230		S	1			X	X	

160-18426 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	7/29/2016 1530	Gil Clarke	TA STL	8.1.16 0825
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Login Sample Receipt Checklist

Client: EA Engineering, Science, and Technology

Job Number: 160-18426-1

Login Number: 18426
List Number: 1
Creator: Clarke, Jill C

List Source: TestAmerica St. Louis

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