ANALYTICAL REPORT

Job Number: 180-111757-1

Job Description: JOF_SES_20201001_1B

For:
Environmental Standards Inc.
1140 Valley Forge Road
PO BOX 810
Valley Forge, PA 19482-0810

Attention: Amanda Cover

Approved for release.
Jennifer L Rumble
Project Manager I
12/29/2020 10:02 AM

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12/29/2020
Revision: 1

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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Qualifiers

Rad

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Revised COC appended to the laboratory report

This report was revised to attach missing ICV data in the level 4 report.

Receipt
The samples were received on 10/2/2020 9:00 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.5º C.

RAD
Method 901.1: Gamma prep batch 160-486236:
Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Ac-228	Ra-228
Bi-214	Ra-226

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.
JOF-SES-01-20201001 ~ AOI1 (180-111757-1), JOF-SES-01-20201001 ~ AOI1 (180-111757-1[DU]), (LCS 160-486236/2-A) and (MB 160-486236/1-A)

Method 901.1: Gamma Prep Batch 160-486234
Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Ac-228	Ra-228
Bi-214	Ra-226

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.
JOF-SES-FB01-20201001 ~ AOI1 (180-111757-2), JOF-SES-EB01-20201001 ~ AOI1 (180-111757-3) and (180-111757-B-2-B DU)

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

Detection Summary

Client: Environmental Standards Inc.
Project/Site: JOF_SES_20201001_1B

Job ID: 180-111757-1

Client Sample ID: JOF-SES-01-20201001 ~ AOI1 — Lab Sample ID: 180-111757-1

No Detections.

Client Sample ID: JOF-SES-FB01-20201001 ~ AOI1 — Lab Sample ID: 180-111757-2

No Detections.

Client Sample ID: JOF-SES-EB01-20201001 ~ AOI1 — Lab Sample ID: 180-111757-3

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: JOF_SES_20201001_1B

Job ID: 180-111757-1

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

Client Sample ID: JOF-SES-01-20201001 ~ AOI1
Date Collected: 10/01/20 12:00
Date Received: 10/02/20 09:00

Lab Sample ID: 180-111757-1
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.25		0.224	0.259	1.00	0.169	pCi/g	10/19/20 18:37	11/12/20 13:17	1
Radium-228	0.944		0.232	0.251		0.142	pCi/g	10/19/20 18:37	11/12/20 13:17	1
Radium 226 and 228 (positive only)	2.19		0.322	0.361			pCi/g	10/19/20 18:37	11/12/20 13:17	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: JOF_SES_20201001_1B

Job ID: 180-111757-1

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

Client Sample ID: JOF-SES-FB01-20201001 ~ AOI1
Date Collected: 10/01/20 10:30
Date Received: 10/02/20 09:00

Lab Sample ID: 180-111757-2
Matrix: Water

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and Radium 228	39.2	U	40.0	40.2			pCi/L	10/19/20 18:32	11/12/20 18:16	1
Radium-226	**28.0**		19.6	19.9	50.0	24.1	pCi/L	10/19/20 18:32	11/12/20 18:16	1
Radium-228	11.2	U	34.9	34.9	50.0	50.0	pCi/L	10/19/20 18:32	11/12/20 18:16	1

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: JOF_SES_20201001_1B

Job ID: 180-111757-1

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

Client Sample ID: JOF-SES-EB01-20201001 ~ AOI1
Date Collected: 10/01/20 10:40
Date Received: 10/02/20 09:00

Lab Sample ID: 180-111757-3
Matrix: Water

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium 226 and Radium 228	10.3	U	32.8	33.0			pCi/L	10/19/20 18:32	11/12/20 20:58	1
Radium-226	10.3	U	14.8	14.8	50.0	18.9	pCi/L	10/19/20 18:32	11/12/20 20:58	1
Radium-228	-25.2	U	29.3	29.5	50.0	41.5	pCi/L	10/19/20 18:32	11/12/20 20:58	1

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

Lab Sample ID: MB 160-486234/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 488943 — **Prep Batch: 486234**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.5089	U	0.715	0.718	50.0	37.7	pCi/L	10/19/20 18:32	11/12/20 18:13	1
Radium 226 and Radium 228	0.0000	U	11.8	11.8			pCi/L	10/19/20 18:32	11/12/20 18:13	1
Radium-228	-5.028	U	11.8	11.8	50.0	41.5	pCi/L	10/19/20 18:32	11/12/20 18:13	1

Lab Sample ID: LCS 160-486234/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 488944 — **Prep Batch: 486234**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	136000	135300		15900		343	pCi/L	100	90 - 111
Cesium-137	43100	44090		5190		88.7	pCi/L	102	90 - 111
Cobalt-60	24300	25130		2960		67.2	pCi/L	103	89 - 110

Lab Sample ID: 180-111757-2 DU — **Client Sample ID: JOF-SES-FB01-20201001 ~ AOI1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 488944 — **Prep Batch: 486234**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Radium-226	28.0		15.78	U	14.6	50.0	17.8	pCi/L	0.35	1
Radium 226 and Radium 228	39.2	U	20.51	U	19.4			pCi/L	0.31	
Radium-228	11.2	U	4.734	U	12.8	50.0	37.2	pCi/L	0.14	1

Lab Sample ID: MB 160-486236/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 488940 — **Prep Batch: 486236**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.06956	U	0.0622	0.0626	1.00	0.422	pCi/g	10/19/20 18:37	11/12/20 13:18	1
Radium 226 and 228 (positive only)	0.2037	U	0.189	0.190			pCi/g	10/19/20 18:37	11/12/20 13:18	1
Radium-228	0.1341	U	0.179	0.179		0.230	pCi/g	10/19/20 18:37	11/12/20 13:18	1

Lab Sample ID: LCS 160-486236/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 488941 — **Prep Batch: 486236**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	96.4	90.96		9.56		1.07	pCi/g	94	87 - 116
Cesium-137	26.8	25.23		2.68		0.156	pCi/g	94	87 - 120
Cobalt-60	9.57	8.824		0.927		0.0624	pCi/g	92	87 - 115

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

Lab Sample ID: 180-111757-1 DU
Matrix: Solid
Analysis Batch: 488953

Client Sample ID: JOF-SES-01-20201001 ~ AOI1
Prep Type: Total/NA
Prep Batch: 486236

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	1.25			1.507		0.300	1.00	0.140	pCi/g			0.46	1
Radium-228	0.944			0.9422		0.303		0.156	pCi/g			0	1
Radium 226 and 228 (positive only)	2.19			2.449		0.426			pCi/g			0.32	

QC Association Summary

Client: Environmental Standards Inc.
Project/Site: JOF_SES_20201001_1B

Job ID: 180-111757-1

Rad

Leach Batch: 485218

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-111757-1 DU	JOF-SES-01-20201001 ~ AOI1	Total/NA	Solid	Dry and Grind	

Leach Batch: 485696

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-111757-1	JOF-SES-01-20201001 ~ AOI1	Total/NA	Solid	Dry and Grind	

Prep Batch: 486234

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-111757-2	JOF-SES-FB01-20201001 ~ AOI1	Total/NA	Water	Fill_Geo-21	
180-111757-3	JOF-SES-EB01-20201001 ~ AOI1	Total/NA	Water	Fill_Geo-21	
MB 160-486234/1-A	Method Blank	Total/NA	Water	Fill_Geo-21	
LCS 160-486234/2-A	Lab Control Sample	Total/NA	Water	Fill_Geo-21	
180-111757-2 DU	JOF-SES-FB01-20201001 ~ AOI1	Total/NA	Water	Fill_Geo-21	

Prep Batch: 486236

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-111757-1	JOF-SES-01-20201001 ~ AOI1	Total/NA	Solid	Fill_Geo-21	485696
MB 160-486236/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-486236/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
180-111757-1 DU	JOF-SES-01-20201001 ~ AOI1	Total/NA	Solid	Fill_Geo-21	485218

Lab Chronicle

Client: Environmental Standards Inc.
Project/Site: JOF_SES_20201001_1B

Job ID: 180-111757-1

Client Sample ID: JOF-SES-01-20201001 ~ AOI1

Lab Sample ID: 180-111757-1
Date Collected: 10/01/20 12:00
Matrix: Solid
Date Received: 10/02/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	485696	10/14/20 15:05	AK	TAL SL
Total/NA	Prep	Fill_Geo-21			278.4 g	1.0 g	486236	10/19/20 18:37	HRT	TAL SL
Total/NA	Analysis	901.1		1			488942	11/12/20 13:17	JCB	TAL SL
	Instrument ID: GAMMAVISION									

Client Sample ID: JOF-SES-FB01-20201001 ~ AOI1

Lab Sample ID: 180-111757-2
Date Collected: 10/01/20 10:30
Matrix: Water
Date Received: 10/02/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Fill_Geo-21			1000 mL	1.0 g	486234	10/19/20 18:32	HRT	TAL SL
Total/NA	Analysis	901.1		1			488953	11/12/20 18:16	JCB	TAL SL
	Instrument ID: GAMMAVISION									

Client Sample ID: JOF-SES-EB01-20201001 ~ AOI1

Lab Sample ID: 180-111757-3
Date Collected: 10/01/20 10:40
Matrix: Water
Date Received: 10/02/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Fill_Geo-21			1000 mL	1.0 g	486234	10/19/20 18:32	HRT	TAL SL
Total/NA	Analysis	901.1		1			488943	11/12/20 20:58	JCB	TAL SL
	Instrument ID: GAMMAVISION									

Laboratory References:

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

Analyst References:

Lab: TAL SL
- Batch Type: Leach
  - AK = Amanda Kraus
- Batch Type: Prep
  - HRT = Hannah Tomasovic
- Batch Type: Analysis
  - JCB = Jacob Boyd

Accreditation/Certification Summary

Client: Environmental Standards Inc.
Project/Site: JOF_SES_20201001_1B

Job ID: 180-111757-1

Laboratory: Eurofins TestAmerica, St. Louis

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

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-22
ANAB	Dept. of Defense ELAP	L2305	04-06-22
ANAB	Dept. of Energy	L2305.01	04-06-22
ANAB	ISO/IEC 17025	L2305	04-06-22
Arizona	State	AZ0813	12-08-20
California	Los Angeles County Sanitation Districts	10259	06-30-21
California	State	2886	06-30-21
Connecticut	State	PH-0241	03-31-21
Florida	NELAP	E87689	12-13-20
HI - RadChem Recognition	State	n/a	06-30-21
Illinois	NELAP	004553	11-30-20
Iowa	State	373	11-30-20
Kansas	NELAP	E-10236	10-31-21
Kentucky (DW)	State	KY90125	12-31-20
Louisiana	NELAP	04080	06-30-21
Louisiana (DW)	State	LA011	12-31-20
Maryland	State	310	09-30-21
MI - RadChem Recognition	State	9005	06-30-21
Missouri	State	780	06-30-22
Nevada	State	MO000542020-1	07-31-21
New Jersey	NELAP	MO002	06-30-21
New York	NELAP	11616	04-01-21
North Dakota	State	R-207	06-30-21
NRC	NRC	24-24817-01	12-31-22
Oklahoma	State	9997	08-31-21
Oregon	NELAP	4157	09-01-21
Pennsylvania	NELAP	68-00540	02-28-21
South Carolina	State	85002001	06-30-21
Texas	NELAP	T104704193-19-13	07-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542019-11	07-31-21
Virginia	NELAP	10310	06-14-21
Washington	State	C592	08-30-21
West Virginia DEP	State	381	10-31-21

Method Summary

Client: Environmental Standards Inc.
Project/Site: JOF_SES_20201001_1B

Job ID: 180-111757-1

Method	Method Description	Protocol	Laboratory
901.1	Radium-226 & Other Gamma Emitters (GS)	EPA	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency
None = None

Laboratory References:

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

Sample Summary

Client: Environmental Standards Inc.
Project/Site: JOF_SES_20201001_1B

Job ID: 180-111757-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-111757-1	JOF-SES-01-20201001 ~ AOI1	Solid	10/01/20 12:00	10/02/20 09:00	
180-111757-2	JOF-SES-FB01-20201001 ~ AOI1	Water	10/01/20 10:30	10/02/20 09:00	
180-111757-3	JOF-SES-EB01-20201001 ~ AOI1	Water	10/01/20 10:40	10/02/20 09:00	

REAGENT TRACEABILITY SUMMARY

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 180-111757-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
1L Marn Cal_00001	02/01/70	Eckert & Ziegler, Lot 115244			(Purchased Reagent)		Americium-241	7034 Bq/L
							Cd-109	64040 Bq/L
							Ce-139	2257 Bq/L
							Cesium-137	1887 Bq/L
							Co-57	1629 Bq/L
							Cs-134	7857 Bq/L
							Hg-203	5295 Bq/L
							Mn-54	4454 Bq/L
							Pb-210	59840 Bq/L
							Sn-113	3614 Bq/L
							Sr-85	7206 Bq/L
							Y-88	8215 Bq/L
							Zn-65	11850 Bq/L
1L Marn LCS_00006	09/18/20	Eckert & Ziegler, Lot 83924-334			(Purchased Reagent)		Americium-241	305.85 dpm/g
							Cesium-137	120.21 dpm/g
							Cobalt-60	197.61 dpm/g
1L Marn LCS_00007	08/25/21	Eckert & Ziegler, Lot 83924-334			(Purchased Reagent)		Americium-241	305.85 dpm/g
							Cesium-137	120.21 dpm/g
							Cobalt-60	197.61 dpm/g
Marn Soil_00002	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		Americium-241	2870 Bq
							Cd-109	39231 Bq
							Ce-139	1302 Bq
							Cesium-137	1087 Bq
							Co-57	849 Bq
							Cobalt-60	1788 Bq
							Hg-203	2820 Bq
							Pb-210	35040 Bq
							Sn-113	2306 Bq
							Y-88	3762 Bq
MarnSolid_00002	02/09/17	Eckert & Ziegler, Lot 90099			(Purchased Reagent)		Americium-241	2797 Bq
							Cd-109	39337 Bq
							Ce-139	1320 Bq
							Cesium-137	1122 Bq
							Co-57	870 Bq
							Hg-203	2814 Bq
							Pb-210	35883 Bq
							Sn-113	2322 Bq
							Y-88	3821 Bq
Source E_00001	04/01/59	02/23/11	water, Lot 79670-334	1.0205 g	Gamma Ampuole_00001	1.0205 g	Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: Eurofins TestAmerica, St. Louis Job No.: 180-111757-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Y-88	12712 Bq
.Gamma Ampuole_00001	04/07/59		Analytics, Lot 79670-334		(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source F_00001	01/01/61	02/23/11	water, Lot 83725-334	10 mL	Gamma Ampuole_00003	2.0327 mL	Americium-241	1846.42 Bq
							Cd-109	26819.3 Bq
							Ce-139	890.424 Bq
							Cesium-137	743.562 Bq
							Co-57	580.6 Bq
							Cobalt-60	1222.38 Bq
							Hg-203	1926.02 Bq
							Sn-113	1576.93 Bq
							Y-88	2572.87 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Source 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: Eurofins TestAmerica, St. Louis Job No.: 180-111757-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
Source I_00001	01/01/61	01/01/12	wataer, Lot 83725-334	10 mL	Gamma Ampuole_00003	1.9559 g	Americium-241	1776.66 Bq
							Cd-109	25806 Bq
							Ce-139	856.782 Bq
							Cesium-137	715.468 Bq
							Co-57	558.664 Bq
							Cobalt-60	1176.2 Bq
							Hg-203	1853.25 Bq
							Sn-113	1517.35 Bq
							Y-88	2475.66 Bq
.Gamma Ampuole_00003	01/19/61	Analytics, Lot 83725-334			(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Tuna Can LCS_00010	08/27/21	Analytics, Lot 74139-334			(Purchased Reagent)		Americium-241	219 dpm/g
							Cesium-137	82.3 dpm/g
							Cobalt-60	136 dpm/g
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
							Y-88	1568 Bq

Reagent

1L Marn Cal_00001

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 115244
Source Description: 1.0 Liter Solid in 130G GA-MA Beaker
Product Code: 8703-EG-SD
Customer: Test America Laboratories- St. Louis
P.O. Number: 3060005, Item 2

This standard radionuclide source was prepared gravimetrically from a master radionuclide solution. The master radionuclide solution was prepared gravimetrically by addition of radionuclides calibrated by an ionization chamber, a liquid scintillation counter, or a germanium gamma-ray spectrometer system. Calibration and purity were checked using germanium gamma-ray spectrometry. 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 (NIST) 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."

Density of solid matrix: 1.17 g/cm³ ± 3 %.

Reference Date: 01-February-2020 12:00 PM EST

TCC Mixture

Isotope	Gamma-Ray Energy, keV	Half-Life, d	Activity, Bq	Flux, s^{-1}	Uncertainty u_A, %	u_B, %	U, %*	Calibration Method**
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Am-241	59.5	1.580E+05	7.034E+03	2.525E+03	0.1	1.8	3.7	4π LS
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Co-57	122.1	2.717E+02	1.629E+03	1.394E+03	0.1	1.8	3.7	IC
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hg-203	279.2	4.659E+01	5.295E+03	4.319E+03	0.1	1.8	3.7	IC
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sr-85	514.0	6.485E+01	7.206E+03	7.098E+03	0.1	1.8	3.7	IC
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cs-134	795.9	———	———	6.714E+03	0.1	1.8	3.7	———
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mn-54	834.8	3.121E+02	4.454E+03	4.453E+03	0.1	1.7	3.5	IC
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Y-88	1836.1	———	———	8.149E+03	0.1	1.7	3.5	———
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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

(Certificate continued on reverse side)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

SRS Number: 115244

Expiration Date: 16-March-2021

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____
K. Eardley, Radiochemist

QC Approved by: _____ **Date:** 05-MAR-20
J. Lahr, Spectroscopist

Reagent

1L Marn LCS_00006

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

St. Louis Radiological Standard Verification

Printed: 9/23/2019 1:08 PM

Standard ID Number: 1L Marn LCS_00006 (1801782)
True Value = 44300 pCi/L
Date Analyzed: 9/18/2019

Radionuclide: Cs-137

	Replicates	
#1	44150	pCi/L
#2	43620	pCi/L
#3	41860	pCi/L

Mean = 43210

1 sigma = 1198.7911

1.96 sigma = 2349.63

True Value minus 5% = 42085 (True Value - 5%)
True Value plus 5% = 46515 (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: [illegible] 9/23/19

2nd Reviewed By/Date: SUB 9/23/19

Standard ID Number: 1L Marn LCS_00006 (1801782)
True Value = 28310 pCi/L
Date Analyzed: 9/18/2019

Radionuclide: Co-60

	Replicates	
#1	27790	pCi/L
#2	27830	pCi/L
#3	27640	pCi/L

Mean = 27753.333

1 sigma = 100.16653

1.96 sigma = 196.3264

True Value minus 5% = 26894.5 (True Value - 5%)
True Value plus 5% = 29725.5 (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: Jody Watson 9/23/19

2nd Reviewed By/Date: _____

Standard ID Number: 1L Marn LCS_00006 (1801782)
True Value = 135900 pCi/L
Date Analyzed: 9/18/2019

Radionuclide: Am-241

	Replicates	
#1	129900	pCi/L
#2	130900	pCi/L
#3	130600	pCi/L

Mean = 130466.67

1 sigma = 513.16014

1.96 sigma = 1005.794

True Value minus 5% = 129105 (True Value - 5%)
True Value plus 5% = 142695 (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: Jody Watson 9/23/19

2nd Reviewed By/Date: _____

eurofins

Environment Testing
TestAmerica

Analysis Report for Gamma Spectroscopy

Batch: 442790 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-442790~2-	LCS	1000.00mL	1.00	GammaVision	GV17	9 / 18 / 19 12:32	60

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	5.893E+001pCi/L	2.054E+002	2.054E+002	4.557E+002	2.254E+002	0.13	205.4490
AG-108M	10982	-3.548E+001pCi/L	4.412E+001	4.409E+001	1.104E+002	5.474E+001	-0.32	44.1221
AG-110M	10973	5.741E+001pCi/L	3.963E+001	3.953E+001	3.138E+002	1.559E+002	0.18	39.6275
AM-241	10818	1.299E+005pCi/L	7.504E+003	2.962E+002	4.136E+002	2.062E+002	314.02	7,503.7429
BA-133	10469	-5.896E+000pCi/L	5.530E+000	5.522E+000	1.821E+002	9.048E+001	-0.03	5.5302
BA-140	10463	1.702E+002pCi/L	2.188E+002	2.186E+002	3.620E+002	1.791E+002	0.47	218.7815
BE-7	10435	-4.410E+002pCi/L	3.359E+002	3.351E+002	1.188E+003	5.900E+002	-0.37	335.8582
BI-207	10195	5.488E+001pCi/L	3.493E+001	3.483E+001	1.746E+002	8.620E+001	0.31	34.9296
BI-210M	10173	5.440E+001pCi/L	7.104E+001	7.097E+001	1.863E+002	9.258E+001	0.29	71.0379
BI-212	10160	-6.652E+001pCi/L	4.701E+002	4.701E+002	1.563E+003	7.738E+002	-0.04	470.0771
BI-214	10154	7.519E+001pCi/L	1.181E+002	1.180E+002	3.902E+002	1.940E+002	0.19	118.0801
CD-109	9254	1.067E+004pCi/L	9.162E+002	6.832E+002	2.164E+003	1.077E+003	4.93	916.1711
CD-113M	17462	-5.042E+005pCi/L	4.233E+005	4.221E+005	1.394E+006	6.919E+005	-0.36	423,349.6875
CE-139	9241	1.025E+001pCi/L	2.898E+001	2.897E+001	9.588E+001	4.766E+001	0.11	28.9815
CE-141	9235	4.137E+001pCi/L	5.067E+001	5.062E+001	1.672E+002	8.319E+001	0.25	50.6652
CE-144	9221	-6.480E-001pCi/L	2.318E+002	2.318E+002	7.674E+002	3.819E+002	0.00	231.7837
CF-249	9215	1.758E+001pCi/L	2.490E+001	2.489E+001	2.027E+002	1.008E+002	0.09	24.9022
CF-251	13690	-1.335E+002pCi/L	1.401E+002	1.397E+002	3.672E+002	1.822E+002	-0.36	140.1153
CO-56	8704	-3.836E-001pCi/L	4.121E-001	4.117E-001	1.157E+002	5.715E+001	0.00	0.4121
CO-57	13694	1.969E+001pCi/L	3.289E+001	3.287E+001	8.042E+002	4.002E+002	0.02	32.8888
CO-58	8698	-5.509E+001pCi/L	4.722E+001	4.714E+001	1.557E+002	7.720E+001	-0.35	47.2192
CO-60	8692	2.779E+004pCi/L	1.375E+003	1.049E+002	6.157E+001	2.980E+001	451.29	1,375.2505
CR-51	8604	2.878E+002pCi/L	3.159E+002	3.155E+002	1.043E+003	5.180E+002	0.28	315.9143
CS-134	8553	5.575E+001pCi/L	4.076E+001	4.066E+001	8.680E+001	4.265E+001	0.64	40.7551
CS-136	8546	6.102E+000pCi/L	4.854E+001	4.854E+001	1.623E+002	8.051E+001	0.04	48.5403
CS-137	8539	4.415E+004pCi/L	2.213E+003	1.557E+002	1.081E+002	5.337E+001	408.57	2,212.9965
EU-152	7145	2.679E+002pCi/L	8.648E+001	8.535E+001	2.462E+002	1.218E+002	1.09	86.4837
EU-154	7138	9.648E+001pCi/L	9.131E+001	9.116E+001	1.589E+002	7.899E+001	0.61	91.3142
EU-155	7131	-2.568E-001pCi/L	1.263E+002	1.263E+002	3.000E+002	1.491E+002	0.00	126.2592
FE-59	7073	-1.485E+001pCi/L	2.228E+001	2.227E+001	2.567E+002	1.269E+002	-0.06	22.2800
GA-68	18005	1.789E+003pCi/L	2.490E+003	2.488E+003	5.322E+003	2.627E+003	0.34	2,489.7265
GD-153	6824	-4.159E+000pCi/L	4.419E+000	4.411E+000	1.994E+002	9.907E+001	-0.02	4.4190
HF-181	6495	6.890E+001pCi/L	4.624E+001	4.611E+001	1.732E+002	8.604E+001	0.40	46.2358
HG-203	6466	-3.806E+001pCi/L	3.521E+001	3.515E+001	1.161E+002	5.766E+001	-0.33	35.2144
I-131	6380	6.226E+001pCi/L	4.564E+001	4.553E+001	1.035E+002	5.129E+001	0.60	45.6386
IR-192	6303	-3.654E+001pCi/L	3.220E+001	3.213E+001	1.061E+002	5.267E+001	-0.34	32.1981
K-40	6148	6.368E+000pCi/L	2.109E+002	2.109E+002	4.494E+002	2.146E+002	0.01	210.8634
KR-85	6111	5.826E+003pCi/L	9.073E+003	9.067E+003	3.001E+004	1.490E+004	0.19	9,073.0791
LA-140	6096	1.769E+001pCi/L	2.417E+001	2.415E+001	5.419E+001	2.588E+001	0.33	24.1697
MN-54	5382	-1.202E+001pCi/L	2.480E+001	2.479E+001	1.160E+002	5.735E+001	-0.10	24.8012
NA-22	5201	2.469E+001pCi/L	2.154E+001	2.150E+001	7.141E+001	3.475E+001	0.35	21.5360
NB-94	5160	3.172E+001pCi/L	3.806E+001	3.802E+001	8.760E+001	4.320E+001	0.36	38.0551
NB-95	5154	2.099E+001pCi/L	3.207E+001	3.205E+001	1.064E+002	5.255E+001	0.20	32.0671
ND-147	5083	3.703E+001pCi/L	5.762E+001	5.758E+001	6.951E+002	3.439E+002	0.05	57.6218
NP-237	4757	1.295E+002pCi/L	2.107E+002	2.105E+002	6.956E+002	3.463E+002	0.19	210.6745
NP-239	4751	7.753E+001pCi/L	8.879E+001	8.866E+001	2.929E+002	1.456E+002	0.26	88.7944
PA-231	4541	1.131E+003pCi/L	1.274E+003	1.272E+003	5.541E+003	2.760E+003	0.20	1,273.5192
PA-233	4535	-3.683E+000pCi/L	4.146E+000	4.142E+000	4.608E+002	2.295E+002	-0.01	4.1465
PA-234	4528	2.711E+001pCi/L	3.844E+001	3.841E+001	4.736E+002	2.357E+002	0.06	38.4380

MQO

PA-234M	19453	7.414E+003pCi/L	6.204E+003	6.194E+003	2.046E+004	1.014E+004	0.36	6,204.1494
PB-210	4467	3.047E+004pCi/L	3.435E+003	2.056E+003	6.687E+003	3.338E+003	4.56	3,434.9772
PB-212	4454	-6.742E+000pCi/L	5.567E+001	5.567E+001	2.716E+002	1.351E+002	-0.02	55.6749
PB-214	4448	9.875E+001pCi/L	9.884E+001	9.871E+001	2.608E+002	1.295E+002	0.38	98.8431
PM-144	19585	2.407E+001pCi/L	3.750E+001	3.748E+001	8.643E+001	4.263E+001	0.28	37.5015
PM-146	2464	4.727E+001pCi/L	3.227E+001	3.218E+001	1.708E+002	8.474E+001	0.28	32.2691
RA-226	1950	-5.245E+001pCi/L	7.662E+002	7.662E+002	2.539E+003	1.262E+003	-0.02	766.2427
RH-106	1882	3.528E+001pCi/L	3.467E+002	3.467E+002	1.152E+003	5.709E+002	0.03	346.6943
RU-103	1828	-3.088E+001pCi/L	2.311E+001	2.306E+001	1.067E+002	5.285E+001	-0.29	23.1139
SB-124	1784	3.882E+001pCi/L	2.784E+001	2.776E+001	1.039E+002	4.937E+001	0.37	27.8439
SB-125	1777	-2.555E+001pCi/L	1.272E+002	1.272E+002	3.314E+002	1.643E+002	-0.08	127.2334
SC-46	1739	-4.534E+001pCi/L	5.577E+001	5.573E+001	1.843E+002	9.147E+001	-0.25	55.7728
SN-113	1570	-1.238E+000pCi/L	5.532E+001	5.532E+001	2.212E+002	1.100E+002	-0.01	55.3221
SN-126	17459	3.118E+002pCi/L	1.661E+002	1.652E+002	4.331E+002	2.145E+002	0.72	166.1244
TA-182	1301	8.044E+001pCi/L	5.697E+001	5.684E+001	3.063E+002	1.498E+002	0.26	56.9726
TC-99M	17412	2.351E+001pCi/L	2.977E+001	2.974E+001	9.825E+001	4.888E+001	0.24	29.7712
TH-227	1058	4.526E+002pCi/L	4.384E+002	4.376E+002	1.050E+003	5.208E+002	0.43	438.4331
TH-229	1046	-6.168E+002pCi/L	6.356E+002	6.338E+002	1.666E+003	8.273E+002	-0.37	635.5951
TH-234	1027	1.353E+002pCi/L	4.756E+002	4.756E+002	1.572E+003	7.827E+002	0.09	475.6285
TL-208	929	-5.310E+001pCi/L	2.811E+001	2.799E+001	1.057E+002	5.226E+001	-0.50	28.1123
TL-210	20861	-5.246E+001pCi/L	3.751E+001	3.740E+001	1.234E+002	6.106E+001	-0.43	37.5125
U-235	281	9.397E+001pCi/L	2.301E+002	2.301E+002	7.650E+002	3.806E+002	0.12	230.1457
Y-88	74	1.938E+001pCi/L	2.060E+001	2.057E+001	4.148E+001	1.941E+001	0.47	20.6015
ZN-65	31	-1.211E+002pCi/L	1.275E+002	1.274E+002	4.212E+002	2.089E+002	-0.29	127.5354
ZR-95	7	-8.681E+001pCi/L	4.229E+001	4.207E+001	3.095E+002	1.536E+002	-0.28	42.2890

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor
LCS 160-442790~2-A	LCS 160-442790~2-A	CS-137	4.415E+004 pCi/L	4.430E+004	99.66%	-0.0638
		CO-60	2.779E+004 pCi/L	2.831E+004	98.14%	-0.3532
		AM-241	1.299E+005 pCi/L	1.359E+005	95.59%	-0.7604

Sample Duplicate Information

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

eurofins

Environment Testing
TestAmerica

Analysis Report for Gamma Spectroscopy

Batch: 442824 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-442824~2-	LCS	1000.00mL	1.00	GammaVision	GV17	9 / 19 / 19 21:44	60

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	1.260E+002pCi/L	2.077E+002	2.076E+002	4.598E+002	2.274E+002	0.27	207.6887
AG-108M	10982	-5.227E+000pCi/L	4.337E+001	4.337E+001	1.089E+002	5.398E+001	-0.05	43.3668
AG-110M	10973	4.320E+001pCi/L	5.180E+001	5.176E+001	2.665E+002	1.323E+002	0.16	51.8021
AM-241	10818	1.309E+005pCi/L	7.565E+003	2.958E+002	4.091E+002	2.040E+002	320.06	7,564.6427
BA-133	10469	2.487E+001pCi/L	6.109E+001	6.108E+001	1.794E+002	8.911E+001	0.14	61.0921
BA-140	10463	-6.915E+001pCi/L	5.118E+001	5.106E+001	3.783E+002	1.872E+002	-0.18	51.1813
BE-7	10435	-4.386E+002pCi/L	4.368E+002	4.362E+002	1.288E+003	6.401E+002	-0.34	436.7878
BI-207	10195	-1.052E+002pCi/L	8.519E+001	8.504E+001	1.894E+002	9.361E+001	-0.56	85.1925
BI-210M	10173	-8.197E+000pCi/L	8.042E+001	8.042E+001	1.570E+002	7.789E+001	-0.05	80.4168
BI-212	10160	3.887E+002pCi/L	4.643E+002	4.639E+002	1.537E+003	7.603E+002	0.25	464.3385
BI-214	10154	1.137E+002pCi/L	4.449E+001	4.412E+001	1.438E+002	7.077E+001	0.79	44.4883
CD-109	9254	1.124E+004pCi/L	9.349E+002	6.790E+002	2.144E+003	1.067E+003	5.24	934.9287
CD-113M	17462	-2.524E+004pCi/L	4.357E+005	4.357E+005	1.445E+006	7.176E+005	-0.02	435,657.8194
CE-139	9241	2.615E+001pCi/L	3.020E+001	3.011E+001	9.947E+001	4.946E+001	0.26	30.2003
CE-141	9235	4.204E+001pCi/L	5.160E+001	5.156E+001	1.703E+002	8.473E+001	0.25	51.6018
CE-144	9221	-1.759E+002pCi/L	1.763E+002	1.761E+002	6.819E+002	3.391E+002	-0.26	176.3437
CF-249	9215	-3.751E+001pCi/L	6.583E+001	6.580E+001	2.176E+002	1.082E+002	-0.17	65.8324
CF-251	13690	-1.306E+002pCi/L	1.101E+002	1.095E+002	3.617E+002	1.795E+002	-0.36	110.0910
CO-56	8704	2.503E+001pCi/L	3.717E+001	3.715E+001	1.156E+002	5.710E+001	0.22	37.1717
CO-57	13694	5.796E+001pCi/L	1.588E+001	1.555E+001	5.065E+001	2.510E+001	1.14	15.8758
CO-58	8698	5.114E+001pCi/L	4.647E+001	4.640E+001	1.027E+002	5.067E+001	0.50	46.4718
CO-60	8692	2.783E+004pCi/L	1.377E+003	1.039E+002	6.131E+001	2.967E+001	453.95	1,377.4362
CR-51	8604	-1.665E+002pCi/L	3.130E+002	3.128E+002	1.035E+003	5.143E+002	-0.16	312.9630
CS-134	8553	9.180E+000pCi/L	1.641E+001	1.640E+001	1.643E+002	8.138E+001	0.06	16.4067
CS-136	8546	-5.490E+001pCi/L	4.813E+001	4.803E+001	1.587E+002	7.868E+001	-0.35	48.1308
CS-137	8539	4.362E+004pCi/L	2.187E+003	1.576E+002	1.160E+002	5.736E+001	375.93	2,186.8242
EU-152	7145	2.161E+002pCi/L	1.425E+002	1.420E+002	2.159E+002	1.073E+002	1.00	142.5286
EU-154	7138	1.937E+002pCi/L	3.573E+001	3.412E+001	1.050E+002	5.204E+001	1.84	35.7335
EU-155	7131	-2.568E-001pCi/L	1.249E+002	1.249E+002	3.220E+002	1.601E+002	0.00	124.8583
FE-59	7073	-5.164E+000pCi/L	5.942E+000	5.937E+000	2.531E+002	1.250E+002	-0.02	5.9422
GA-68	18005	1.908E+003pCi/L	2.558E+003	2.556E+003	5.467E+003	2.699E+003	0.35	2,558.4810
GD-153	6824	5.411E+001pCi/L	5.273E+001	5.262E+001	1.846E+002	9.166E+001	0.29	52.7308
HF-181	6495	-1.339E+001pCi/L	8.424E+000	8.397E+000	1.761E+002	8.751E+001	-0.08	8.4241
HG-203	6466	1.404E+001pCi/L	3.404E+001	3.403E+001	1.127E+002	5.597E+001	0.12	34.0383
I-131	6380	-4.380E+001pCi/L	2.259E+001	2.248E+001	1.261E+002	6.260E+001	-0.35	22.5912
IR-192	6303	5.303E+001pCi/L	4.076E+001	4.064E+001	1.176E+002	5.845E+001	0.45	40.7644
K-40	6148	1.424E+002pCi/L	2.173E+002	2.172E+002	4.572E+002	2.185E+002	0.31	217.3479
KR-85	6111	-1.009E+004pCi/L	9.510E+003	9.493E+003	2.271E+004	1.125E+004	-0.44	9,509.9527
LA-140	6096	-2.993E+000pCi/L	2.561E+001	2.561E+001	5.322E+001	2.539E+001	-0.06	25.6131
MN-54	5382	1.437E+002pCi/L	4.931E+001	4.880E+001	1.069E+002	5.279E+001	1.34	49.3097
NA-22	5201	0.000E+000pCi/L	2.102E+001	2.102E+001	7.104E+001	3.457E+001	0.00	21.0178
NB-94	5160	1.218E+001pCi/L	3.726E+001	3.726E+001	8.610E+001	4.245E+001	0.14	37.2605
NB-95	5154	3.839E+001pCi/L	3.216E+001	3.210E+001	1.061E+002	5.244E+001	0.36	32.1615
ND-147	5083	6.536E+001pCi/L	1.001E+002	1.001E+002	6.901E+002	3.414E+002	0.09	100.1242
NP-237	4757	-1.406E+001pCi/L	2.137E+002	2.137E+002	7.071E+002	3.521E+002	-0.02	213.7325
NP-239	4751	7.754E+001pCi/L	8.843E+001	8.830E+001	2.917E+002	1.450E+002	0.27	88.4318
PA-231	4541	0.000E+000pCi/L	3.867E+002	3.866E+002	5.621E+003	2.799E+003	0.00	386.6577
PA-233	4535	0.000E+000pCi/L	6.011E+001	6.010E+001	4.587E+002	2.285E+002	0.00	60.1060
PA-234	4528	1.169E+002pCi/L	1.623E+002	1.622E+002	3.354E+002	1.666E+002	0.35	162.3439

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PA-234M	19453	-9.193E+003pCi/L	4.001E+003	3.976E+003	2.094E+004	1.038E+004	-0.44	4,000.7899
PB-210	4467	3.405E+004pCi/L	3.696E+003	2.051E+003	6.656E+003	3.323E+003	5.12	3,695.9167
PB-212	4454	5.888E+001pCi/L	8.686E+001	8.678E+001	2.867E+002	1.427E+002	0.21	86.8633
PB-214	4448	-1.037E+002pCi/L	4.797E+001	4.767E+001	2.691E+002	1.336E+002	-0.39	47.9722
PM-144	19585	3.179E+001pCi/L	3.413E+001	3.409E+001	8.550E+001	4.216E+001	0.37	34.1260
PM-146	2464	4.265E+001pCi/L	6.893E+001	6.889E+001	1.671E+002	8.292E+001	0.26	68.9257
RH-106	1882	-4.193E+002pCi/L	5.687E+002	5.683E+002	1.879E+003	9.340E+002	-0.22	568.7323
RU-103	1828	9.381E+000pCi/L	4.375E+001	4.375E+001	1.050E+002	5.202E+001	0.09	43.7534
SB-124	1784	7.764E+001pCi/L	2.964E+001	2.938E+001	6.976E+001	3.435E+001	1.11	29.6400
SB-125	1777	1.262E+002pCi/L	9.263E+001	9.241E+001	3.263E+002	1.618E+002	0.39	92.6327
SC-46	1739	1.527E+002pCi/L	5.620E+001	5.570E+001	1.141E+002	5.636E+001	1.34	56.2045
SN-113	1570	5.917E+001pCi/L	6.715E+001	6.709E+001	2.216E+002	1.102E+002	0.27	67.1539
SN-126	17459	1.773E+002pCi/L	1.765E+002	1.762E+002	5.822E+002	2.890E+002	0.30	176.4514
TA-182	1301	-2.171E+002pCi/L	1.794E+002	1.791E+002	5.916E+002	2.933E+002	-0.37	179.4494
TC-99M	17412	-2.371E+001pCi/L	3.012E+001	3.009E+001	9.940E+001	4.946E+001	-0.24	30.1207
TH-227	1058	2.936E+002pCi/L	2.409E+002	2.402E+002	1.036E+003	5.138E+002	0.28	240.8636
TH-229	1046	2.128E+002pCi/L	5.197E+002	5.194E+002	1.587E+003	7.881E+002	0.13	519.6968
TH-234	1027	1.366E+002pCi/L	4.704E+002	4.703E+002	1.555E+003	7.740E+002	0.09	470.3534
TL-208	929	-2.515E+001pCi/L	5.300E+001	5.298E+001	1.022E+002	5.048E+001	-0.25	52.9952
TL-210	20861	0.000E+000pCi/L	2.403E+001	2.403E+001	1.427E+002	7.069E+001	0.00	24.0328
U-235	281	-1.885E+002pCi/L	1.833E+002	1.831E+002	6.971E+002	3.466E+002	-0.27	183.3280
Y-88	74	2.442E+001pCi/L	2.828E+001	2.825E+001	4.458E+001	2.096E+001	0.55	28.2837
ZN-65	31	1.457E+002pCi/L	1.174E+002	1.171E+002	3.868E+002	1.917E+002	0.38	117.3531
ZR-95	7	5.804E+001pCi/L	4.810E+001	4.801E+001	1.720E+002	8.484E+001	0.34	48.0975

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor
LCS 160-442824~2-A	LCS 160-442824~2-A	CS-137	4.362E+004 pCi/L	4.430E+004	98.47%	-0.2864
		CO-60	2.783E+004 pCi/L	2.830E+004	98.36%	-0.3125
		AM-241	1.309E+005 pCi/L	1.359E+005	96.37%	-0.6215

Sample Duplicate Information

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

eurofins Environment Testing TestAmerica

Analysis Report for Gamma Spectroscopy

Batch: 442125 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-442125~2-	LCS	1000.00mL	1.00	GammaVision	GV16	9 / 20 / 19 11:32	60

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	5.052E+001pCi/L	2.070E+002	2.070E+002	4.427E+002	2.191E+002	0.11	206.9764
AG-108M	10982	1.946E+001pCi/L	4.865E+001	4.864E+001	1.117E+002	5.545E+001	0.17	48.6485
AG-110M	10973	5.363E+001pCi/L	3.063E+001	3.051E+001	2.336E+002	1.159E+002	0.23	30.6266
AM-241	10818	1.306E+005pCi/L	7.543E+003	2.824E+002	3.945E+002	1.968E+002	330.97	7,543.1641
BA-133	10469	-5.938E+001pCi/L	5.281E+001	5.272E+001	1.741E+002	8.652E+001	-0.34	52.8137
BA-140	10463	-3.906E+001pCi/L	4.054E+001	4.049E+001	3.658E+002	1.812E+002	-0.11	40.5376
BE-7	10435	-4.662E+002pCi/L	4.723E+002	4.718E+002	1.557E+003	7.750E+002	-0.30	472.3389
BI-207	10195	-4.598E+001pCi/L	1.993E+001	1.980E+001	1.802E+002	8.910E+001	-0.26	19.9270
BI-210M	10173	8.992E+001pCi/L	5.672E+001	5.648E+001	1.295E+002	6.422E+001	0.69	56.7237
BI-212	10160	3.918E+002pCi/L	4.477E+002	4.473E+002	1.481E+003	7.332E+002	0.26	447.7272
BI-214	10154	2.184E+001pCi/L	5.824E+001	5.823E+001	3.855E+002	1.918E+002	0.06	58.2435
CD-109	9254	1.561E+004pCi/L	1.050E+003	5.528E+002	1.187E+003	5.890E+002	13.15	1,050.0335
CD-113M	17462	-5.491E+005pCi/L	4.609E+005	4.595E+005	1.517E+006	7.539E+005	-0.36	460,861.9779
CE-139	9241	-2.273E+001pCi/L	2.845E+001	2.838E+001	9.376E+001	4.663E+001	-0.24	28.4510
CE-141	9235	-4.783E+001pCi/L	4.714E+001	4.708E+001	1.177E+002	5.845E+001	-0.41	47.1434
CE-144	9221	1.953E+002pCi/L	2.881E+002	2.879E+002	9.507E+002	4.737E+002	0.21	288.1256
CF-249	9215	-7.679E+000pCi/L	6.452E+000	6.440E+000	2.091E+002	1.040E+002	-0.04	6.4524
CF-251	13690	-7.912E+001pCi/L	1.434E+002	1.432E+002	3.586E+002	1.781E+002	-0.22	143.3940
CO-56	8704	5.984E+001pCi/L	5.172E+001	5.164E+001	1.101E+002	5.446E+001	0.54	51.7200
CO-57	13694	1.543E+001pCi/L	2.267E+001	2.265E+001	9.989E+002	4.978E+002	0.02	22.6696
CO-58	8698	-6.012E+001pCi/L	4.745E+001	4.735E+001	1.563E+002	7.756E+001	-0.38	47.4451
CO-60	8692	2.764E+004pCi/L	1.368E+003	1.007E+002	5.538E+001	2.681E+001	499.14	1,367.9659
CR-51	8604	-1.718E+002pCi/L	3.069E+002	3.068E+002	1.015E+003	5.044E+002	-0.17	306.8899
CS-134	8553	-6.449E+001pCi/L	4.823E+001	4.813E+001	1.588E+002	7.874E+001	-0.41	48.2314
CS-136	8546	4.573E+001pCi/L	3.711E+001	3.703E+001	1.576E+002	7.819E+001	0.29	37.1123
CS-137	8539	4.186E+004pCi/L	2.098E+003	1.420E+002	1.548E+002	7.681E+001	270.43	2,097.7509
EU-152	7145	2.864E+002pCi/L	8.264E+001	8.128E+001	2.490E+002	1.233E+002	1.15	82.6374
EU-154	7138	1.869E+002pCi/L	1.088E+002	1.083E+002	1.494E+002	7.426E+001	1.25	108.7635
EU-155	7131	-9.448E+001pCi/L	9.520E+001	9.504E+001	5.331E+002	2.658E+002	-0.18	95.2004
FE-59	7073	4.209E+001pCi/L	1.179E+002	1.179E+002	2.440E+002	1.207E+002	0.17	117.9184
GA-68	18005	9.011E+002pCi/L	2.611E+003	2.611E+003	5.405E+003	2.672E+003	0.17	2,611.0358
GD-153	6824	-6.534E+001pCi/L	9.835E+001	9.826E+001	3.244E+002	1.617E+002	-0.20	98.3456
HF-181	6495	-6.149E+001pCi/L	6.232E+001	6.225E+001	2.055E+002	1.023E+002	-0.30	62.3244
HG-203	6466	-4.399E+000pCi/L	3.361E+001	3.360E+001	1.113E+002	5.534E+001	-0.04	33.6058
I-131	6380	-4.911E+001pCi/L	4.451E+001	4.444E+001	1.062E+002	5.269E+001	-0.46	44.5095
IR-192	6303	6.398E+001pCi/L	5.310E+001	5.296E+001	2.081E+002	1.037E+002	0.31	53.0995
K-40	6148	-4.653E+000pCi/L	2.255E+002	2.255E+002	4.633E+002	2.227E+002	-0.01	225.4864
KR-85	6111	5.784E+003pCi/L	8.512E+003	8.506E+003	2.814E+004	1.397E+004	0.21	8,512.2408
LA-140	6096	3.858E+001pCi/L	5.187E+001	5.183E+001	5.478E+001	2.630E+001	0.70	51.8708
MN-54	5382	1.704E+002pCi/L	4.056E+001	3.968E+001	8.625E+001	4.253E+001	1.98	40.5603
NA-22	5201	0.000E+000pCi/L	2.190E+001	2.190E+001	7.300E+001	3.565E+001	0.00	21.9014
NB-94	5160	-4.584E+001pCi/L	3.652E+001	3.644E+001	1.203E+002	5.964E+001	-0.38	36.5152
NB-95	5154	4.674E+001pCi/L	3.080E+001	3.071E+001	1.013E+002	5.008E+001	0.46	30.8018
ND-147	5083	2.959E+002pCi/L	1.575E+002	1.566E+002	4.337E+002	2.136E+002	0.68	157.4803
NP-237	4757	1.436E+002pCi/L	1.623E+002	1.621E+002	5.354E+002	2.665E+002	0.27	162.3498
NP-239	4751	-8.950E+001pCi/L	1.565E+002	1.564E+002	5.163E+002	2.574E+002	-0.17	156.4949
PA-231	4541	3.354E+002pCi/L	1.001E+003	1.001E+003	6.175E+003	3.078E+003	0.05	1,001.4223
PA-233	4535	-7.927E-001pCi/L	1.513E+002	1.513E+002	5.038E+002	2.511E+002	0.00	151.2912
PA-234	4528	1.879E+002pCi/L	2.144E+002	2.142E+002	5.802E+002	2.891E+002	0.32	214.4125

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PA-234M	19453	4.998E+003pCi/L	7.037E+003	7.033E+003	2.327E+004	1.155E+004	0.21	7,037.1757
PB-210	4467	-1.950E+003pCi/L	7.659E+002	7.454E+002	7.122E+003	3.556E+003	-0.27	765.9425
PB-212	4454	-8.726E+001pCi/L	7.168E+001	7.146E+001	2.916E+002	1.452E+002	-0.30	71.6766
PB-214	4448	6.523E+001pCi/L	1.146E+002	1.146E+002	2.754E+002	1.369E+002	0.24	114.6310
PM-144	19585	3.813E+001pCi/L	3.102E+001	3.097E+001	1.023E+002	5.063E+001	0.37	31.0249
PM-146	2464	-3.359E+001pCi/L	4.124E+001	4.120E+001	1.697E+002	8.426E+001	-0.20	41.2386
RH-106	1882	7.322E+002pCi/L	6.061E+002	6.050E+002	1.780E+003	8.850E+002	0.41	606.1260
RU-103	1828	3.702E+001pCi/L	4.452E+001	4.449E+001	1.021E+002	5.062E+001	0.36	44.5245
SB-124	1784	2.196E+000pCi/L	1.950E+000	1.946E+000	1.785E+002	8.876E+001	0.01	1.9496
SB-125	1777	2.658E+002pCi/L	1.456E+002	1.449E+002	3.315E+002	1.645E+002	0.80	145.5632
SC-46	1739	3.096E+001pCi/L	5.479E+001	5.477E+001	1.813E+002	9.001E+001	0.17	54.7880
SN-113	1570	-1.066E+001pCi/L	5.254E+001	5.253E+001	2.127E+002	1.058E+002	-0.05	52.5367
SN-126	17459	-5.478E+002pCi/L	1.277E+003	1.276E+003	4.208E+003	2.102E+003	-0.13	1,276.6085
TA-182	1301	1.311E+002pCi/L	1.679E+002	1.678E+002	5.552E+002	2.754E+002	0.24	167.9069
TC-99M	17412	0.000E+000pCi/L	1.539E+001	1.539E+001	1.285E+002	6.402E+001	0.00	15.3857
TH-227	1058	4.968E+002pCi/L	3.199E+002	3.185E+002	8.148E+002	4.037E+002	0.61	319.8905
TH-229	1046	-1.340E+001pCi/L	1.883E+001	1.880E+001	1.606E+003	7.980E+002	-0.01	18.8319
TH-234	1027	-1.598E+002pCi/L	3.559E+002	3.558E+002	2.054E+003	1.024E+003	-0.08	355.8956
TL-208	929	7.612E+001pCi/L	3.925E+001	3.906E+001	1.021E+002	5.050E+001	0.75	39.2461
TL-210	20861	1.637E+001pCi/L	2.597E+001	2.595E+001	1.373E+002	6.809E+001	0.12	25.9650
U-235	281	1.556E+002pCi/L	1.458E+002	1.455E+002	9.969E+002	4.967E+002	0.16	145.7536
Y-88	74	4.584E+001pCi/L	2.350E+001	2.336E+001	4.347E+001	2.054E+001	1.05	23.5040
ZN-65	31	1.570E+002pCi/L	1.141E+002	1.138E+002	3.755E+002	1.863E+002	0.42	114.0678
ZR-95	7	-7.458E+001pCi/L	3.370E+002	3.370E+002	1.736E+002	8.577E+001	-0.43	336.9960

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor
LCS 160-442125~2-A	LCS 160-442125~2-A	CS-137	4.186E+004 pCi/L	4.429E+004	94.50%	-1.0707
		CO-60	2.764E+004 pCi/L	2.829E+004	97.71%	-0.4370
		AM-241	1.306E+005 pCi/L	1.359E+005	96.11%	-0.6690

Sample Duplicate Information

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

Reagent

1L Marn LCS_00007

Standard ID Number: 1L Marn LCS_00007 (1962596)
True Value = 135700 pCi/L
Date Analyzed: 8/25/2020

Radionuclide: Am-241

	Replicates	
#1	143700	pCi/L
#2	139000	pCi/L
#3	136300	pCi/L

Mean = 139666.67

1 sigma = 3744.7741

1.96 sigma = 7339.757

True Value minus 5% = 128915 (True Value - 5%)
True Value plus 5% = 142485 (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: Jody Watson 9/8/20 JWatson

2nd Reviewed By/Date: Kil Ey 9/8/20

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

St. Louis Radiological Standard Verification

Printed: 9/8/2020 4:50 PM

Standard ID Number: 1L Marn LCS_00007 (1962596)
True Value = 43350 pCi/L
Date Analyzed: 8/25/2020

Radionuclide: Cs-137

	Replicates	
#1	44570	pCi/L
#2	44660	pCi/L
#3	43190	pCi/L

Mean = 44140

1 sigma = 823.95388

1.96 sigma = 1614.95

True Value minus 5% = 41182.5 (True Value - 5%)
True Value plus 5% = 45517.5 (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: Jody Watson 9/8/20

2nd Reviewed By/Date: Kil Eg 9/8/20

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

St. Louis Radiological Standard Verification

Printed: 9/8/2020 4:50 PM

Standard ID Number: 1L Marn LCS_00007 (1962596)
True Value = 25030 pCi/L
Date Analyzed: 8/25/2020

Radionuclide: Co-60

	Replicates	
#1	26010	pCi/L
#2	25580	pCi/L
#3	23690	pCi/L

Mean = 25093.333

1 sigma = 1234.1934

1.96 sigma = 2419.019

True Value minus 5% = 23778.5 (True Value - 5%)
True Value plus 5% = 26281.5 (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: Jody Watson 9/8/20 JWatson

2nd Reviewed By/Date: Kil Eg 9/8/20

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Analysis Report for Gamma Spectroscopy

Batch: 480253 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-480253~2-	LCS	1000.00mL	1.00	GammaVision	GV12	8 / 25 / 20 18:48	60

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	-1.105E+001pCi/L	2.492E+002	2.492E+002	5.341E+002	2.641E+002	-0.02	249.2207
AG-108M	10982	-1.720E+001pCi/L	4.904E+001	4.903E+001	1.623E+002	8.068E+001	-0.11	49.0405
AG-110M	10973	1.098E+002pCi/L	8.670E+001	8.646E+001	3.172E+002	1.573E+002	0.35	86.7026
AM-241	10818	1.437E+005pCi/L	8.449E+003	3.322E+002	4.688E+002	2.338E+002	306.42	8,448.6445
BA-133	10469	6.647E+001pCi/L	1.015E+002	1.014E+002	2.047E+002	1.017E+002	0.32	101.4945
BA-140	10463	1.756E+002pCi/L	2.614E+002	2.612E+002	3.988E+002	1.973E+002	0.44	261.3538
BE-7	10435	1.337E+002pCi/L	5.183E+002	5.182E+002	1.715E+003	8.531E+002	0.08	518.2662
BI-207	10195	-7.061E+001pCi/L	8.698E+001	8.688E+001	1.796E+002	8.872E+001	-0.39	86.9755
BI-210M	10173	-4.779E+001pCi/L	5.800E+001	5.793E+001	1.915E+002	9.513E+001	-0.25	57.9966
BI-212	10160	7.619E+002pCi/L	5.805E+002	5.787E+002	1.911E+003	9.457E+002	0.40	580.4702
BI-214	10154	2.511E+002pCi/L	1.278E+002	1.269E+002	2.121E+002	1.047E+002	1.18	127.7562
CD-109	9254	1.022E+004pCi/L	8.322E+002	5.761E+002	1.783E+003	8.859E+002	5.73	832.2101
CD-113M	17462	4.880E+005pCi/L	5.052E+005	5.042E+005	1.666E+006	8.277E+005	0.29	505,196.1344
CE-139	9241	1.539E+001pCi/L	1.817E+001	1.815E+001	6.009E+001	2.974E+001	0.26	18.1709
CE-141	9235	-1.015E-005pCi/L	7.452E+001	7.452E+001	2.465E+002	1.228E+002	0.00	74.5235
CE-144	9221	-2.114E+002pCi/L	3.173E+002	3.171E+002	1.047E+003	5.216E+002	-0.20	317.3174
CF-249	9215	5.792E+001pCi/L	7.020E+001	7.012E+001	2.317E+002	1.152E+002	0.25	70.1992
CF-251	13690	3.074E+001pCi/L	1.515E+002	1.515E+002	3.799E+002	1.886E+002	0.08	151.5162
CO-56	8704	-3.729E+001pCi/L	4.330E+001	4.325E+001	1.433E+002	7.081E+001	-0.26	43.3012
CO-57	13694	-2.891E+001pCi/L	3.262E+002	3.262E+002	1.079E+003	5.373E+002	-0.03	326.1967
CO-58	8698	-1.665E+001pCi/L	4.818E+001	4.817E+001	1.598E+002	7.921E+001	-0.10	48.1751
CO-60	8692	2.601E+004pCi/L	1.533E+003	1.092E+002	9.653E+001	4.722E+001	269.49	1,532.6191
CR-51	8604	-4.005E+002pCi/L	6.357E+002	6.353E+002	2.098E+003	1.045E+003	-0.19	635.6954
CS-134	8553	-1.912E-001pCi/L	1.385E-001	1.380E-001	2.595E+002	1.288E+002	0.00	0.1385
CS-136	8546	-7.709E+001pCi/L	6.224E+001	6.204E+001	2.049E+002	1.016E+002	-0.38	62.2376
CS-137	8539	4.457E+004pCi/L	2.625E+003	1.694E+002	1.388E+002	6.869E+001	321.20	2,624.5182
EU-152	7145	3.218E+002pCi/L	1.979E+002	1.970E+002	7.568E+002	3.768E+002	0.43	197.9138
EU-154	7138	1.893E+002pCi/L	1.129E+002	1.124E+002	1.904E+002	9.460E+001	0.99	112.9060
EU-155	7131	-1.063E+002pCi/L	1.848E+002	1.847E+002	6.100E+002	3.040E+002	-0.17	184.8356
FE-59	7073	-1.386E+001pCi/L	4.350E+001	4.349E+001	2.432E+002	1.201E+002	-0.06	43.4963
GA-68	18005	6.210E+002pCi/L	2.608E+003	2.608E+003	5.407E+003	2.670E+003	0.11	2,608.0352
GD-153	6824	-7.725E+001pCi/L	1.014E+002	1.012E+002	3.344E+002	1.665E+002	-0.23	101.3604
HF-181	6495	4.523E+001pCi/L	6.032E+001	6.026E+001	2.366E+002	1.177E+002	0.19	60.3187
HG-203	6466	1.359E+001pCi/L	3.619E+001	3.618E+001	1.198E+002	5.952E+001	0.11	36.1898
I-131	6380	-5.422E+001pCi/L	5.023E+001	5.013E+001	1.198E+002	5.943E+001	-0.45	50.2316
IR-192	6303	-2.511E+001pCi/L	3.949E+001	3.946E+001	2.900E+002	1.445E+002	-0.09	39.4911
K-40	6148	4.185E+001pCi/L	2.111E+002	2.111E+002	4.249E+002	2.030E+002	0.10	211.1094
KR-85	6111	1.101E+004pCi/L	8.993E+003	8.966E+003	2.960E+004	1.469E+004	0.37	8,993.1834
LA-140	6096	5.111E+001pCi/L	3.798E+001	3.786E+001	5.454E+001	2.596E+001	0.94	37.9834
MN-54	5382	2.649E+001pCi/L	5.303E+001	5.301E+001	1.135E+002	5.604E+001	0.23	53.0290
NA-22	5201	0.000E+000pCi/L	2.601E+001	2.601E+001	8.804E+001	4.286E+001	0.00	26.0129
NB-94	5160	-5.261E+001pCi/L	4.238E+001	4.226E+001	1.396E+002	6.910E+001	-0.38	42.3751
NB-95	5154	-5.496E+000pCi/L	3.422E+001	3.422E+001	1.139E+002	5.631E+001	-0.05	34.2203
ND-147	5083	3.497E+002pCi/L	3.132E+002	3.124E+002	7.173E+002	3.548E+002	0.49	313.2373
NP-237	4757	-7.275E+001pCi/L	1.791E+002	1.790E+002	5.923E+002	2.946E+002	-0.12	179.0800
NP-239	4751	-1.158E+002pCi/L	2.046E+002	2.044E+002	6.750E+002	3.364E+002	-0.17	204.5518
PA-231	4541	1.782E+003pCi/L	2.050E+003	2.047E+003	1.165E+004	5.804E+003	0.15	2,049.5313
PA-233	4535	-4.388E+000pCi/L	5.031E+000	5.024E+000	5.631E+002	2.806E+002	-0.01	5.0308
PA-234	4528	-9.890E-002pCi/L	1.487E-001	1.486E-001	6.425E+002	3.201E+002	0.00	0.1487

MQO

PA-234M	19453	-1.508E+004pCi/L	1.171E+004	1.167E+004	3.852E+004	1.911E+004	-0.39	11,705.0046
PB-210	4467	-2.397E+003pCi/L	4.656E+002	4.438E+002	9.397E+003	4.692E+003	-0.26	465.5901
PB-212	4454	-8.982E+001pCi/L	7.897E+001	7.879E+001	3.193E+002	1.590E+002	-0.28	78.9704
PB-214	4448	-2.124E+001pCi/L	8.711E+001	8.710E+001	2.888E+002	1.434E+002	-0.07	87.1133
PM-144	19585	1.790E+001pCi/L	3.940E+001	3.939E+001	8.754E+001	4.315E+001	0.20	39.4049
PM-146	2464	4.724E+001pCi/L	7.706E+001	7.701E+001	1.842E+002	9.142E+001	0.26	77.0645
RH-106	1882	5.470E+002pCi/L	7.464E+002	7.457E+002	2.465E+003	1.226E+003	0.22	746.4136
RU-103	1828	2.149E+001pCi/L	5.075E+001	5.074E+001	1.167E+002	5.782E+001	0.18	50.7541
SB-124	1784	5.007E+001pCi/L	6.915E+001	6.909E+001	2.284E+002	1.136E+002	0.22	69.1547
SB-125	1777	2.220E+002pCi/L	1.791E+002	1.786E+002	3.647E+002	1.809E+002	0.61	179.0904
SC-46	1739	-7.771E+001pCi/L	6.331E+001	6.315E+001	2.085E+002	1.034E+002	-0.37	63.3145
SN-113	1570	-1.462E+001pCi/L	6.985E+001	6.984E+001	2.313E+002	1.150E+002	-0.06	69.8498
SN-126	17459	-6.425E+002pCi/L	1.513E+003	1.513E+003	4.988E+003	2.492E+003	-0.13	1,513.2851
TA-182	1301	1.073E+002pCi/L	1.958E+002	1.957E+002	6.486E+002	3.214E+002	0.17	195.7639
TC-99M	17412	1.286E+001pCi/L	4.346E+001	4.345E+001	1.436E+002	7.154E+001	0.09	43.4572
TH-227	1058	-3.983E+002pCi/L	3.954E+002	3.947E+002	1.304E+003	6.476E+002	-0.31	395.4142
TH-229	1046	5.255E+002pCi/L	5.134E+002	5.124E+002	1.693E+003	8.407E+002	0.31	513.3774
TH-234	1027	-4.476E+002pCi/L	5.164E+002	5.157E+002	3.425E+003	1.705E+003	-0.13	516.3775
TL-208	929	5.484E+001pCi/L	3.399E+001	3.384E+001	1.267E+002	6.261E+001	0.43	33.9896
TL-210	20861	-5.686E+001pCi/L	5.820E+001	5.808E+001	1.919E+002	9.529E+001	-0.30	58.1971
U-235	281	8.798E+001pCi/L	3.951E+002	3.950E+002	1.306E+003	6.505E+002	0.07	395.0608
Y-88	74	4.951E+001pCi/L	3.839E+001	3.828E+001	4.444E+001	2.088E+001	1.11	38.3943
ZN-65	31	1.454E+002pCi/L	1.108E+002	1.104E+002	3.645E+002	1.806E+002	0.40	110.7653
ZR-95	7	1.227E+001pCi/L	5.533E+001	5.532E+001	1.764E+002	8.703E+001	0.07	55.3291

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-480253~2-A	LCS 160-480253~2-A	CS-137	4.457E+004	pCi/L	4.335E+004	102.80%	0.4394
		CO-60	2.601E+004	pCi/L	2.503E+004	103.94%	0.6111
		AM-241	1.437E+005	pCi/L	1.357E+005	105.90%	0.9120

Sample Duplicate Information

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

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Analysis Report for Gamma Spectroscopy

Batch: 479609 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-479609~2-	LCS	1000.00mL	1.00	GammaVision	GV07	9 / 3 / 20 14:19	120

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	11136	2.479E+002pCi/L	2.133E+002	2.128E+002	5.534E+002	2.744E+002	0.45	213.3013
AG-108M	10982	-6.340E+001pCi/L	5.069E+001	5.055E+001	1.667E+002	8.301E+001	-0.38	50.6856
AG-110M	10973	7.851E+001pCi/L	6.828E+001	6.812E+001	4.313E+002	2.147E+002	0.18	68.2753
AM-241	10818	1.390E+005pCi/L	8.172E+003	3.186E+002	4.606E+002	2.299E+002	301.67	8,171.7604
BA-133	10469	8.386E+001pCi/L	1.032E+002	1.031E+002	3.402E+002	1.696E+002	0.25	103.2234
BA-140	10463	-2.383E+002pCi/L	1.707E+002	1.701E+002	5.609E+002	2.789E+002	-0.42	170.6722
BE-7	10435	-6.174E+002pCi/L	5.107E+002	5.094E+002	1.680E+003	8.368E+002	-0.37	510.6877
BI-207	10195	5.853E+000pCi/L	9.473E+001	9.473E+001	1.845E+002	9.139E+001	0.03	94.7274
BI-210M	10173	-2.041E+001pCi/L	3.083E+001	3.081E+001	1.841E+002	9.163E+001	-0.11	30.8316
BI-212	10160	0.000E+000pCi/L	1.507E+002	1.507E+002	1.987E+003	9.864E+002	0.00	150.7098
BI-214	10154	-1.433E+002pCi/L	8.821E+001	8.780E+001	4.263E+002	2.122E+002	-0.34	88.2055
CD-109	9254	9.030E+003pCi/L	6.433E+002	3.636E+002	1.102E+003	5.475E+002	8.20	643.2839
CD-113M	17462	-5.412E+005pCi/L	4.025E+005	4.010E+005	1.322E+006	6.577E+005	-0.41	402,453.5623
CE-139	9241	-3.478E+001pCi/L	2.771E+001	2.764E+001	9.115E+001	4.539E+001	-0.38	27.7114
CE-141	9235	5.660E+001pCi/L	5.909E+001	5.900E+001	1.946E+002	9.705E+001	0.29	59.0947
CE-144	9221	-8.411E+001pCi/L	1.653E+002	1.652E+002	5.459E+002	2.718E+002	-0.15	165.2686
CF-249	9215	-5.830E+000pCi/L	6.071E+001	6.071E+001	2.009E+002	9.999E+001	-0.03	60.7092
CF-251	13690	-1.787E+002pCi/L	1.281E+002	1.276E+002	4.208E+002	2.095E+002	-0.42	128.0562
CO-56	8704	8.421E+001pCi/L	6.439E+001	6.420E+001	1.341E+002	6.645E+001	0.63	64.3893
CO-57	13694	8.997E+000pCi/L	2.098E+001	2.097E+001	8.763E+002	4.370E+002	0.01	20.9790
CO-58	8698	-7.230E+001pCi/L	5.046E+001	5.028E+001	1.658E+002	8.237E+001	-0.44	50.4638
CO-60	8692	2.558E+004pCi/L	1.506E+003	9.676E+001	6.488E+001	3.161E+001	394.24	1,506.1953
CR-51	8604	4.648E+002pCi/L	5.533E+002	5.526E+002	1.823E+003	9.092E+002	0.25	553.3025
CS-134	8553	7.734E+001pCi/L	4.850E+001	4.828E+001	1.686E+002	8.360E+001	0.46	48.4968
CS-136	8546	7.342E+001pCi/L	5.154E+001	5.132E+001	1.970E+002	9.785E+001	0.37	51.5378
CS-137	8539	4.466E+004pCi/L	2.629E+003	1.517E+002	1.247E+002	6.183E+001	358.15	2,628.7531
EU-152	7145	1.441E+002pCi/L	7.727E+001	7.681E+001	8.129E+002	4.054E+002	0.18	77.2746
EU-154	7138	1.008E+002pCi/L	6.885E+001	6.859E+001	1.567E+002	7.803E+001	0.64	68.8500
EU-155	7131	4.303E+001pCi/L	6.088E+001	6.083E+001	5.420E+002	2.704E+002	0.08	60.8778
FE-59	7073	1.088E+002pCi/L	1.291E+002	1.290E+002	2.505E+002	1.241E+002	0.43	129.1293
GA-68	18005	3.372E+003pCi/L	3.833E+003	3.827E+003	7.432E+003	3.681E+003	0.45	3,833.2385
GD-153	6824	8.260E+001pCi/L	1.088E+002	1.087E+002	4.000E+002	1.996E+002	0.21	108.8045
HF-181	6495	-8.626E+001pCi/L	4.171E+001	4.140E+001	2.319E+002	1.155E+002	-0.37	41.7059
HG-203	6466	-3.877E+001pCi/L	3.929E+001	3.923E+001	1.295E+002	6.447E+001	-0.30	39.2922
I-131	6380	-1.098E+001pCi/L	6.408E+000	6.375E+000	1.148E+002	5.705E+001	-0.10	6.4078
IR-192	6303	1.911E+001pCi/L	1.309E+001	1.303E+001	2.603E+002	1.298E+002	0.07	13.0885
K-40	6148	-3.295E+002pCi/L	1.236E+003	1.235E+003	4.449E+002	2.147E+002	-0.74	1,235.5900
KR-85	6111	-1.363E+004pCi/L	8.996E+003	8.954E+003	2.952E+004	1.467E+004	-0.46	8,995.9819
LA-140	6096	-1.351E+001pCi/L	1.673E+002	1.673E+002	4.953E+001	2.372E+001	-0.27	167.3463
MN-54	5382	5.078E+001pCi/L	5.792E+001	5.784E+001	1.157E+002	5.731E+001	0.44	57.9208
NA-22	5201	0.000E+000pCi/L	2.612E+001	2.612E+001	8.745E+001	4.283E+001	0.00	26.1191
NB-94	5160	-6.074E+001pCi/L	4.559E+001	4.545E+001	1.499E+002	7.446E+001	-0.41	45.5888
NB-95	5154	0.000E+000pCi/L	2.433E+001	2.433E+001	1.493E+002	7.416E+001	0.00	24.3291
ND-147	5083	-4.353E+002pCi/L	3.233E+002	3.222E+002	1.063E+003	5.284E+002	-0.41	323.3498
NP-237	4757	1.795E+002pCi/L	2.536E+002	2.533E+002	8.358E+002	4.170E+002	0.21	253.5502
NP-239	4751	-1.300E+002pCi/L	1.803E+002	1.801E+002	5.941E+002	2.964E+002	-0.22	180.2647
PA-231	4541	1.721E+003pCi/L	1.598E+003	1.595E+003	8.400E+003	4.186E+003	0.20	1,598.3015
PA-233	4535	-8.394E+000pCi/L	5.393E+000	5.371E+000	5.194E+002	2.590E+002	-0.02	5.3934
PA-234	4528	3.200E+001pCi/L	1.077E+002	1.077E+002	3.560E+002	1.773E+002	0.09	107.7203

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PA-234M	19453	1.039E+003pCi/L	1.019E+004	1.019E+004	3.382E+004	1.679E+004	0.03	10,194.8008
PB-210	4467	2.832E+003pCi/L	2.335E+003	2.329E+003	7.677E+003	3.835E+003	0.37	2,335.1643
PB-212	4454	-6.710E+001pCi/L	3.285E+001	3.261E+001	2.827E+002	1.409E+002	-0.24	32.8505
PB-214	4448	2.469E+001pCi/L	2.193E+001	2.188E+001	5.480E+002	2.733E+002	0.05	21.9302
PM-144	19585	-5.803E+001pCi/L	1.361E+002	1.360E+002	1.440E+002	7.152E+001	-0.40	136.0890
PM-146	2464	-2.383E+001pCi/L	8.546E+001	8.545E+001	1.820E+002	9.050E+001	-0.13	85.4596
RH-106	1882	6.191E+002pCi/L	5.187E+002	5.174E+002	1.066E+003	5.282E+002	0.58	518.7123
RU-103	1828	1.810E+001pCi/L	5.357E+001	5.356E+001	1.142E+002	5.672E+001	0.16	53.5708
SB-124	1784	5.404E+001pCi/L	3.396E+001	3.382E+001	1.896E+002	9.435E+001	0.29	33.9649
SB-125	1777	1.651E+002pCi/L	8.779E+001	8.725E+001	5.156E+002	2.567E+002	0.32	87.7919
SC-46	1739	8.586E+001pCi/L	8.313E+001	8.298E+001	2.739E+002	1.363E+002	0.31	83.1321
SN-113	1570	-3.574E+001pCi/L	7.308E+001	7.305E+001	1.556E+002	7.733E+001	-0.23	73.0813
SN-126	17459	-7.139E+002pCi/L	1.159E+003	1.158E+003	3.818E+003	1.908E+003	-0.19	1,158.8913
TA-182	1301	-3.008E+002pCi/L	2.052E+002	2.044E+002	6.741E+002	3.348E+002	-0.45	205.2008
TC-99M	17412	3.461E+001pCi/L	3.619E+001	3.612E+001	1.192E+002	5.942E+001	0.29	36.1893
TH-227	1058	9.138E+003pCi/L	7.993E+002	5.920E+002	1.115E+003	5.546E+002	8.20	799.2960
TH-229	1046	5.496E+002pCi/L	7.095E+002	7.088E+002	1.562E+003	7.773E+002	0.35	709.4888
TH-234	1027	5.262E+002pCi/L	1.241E+003	1.240E+003	4.093E+003	2.042E+003	0.13	1,240.8347
TL-208	929	1.821E+001pCi/L	5.517E+001	5.516E+001	1.178E+002	5.839E+001	0.15	55.1669
TL-210	20861	2.548E+001pCi/L	2.498E+001	2.493E+001	1.326E+002	6.576E+001	0.19	24.9812
U-235	281	2.741E+002pCi/L	3.114E+002	3.110E+002	1.026E+003	5.115E+002	0.27	311.4073
Y-88	74	6.410E+000pCi/L	2.158E+001	2.158E+001	4.043E+001	1.913E+001	0.16	21.5846
ZN-65	31	1.679E+002pCi/L	1.160E+002	1.155E+002	3.810E+002	1.892E+002	0.44	115.9593
ZR-95	7	1.099E+002pCi/L	8.128E+001	8.103E+001	2.673E+002	1.327E+002	0.41	81.2832

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-479609~2-A	LCS 160-479609~2-A	CS-137	4.466E+004	pCi/L	4.333E+004	103.07%	0.4802
		CO-60	2.558E+004	pCi/L	2.495E+004	102.52%	0.3961
		AM-241	1.390E+005	pCi/L	1.357E+005	102.43%	0.3881

Sample Duplicate Information

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

eurofins | Environment Testing TestAmerica

Analysis Report for Gamma Spectroscopy

Batch: 479471 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-479471~2-	LCS	1000.00mL	1.00	GammaVision	GV02	9 / 4 / 20 9:16	120

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	-2.603E+002pCi/L	7.417E+001	7.258E+001	4.848E+002	2.402E+002	-0.54	74.1728
AG-108M	10982	-2.495E+001pCi/L	4.864E+001	4.861E+001	1.163E+002	5.777E+001	-0.21	48.6371
AG-110M	10973	-9.508E+001pCi/L	8.309E+001	8.290E+001	2.737E+002	1.360E+002	-0.35	83.0894
AM-241	10818	1.363E+005pCi/L	8.016E+003	2.571E+002	3.645E+002	1.818E+002	374.10	8,016.3205
BA-133	10469	9.428E+000pCi/L	5.388E+001	5.387E+001	1.784E+002	8.871E+001	0.05	53.8761
BA-140	10463	2.014E+001pCi/L	1.501E+002	1.501E+002	3.605E+002	1.786E+002	0.06	150.1336
BE-7	10435	-4.514E+002pCi/L	4.736E+002	4.728E+002	1.561E+003	7.770E+002	-0.29	473.5882
BI-207	10195	-1.654E+001pCi/L	4.412E+001	4.411E+001	1.837E+002	9.089E+001	-0.09	44.1232
BI-210M	10173	2.832E+001pCi/L	5.084E+001	5.082E+001	1.680E+002	8.356E+001	0.17	50.8448
BI-212	10160	-3.137E+001pCi/L	4.753E+002	4.753E+002	1.580E+003	7.829E+002	-0.02	475.3473
BI-214	10154	9.053E+000pCi/L	1.217E+002	1.217E+002	4.027E+002	2.004E+002	0.02	121.6627
CD-109	9254	9.867E+003pCi/L	6.619E+002	3.194E+002	9.233E+002	4.583E+002	10.69	661.9487
CD-113M	17462	-3.637E+005pCi/L	4.069E+005	4.063E+005	1.342E+006	6.673E+005	-0.27	406,923.1002
CE-139	9241	0.000E+000pCi/L	1.651E+001	1.651E+001	8.346E+001	4.153E+001	0.00	16.5071
CE-141	9235	4.022E+001pCi/L	5.984E+001	5.979E+001	1.974E+002	9.839E+001	0.20	59.8372
CE-144	9221	0.000E+000pCi/L	6.379E+001	6.379E+001	6.015E+002	2.995E+002	0.00	63.7874
CF-249	9215	-6.092E+001pCi/L	7.135E+001	7.126E+001	2.353E+002	1.172E+002	-0.26	71.3545
CF-251	13690	5.930E+001pCi/L	1.287E+002	1.286E+002	3.219E+002	1.600E+002	0.18	128.6724
CO-56	8704	6.158E+001pCi/L	6.491E+001	6.481E+001	1.143E+002	5.653E+001	0.54	64.9088
CO-57	13694	0.000E+000pCi/L	2.613E+002	2.613E+002	8.626E+002	4.300E+002	0.00	261.3226
CO-58	8698	-5.986E+001pCi/L	5.091E+001	5.079E+001	1.677E+002	8.326E+001	-0.36	50.9115
CO-60	8692	2.369E+004pCi/L	1.395E+003	9.278E+001	6.555E+001	3.189E+001	361.42	1,395.2488
CR-51	8604	3.326E+002pCi/L	3.111E+002	3.105E+002	1.025E+003	5.098E+002	0.32	311.1382
CS-134	8553	2.015E+001pCi/L	1.866E+001	1.863E+001	1.673E+002	8.296E+001	0.12	18.6635
CS-136	8546	-5.889E+001pCi/L	5.182E+001	5.168E+001	1.707E+002	8.474E+001	-0.35	51.8167
CS-137	8539	4.319E+004pCi/L	2.542E+003	1.500E+002	1.199E+002	5.936E+001	360.23	2,542.1996
EU-152	7145	3.147E+002pCi/L	7.712E+001	7.487E+001	2.433E+002	1.206E+002	1.29	77.1197
EU-154	7138	9.723E+001pCi/L	6.234E+001	6.208E+001	1.327E+002	6.601E+001	0.73	62.3437
EU-155	7131	7.786E+001pCi/L	1.001E+002	9.996E+001	3.300E+002	1.644E+002	0.24	100.0661
FE-59	7073	-1.432E+002pCi/L	6.040E+001	5.981E+001	3.955E+002	1.964E+002	-0.36	60.3966
GA-68	18005	3.009E+003pCi/L	3.434E+003	3.429E+003	7.320E+003	3.621E+003	0.41	3,434.4117
GD-153	6824	6.434E+001pCi/L	5.172E+001	5.155E+001	1.434E+002	7.129E+001	0.45	51.7169
HF-181	6495	-1.355E+001pCi/L	1.015E+001	1.012E+001	2.051E+002	1.021E+002	-0.07	10.1485
HG-203	6466	6.564E+000pCi/L	3.152E+001	3.152E+001	1.044E+002	5.189E+001	0.06	31.5230
I-131	6380	5.418E+001pCi/L	5.259E+001	5.249E+001	1.045E+002	5.189E+001	0.52	52.5867
IR-192	6303	-3.021E+001pCi/L	3.634E+001	3.629E+001	1.199E+002	5.964E+001	-0.25	36.3441
K-40	6148	1.350E+002pCi/L	1.564E+002	1.562E+002	3.387E+002	1.604E+002	0.40	156.4389
KR-85	6111	1.014E+004pCi/L	8.596E+003	8.571E+003	2.830E+004	1.405E+004	0.36	8,595.5710
LA-140	6096	1.363E+001pCi/L	1.489E+001	1.487E+001	3.196E+001	1.490E+001	0.43	14.8890
MN-54	5382	-1.431E+001pCi/L	5.294E+001	5.293E+001	1.173E+002	5.807E+001	-0.12	52.9378
NA-22	5201	0.000E+000pCi/L	2.088E+001	2.088E+001	6.874E+001	3.352E+001	0.00	20.8771
NB-94	5160	-2.874E+001pCi/L	3.913E+001	3.909E+001	8.998E+001	4.446E+001	-0.32	39.1298
NB-95	5154	2.202E+000pCi/L	4.213E+001	4.213E+001	9.726E+001	4.807E+001	0.02	42.1263
ND-147	5083	2.478E+002pCi/L	1.781E+002	1.774E+002	4.793E+002	2.365E+002	0.52	178.1276
NP-237	4757	-1.313E+002pCi/L	1.330E+002	1.328E+002	4.383E+002	2.182E+002	-0.30	132.9912
NP-239	4751	7.471E+001pCi/L	9.666E+001	9.655E+001	3.187E+002	1.588E+002	0.23	96.6632
PA-231	4541	0.000E+000pCi/L	5.711E+002	5.711E+002	6.057E+003	3.020E+003	0.00	571.1229
PA-233	4535	-1.509E+000pCi/L	1.504E+002	1.504E+002	4.974E+002	2.480E+002	0.00	150.4400
PA-234	4528	1.901E+002pCi/L	1.294E+002	1.289E+002	3.665E+002	1.825E+002	0.52	129.3824

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PA-234M	19453	3.491E+003pCi/L	6.912E+003	6.909E+003	2.288E+004	1.136E+004	0.15	6,912.0942
PB-210	4467	2.404E+004pCi/L	2.564E+003	2.140E+003	7.005E+003	3.499E+003	3.43	2,564.1348
PB-212	4454	-7.641E+001pCi/L	4.430E+001	4.407E+001	2.653E+002	1.322E+002	-0.29	44.2995
PB-214	4448	7.855E+001pCi/L	8.891E+001	8.879E+001	2.932E+002	1.458E+002	0.27	88.9084
PM-144	19585	3.893E+001pCi/L	2.411E+001	2.400E+001	5.763E+001	2.829E+001	0.68	24.1075
PM-146	2464	4.326E+001pCi/L	3.840E+001	3.832E+001	1.717E+002	8.531E+001	0.25	38.4016
RH-106	1882	-4.438E+002pCi/L	5.750E+002	5.744E+002	1.552E+003	7.713E+002	-0.29	575.0252
RU-103	1828	-3.363E+001pCi/L	4.336E+001	4.331E+001	1.060E+002	5.255E+001	-0.32	43.3559
SB-124	1784	4.955E+001pCi/L	2.365E+001	2.347E+001	1.858E+002	9.243E+001	0.27	23.6529
SB-125	1777	2.375E+002pCi/L	1.504E+002	1.498E+002	3.430E+002	1.703E+002	0.69	150.4482
SC-46	1739	-4.994E+000pCi/L	9.912E+000	9.908E+000	2.025E+002	1.006E+002	-0.02	9.9121
SN-113	1570	6.290E+001pCi/L	7.330E+001	7.321E+001	2.417E+002	1.204E+002	0.26	73.2989
SN-126	17459	-4.880E+002pCi/L	1.161E+003	1.161E+003	3.827E+003	1.912E+003	-0.13	1,161.0375
TA-182	1301	4.496E+001pCi/L	3.657E+001	3.647E+001	5.812E+002	2.884E+002	0.08	36.5702
TC-99M	17412	2.378E+001pCi/L	3.562E+001	3.559E+001	1.175E+002	5.857E+001	0.20	35.6250
TH-227	1058	-1.622E+002pCi/L	4.099E+002	4.097E+002	1.026E+003	5.097E+002	-0.16	409.8598
TH-229	1046	7.010E+002pCi/L	4.962E+002	4.945E+002	1.432E+003	7.120E+002	0.49	496.2409
TH-234	1027	-5.492E+002pCi/L	1.959E+002	1.932E+002	1.275E+003	6.352E+002	-0.43	195.9051
TL-208	929	4.417E+001pCi/L	2.689E+001	2.676E+001	7.033E+001	3.464E+001	0.63	26.8873
TL-210	20861	3.818E+001pCi/L	3.966E+001	3.959E+001	1.309E+002	6.488E+001	0.29	39.6636
U-235	281	1.624E+002pCi/L	2.540E+002	2.538E+002	8.582E+002	4.278E+002	0.19	254.0205
Y-88	74	-2.587E+000pCi/L	1.870E+001	1.870E+001	3.938E+001	1.852E+001	-0.07	18.7027
ZN-65	31	1.270E+002pCi/L	1.185E+002	1.183E+002	3.908E+002	1.939E+002	0.32	118.5336
ZR-95	7	-4.994E+000pCi/L	7.555E+001	7.555E+001	1.744E+002	8.621E+001	-0.03	75.5489

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-479471~2-A	LCS 160-479471~2-A	CS-137	4.319E+004	pCi/L	4.333E+004	99.67%	-0.0530
		CO-60	2.369E+004	pCi/L	2.494E+004	94.98%	-0.8450
		AM-241	1.363E+005	pCi/L	1.357E+005	100.51%	0.0829

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

Reagent

Gamma Ampuole_00001

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

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

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

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

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

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

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

This standard will expire one year after the calibration date.

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

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

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Gamma Ampuole_00003

Eckert & Ziegler
Analytics

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)

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

This standard will expire one year after the reference date.

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

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

Reagent

Marn Soil_00002

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83814-334

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

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

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

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

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

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

(Certificate continued on reverse side)

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

Source Prepared by: _____
Z. Dimitrova, Radiochemist

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

Reagent

MarnSolid_00002

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

90099

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

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

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

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

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

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

(Certificate continued on reverse side)

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

Source Prepared by: _____
Z. Dimitrova, Radiochemist

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

Reagent

Source 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 F_00001

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

83725-334
5 mL Liquid in Flame Sealed Vial

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

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

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

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

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

(Certificate continued on reverse side)

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

This standard will expire one year after the reference date.

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

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

Reagent

Source H_00002

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

83725-334
5 mL Liquid in Flame Sealed Vial

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

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

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

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

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

(Certificate continued on reverse side)

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

This standard will expire one year after the reference date.

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

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

Reagent

Source I_00001

Eckert & Ziegler
Analytics

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Fax 404•352•2837
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CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

83725-334
5 mL Liquid in Flame Sealed Vial

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

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

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

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

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

(Certificate continued on reverse side)

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

This standard will expire one year after the reference date.

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

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

Reagent

Tuna Can LCS_00010

Standard ID Number: Tuna Can LCS_00010 (1962547)
True Value = 9.843 pCi/g
Date Analyzed: 8/27/2020

Radionuclide: Co-60

	Replicates	
#1	9.204	pCi/g
#2	9.454	pCi/g
#3	10.12	pCi/g

Mean = 9.5926667

1 sigma = 0.4734821

1.96 sigma = 0.928025

True Value minus 5% = 9.35085 (True Value - 5%)
True Value plus 5% = 10.33515 (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: [signature] 9-8-20

2nd Reviewed By/Date: [signature] 9/8/20

Standard ID Number: Tuna Can LCS_00010 (1962547)
True Value = 96.48 pCi/g
Date Analyzed: 8/27/2020

Radionuclide: Am-241

	Replicates	
#1	101	pCi/g
#2	94.13	pCi/g
#3	97.09	pCi/g

Mean = 97.406667

1 sigma = 3.44593

1.96 sigma = 6.754023

True Value minus 5% = 91.656 (True Value - 5%)
True Value plus 5% = 101.304 (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: 9-8-20

2nd Reviewed By/Date: 9/8/20

Standard ID Number: Tuna Can LCS_00010 (1962547)
True Value = 26.91 pCi/g
Date Analyzed: 8/27/2020

Radionuclide: Cs-137

	Replicates	
#1	25.53	pCi/g
#2	26.35	pCi/g
#3	26.48	pCi/g

Mean = 26.12

1 sigma = 0.5150728

1.96 sigma = 1.009543

True Value minus 5% = 25.5645 (True Value - 5%)
True Value plus 5% = 28.2555 (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: 9-8-20

2nd Reviewed By/Date: 9/8/20

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Analysis Report for Gamma Spectroscopy

Batch: 480854 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-480854~2-	LCS	341.90g	1.00	GammaVision	GV13	8 / 27 / 20 8:56	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	5.690E-001pCi/g	3.014E-001	3.000E-001	6.571E-001	3.147E-001	0.87	0.3014
AG-108M	10982	-1.094E-001pCi/g	9.861E-002	9.845E-002	2.274E-001	1.112E-001	-0.48	0.0986
AG-110M	10973	4.760E-002pCi/g	9.239E-002	9.236E-002	3.317E-001	1.604E-001	0.14	0.0924
AM-241	10818	1.011E+002pCi/g	5.287E+000	6.333E-001	9.153E-001	4.533E-001	110.49	5.2866
BA-133	10469	-1.129E-001pCi/g	1.051E-001	1.050E-001	3.480E-001	1.708E-001	-0.32	0.1051
BA-140	10463	1.714E-001pCi/g	1.627E-001	1.625E-001	6.779E-001	3.279E-001	0.25	0.1627
BE-7	10435	-8.950E-001pCi/g	8.221E-001	8.208E-001	2.720E+000	1.337E+000	-0.33	0.8221
BI-207	10195	-1.001E-001pCi/g	1.390E-001	1.389E-001	2.935E-001	1.407E-001	-0.34	0.1390
BI-210M	10173	-1.267E-001pCi/g	1.036E-001	1.033E-001	3.421E-001	1.678E-001	-0.37	0.1036
BI-212	10160	8.602E-001pCi/g	6.789E-001	6.774E-001	2.251E+000	1.081E+000	0.38	0.6789
BI-214	10154	6.127E-001pCi/g	1.421E-001	1.385E-001	2.678E-001	1.275E-001	2.29	0.1421
CD-109	9254	-1.448E+000pCi/g	2.324E+000	2.322E+000	7.689E+000	3.815E+000	-0.19	2.3237
CD-113M	17462	1.010E+003pCi/g	8.399E+002	8.373E+002	2.773E+003	1.360E+003	0.36	839.8551
CE-139	9241	5.455E-002pCi/g	5.078E-002	5.051E-002	1.674E-001	8.224E-002	0.33	0.0508
CE-141	9235	-7.142E-002pCi/g	1.341E-001	1.340E-001	4.448E-001	2.200E-001	-0.16	0.1341
CE-144	9221	0.000E+000pCi/g	2.039E-001	2.039E-001	1.936E+000	9.580E-001	0.00	0.2039
CF-249	9215	1.749E-001pCi/g	1.420E-001	1.417E-001	3.713E-001	1.824E-001	0.47	0.1420
CF-251	13690	-3.072E-001pCi/g	3.075E-001	3.063E-001	7.372E-001	3.613E-001	-0.42	0.3075
CO-56	8704	8.719E-002pCi/g	7.335E-002	7.321E-002	1.592E-001	7.581E-002	0.55	0.0734
CO-57	13694	5.162E-002pCi/g	4.010E-002	4.001E-002	1.324E-001	6.492E-002	0.39	0.0401
CO-58	8698	-1.014E-001pCi/g	7.891E-002	7.874E-002	2.610E-001	1.268E-001	-0.39	0.0789
CO-60	8692	9.204E+000pCi/g	4.822E-001	1.378E-001	2.944E-002	9.308E-003	312.61	0.4822
CR-51	8604	7.371E-001pCi/g	1.161E+000	1.161E+000	3.847E+000	1.905E+000	0.19	1.1612
CS-134	8553	1.453E-001pCi/g	8.591E-002	8.559E-002	2.095E-001	1.005E-001	0.69	0.0859
CS-136	8546	-1.069E-001pCi/g	8.955E-002	8.934E-002	2.964E-001	1.445E-001	-0.36	0.0896
CS-137	8539	2.553E+001pCi/g	1.358E+000	2.815E-001	1.955E-001	9.407E-002	130.56	1.3575
EU-152	7145	3.158E-001pCi/g	2.187E-001	2.180E-001	4.829E-001	2.377E-001	0.65	0.2187
EU-154	7138	2.305E-001pCi/g	1.597E-001	1.592E-001	2.930E-001	1.439E-001	0.79	0.1597
EU-155	7131	0.000E+000pCi/g	8.444E-002	8.444E-002	1.331E+000	6.605E-001	0.00	0.0844
FE-59	7073	3.236E-002pCi/g	1.721E-001	1.721E-001	3.681E-001	1.758E-001	0.09	0.1721
GA-68	18005	2.458E+000pCi/g	3.094E+000	3.091E+000	6.566E+000	3.119E+000	0.37	3.0944
GD-153	6824	-1.776E-001pCi/g	2.836E-001	2.834E-001	9.383E-001	4.655E-001	-0.19	0.2836
HF-181	6495	1.037E-001pCi/g	1.285E-001	1.284E-001	3.593E-001	1.765E-001	0.29	0.1285
HG-203	6466	-1.526E-003pCi/g	5.786E-002	5.786E-002	1.947E-001	9.530E-002	-0.01	0.0579
I-131	6380	1.542E-001pCi/g	6.387E-002	6.337E-002	1.445E-001	6.974E-002	1.07	0.0639
IR-192	6303	1.711E-002pCi/g	1.360E-001	1.360E-001	4.521E-001	2.240E-001	0.04	0.1360
K-40	6148	-8.061E-002pCi/g	4.803E-001	4.803E-001	1.029E+000	4.601E-001	-0.08	0.4803
KR-85	6111	1.054E+001pCi/g	1.492E+001	1.491E+001	4.982E+001	2.430E+001	0.21	14.9225
LA-140	6096	3.875E-002pCi/g	1.385E-002	1.370E-002	3.570E-002	1.129E-002	1.09	0.0139
MN-54	5382	2.492E-002pCi/g	7.863E-002	7.862E-002	1.732E-001	8.286E-002	0.14	0.0786
NA-22	5201	3.343E-002pCi/g	3.122E-002	3.118E-002	1.061E-001	4.784E-002	0.31	0.0312
NB-94	5160	7.446E-002pCi/g	6.121E-002	6.109E-002	2.030E-001	9.812E-002	0.37	0.0612
NB-95	5154	3.029E-002pCi/g	4.562E-002	4.559E-002	1.544E-001	7.368E-002	0.20	0.0456
ND-147	5083	-3.029E-001pCi/g	5.618E-001	5.615E-001	1.314E+000	6.362E-001	-0.23	0.5618
NP-237	4757	-1.866E-001pCi/g	6.662E-001	6.661E-001	2.209E+000	1.096E+000	-0.08	0.6662
NP-239	4751	2.288E-001pCi/g	3.665E-001	3.662E-001	1.213E+000	6.016E-001	0.19	0.3665
PA-231	4541	-2.496E+000pCi/g	3.789E+000	3.787E+000	1.255E+001	6.214E+000	-0.20	3.7895
PA-233	4535	-1.958E-001pCi/g	3.240E-001	3.238E-001	1.073E+000	5.316E-001	-0.18	0.3240
PA-234	4528	5.480E-001pCi/g	3.358E-001	3.346E-001	1.176E+000	5.819E-001	0.47	0.3358

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PA-234M	19453	**5.446E+000**pCi/g	3.925E+000	3.915E+000	3.402E+001	1.650E+001	0.16	3.9251
PB-210	4467	**7.585E+002**pCi/g	4.499E+001	6.355E+000	1.124E+001	5.566E+000	67.51	44.9882
PB-212	4454	**6.068E-001**pCi/g	1.158E-001	1.090E-001	2.492E-001	1.211E-001	2.44	0.1158
PB-214	4448	**6.748E-001**pCi/g	1.648E-001	1.610E-001	3.420E-001	1.657E-001	1.97	0.1648
PM-144	19585	**-7.895E-002**pCi/g	6.140E-002	6.126E-002	2.032E-001	9.831E-002	-0.39	0.0614
PM-146	2464	**7.280E-002**pCi/g	6.471E-002	6.461E-002	3.139E-001	1.533E-001	0.23	0.0647
RA-226	1950	**0.000E+000**pCi/g	9.941E-001	9.941E-001	4.142E+000	2.032E+000	0.00	0.9941
RH-106	1882	**1.572E+000**pCi/g	9.438E-001	9.403E-001	3.164E+000	1.552E+000	0.50	0.9438
RU-103	1828	**-3.026E-002**pCi/g	8.171E-002	8.169E-002	1.912E-001	9.281E-002	-0.16	0.0817
SB-124	1784	**9.120E-002**pCi/g	3.081E-002	3.040E-002	7.468E-002	2.361E-002	1.22	0.0308
SB-125	1777	**-2.083E-002**pCi/g	2.766E-001	2.766E-001	6.463E-001	3.154E-001	-0.03	0.2766
SC-46	1739	**-1.231E-001**pCi/g	9.600E-002	9.580E-002	3.173E-001	1.547E-001	-0.39	0.0960
SN-113	1570	**-8.991E-002**pCi/g	1.205E-001	1.204E-001	4.005E-001	1.969E-001	-0.22	0.1205
SN-126	17459	**-1.392E+000**pCi/g	3.135E+000	3.134E+000	1.035E+001	5.159E+000	-0.13	3.1347
TA-182	1301	**9.655E-002**pCi/g	8.361E-002	8.348E-002	1.905E-001	7.655E-002	0.51	0.0836
TC-99M	17412	**0.000E+000**pCi/g	1.397E-002	1.397E-002	2.524E-001	1.249E-001	0.00	0.0140
TH-227	1058	**8.499E-001**pCi/g	8.000E-001	7.983E-001	1.924E+000	9.394E-001	0.44	0.8000
TH-229	1046	**1.064E+000**pCi/g	1.037E+000	1.033E+000	3.023E+000	1.482E+000	0.35	1.0368
TH-234	1027	**1.599E+000**pCi/g	7.340E-001	7.286E-001	1.814E+000	8.870E-001	0.88	0.7340
TL-208	929	**2.325E-001**pCi/g	8.025E-002	7.934E-002	1.658E-001	7.949E-002	1.40	0.0802
TL-210	20861	**6.726E-002**pCi/g	5.415E-002	5.402E-002	1.797E-001	8.618E-002	0.37	0.0542
U-235	281	**2.440E-001**pCi/g	1.552E-001	1.548E-001	1.892E+000	9.358E-001	0.13	0.1552
Y-88	74	**4.542E-002**pCi/g	1.537E-002	1.514E-002	3.849E-002	1.217E-002	1.18	0.0154
ZN-65	31	**1.959E-001**pCi/g	1.567E-001	1.564E-001	5.194E-001	2.504E-001	0.38	0.1567
ZR-95	7	**9.429E-002**pCi/g	1.245E-001	1.244E-001	2.727E-001	1.300E-001	0.35	0.1245

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-480854~2-A	LCS 160-480854~2-A	CS-137	2.553E+001	pCi/g	2.691E+001	94.87%	-0.9636
		CO-60	9.204E+000	pCi/g	9.843E+000	93.51%	-1.2487
		AM-241	1.011E+002	pCi/g	9.648E+001	104.83%	0.8369

Sample Duplicate Information

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

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Analysis Report for Gamma Spectroscopy

Batch: 480892 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-480892~2-	LCS	341.90g	1.00	GammaVision	GV09	8 / 30 / 20 17:17	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	2.700E-001pCi/g	1.928E-001	1.923E-001	7.918E-001	3.814E-001	0.34	0.1928
AG-108M	10982	-9.973E-002pCi/g	1.011E-001	1.010E-001	2.337E-001	1.142E-001	-0.43	0.1011
AG-110M	10973	6.226E-002pCi/g	1.694E-002	1.664E-002	4.043E-001	1.965E-001	0.15	0.0169
AM-241	10818	9.413E+001pCi/g	4.941E+000	7.416E-001	1.055E+000	5.232E-001	89.19	4.9414
BA-133	10469	1.153E-001pCi/g	1.042E-001	1.041E-001	3.451E-001	1.691E-001	0.33	0.1042
BA-140	10463	2.933E-001pCi/g	2.779E-001	2.775E-001	6.588E-001	3.178E-001	0.45	0.2779
BE-7	10435	2.177E-001pCi/g	8.361E-001	8.360E-001	2.796E+000	1.373E+000	0.08	0.8361
BI-207	10195	-1.864E-001pCi/g	1.386E-001	1.383E-001	3.201E-001	1.537E-001	-0.58	0.1386
BI-210M	10173	-1.336E-001pCi/g	8.201E-002	8.163E-002	3.617E-001	1.774E-001	-0.37	0.0820
BI-212	10160	-1.215E+000pCi/g	8.918E-001	8.896E-001	2.946E+000	1.426E+000	-0.41	0.8918
BI-214	10154	4.202E-001pCi/g	9.110E-002	8.845E-002	2.620E-001	1.243E-001	1.60	0.0911
CD-109	9254	-1.440E+000pCi/g	2.394E+000	2.393E+000	7.925E+000	3.931E+000	-0.18	2.3944
CD-113M	17462	8.671E+002pCi/g	8.406E+002	8.387E+002	2.785E+003	1.364E+003	0.31	840.6049
CE-139	9241	-6.636E-002pCi/g	2.270E-001	2.269E-001	1.933E-001	9.507E-002	-0.34	0.2270
CE-141	9235	-1.017E-001pCi/g	1.411E-001	1.410E-001	4.672E-001	2.312E-001	-0.22	0.1411
CE-144	9221	4.096E-001pCi/g	5.770E-001	5.766E-001	1.912E+000	9.455E-001	0.21	0.5770
CF-249	9215	2.290E-003pCi/g	2.010E-003	2.007E-003	4.205E-001	2.069E-001	0.01	0.0020
CF-251	13690	-1.458E-001pCi/g	2.822E-001	2.819E-001	7.139E-001	3.493E-001	-0.20	0.2822
CO-56	8704	4.859E-002pCi/g	5.338E-002	5.333E-002	1.725E-001	8.227E-002	0.28	0.0534
CO-57	13694	5.289E-002pCi/g	4.814E-002	4.806E-002	1.592E-001	7.830E-002	0.33	0.0481
CO-58	8698	-9.785E-002pCi/g	6.909E-002	6.891E-002	2.602E-001	1.263E-001	-0.38	0.0691
CO-60	8692	9.454E+000pCi/g	4.963E-001	1.449E-001	3.083E-002	9.746E-003	306.69	0.4963
CR-51	8604	6.785E-001pCi/g	1.046E+000	1.046E+000	3.469E+000	1.715E+000	0.20	1.0462
CS-134	8553	1.423E-001pCi/g	6.850E-002	6.810E-002	1.127E-001	5.193E-002	1.26	0.0685
CS-136	8546	-1.010E-001pCi/g	8.183E-002	8.162E-002	2.708E-001	1.315E-001	-0.37	0.0818
CS-137	8539	2.635E+001pCi/g	1.401E+000	2.890E-001	1.783E-001	8.531E-002	147.75	1.4010
EU-152	7145	2.854E-001pCi/g	2.541E-001	2.536E-001	4.660E-001	2.291E-001	0.61	0.2541
EU-154	7138	1.229E-001pCi/g	7.290E-002	7.262E-002	3.359E-001	1.652E-001	0.37	0.0729
EU-155	7131	-3.284E-003pCi/g	3.802E-003	3.798E-003	1.364E+000	6.768E-001	0.00	0.0038
FE-59	7073	-2.032E-001pCi/g	2.034E-001	2.032E-001	4.271E-001	2.050E-001	-0.48	0.2034
GA-68	18005	2.868E+000pCi/g	3.177E+000	3.173E+000	6.729E+000	3.193E+000	0.43	3.1767
GD-153	6824	-1.769E-001pCi/g	2.848E-001	2.846E-001	9.424E-001	4.674E-001	-0.19	0.2848
HF-181	6495	1.100E-001pCi/g	1.409E-001	1.408E-001	3.699E-001	1.817E-001	0.30	0.1409
HG-203	6466	7.831E-002pCi/g	6.296E-002	6.280E-002	2.080E-001	1.018E-001	0.38	0.0630
I-131	6380	1.174E-001pCi/g	8.007E-002	7.984E-002	1.875E-001	9.116E-002	0.63	0.0801
IR-192	6303	4.065E-002pCi/g	6.137E-002	6.132E-002	4.262E-001	2.109E-001	0.10	0.0614
K-40	6148	8.349E-001pCi/g	2.600E-001	2.565E-001	6.787E-001	2.821E-001	1.23	0.2600
KR-85	6111	1.794E+001pCi/g	1.717E+001	1.714E+001	5.694E+001	2.784E+001	0.32	17.1729
LA-140	6096	7.524E-002pCi/g	5.455E-002	5.440E-002	1.151E-001	5.069E-002	0.65	0.0545
MN-54	5382	4.902E-002pCi/g	7.892E-002	7.888E-002	1.731E-001	8.265E-002	0.28	0.0789
NA-22	5201	4.886E-002pCi/g	2.752E-002	2.741E-002	8.852E-002	3.879E-002	0.55	0.0275
NB-94	5160	-2.775E-002pCi/g	6.346E-002	6.344E-002	1.957E-001	9.432E-002	-0.14	0.0635
NB-95	5154	8.442E-002pCi/g	5.977E-002	5.961E-002	1.974E-001	9.500E-002	0.43	0.0598
ND-147	5083	-2.273E-001pCi/g	5.299E-001	5.297E-001	1.244E+000	6.007E-001	-0.18	0.5299
NP-237	4757	4.042E-001pCi/g	6.719E-001	6.715E-001	2.224E+000	1.103E+000	0.18	0.6719
NP-239	4751	1.596E-002pCi/g	3.862E-001	3.862E-001	1.282E+000	6.362E-001	0.01	0.3862
PA-231	4541	0.000E+000pCi/g	7.918E-001	7.918E-001	1.249E+001	6.179E+000	0.00	0.7918
PA-233	4535	0.000E+000pCi/g	7.687E-002	7.686E-002	1.020E+000	5.048E-001	0.00	0.0769
PA-234	4528	2.505E-001pCi/g	3.469E-001	3.467E-001	1.149E+000	5.684E-001	0.22	0.3469

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PA-234M	19453	**1.512E+000**pCi/g	1.230E+000	1.227E+000	3.968E+001	1.930E+001	0.04	1.2296
PB-210	4467	**7.452E+002**pCi/g	4.446E+001	7.841E+000	1.321E+001	6.549E+000	56.43	44.4559
PB-212	4454	**4.663E-001**pCi/g	9.261E-002	8.756E-002	2.707E-001	1.317E-001	1.72	0.0926
PB-214	4448	**2.928E-001**pCi/g	1.117E-001	1.106E-001	3.569E-001	1.729E-001	0.82	0.1117
PM-144	19585	**6.550E-002**pCi/g	5.197E-002	5.186E-002	1.724E-001	8.275E-002	0.38	0.0520
PM-146	2464	**4.863E-003**pCi/g	8.120E-003	8.117E-003	3.303E-001	1.613E-001	0.01	0.0081
RA-226	1950	**1.613E+000**pCi/g	1.204E+000	1.196E+000	3.956E+000	1.937E+000	0.41	1.2045
RH-106	1882	**1.053E+000**pCi/g	7.286E-001	7.265E-001	1.925E+000	9.310E-001	0.55	0.7286
RU-103	1828	**-6.042E-002**pCi/g	3.890E-002	3.878E-002	2.003E-001	9.724E-002	-0.30	0.0389
SB-124	1784	**6.375E-002**pCi/g	2.626E-002	2.603E-002	7.831E-002	2.476E-002	0.81	0.0263
SB-125	1777	**-1.913E-001**pCi/g	2.384E-001	2.382E-001	7.029E-001	3.434E-001	-0.27	0.2384
SC-46	1739	**9.672E-002**pCi/g	7.924E-002	7.908E-002	2.626E-001	1.272E-001	0.37	0.0792
SN-113	1570	**-9.097E-002**pCi/g	1.327E-001	1.326E-001	4.410E-001	2.170E-001	-0.21	0.1327
SN-126	17459	**-1.424E+000**pCi/g	3.105E+000	3.104E+000	1.025E+001	5.110E+000	-0.14	3.1053
TA-182	1301	**3.208E-002**pCi/g	1.071E-001	1.071E-001	4.631E-001	2.120E-001	0.07	0.1071
TC-99M	17412	**0.000E+000**pCi/g	2.030E-002	2.030E-002	2.544E-001	1.259E-001	0.00	0.0203
TH-227	1058	**1.922E+000**pCi/g	7.659E-001	7.569E-001	1.691E+000	8.218E-001	1.14	0.7659
TH-229	1046	**8.462E-001**pCi/g	1.096E+000	1.094E+000	3.118E+000	1.527E+000	0.27	1.0960
TH-234	1027	**-9.617E-001**pCi/g	1.574E+000	1.573E+000	5.208E+000	2.583E+000	-0.18	1.5735
TL-208	929	**2.059E-001**pCi/g	5.777E-002	5.677E-002	1.290E-001	6.095E-002	1.60	0.0578
TL-210	20861	**-9.520E-002**pCi/g	6.890E-002	6.868E-002	2.274E-001	1.099E-001	-0.42	0.0689
U-235	281	**3.352E-002**pCi/g	2.877E-002	2.872E-002	2.029E+000	1.004E+000	0.02	0.0288
Y-88	74	**-6.758E-002**pCi/g	7.125E-002	7.114E-002	1.434E-001	6.426E-002	-0.47	0.0712
ZN-65	31	**0.000E+000**pCi/g	3.364E-002	3.364E-002	6.238E-001	3.022E-001	0.00	0.0336
ZR-95	7	**4.781E-002**pCi/g	1.198E-001	1.198E-001	2.654E-001	1.260E-001	0.18	0.1198

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-480892~2-A	LCS 160-480892~2-A	**CS-137**	2.635E+001	pCi/g	2.690E+001	97.95%	-0.3742
		CO-60	9.454E+000	pCi/g	9.831E+000	96.17%	-0.7178
		AM-241	9.413E+001	pCi/g	9.647E+001	97.58%	-0.4466

Sample Duplicate Information

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

eurofins | Environment Testing TestAmerica

Analysis Report for Gamma Spectroscopy

Batch: 479483 **Operator:**

MQO

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-479483~2-	LCS	341.90g	1.00	GammaVision	GV05	9 / 3 / 20 14:27	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	4.944E-001pCi/g	4.101E-001	4.094E-001	1.136E+000	5.407E-001	0.44	0.4101
AG-108M	10982	-3.828E-002pCi/g	1.315E-001	1.315E-001	3.201E-001	1.554E-001	-0.12	0.1315
AG-110M	10973	8.515E-002pCi/g	1.856E-001	1.856E-001	5.863E-001	2.826E-001	0.15	0.1856
AM-241	10818	9.709E+001pCi/g	5.107E+000	8.284E-001	1.175E+000	5.809E-001	82.64	5.1067
BA-133	10469	4.253E-003pCi/g	1.436E-001	1.436E-001	4.844E-001	2.364E-001	0.01	0.1436
BA-140	10463	5.377E-002pCi/g	3.646E-001	3.646E-001	9.070E-001	4.328E-001	0.06	0.3646
BE-7	10435	1.090E+000pCi/g	1.027E+000	1.025E+000	3.408E+000	1.661E+000	0.32	1.0267
BI-207	10195	9.216E-002pCi/g	1.818E-001	1.818E-001	4.052E-001	1.906E-001	0.23	0.1818
BI-210M	10173	-1.525E-001pCi/g	1.444E-001	1.441E-001	4.788E-001	2.338E-001	-0.32	0.1444
BI-212	10160	-1.566E+000pCi/g	1.260E+000	1.257E+000	4.183E+000	2.006E+000	-0.37	1.2601
BI-214	10154	9.176E-001pCi/g	1.844E-001	1.781E-001	3.310E-001	1.534E-001	2.77	0.1844
CD-109	9254	0.000E+000pCi/g	2.064E+000	2.064E+000	6.892E+000	3.400E+000	0.00	2.0639
CD-113M	17462	4.628E+002pCi/g	1.161E+003	1.161E+003	3.895E+003	1.901E+003	0.12	1,161.1819
CE-139	9241	3.249E-002pCi/g	7.099E-002	7.093E-002	2.371E-001	1.162E-001	0.14	0.0710
CE-141	9235	1.015E-001pCi/g	1.217E-001	1.216E-001	4.043E-001	1.985E-001	0.25	0.1217
CE-144	9221	-4.537E-001pCi/g	6.702E-001	6.698E-001	1.840E+000	9.045E-001	-0.25	0.6702
CF-249	9215	1.441E-001pCi/g	1.669E-001	1.667E-001	5.547E-001	2.716E-001	0.26	0.1669
CF-251	13690	1.708E-001pCi/g	3.206E-001	3.203E-001	8.562E-001	4.163E-001	0.20	0.3206
CO-56	8704	-1.612E-002pCi/g	1.388E-002	1.385E-002	3.105E-001	1.479E-001	-0.05	0.0139
CO-57	13694	-5.764E-003pCi/g	4.797E-003	4.787E-003	2.122E-001	1.042E-001	-0.03	0.0048
CO-58	8698	-1.395E-001pCi/g	1.041E-001	1.038E-001	4.040E-001	1.949E-001	-0.35	0.1041
CO-60	8692	1.012E+001pCi/g	5.447E-001	1.968E-001	5.871E-002	1.856E-002	172.32	0.5447
CR-51	8604	-8.703E-001pCi/g	8.021E-002	6.537E-002	2.828E+000	1.381E+000	-0.31	0.0802
CS-134	8553	-9.922E-003pCi/g	1.525E-002	1.524E-002	3.869E-001	1.852E-001	-0.03	0.0153
CS-136	8546	-4.054E-002pCi/g	1.190E-001	1.190E-001	4.034E-001	1.946E-001	-0.10	0.1190
CS-137	8539	2.648E+001pCi/g	1.428E+000	3.743E-001	1.815E-001	8.370E-002	145.93	1.4276
EU-152	7145	3.054E-002pCi/g	3.209E-002	3.205E-002	6.219E-001	3.051E-001	0.05	0.0321
EU-154	7138	1.167E-001pCi/g	1.205E-001	1.203E-001	3.998E-001	1.958E-001	0.29	0.1205
EU-155	7131	1.471E-001pCi/g	1.777E-001	1.775E-001	8.532E-001	4.189E-001	0.17	0.1777
FE-59	7073	-4.795E-002pCi/g	2.837E-001	2.837E-001	6.316E-001	2.995E-001	-0.08	0.2837
GA-68	18005	7.586E+000pCi/g	3.261E+000	3.233E+000	6.988E+000	3.173E+000	1.09	3.2608
GD-153	6824	-2.801E-002pCi/g	5.521E-002	5.518E-002	6.362E-001	3.126E-001	-0.04	0.0552
HF-181	6495	8.921E-002pCi/g	1.097E-001	1.096E-001	4.675E-001	2.280E-001	0.19	0.1097
HG-203	6466	-9.602E-002pCi/g	8.885E-002	8.868E-002	2.946E-001	1.437E-001	-0.33	0.0889
I-131	6380	-1.976E-002pCi/g	1.045E-001	1.045E-001	2.685E-001	1.298E-001	-0.07	0.1045
IR-192	6303	1.631E-001pCi/g	1.165E-001	1.161E-001	3.014E-001	1.470E-001	0.54	0.1165
K-40	6148	3.092E-001pCi/g	6.560E-001	6.558E-001	1.633E+000	7.073E-001	0.19	0.6560
KR-85	6111	1.500E+001pCi/g	2.299E+001	2.297E+001	7.705E+001	3.740E+001	0.19	22.9890
LA-140	6096	7.342E-002pCi/g	1.170E-001	1.169E-001	1.342E-001	5.392E-002	0.55	0.1170
MN-54	5382	-5.141E-002pCi/g	1.060E-001	1.060E-001	3.063E-001	1.459E-001	-0.17	0.1060
NA-22	5201	0.000E+000pCi/g	1.086E-002	1.086E-002	1.639E-001	7.154E-002	0.00	0.0109
NB-94	5160	-1.157E-001pCi/g	1.038E-001	1.037E-001	2.434E-001	1.153E-001	-0.48	0.1038
NB-95	5154	0.000E+000pCi/g	4.859E-002	4.859E-002	3.278E-001	1.571E-001	0.00	0.0486
ND-147	5083	-2.549E-001pCi/g	7.572E-001	7.570E-001	1.867E+000	8.952E-001	-0.14	0.7572
NP-237	4757	-4.490E-001pCi/g	6.582E-001	6.577E-001	2.183E+000	1.078E+000	-0.21	0.6582
NP-239	4751	2.024E-001pCi/g	2.353E-001	2.350E-001	7.812E-001	3.833E-001	0.26	0.2353
PA-231	4541	-2.997E+000pCi/g	4.841E+000	4.838E+000	1.608E+001	7.930E+000	-0.19	4.8411
PA-233	4535	2.324E-001pCi/g	3.787E-001	3.785E-001	1.258E+000	6.202E-001	0.18	0.3787
PA-234	4528	6.452E-001pCi/g	4.954E-001	4.942E-001	1.115E+000	5.479E-001	0.58	0.4954

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PA-234M	19453	0.000E+000pCi/g	5.289E+000	5.289E+000	5.177E+001	2.487E+001	0.00	5.2894
PB-210	4467	7.386E+002pCi/g	4.406E+001	7.774E+000	1.404E+001	6.940E+000	52.63	44.0631
PB-212	4454	7.186E-001pCi/g	1.538E-001	1.466E-001	3.428E-001	1.655E-001	2.10	0.1538
PB-214	4448	-6.367E-002pCi/g	2.773E-002	2.753E-002	7.368E-001	3.590E-001	-0.09	0.0277
PM-144	19585	-5.444E-002pCi/g	9.646E-002	9.641E-002	2.297E-001	1.085E-001	-0.24	0.0965
PM-146	2464	1.814E-001pCi/g	1.448E-001	1.445E-001	4.304E-001	2.085E-001	0.42	0.1448
RH-106	1882	2.868E+000pCi/g	8.652E-001	8.523E-001	2.169E+000	1.027E+000	1.32	0.8652
RU-103	1828	-1.035E-001pCi/g	1.218E-001	1.217E-001	2.962E-001	1.429E-001	-0.35	0.1218
SB-124	1784	-5.095E-002pCi/g	4.493E-002	4.485E-002	5.115E-001	2.501E-001	-0.10	0.0449
SB-125	1777	-4.035E-002pCi/g	4.031E-002	4.026E-002	9.519E-001	4.619E-001	-0.04	0.0403
SC-46	1739	1.077E-001pCi/g	1.240E-001	1.238E-001	4.152E-001	1.999E-001	0.26	0.1240
SN-113	1570	-1.591E-001pCi/g	1.808E-001	1.806E-001	6.006E-001	2.942E-001	-0.26	0.1808
SN-126	17459	2.299E-001pCi/g	7.545E-001	7.544E-001	2.522E+000	1.239E+000	0.09	0.7545
TA-182	1301	5.003E-001pCi/g	1.700E-001	1.681E-001	1.219E+000	5.825E-001	0.41	0.1700
TC-99M	17412	-5.649E-002pCi/g	7.277E-002	7.270E-002	2.417E-001	1.188E-001	-0.23	0.0728
TH-227	1058	7.045E-001pCi/g	6.195E-001	6.180E-001	2.638E+000	1.280E+000	0.27	0.6195
TH-229	1046	-1.122E+000pCi/g	1.457E+000	1.454E+000	3.868E+000	1.885E+000	-0.29	1.4566
TH-234	1027	5.364E-001pCi/g	1.315E+000	1.315E+000	4.377E+000	2.158E+000	0.12	1.3154
TL-208	929	4.197E-001pCi/g	1.425E-001	1.408E-001	2.197E-001	1.035E-001	1.91	0.1425
TL-210	20861	0.000E+000pCi/g	5.928E-002	5.928E-002	3.469E-001	1.664E-001	0.00	0.0593
U-235	281	4.017E-001pCi/g	5.277E-001	5.273E-001	1.754E+000	8.611E-001	0.23	0.5277
Y-88	74	-2.104E-002pCi/g	8.928E-002	8.928E-002	1.984E-001	8.492E-002	-0.11	0.0893
ZN-65	31	-1.985E-001pCi/g	2.853E-001	2.852E-001	9.607E-001	4.620E-001	-0.21	0.2853
ZR-95	7	8.486E-002pCi/g	1.618E-001	1.617E-001	3.883E-001	1.818E-001	0.22	0.1618

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor
LCS 160-479483~2-A	LCS 160-479483~2-A	CS-137	2.648E+001 pCi/g	2.690E+001	98.45%	-0.2773
		CO-60	1.012E+001 pCi/g	9.817E+000	103.04%	0.5235
		AM-241	9.709E+001 pCi/g	9.647E+001	100.65%	0.1155

Sample Duplicate Information

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

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)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS FOUNDED 1956 SOCIETY

Corporate Office
Laboratory

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

GAMMA SPECTROSCOPY

Method 901.1
Ra-226

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

Prep Batch: 486234

Fill Geometry, 21-Day In-Growth

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 486234

Lab Id: MB 160-486234/1-A | Analyzed: 11/12/20 18:13 | Ts: 120 | Sigma: 2
Client ID: | Detector: GV17 | Decay Corrected: No | Ingrowth:

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	-0.5089	0.715	0.718	U	pCi/L	50.0	37.7	488943
Radium 226 and Radium 228	0.0000	11.8	11.8	U	pCi/L		41.5	488943
Radium-228	-5.028	11.8	11.8	U	pCi/L	50.0	41.5	488943

Lab Id: LCS 160-486234/2-A | Analyzed: 11/12/20 18:13 | Ts: 120 | Sigma: 2
Client ID: | Detector: GV18 | Decay Corrected: No | Ingrowth:

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Americium-241	135300	477	15900		pCi/L		343	488944
Cesium-137	44090	235	5190		pCi/L		88.7	488944
Cobalt-60	25130	156	2960		pCi/L		67.2	488944

Lab Id: 180-111757-2 | Analyzed: 11/12/20 18:16 | Ts: 120 | Sigma: 2
Client ID: JOF-SES-FB01-20201001 ~ AOI1 | Detector: GV15 | Decay Corrected: | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium 226 and Radium 228	39.2	40.0	40.2	U	pCi/L		50.0	488953
Radium-226	28.0	19.6	19.9		pCi/L	50.0	24.1	488953
Radium-228	11.2	34.9	34.9	U	pCi/L	50.0	50.0	488953

Lab Id: 180-111757-2 DU | Analyzed: 11/12/20 20:57 | Ts: 120 | Sigma: 2
Client ID: JOF-SES-FB01-20201001 ~ AOI1 | Detector: GV18 | Decay Corrected: No | Ingrowth:

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	15.78	14.4	14.6	U	pCi/L	50.0	17.8	488944
Radium 226 and Radium 228	20.51	19.3	19.4	U	pCi/L		37.2	488944
Radium-228	4.734	12.8	12.8	U	pCi/L	50.0	37.2	488944

Lab Id: 180-111757-3 | Analyzed: 11/12/20 20:58 | Ts: 120 | Sigma: 2
Client ID: JOF-SES-EB01-20201001 ~ AOI1 | Detector: GV17 | Decay Corrected: | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium 226 and Radium 228	10.3	32.8	33.0	U	pCi/L		41.5	488943

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 486234

Lab Id:	180-111757-3	Analyzed:	11/12/20 20:58	Ts:	120	Sigma:	2
Client ID:	JOF-SES-EB01-20201001 ~ AOI1	Detector:	GV17	Decay Corrected:	No	Ingrowth:	

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	10.3	14.8	14.8	U	pCi/L	50.0	18.9	488943
Radium-228	-25.2	29.3	29.5	U	pCi/L	50.0	41.5	488943

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 160-486234/1-A	Radium-226			-0.5089	U	pCi/L							-1.4178
MB 160-486234/1-A	Radium 226 and Radium 228			0.0000	U	pCi/L							
MB 160-486234/1-A	Radium-228			-5.028	U	pCi/L							-.8536
Lab Control Sample ID:	**Analyte**	**Parent Result**	**Spike Added**	**LCS Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**RER Limit**	**Z Factor**
LCS 160-486234/2-A	Americium-241		136000	135300		pCi/L	100	90 - 111					-.0358
LCS 160-486234/2-A	Cesium-137		43100	44090		pCi/L	102	90 - 111					.3487
LCS 160-486234/2-A	Cobalt-60		24300	25130		pCi/L	103	89 - 110					.5161
Duplicate ID:	**Analyte**	**Parent Result**	**Spike Added**	**DU Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**RER Limit**	**Z Factor**
180-111757-2	Radium-226	28.0		15.78	U	pCi/L			56	0.35	0.99	1	.9899
180-111757-2	Radium 226 and Radium 228	39.2		20.51	U	pCi/L			63	0.31	0.84		
180-111757-2	Radium-228	11.2		4.734	U	pCi/L			81	0.14	0.35	1	.3499

Glossary:

Ts = Count Duration, Sample

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 180-111757-1

SDG No.:

Batch Number: 486234 Batch Start Date: 10/19/20 18:32 Batch Analyst: Tomasovic, Hannah R

Batch Method: Fill_Geo-21 Batch End Date: 10/19/20 19:00

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	IngDecDate1	IngDecDate3	Geometry	1L Marn LCS 00007	
MB 160-486234/1		Fill_Geo-21, 901.1		1000 mL	10/19/2020 19:00	11/09/2020 19:00	1L Marn		
LCS 160-486234/2		Fill_Geo-21, 901.1		1000 mL	10/19/2020 19:00	11/09/2020 19:00	1L Marn	# mL	
180-111757-B-2	JOF-SES-FB01-202 01001 ~ AOI1	Fill_Geo-21, 901.1	T	1000 mL	10/19/2020 19:00	11/09/2020 19:00	1L Marn		
180-111757-B-2 DU	JOF-SES-FB01-202 01001 ~ AOI1	Fill_Geo-21, 901.1	T	1000 mL	10/19/2020 19:00	11/09/2020 19:00	1L Marn		
180-111757-C-3	JOF-SES-EB01-202 01001 ~ AOI1	Fill_Geo-21, 901.1	T	1000 mL	10/19/2020 19:00	11/09/2020 19:00	1L Marn		

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

Basis	Basis Description
T	Total/NA

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

Test America St. Louis Spectrum ID: 17_Gamma_20202083

Sample Description: 486234_Gamma_MB 160-486234~1-A
Detector: Detector #17
Batch ID: 486234
Work Order Number: Gamma
Lot Number: MB 160-486234~1-A

Decay to Time: 11/12/2020 18:13 Live Time: 7200 sec
Acquisition Time: 11/12/2020 18:13:36 Real Time: 7222 sec
Analysis Time: 11/12/2020 20:14 Dead Time: 0.31 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 17_TCC-1L Marn.Clb
Efficiency Cal Desc: 17_1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 14:27
Energy Cal Date: 7/23/2020 16:21
Library: Client_Long_Rev15.lib
Bkgd Correction File: 17_2020-11-07_2216.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	-1.293E+00	108.1	1.398E+00	1.400E+00	4.675E+00
NA-22	1.028E-02	987.4	1.015E-01	1.015E-01	3.736E-01
K-40	-1.582E+00	115.7	1.830E+00	1.833E+00	4.785E+00
Sc-46	-2.225E-01	100.7	2.241E-01	2.244E-01	7.494E-01
CR-51	-1.013E+00	173.1	1.753E+00	1.754E+00	5.860E+00
MN-54	9.650E-02	91.3	8.814E-02	8.832E-02	2.069E-01
FE-59	-2.634E-01	53.5	1.410E-01	1.419E-01	6.705E-01
Co-56	1.599E-01	59.6	9.522E-02	9.568E-02	3.243E-01
CO-57	0.000E+00	1.#INF	4.551E-02	4.551E-02	2.711E-01
CO-58	1.493E-01	53.4	7.971E-02	8.019E-02	2.574E-01
CO-60	2.764E-02	103.7	2.867E-02	2.872E-02	3.398E-01
ZN-65	0.000E+00	1.#INF	6.875E-02	6.875E-02	9.304E-01
NB-94	2.219E-01	45.6	1.012E-01	1.021E-01	2.314E-01
ZR-95	1.971E-01	70.1	1.383E-01	1.387E-01	4.847E-01
NB-95	4.705E-02	192.9	9.077E-02	9.081E-02	3.149E-01
RU-103	-7.866E-02	141.1	1.110E-01	1.111E-01	2.775E-01
RH-106	-1.521E+00	154.1	2.345E+00	2.346E+00	7.870E+00
AG-108M	7.843E-02	150.7	1.182E-01	1.183E-01	2.562E-01
AG-110M	-1.422E-01	56.5	8.030E-02	8.073E-02	1.094E+00
SN-113	-1.752E-01	113.5	1.989E-01	1.991E-01	6.657E-01
SB-124	1.206E-01	152.7	1.842E-01	1.843E-01	6.201E-01
SB-125	2.381E-01	148.5	3.535E-01	3.538E-01	7.717E-01
I-131	5.445E-02	84.8	4.619E-02	4.630E-02	2.987E-01
Gd-153	-1.297E-01	241.4	3.131E-01	3.132E-01	1.051E+00
Ga-68	2.286E+00	250.8	5.734E+00	5.736E+00	1.346E+01
Tc-99m	0.000E+00	1.#INF	6.016E-02	6.016E-02	5.161E-01
BA-133	-8.878E-02	188.4	1.673E-01	1.673E-01	5.669E-01
CS-134	3.091E-01	40.6	1.255E-01	1.268E-01	3.200E-01
CS-137	-4.080E-02	308.6	1.259E-01	1.259E-01	4.346E-01
CE-139	9.079E-02	109.8	9.970E-02	9.984E-02	3.333E-01
Ba-140	3.971E-01	97.5	3.871E-01	3.878E-01	9.257E-01
La-140	2.349E-01	55.1	1.294E-01	1.302E-01	2.402E-01
CE-141	7.099E-02	348.4	2.473E-01	2.474E-01	8.285E-01

CE-144	-6.515E-01	157.8	1.028E+00	1.029E+00	3.429E+00
PM-144	6.588E-02	160.7	1.059E-01	1.059E-01	2.977E-01
EU-152	2.907E-01	73.0	2.123E-01	2.130E-01	9.515E-01
EU-154	4.500E-01	62.8	2.827E-01	2.840E-01	5.906E-01
EU-155	2.019E-01	115.2	2.326E-01	2.329E-01	1.323E+00
HF-181	-1.783E-01	111.9	1.996E-01	1.999E-01	6.677E-01
Ta-182	3.024E-01	113.5	3.434E-01	3.438E-01	1.516E+00
Hg-203	9.624E-02	88.9	8.551E-02	8.570E-02	2.861E-01
TL-208	2.964E-01	44.6	1.322E-01	1.334E-01	2.942E-01
PM-146	-5.577E-02	264.5	1.475E-01	1.475E-01	3.666E-01
Y-88	9.680E-02	88.8	8.600E-02	8.619E-02	2.538E-01
Cd-113m	8.402E+02	139.4	1.171E+03	1.173E+03	3.963E+03
Cd-109	0.000E+00	1.#INF	5.370E-01	5.370E-01	9.318E+00
Cf-251	3.540E-01	128.5	4.550E-01	4.555E-01	1.166E+00
Cf-249	-1.589E-01	106.5	1.692E-01	1.695E-01	5.668E-01
Sn-126	8.090E-02	1140.4	9.226E-01	9.226E-01	3.115E+00
PB-210	1.633E+00	139.0	2.269E+00	2.271E+00	6.024E+00
PB-212	-1.212E-01	169.1	2.048E-01	2.049E-01	6.932E-01
PB-214	3.220E-01	56.0	1.802E-01	1.812E-01	5.184E-01
BI-207	-3.125E-01	31.3	9.777E-02	9.948E-02	5.628E-01
BI-212	1.291E+00	84.4	1.090E+00	1.092E+00	3.678E+00
U-235	0.000E+00	1.#INF	4.422E-01	4.422E-01	4.442E+00
BI-214	-1.883E-02	70.3	1.323E-02	1.328E-02	1.396E+00
BI-210M	-1.707E-01	90.8	1.550E-01	1.553E-01	5.108E-01
AC-228	-1.860E-01	117.0	2.177E-01	2.180E-01	1.535E+00
TH-227	1.299E-01	821.2	1.067E+00	1.067E+00	2.807E+00
TH-229	1.491E+00	105.5	1.573E+00	1.575E+00	4.033E+00
TH-234	2.973E+00	94.2	2.801E+00	2.807E+00	7.948E+00
PA-231	0.000E+00	1.#INF	2.321E+00	2.322E+00	3.038E+01
PA-233	0.000E+00	1.#INF	8.700E-02	8.700E-02	1.444E+00
PA-234	-1.560E-01	158.7	2.477E-01	2.478E-01	2.024E+00
PA-234M	-3.492E+00	612.2	2.138E+01	2.138E+01	7.379E+01
AM-241	-2.050E-01	130.2	2.669E-01	2.672E-01	8.914E-01
Np-237	4.538E-01	159.6	7.243E-01	7.248E-01	2.421E+00
Ir-192	-1.374E-01	168.7	2.319E-01	2.321E-01	7.757E-01
Cs-136	2.011E-01	26.2	5.274E-02	5.428E-02	4.957E-01
Np-239	3.098E-01	136.1	4.217E-01	4.221E-01	1.411E+00
Nd-147	1.163E+00	43.4	5.048E-01	5.103E-01	1.191E+00
TL-210	8.062E-02	105.8	8.529E-02	8.545E-02	2.909E-01
Kr-85	2.768E+01	130.8	3.620E+01	3.624E+01	1.214E+02
Total	8.849E+02				

Analyst: Jacob Boyd

Sample description
486234_Gamma_MB 160-486234~1-A

Spectrum Filename: C:\User\SPC\Det17\17_Gamma_20202083.An1

Acquisition information

Start time:	11/12/2020 6:13:36 PM
Live time:	7200
Real time:	7222
Dead time:	0.31 %
Detector ID:	17

Detector system
Ge17 SN/11080671

Calibration

Filename:	17_TCC-1L Marn.Clb

17_1L Marn_1893022-115244

Energy Calibration

Created:	7/23/2020 4:21:49 PM
Zero offset:	0.168 keV
Gain:	0.250 keV/channel
Quadratic:	-2.402E-08 keV/channel^2

Efficiency Calibration

Created:	5/6/2020 2:27:38 PM
Type:	TCC Polynomial
Coefficients:	-0.423753 -4.300989 -0.683475
	6.999694 0.000000 0.000000

Library Files

Main analysis library:	Client_Long_Rev15.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.69keV)
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	11/12/2020 6:13:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	17_2020-11-07_2216.PBC 11/7/2020 10:16:38 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 14 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0960

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.70	20.	138.98	0.82	4.195E-02	46.54	4.050	PBC<MDA	PB210
63.38	8.	393.79	0.49	4.839E-02	63.29	3.100	PBC<MDA	TH234
80.99	14.	166.89	0.90	5.125E-02	80.99	29.364	PBC<MDA	BA133
86.49	22.	159.59	0.91	5.160E-02	86.49	13.100	PBC<MDA	Np237
					86.54	33.600	1.769E-01	EU155
					86.94	9.040	6.574E-01	Sn126
86.54	22.	162.40	0.91	5.160E-02	86.49	13.100	PBC<MDA	Np237
					86.54	33.600	1.769E-01	EU155
					86.94	9.040	6.574E-01	Sn126
86.94	22.	165.08	0.91	5.162E-02	86.49	13.100	PBC<MDA	Np237
					86.54	33.600	1.770E-01	EU155
					86.94	9.040	6.578E-01	Sn126
87.57	14.	272.60	0.91	5.164E-02	87.57	37.500	PBC<MDA	Sn126
92.74	30.	94.21	1.07	5.176E-02	92.59	2.692	PBC<MDA	TH234
					93.35	5.561	1.439E+00	AC228
105.31	19.	163.55	0.93	5.151E-02	105.31	20.609	PBC<MDA	EU155
106.13	21.	136.11	0.93	5.147E-02	106.13	18.835	PBC<MDA	Np239
123.10	16.	144.48	0.94	5.025E-02	123.10	35.632	PBC<MDA	EU154
145.44	12.	348.45	0.96	4.784E-02	145.44	48.400	PBC<MDA	CE141
165.85	23.	109.82	0.98	4.526E-02	165.85	76.487	PBC<MDA	CE139
176.60	19.	128.54	0.99	4.385E-02	176.60	17.000	PBC<MDA	Cf251
185.71	79.	19.40	0.75	4.265E-02	185.72	47.821	5.380E-01	U235
193.51	20.	105.48	1.01	4.163E-02	193.51	4.400	PBC<MDA	TH229
227.00	6.	360.56	1.04	3.757E-02	227.00	6.300	PBC<MDA	Cf251
238.49	17.	112.13	0.75	3.636E-02	238.63	43.042	PBC<MDA	PB212
242.00	19.	125.92	1.05	3.601E-02	242.00	7.376	PBC<MDA	PB214
244.69	5.	491.60	1.05	3.574E-02	244.69	5.531	PBC<MDA	EU152
256.24	2.	821.17	1.06	3.465E-02	256.24	7.000	PBC<MDA	TH227

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
263.70	12.	139.42	1.07	3.398E-02	263.70	0.006	PBC<MDA	Cd113m
279.20	18.	88.86	1.08	3.268E-02	279.20	81.500	PBC<MDA	Hg203
284.30	3.	635.22	1.09	3.228E-02	284.30	5.622	PBC<MDA	I131
328.76	27.	55.11	1.13	2.920E-02	328.76	15.618	PBC<MDA	La140
338.32	9.	194.82	1.14	2.862E-02	338.32	12.069	PBC<MDA	AC228
340.57	16.	116.70	1.14	2.849E-02	340.57	37.446	PBC<MDA	Cs136
344.29	5.	402.09	1.14	2.828E-02	344.29	23.805	PBC<MDA	EU152
352.01	24.	55.96	1.00	2.784E-02	351.93	37.067	PBC<MDA	PB214
427.88	3.	515.86	1.21	2.430E-02	427.88	29.181	PBC<MDA	SB125
433.94	5.	294.33	1.22	2.406E-02	433.94	90.480	PBC<MDA	AG108M
463.37	2.	706.27	1.24	2.299E-02	463.37	10.591	PBC<MDA	SB125
511.86	140.	15.32	2.53	2.145E-02	511.86	19.226	4.714E+00	RH106
513.98	18.	130.80	1.28	2.139E-02	513.98	0.434	PBC<MDA	Kr85
531.00	23.	43.41	1.30	2.091E-02	531.00	13.133	PBC<MDA	Nd147
537.26	14.	97.47	1.30	2.075E-02	537.26	24.146	PBC<MDA	Ba140
563.24	7.	161.87	1.32	2.008E-02	563.24	6.402	PBC<MDA	CS134
569.32	25.	40.60	1.33	1.993E-02	569.32	11.481	PBC<MDA	CS134
					569.47	8.200	2.125E+00	PA234
					569.70	97.740	1.783E-01	BI207
569.47	4.	280.62	1.33	1.993E-02	569.32	11.481	PBC<MDA	CS134
					569.47	8.200	3.400E-01	PA234
					569.70	97.740	2.853E-02	BI207
583.12	29.	44.61	0.56	1.961E-02	583.02	72.904	PBC<MDA	TL208
600.50	15.	148.48	1.35	1.921E-02	600.50	17.711	PBC<MDA	SB125
602.73	15.	152.74	1.36	1.916E-02	602.73	89.553	PBC<MDA	SB124
604.71	12.	202.01	1.36	1.912E-02	604.71	84.286	PBC<MDA	CS134
609.18	-20.	114.84	1.36	1.902E-02	609.31	40.151	PBC<MDA	BI214
610.30	15.	146.52	1.36	1.900E-02	610.30	5.660	PBC<MDA	RU103
614.28	15.	150.67	1.36	1.891E-02	614.28	89.850	PBC<MDA	AG108M
618.06	11.	218.54	1.37	1.883E-02	618.06	99.100	PBC<MDA	PM144
636.97	13.	84.84	1.38	1.845E-02	636.97	7.508	PBC<MDA	I131
696.54	6.	235.67	1.43	1.735E-02	696.54	99.000	PBC<MDA	PM144
702.63	24.	45.62	1.43	1.725E-02	702.63	87.168	PBC<MDA	NB94
724.20	9.	104.83	1.45	1.689E-02	724.20	44.200	PBC<MDA	ZR95
726.29	10.	84.42	1.45	1.685E-02	727.17	6.448	PBC<MDA	BI212
756.73	14.	93.18	1.47	1.639E-02	756.73	54.500	PBC<MDA	ZR95
763.94	12.	68.18	1.48	1.629E-02	763.94	16.268	PBC<MDA	AG110M
765.79	5.	192.92	1.48	1.626E-02	765.79	99.801	PBC<MDA	NB95
					766.41	0.198	PBC<MDA	PA234M
766.41	-4.	278.30	1.48	1.625E-02	765.79	99.801	PBC<MDA	NB95
					766.41	0.198	PBC<MDA	PA234M
778.92	10.	121.39	1.49	1.607E-02	778.92	10.974	PBC<MDA	EU152
795.87	16.	51.15	1.50	1.584E-02	795.87	71.916	PBC<MDA	CS134
799.60	9.	105.80	1.51	1.579E-02	799.60	98.960	PBC<MDA	TL210
801.95	13.	101.23	1.51	1.576E-02	801.95	6.654	PBC<MDA	CS134
810.78	16.	53.40	1.51	1.564E-02	810.78	95.909	PBC<MDA	CO58
815.77	7.	147.29	1.52	1.557E-02	815.77	22.168	PBC<MDA	La140
834.85	11.	91.33	1.53	1.533E-02	834.85	100.000	PBC<MDA	MN54

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
846.77	9.	133.96	1.54	1.518E-02	846.77	82.771	PBC<MDA	Co56
861.57	5.	182.87	1.55	1.502E-02	860.56	13.237	PBC<MDA	TL208
873.23	11.	86.25	1.56	1.487E-02	873.23	9.411	PBC<MDA	EU154
898.04	11.	88.85	1.58	1.459E-02	898.04	82.381	PBC<MDA	Y88
911.07	-12.	129.65	1.59	1.444E-02	911.07	24.442	PBC<MDA	AC228
937.49	2.	619.68	1.61	1.417E-02	937.49	25.557	PBC<MDA	AG110M
964.11	10.	73.04	1.62	1.390E-02	964.11	11.751	PBC<MDA	EU152
996.33	10.	84.96	1.65	1.359E-02	996.33	9.605	PBC<MDA	EU154
1001.00	-2.	612.20	1.65	1.355E-02	1001.00	0.505	PBC<MDA	PA234M
1037.84	11.	59.56	1.67	1.322E-02	1037.84	10.562	PBC<MDA	Co56
1048.07	26.	26.22	1.68	1.313E-02	1048.07	60.119	4.635E-01	Cs136
1077.40	4.	250.83	1.70	1.288E-02	1077.40	3.300	PBC<MDA	Ga68
1120.49	12.	81.06	2.56	1.254E-02	1120.29	13.140	PBC<MDA	BI214
					1120.55	87.531	PBC<MDA	Sc46
					1121.30	29.171	PBC<MDA	Ta182
1121.30	10.	113.55	1.73	1.253E-02	1120.29	13.140	PBC<MDA	BI214
					1120.55	87.531	1.308E-01	Sc46
					1121.30	29.171	3.926E-01	Ta182
1173.24	7.	103.74	1.76	1.215E-02	1173.24	88.790	PBC<MDA	CO60
1221.41	4.	232.74	1.79	1.181E-02	1221.41	24.251	PBC<MDA	Ta182
1238.28	3.	419.46	1.80	1.170E-02	1238.28	50.670	PBC<MDA	Co56
1274.53	1.	987.42	1.82	1.147E-02	1274.53	78.543	PBC<MDA	NA22
					1274.54	32.389	2.493E-02	EU154
1408.00	7.	88.36	1.90	1.070E-02	1408.00	17.355	PBC<MDA	EU152
1461.54	48.	14.43	0.62	1.042E-02	1460.83	10.700	PBC<MDA	K40
1596.21	6.	96.69	2.00	9.778E-03	1596.21	81.621	PBC<MDA	La140
1764.69	-6.	126.38	2.08	9.086E-03	1764.49	15.819	PBC<MDA	BI214
1771.35	1.	714.14	2.09	9.060E-03	1771.35	12.000	PBC<MDA	Co56
1836.06	4.	163.85	2.12	8.820E-03	1836.06	88.406	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
741.86	185.71	55.	79.	1.852E+03	19.40	0.748	- 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_Rev15.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	186.06	46.70	231.	20.	0.003	138.98	0.823
TH-227	199.79	50.14	397.	-13.	-0.002	215.82	0.874s
AM-241	237.36	59.54	514.	-25.	-0.003	130.20	0.883s
TH-234	252.74	63.38	274.	8.	0.001	393.79	0.486s
BA-133	323.13	80.99	156.	14.	0.002	166.89	0.903s
Np-237	345.13	86.49	610.	22.	0.003	159.59	0.908
EU-155	345.34	86.54	632.	22.	0.003	162.40	0.908
Sn-126	346.93	86.94	654.	22.	0.003	165.08	0.908
Sn-126	349.44	87.57	676.	14.	0.002	272.60	0.909
Cd-109	351.32	88.04	690.	0.	0.000	1000.00	0.909s
Nd-147	363.56	91.10	731.	-24.	-0.003	161.01	0.912s
TH-234	370.12	92.74	273.	30.	0.004	94.21	1.070s
AC-228	372.55	93.35	737.	-25.	-0.003	154.75	0.915s
Gd-153	389.15	97.50	511.	-13.	-0.002	241.40	0.918s
Np-239	397.14	99.50	525.	0.	0.000	1000.00	0.920s
Gd-153	411.94	103.20	525.	0.	0.000	1000.00	0.924
Np-239	413.94	103.70	525.	0.	0.000	1000.00	0.924s
EU-155	420.39	105.31	446.	19.	0.003	163.55	0.926
Np-239	423.65	106.13	412.	21.	0.003	136.11	0.927s
EU-152	486.23	121.78	280.	-23.	-0.003	104.98	0.941s
CO-57	487.35	122.06	303.	0.	0.000	1000.00	0.941s
EU-154	491.50	123.10	248.	16.	0.002	144.48	0.942
PA-234	524.27	131.29	742.	-24.	-0.003	158.72	0.950s
HF-181	531.18	133.02	772.	-6.	-0.001	556.39	0.951s
CE-144	533.24	133.54	804.	-26.	-0.004	157.79	0.952s
HF-181	544.28	136.30	830.	-26.	-0.004	159.82	0.954s
CO-57	544.97	136.47	856.	-11.	-0.002	371.09	0.955s
Tc-99m	561.12	140.51	867.	0.	0.000	1000.00	0.958s
U-235	574.21	143.79	867.	0.	0.000	1000.00	0.961s
CE-141	580.83	145.44	844.	12.	0.002	348.45	0.963
Ba-140	649.68	162.66	292.	-24.	-0.003	102.46	0.979
U-235	652.56	163.38	324.	-32.	-0.004	96.92	0.980
CE-139	662.45	165.85	297.	23.	0.003	109.82	0.982s
Cf-251	705.42	176.60	165.	19.	0.003	128.54	0.991
U-235	741.89	185.72	215.	-9.	-0.001	241.48	1.000D
TH-229	773.03	193.51	117.	20.	0.003	105.48	1.007s
TH-229	842.37	210.85	158.	-10.	-0.001	245.13	1.023s
Cf-251	906.95	227.00	132.	6.	0.001	360.56	1.037s
TH-227	942.82	235.97	232.	-17.	-0.002	127.82	1.045
PB-212	953.46	238.63	262.	-14.	-0.002	169.05	1.048s
PB-214	966.92	242.00	266.	19.	0.003	125.92	1.051
EU-152	977.70	244.69	338.	5.	0.001	491.60	1.053s
TH-227	1023.87	256.24	99.	2.	0.000	821.17	1.064s
Cd-113m	1053.70	263.70	142.	12.	0.002	139.42	1.070s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-210M	1062.23	265.83	163.	-21.	-0.003	90.81	1.072
TL-208	1108.02	277.28	136.	-5.	-0.001	317.51	1.082s
Hg-203	1115.69	279.20	125.	18.	0.003	88.86	1.084s
I-131	1136.08	284.30	99.	3.	0.000	635.22	1.088s
PB-214	1179.23	295.09	553.	-41.	-0.006	37.56	1.098s
TL-210	1182.87	296.00	529.	-19.	-0.003	171.95	1.099s
PB-212	1198.98	300.03	557.	-4.	-0.001	193.77	1.102s
PA-231	1199.14	300.07	556.	0.	0.000	1000.00	1.102s
PA-233	1199.58	300.18	556.	0.	0.000	1000.00	1.102s
PA-231	1209.46	302.65	556.	0.	0.000	1000.00	1.104s
BA-133	1210.27	302.85	556.	0.	0.000	1000.00	1.105s
Ba-140	1218.25	304.85	556.	0.	0.000	1000.00	1.106s
BI-210M	1218.44	304.90	556.	0.	0.000	1000.00	1.106s
Ir-192	1232.61	308.44	556.	0.	0.000	1000.00	1.110
PA-233	1246.90	312.01	556.	0.	0.000	1000.00	1.113s
Ir-192	1264.81	316.49	590.	-21.	-0.003	168.73	1.117
CR-51	1279.18	320.08	670.	-21.	-0.003	173.12	1.120s
La-140	1313.87	328.76	96.	27.	0.004	55.11	1.127s
Cf-249	1332.59	333.44	178.	-4.	-0.001	438.86	1.132s
AC-228	1352.10	338.32	153.	9.	0.001	194.82	1.136s
Cs-136	1361.10	340.57	162.	16.	0.002	116.70	1.138
EU-152	1375.96	344.29	178.	5.	0.001	402.09	1.141s
PB-214	1406.85	352.01	59.	24.	0.003	55.96	0.998
BA-133	1422.80	356.00	184.	-10.	-0.001	188.40	1.151s
I-131	1456.73	364.48	91.	-11.	-0.002	123.54	1.158s
BA-133	1534.14	383.84	187.	-10.	-0.001	202.45	1.175
Cf-249	1550.58	387.95	209.	-20.	-0.003	106.48	1.179s
SN-113	1565.53	391.69	272.	-21.	-0.003	113.48	1.182s
SB-125	1710.25	427.88	62.	3.	0.000	515.86	1.212
AG-108M	1734.49	433.94	65.	5.	0.001	294.33	1.217s
PM-146	1814.25	453.88	64.	-6.	-0.001	264.50	1.234s
SB-125	1852.19	463.37	98.	2.	0.000	706.27	1.242
Ir-192	1870.96	468.06	119.	-17.	-0.002	92.35	1.246s
BE-7	1909.10	477.59	267.	-22.	-0.003	108.11	1.254s
HF-181	1926.70	482.00	288.	-22.	-0.003	111.95	1.258s
La-140	1946.79	487.02	292.	-21.	-0.003	114.45	1.262s
RU-103	1986.92	497.05	60.	-11.	-0.002	141.13	1.270s
RH-106	2046.16	511.86	160.	140.	0.019	15.32	2.532
Kr-85	2054.62	513.98	284.	18.	0.003	130.80	1.284s
Nd-147	2122.69	531.00	20.	23.	0.003	43.41	1.298s
Ba-140	2147.73	537.26	43.	14.	0.002	97.47	1.303s
CS-134	2251.63	563.24	27.	7.	0.001	161.87	1.324s
CS-134	2275.96	569.32	39.	25.	0.003	40.60	1.329s
PA-234	2276.56	569.47	61.	4.	0.001	280.62	1.329s
BI-207	2277.49	569.70	65.	0.	0.000	1000.00	1.329s
TL-208	2331.16	583.12	35.	29.	0.004	44.61	0.562s
SB-125	2400.67	600.50	237.	15.	0.002	148.48	1.354s
SB-124	2409.60	602.73	252.	15.	0.002	152.74	1.356s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CS-134	2417.51	604.71	266.	12.	0.002	202.01	1.357s
BI-214	2435.92	609.31	253.	-20.	-0.003	114.84	1.361
RU-103	2439.86	610.30	233.	15.	0.002	146.52	1.361s
AG-108M	2455.79	614.28	248.	15.	0.002	150.67	1.365s
PM-144	2470.92	618.06	267.	11.	0.001	218.54	1.368s
RH-106	2486.34	621.92	342.	-17.	-0.002	154.10	1.371s
SB-125	2542.23	635.89	61.	-16.	-0.002	144.07	1.381s
I-131	2546.57	636.97	52.	13.	0.002	84.84	1.383s
AG-110M	2629.71	657.76	56.	-5.	-0.001	290.51	1.399
CS-137	2645.31	661.66	94.	-4.	-0.001	308.59	1.402
PM-144	2784.84	696.54	54.	6.	0.001	235.67	1.429s
NB-94	2809.19	702.63	23.	24.	0.003	45.62	1.433s
SB-124	2889.82	722.79	65.	-11.	-0.002	105.79	1.449s
EU-154	2892.11	723.36	54.	0.	0.000	1000.00	1.449s
ZR-95	2895.47	724.20	38.	9.	0.001	104.83	1.450s
BI-212	2907.36	727.17	31.	10.	0.001	84.42	1.452s
PM-146	2941.56	735.72	57.	-5.	-0.001	243.09	1.458s
ZR-95	3025.60	756.73	37.	14.	0.002	93.18	1.474s
AG-110M	3054.46	763.94	25.	12.	0.002	68.18	1.479
NB-95	3061.84	765.79	54.	5.	0.001	192.92	1.481s
PA-234M	3064.34	766.41	57.	-4.	-0.001	278.30	1.481s
EU-152	3114.37	778.92	33.	10.	0.001	121.39	1.491s
BI-212	3140.37	785.42	42.	-6.	-0.001	232.74	1.495
CS-134	3182.18	795.87	26.	16.	0.002	51.15	1.503s
TL-210	3197.10	799.60	42.	9.	0.001	105.80	1.506s
CS-134	3206.50	801.95	78.	13.	0.002	101.23	1.508s
CO-58	3241.80	810.77	29.	16.	0.002	53.40	1.514s
La-140	3261.79	815.77	47.	7.	0.001	147.29	1.518
MN-54	3338.11	834.85	19.	11.	0.001	91.33	1.532s
Co-56	3385.80	846.77	33.	9.	0.001	133.96	1.541s
TL-208	3440.99	860.56	22.	5.	0.001	182.87	1.550s
NB-94	3483.13	871.10	47.	-14.	-0.002	75.69	1.558s
EU-154	3491.66	873.23	38.	11.	0.002	86.25	1.560s
PA-234	3520.87	880.53	124.	-19.	-0.003	86.67	1.565s
PA-234	3531.71	883.24	143.	-19.	-0.003	92.48	1.567
AG-110M	3537.48	884.68	170.	-21.	-0.003	90.07	1.568s
Sc-46	3555.87	889.28	216.	-21.	-0.003	100.69	1.571s
Y-88	3590.92	898.04	19.	11.	0.002	88.85	1.577s
AC-228	3643.05	911.07	61.	-12.	-0.002	129.65	1.586s
AG-110M	3748.76	937.49	23.	2.	0.000	619.68	1.605s
PA-234	3782.88	946.02	33.	-6.	-0.001	218.04	1.611s
EU-152	3855.25	964.11	24.	10.	0.001	73.04	1.623s
EU-154	3984.16	996.33	30.	10.	0.001	84.96	1.646s
PA-234M	4002.84	1001.00	52.	-2.	0.000	612.20	1.649s
Co-56	4150.25	1037.84	6.	11.	0.001	59.56	1.674s
Cs-136	4191.18	1048.07	11.	26.	0.004	26.22	1.680s
RH-106	4200.35	1050.36	52.	-11.	-0.002	95.03	1.682
BI-207	4253.56	1063.66	61.	-22.	-0.003	31.28	1.691s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ga-68	4308.54	1077.40	20.	4.	0.001	250.83	1.700
FE-59	4395.97	1099.25	45.	-13.	-0.002	53.53	1.714s
EU-152	4447.29	1112.07	82.	-8.	-0.001	95.32	1.723s
ZN-65	4461.18	1115.55	74.	0.	0.000	1000.00	1.725
BI-214	4480.97	1120.49	22.	12.	0.002	81.06	2.562s
Sc-46	4481.20	1120.55	74.	0.	0.000	1000.00	1.728s
Ta-182	4484.20	1121.30	64.	10.	0.001	113.55	1.728s
CO-60	4692.03	1173.24	11.	7.	0.001	103.74	1.762s
Ta-182	4755.30	1189.05	25.	-5.	-0.001	224.35	1.771s
Ta-182	4884.80	1221.41	16.	4.	0.001	232.74	1.792s
Co-56	4952.31	1238.28	28.	3.	0.000	419.46	1.802s
NA-22	5097.38	1274.53	21.	1.	0.000	987.42	1.824
EU-154	5097.42	1274.54	22.	0.	0.000	1000.00	1.824s
FE-59	5165.67	1291.60	32.	-13.	-0.002	102.72	1.834s
CO-60	5329.38	1332.50	22.	-3.	0.000	426.60	1.858s
AG-110M	5536.67	1384.30	27.	-9.	-0.001	134.37	1.888s
EU-152	5631.54	1408.00	5.	7.	0.001	88.36	1.902s
K-40	5842.99	1460.83	59.	-13.	-0.002	115.69	1.931s
La-140	6384.87	1596.21	6.	6.	0.001	96.69	2.003s
SB-124	6764.24	1690.98	23.	-9.	-0.001	133.23	2.050s
BI-214	7058.52	1764.49	30.	-6.	-0.001	126.38	2.085s
Co-56	7085.98	1771.35	25.	1.	0.000	714.14	2.088s
Y-88	7345.05	1836.06	6.	4.	0.001	163.85	2.117s

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	R	-1.2929E+00				5.31E+01	
			477.60	-1.293E+00	(	4.675E+00 1.08E+02 1.04E+01	G
NA-22	R	1.0279E-02				9.50E+02	
			1274.53	1.028E-02	(	3.736E-01 9.87E+02 7.85E+01	G
K-40	N	-1.5821E+00				4.66E+11	
			1460.83	-1.582E+00	?(P	4.785E+00 1.16E+02 1.07E+01	G
Sc-46	R	-2.2253E-01				8.38E+01	
			889.28	-2.225E-01	?(	7.494E-01 1.01E+02 8.99E+01	G
			1120.55	0.000E+00	+	5.416E-01 1.00E+03 8.75E+01	G

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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CR-51	R	-1.0126E+00					2.77E+01	
			320.08	-1.013E+00	&(	5.860E+00	1.73E+02	9.83E+00 G
MN-54	C	9.6501E-02					3.12E+02	
			834.85	9.650E-02	?(	2.069E-01	9.13E+01	1.00E+02 G
FE-59	R	-2.6341E-01					4.45E+01	
			1099.25	-2.634E-01	?(P	6.705E-01	5.35E+01	5.56E+01 G
			1291.60	-3.644E-01	+	8.148E-01	1.03E+02	4.36E+01 G
Co-56	R	1.5988E-01					7.73E+01	
			846.77	1.031E-01	&(	3.243E-01	1.34E+02	8.28E+01 G
			1238.28	6.739E-02	?(P	6.424E-01	4.19E+02	5.07E+01 G
			1037.84	1.048E+00	&(P	1.449E+00	5.96E+01	1.06E+01 G
			1771.35	1.277E-01	?	3.323E+00	7.14E+02	1.20E+01 A
CO-58	R	1.4926E-01					7.09E+01	
			810.78	1.493E-01	?(	2.574E-01	5.34E+01	9.59E+01 G
CO-60	R	2.7637E-02					1.93E+03	
			1332.50	-3.974E-02	?(P	3.398E-01	4.27E+02	9.01E+01 G
			1173.24	9.598E-02	?(P	2.358E-01	1.04E+02	8.88E+01 G
NB-94	R	2.2189E-01					7.41E+06	
			702.63	2.219E-01	&(P	2.314E-01	4.56E+01	8.72E+01 G
			871.10	-1.441E-01	-	3.642E-01	7.57E+01	8.84E+01 G
ZR-95	I	1.9715E-01					6.40E+01	
			756.73	2.254E-01	?(	4.847E-01	9.32E+01	5.45E+01 G
			724.20	1.624E-01	?(	5.812E-01	1.05E+02	4.42E+01 G
NB-95	I	4.7051E-02					6.40E+01	
			765.79	4.705E-02	?(	3.149E-01	1.93E+02	9.98E+01 G
RU-103	R	-7.8664E-02					3.93E+01	
			497.05	-7.866E-02	?(	2.775E-01	1.41E+02	8.87E+01 G
			610.30	1.933E+00	?	9.538E+00	1.47E+02	5.66E+00 GA
RH-106	R	-1.5215E+00					3.74E+02	
			621.92	-1.521E+00	&(	7.870E+00	1.54E+02	8.36E+00 G
			1050.36	-9.192E+00	+	2.954E+01	9.50E+01	1.31E+00 G
			511.86	4.714E+00		2.076E+00	1.53E+01	1.92E+01 GA
AG-108M	C	7.8431E-02					1.53E+05	
			433.94	3.456E-02	(P	2.562E-01	2.94E+02	9.05E+01 G
			722.94	-6.477E-04	%	3.342E-01	1.45E+04	9.08E+01 G
			614.28	1.226E-01	&(	6.218E-01	1.51E+02	8.98E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AG-110M	R	-1.4216E-01					2.50E+02	
			884.68	-3.638E-01	?(	1.094E+00	9.01E+01	5.47E+01 G
			657.76	-5.587E-02	&	3.948E-01	2.91E+02	7.35E+01 G
			937.49	6.394E-02	+	9.675E-01	6.20E+02	2.56E+01 G
			1384.30	-6.247E-01	+ P	1.834E+00	1.34E+02	1.89E+01 G
			763.94	6.029E-01	?(	1.363E+00	6.82E+01	1.63E+01 G
SN-113	F	-1.7524E-01					1.15E+02	
			391.69	-1.752E-01	?(	6.657E-01	1.13E+02	6.42E+01 G
SB-124	R	1.2061E-01					6.02E+01	
			602.73	1.206E-01	?(	6.201E-01	1.53E+02	8.96E+01 G
			1690.98	-3.153E-01	+	9.057E-01	1.33E+02	4.07E+01 G
			722.79	-1.055E+00	+	3.782E+00	1.06E+02	8.76E+00 G
SB-125	R	2.3808E-01					1.01E+03	
			427.88	5.877E-02	?(P	7.717E-01	5.16E+02	2.92E+01 G
			600.50	6.075E-01	?(	3.037E+00	1.48E+02	1.77E+01 G
			635.89	-1.093E+00	+ P	2.621E+00	1.44E+02	1.13E+01 G
			463.37	1.144E-01	?(P	2.786E+00	7.06E+02	1.06E+01 G
I-131	R	5.4448E-02					8.02E+00	
			364.48	-7.100E-02	?(P	2.987E-01	1.24E+02	8.11E+01 G
			284.30	2.273E-01	?(P	3.770E+00	6.35E+02	5.62E+00 G
			636.97	1.280E+00	?(	3.649E+00	8.48E+01	7.51E+00 G
Gd-153	R	-1.2971E-01					2.42E+02	
			97.50	-1.297E-01	&(	1.051E+00	2.41E+02	2.76E+01 G
			103.20	0.000E+00	&	1.520E+00	1.00E+03	1.94E+01 G
Ga-68	C	2.2861E+00					4.71E-02	
			1077.40	2.286E+00	?(	1.346E+01	2.51E+02	3.30E+00 G
BA-133	R	-8.8781E-02					3.85E+03	
			356.00	-8.878E-02	?(	5.669E-01	1.88E+02	5.85E+01 G
			302.85	0.000E+00	+	2.961E+00	1.00E+03	1.71E+01 G
			383.84	-5.413E-01	+	3.717E+00	2.02E+02	9.46E+00 GA
			80.99	1.254E-01	& P	5.629E-01	1.67E+02	2.94E+01 GA
CS-134	R	3.0906E-01					7.54E+02	
			795.87	1.951E-01	&(	3.200E-01	5.11E+01	7.19E+01 G
			604.71	9.955E-02	?(	6.790E-01	2.02E+02	8.43E+01 G
			569.32	1.517E+00	?(	1.931E+00	4.06E+01	1.15E+01 G
			801.95	1.701E+00	?(	5.813E+00	1.01E+02	6.65E+00 G
			563.24	7.335E-01	?(P	2.919E+00	1.62E+02	6.40E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CS-137	I	-4.0801E-02					1.10E+04	
			661.66	-4.080E-02	(	4.346E-01	3.09E+02	8.52E+01 G
CE-139	R	9.0786E-02					1.38E+02	
			165.85	9.079E-02	(	3.333E-01	1.10E+02	7.65E+01 G
Ba-140	R	3.9714E-01					1.28E+01	
			537.26	3.971E-01	?(	9.257E-01	9.75E+01	2.41E+01 G
			162.66	-1.274E+00	+	4.359E+00	1.02E+02	5.74E+00 G
			304.85	0.000E+00	&	1.403E+01	1.00E+03	3.62E+00 G
La-140	R	2.3487E-01					1.28E+01	
			1596.21	1.102E-01	?(	2.402E-01	9.67E+01	8.16E+01 G
			487.02	-3.541E-01	+	1.356E+00	1.14E+02	3.80E+01 G
			328.76	8.257E-01	?(P	1.475E+00	5.51E+01	1.56E+01 G
			815.77	2.776E-01	&(P	1.399E+00	1.47E+02	2.22E+01 G
CE-141	I	7.0986E-02					3.25E+01	
			145.44	7.099E-02	&(	8.285E-01	3.48E+02	4.84E+01 G
CE-144	I	-6.5147E-01					2.85E+02	
			133.54	-6.515E-01	(	3.429E+00	1.58E+02	1.11E+01 G
PM-144	C	6.5880E-02					3.63E+02	
			696.54	5.202E-02	?(P	2.977E-01	2.36E+02	9.90E+01 G
			618.06	7.973E-02	?(P	5.871E-01	2.19E+02	9.91E+01 G
EU-152	R	2.9075E-01					4.94E+03	
			121.78	-2.712E-01	(	9.515E-01	1.05E+02	2.34E+01 G
			344.29	9.754E-02	+	1.340E+00	4.02E+02	2.38E+01 G
			1112.07	-7.752E-01	+ P	4.362E+00	9.53E+01	1.13E+01 G
			778.92	8.136E-01	?(	2.311E+00	1.21E+02	1.10E+01 G
			964.11	8.820E-01	&(	2.152E+00	7.30E+01	1.18E+01 G
			244.69	3.729E-01	?(	6.207E+00	4.92E+02	5.53E+00 G
			1408.00	4.950E-01	?	1.008E+00	8.84E+01	1.74E+01 GA
EU-154	R	4.4998E-01					3.14E+03	
			123.10	1.215E-01	&(	5.906E-01	1.44E+02	3.56E+01 G
			1274.54	0.000E+00	-	9.185E-01	1.00E+03	3.24E+01 G
			723.36	0.000E+00	&	1.853E+00	1.00E+03	1.64E+01 G
			873.23	1.076E+00	?(	3.133E+00	8.63E+01	9.41E+00 G
			1004.77	-3.248E-02	%	2.527E+00	2.20E+03	1.61E+01 G
			996.33	1.055E+00	?(	3.027E+00	8.50E+01	9.61E+00 G
EU-155	R	2.0185E-01					1.81E+03	
			105.31	2.425E-01	&(P	1.323E+00	1.64E+02	2.06E+01 G
			86.54	1.769E-01	&(	9.604E-01	1.62E+02	3.36E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
HF-181	R	-1.7830E-01					4.24E+01	
			482.00	-1.783E-01	?(	6.677E-01	1.12E+02	7.61E+01 G
			133.02	-5.194E-02	+ P	1.243E+00	5.56E+02	3.00E+01 G
			345.83	-2.501E-02	%	2.432E+00	2.83E+03	1.31E+01 G
			136.30	-1.547E+00	&	8.247E+00	1.60E+02	4.72E+00 G
Ta-182	R	3.0240E-01					1.14E+02	
			1121.30	3.926E-01	(	1.516E+00	1.14E+02	2.92E+01 G
			1221.41	1.939E-01	?(	1.035E+00	2.33E+02	2.43E+01 G
			1189.05	-3.377E-01	+	1.757E+00	2.24E+02	1.71E+01 G
Hg-203	F	9.6238E-02					4.66E+01	
			279.20	9.624E-02	&(	2.861E-01	8.89E+01	8.15E+01 G
TL-208	R	2.9638E-01					6.98E+02	
			583.02	2.818E-01	(P	2.942E-01	4.46E+01	7.29E+01 G
			277.28	-4.222E-01	-	4.593E+00	3.18E+02	5.26E+00 G
			860.56	3.768E-01	&(P	1.703E+00	1.83E+02	1.32E+01 G
PM-146	C	-5.5767E-02					2.02E+03	
			453.88	-5.577E-02	?(P	3.666E-01	2.65E+02	6.50E+01 G
			747.16	8.234E-03	%	9.635E-01	4.96E+03	3.40E+01 G
			735.72	-1.696E-01	+ P	1.395E+00	2.43E+02	2.25E+01 G
Y-88	R	9.6797E-02					1.07E+02	
			1836.06	6.887E-02	?(P	2.538E-01	1.64E+02	8.84E+01 G
			898.04	1.268E-01	&(	2.640E-01	8.88E+01	8.24E+01 G
Cd-113m		8.4018E+02					5.33E+03	
			263.70	8.402E+02	*(	3.963E+03	1.39E+02	6.00E-03 K
Cf-251	T	3.5399E-01					3.28E+05	
			176.60	3.540E-01	?(	1.166E+00	1.29E+02	1.70E+01 G
			227.00	3.521E-01	*	3.301E+00	3.61E+02	6.30E+00 GA
Cf-249	T	-1.5889E-01					1.28E+05	
			387.95	-1.589E-01	?(	5.668E-01	1.06E+02	6.60E+01 G
			333.44	-1.341E-01	+	2.011E+00	4.39E+02	1.55E+01 G
Sn-126		8.0900E-02					3.65E+07	
			87.57	9.725E-02	&	8.887E-01	2.73E+02	3.75E+01 GA
			64.28	8.090E-02	&(	3.115E+00	1.14E+03	9.70E+00 G
			86.94	6.578E-01	?	3.629E+00	1.65E+02	9.04E+00 GA
PB-210	R	1.6328E+00					8.14E+03	
			46.54	1.633E+00	(P	6.024E+00	1.39E+02	4.05E+00 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PB-212   R  -1.2115E-01                                     6.98E+02
                         238.63-1.212E-01 ?(P 6.932E-01 1.69E+02 4.30E+01 G
                         300.03-6.689E-01 + P 1.717E+01 1.94E+02 2.93E+00 GA

PB-214   R   3.2203E-01                                     5.84E+05
                         351.93 3.220E-01  (P 5.184E-01 5.60E+01 3.71E+01 G
                         295.09-9.325E-01 - P 2.574E+00 3.76E+01 1.93E+01 G
                         242.00 9.739E-01     4.113E+00 1.26E+02 7.38E+00 GA

BI-207   C  -3.1255E-01                                     1.18E+04
                        1063.66-3.125E-01 ?(P 5.628E-01 3.13E+01 7.45E+01 G
                         569.70 0.000E+00 +   2.873E-01 1.00E+03 9.77E+01 G

BI-212   R   1.2908E+00                                     6.98E+02
                         727.17 1.291E+00 &(  3.678E+00 8.44E+01 6.45E+00 G
                         785.42-5.139E+00 +   2.818E+01 2.33E+02 1.01E+00 GA

BI-214   R  -1.8829E-02                                     5.84E+05
                         609.31-3.579E-01 ?(P 1.396E+00 1.15E+02 4.02E+01 G
                        1120.29 1.017E+00  (P 2.068E+00 8.11E+01 1.31E+01 G
                        1764.49-5.943E-01 + P 2.734E+00 1.26E+02 1.58E+01 G

BI-210M  T  -1.7070E-01                                     1.10E+09
                         265.83-1.707E-01 &(P 5.108E-01 9.08E+01 5.00E+01 G
                         304.90 0.000E+00 &   1.815E+00 1.00E+03 2.80E+01 G

AC-228   R  -1.8604E-01                                     2.10E+03
                         911.07-4.603E-01 *(P 1.535E+00 1.30E+02 2.44E+01 G
                         968.97 2.101E-02 % P 2.595E+00 3.52E+03 1.46E+01 G
                         338.32 3.693E-01  (P 2.429E+00 1.95E+02 1.21E+01 G
                          93.35-1.207E+00 +   6.236E+00 1.55E+02 5.56E+00 XA

TH-227   R   1.2990E-01                                     7.95E+03
                         256.24 1.299E-01 *(P 2.807E+00 8.21E+02 7.00E+00 G
                         235.97-5.294E-01 +   2.273E+00 1.28E+02 1.23E+01 G
                          50.14-5.234E-01 +   3.799E+00 2.16E+02 8.00E+00 G

TH-229   N   1.4913E+00                                     2.68E+06
                         193.51 1.491E+00 ?(  4.033E+00 1.05E+02 4.40E+00 G
                         210.85-1.139E+00 &   7.214E+00 2.45E+02 2.99E+00 G

TH-234   R   2.9734E+00                                     1.63E+12
                          92.59 2.973E+00 @(P 7.948E+00 9.42E+01 2.69E+00 G
                          63.29 7.101E-01 - P 7.400E+00 3.94E+02 3.10E+00 G
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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PA-234   R  -1.5605E-01                                     1.63E+12
                         131.29-3.820E-01 &(  2.024E+00 1.59E+02 1.80E+01 G
                         946.02-4.172E-01 +   2.160E+00 2.18E+02 1.34E+01 G
                         569.47 3.400E-01 ?(  3.324E+00 2.81E+02 8.20E+00 C
                         883.24-1.851E+00 +   5.727E+00 9.25E+01 9.60E+00 G
                         880.53-2.951E+00 +   8.549E+00 8.67E+01 6.00E+00 GA

PA-234M  R  -3.4917E+00                                     1.63E+12
                        1001.00-3.492E+00 &(P 7.379E+01 6.12E+02 5.05E-01 G
                         766.41-1.725E+01 + P 1.630E+02 2.78E+02 1.98E-01 G

AM-241   T  -2.0502E-01                                     1.58E+05
                          59.54-2.050E-01 ?(  8.914E-01 1.30E+02 3.57E+01 G

Np-237   F   4.5385E-01                                     2.14E+06
                          86.49 4.538E-01 &(  2.421E+00 1.60E+02 1.31E+01 G

Ir-192   R  -1.3745E-01                                     7.40E+01
                         316.49-1.374E-01 &(  7.757E-01 1.69E+02 6.92E+01 G
                         468.06-2.630E-01 +   8.140E-01 9.24E+01 4.01E+01 G
                         308.44 0.000E+00 +   2.410E+00 1.00E+03 2.13E+01 G

Cs-136   R   2.0115E-01                                     1.30E+01
                         818.50-4.958E-03 %(  4.957E-01 2.85E+03 7.74E+01 G
                        1048.07 4.635E-01 ?(  3.156E-01 2.62E+01 6.01E+01 G
                         340.57 2.059E-01 &(  8.085E-01 1.17E+02 3.74E+01 G

Np-239   R   3.0979E-01                                     2.36E+00
                         103.70 0.000E+00 -   1.296E+00 1.00E+03 2.30E+01 X
                         106.13 3.098E-01 ?(  1.411E+00 1.36E+02 1.88E+01 G
                          99.50 0.000E+00 &   2.068E+00 1.00E+03 1.44E+01 X

Nd-147   R   1.1631E+00                                     1.11E+01
                         531.00 1.163E+00 @(  1.191E+00 4.34E+01 1.31E+01 G
                          91.10-2.324E-01 -   1.250E+00 1.61E+02 2.76E+01 G

TL-210   R   8.0618E-02                                     5.84E+05
                         799.60 8.062E-02 ?(  2.909E-01 1.06E+02 9.90E+01 G
                         296.00-1.069E-01 +   6.156E-01 1.72E+02 7.90E+01 G
                        1313.00-3.925E-02 &   1.576E+00 1.76E+03 2.10E+01 CA

Kr-85    I   2.7676E+01                                     3.92E+03
                         513.98 2.768E+01 ?(  1.214E+02 1.31E+02 4.34E-01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
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! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	397.	-13.	-0.002	215.82	-5.234E-01	
AM-241	59.54	514.	-25.	-0.003	130.20	-2.050E-01	
BA-133	80.99	156.	14.	0.002	166.89	1.254E-01	P
Np-237	86.49	610.	22.	0.003	159.59	4.538E-01	
EU-155	86.54	632.	22.	0.003	162.40	1.769E-01	
Sn-126	86.94	654.	22.	0.003	165.08	6.578E-01	
Sn-126	87.57	676.	14.	0.002	272.60	9.725E-02	
Nd-147	91.10	731.	-24.	-0.003	161.01	-2.324E-01	
AC-228	93.35	737.	-25.	-0.003	154.75	-1.207E+00	
Gd-153	97.50	511.	-13.	-0.002	241.40	-1.297E-01	
EU-155	105.31	446.	19.	0.003	163.55	2.425E-01	P
Np-239	106.13	412.	21.	0.003	136.11	3.098E-01	
EU-152	121.78	280.	-23.	-0.003	104.98	-2.712E-01	
EU-154	123.10	248.	16.	0.002	144.48	1.215E-01	
PA-234	131.29	742.	-24.	-0.003	158.72	-3.820E-01	
HF-181	133.02	772.	-6.	-0.001	556.39	-5.194E-02	P
CE-144	133.54	804.	-26.	-0.004	157.79	-6.515E-01	
HF-181	136.30	830.	-26.	-0.004	159.82	-1.547E+00	
CO-57	136.47	856.	-11.	-0.002	371.09	-2.919E-01	
CE-141	145.44	844.	12.	0.002	348.45	7.099E-02	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ba-140	162.66	292.	-24.	-0.003	102.46	-1.274E+00	
U-235	163.38	324.	-32.	-0.004	96.92	-2.104E+00	P
CE-139	165.85	297.	23.	0.003	109.82	9.079E-02	
Cf-251	176.60	165.	19.	0.003	128.54	3.540E-01	
U-235	185.72	215.	-9.	-0.001	241.48	-5.902E-02	
TH-229	193.51	117.	20.	0.003	105.48	1.491E+00	
TH-229	210.85	158.	-10.	-0.001	245.13	-1.139E+00	
Cf-251	227.00	132.	6.	0.001	360.56	3.521E-01	
TH-227	235.97	232.	-17.	-0.002	127.82	-5.294E-01	
PB-212	238.63	262.	-14.	-0.002	169.05	-1.212E-01	P
EU-152	244.69	338.	5.	0.001	491.60	3.729E-01	
TH-227	256.24	99.	2.	0.000	821.17	1.299E-01	P
Cd-113m	263.70	142.	12.	0.002	139.42	8.402E+02	
BI-210M	265.83	163.	-21.	-0.003	90.81	-1.707E-01	P
I-131	284.30	99.	3.	0.000	635.22	2.273E-01	P
TL-210	296.00	529.	-19.	-0.003	171.95	-1.069E-01	
PB-212	300.03	557.	-4.	-0.001	193.77	-6.689E-01	P
Ir-192	316.49	590.	-21.	-0.003	168.73	-1.374E-01	
CR-51	320.08	670.	-21.	-0.003	173.12	-1.013E+00	
La-140	328.76	96.	27.	0.004	55.11	8.257E-01	P
Cf-249	333.44	178.	-4.	-0.001	438.86	-1.341E-01	
AC-228	338.32	153.	9.	0.001	194.82	3.693E-01	P
Cs-136	340.57	162.	16.	0.002	116.70	2.059E-01	
EU-152	344.29	178.	5.	0.001	402.09	9.754E-02	
BA-133	356.00	184.	-10.	-0.001	188.40	-8.878E-02	
I-131	364.48	91.	-11.	-0.002	123.54	-7.100E-02	P
BA-133	383.84	187.	-10.	-0.001	202.45	-5.413E-01	
Cf-249	387.95	209.	-20.	-0.003	106.48	-1.589E-01	
SN-113	391.69	272.	-21.	-0.003	113.48	-1.752E-01	
SB-125	427.88	62.	3.	0.000	515.86	5.877E-02	P
AG-108M	433.94	65.	5.	0.001	294.33	3.456E-02	P
PM-146	453.88	64.	-6.	-0.001	264.50	-5.577E-02	P
SB-125	463.37	98.	2.	0.000	706.27	1.144E-01	P
Ir-192	468.06	119.	-17.	-0.002	92.35	-2.630E-01	
BE-7	477.59	267.	-22.	-0.003	108.11	-1.293E+00	
HF-181	482.00	288.	-22.	-0.003	111.95	-1.783E-01	
La-140	487.02	292.	-21.	-0.003	114.45	-3.541E-01	
RU-103	497.05	60.	-11.	-0.002	141.13	-7.866E-02	
RH-106	511.86	160.	140.	0.019	15.32	4.714E+00	
Kr-85	513.98	284.	18.	0.003	130.80	2.768E+01	
Nd-147	531.00	20.	23.	0.003	43.41	1.163E+00	
Ba-140	537.26	43.	14.	0.002	97.47	3.971E-01	
CS-134	563.24	27.	7.	0.001	161.87	7.335E-01	P
CS-134	569.32	39.	25.	0.003	40.60	1.517E+00	
PA-234	569.47	61.	4.	0.001	280.62	3.400E-01	
SB-125	600.50	237.	15.	0.002	148.48	6.075E-01	
SB-124	602.73	252.	15.	0.002	152.74	1.206E-01	
CS-134	604.71	266.	12.	0.002	202.01	9.955E-02	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RU-103	610.30	233.	15.	0.002	146.52	1.933E+00	
AG-108M	614.28	248.	15.	0.002	150.67	1.226E-01	
PM-144	618.06	267.	11.	0.001	218.54	7.973E-02	P
RH-106	621.92	342.	-17.	-0.002	154.10	-1.521E+00	
SB-125	635.89	61.	-16.	-0.002	144.07	-1.093E+00	P
I-131	636.97	52.	13.	0.002	84.84	1.280E+00	
AG-110M	657.76	56.	-5.	-0.001	290.51	-5.587E-02	
CS-137	661.66	94.	-4.	-0.001	308.59	-4.080E-02	
PM-144	696.54	54.	6.	0.001	235.67	5.202E-02	P
NB-94	702.63	23.	24.	0.003	45.62	2.219E-01	P
SB-124	722.79	65.	-11.	-0.002	105.79	-1.055E+00	
ZR-95	724.20	38.	9.	0.001	104.83	1.624E-01	
PM-146	735.72	57.	-5.	-0.001	243.09	-1.696E-01	P
ZR-95	756.73	37.	14.	0.002	93.18	2.254E-01	
AG-110M	763.94	25.	12.	0.002	68.18	6.029E-01	
NB-95	765.79	54.	5.	0.001	192.92	4.705E-02	
PA-234M	766.41	57.	-4.	-0.001	278.30	-1.725E+01	P
EU-152	778.92	33.	10.	0.001	121.39	8.136E-01	
CS-134	795.87	26.	16.	0.002	51.15	1.951E-01	
TL-210	799.60	42.	9.	0.001	105.80	8.062E-02	
CS-134	801.95	78.	13.	0.002	101.23	1.701E+00	
CO-58	810.77	29.	16.	0.002	53.40	1.493E-01	
La-140	815.77	47.	7.	0.001	147.29	2.776E-01	P
MN-54	834.85	19.	11.	0.001	91.33	9.650E-02	
Co-56	846.77	33.	9.	0.001	133.96	1.031E-01	
NB-94	871.10	47.	-14.	-0.002	75.69	-1.441E-01	
EU-154	873.23	38.	11.	0.002	86.25	1.076E+00	
PA-234	880.53	124.	-19.	-0.003	86.67	-2.951E+00	
PA-234	883.24	143.	-19.	-0.003	92.48	-1.851E+00	
AG-110M	884.68	170.	-21.	-0.003	90.07	-3.638E-01	
Sc-46	889.28	216.	-21.	-0.003	100.69	-2.225E-01	
Y-88	898.04	19.	11.	0.002	88.85	1.268E-01	
AC-228	911.07	61.	-12.	-0.002	129.65	-4.603E-01	P
AG-110M	937.49	23.	2.	0.000	619.68	6.394E-02	
PA-234	946.02	33.	-6.	-0.001	218.04	-4.172E-01	
EU-152	964.11	24.	10.	0.001	73.04	8.820E-01	
EU-154	996.33	30.	10.	0.001	84.96	1.055E+00	
PA-234M	1001.00	52.	-2.	0.000	612.20	-3.492E+00	P
Co-56	1037.84	6.	11.	0.001	59.56	1.048E+00	P
Cs-136	1048.07	11.	26.	0.004	26.22	4.635E-01	
RH-106	1050.36	52.	-11.	-0.002	95.03	-9.192E+00	
BI-207	1063.66	61.	-22.	-0.003	31.28	-3.125E-01	P
Ga-68	1077.40	20.	4.	0.001	250.83	2.286E+00	
FE-59	1099.25	45.	-13.	-0.002	53.53	-2.634E-01	P
EU-152	1112.07	82.	-8.	-0.001	95.32	-7.752E-01	P
Ta-182	1121.30	64.	10.	0.001	113.55	3.926E-01	
CO-60	1173.24	11.	7.	0.001	103.74	9.598E-02	P
Ta-182	1189.05	25.	-5.	-0.001	224.35	-3.377E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
Ta-182	1221.41	16.	4.	0.001	232.74	1.939E-01		
Co-56	1238.28	28.	3.	0.000	419.46	6.739E-02		P
FE-59	1291.60	32.	-13.	-0.002	102.72	-3.644E-01		
CO-60	1332.50	22.	-3.	0.000	426.60	-3.974E-02		P
AG-110M	1384.30	27.	-9.	-0.001	134.37	-6.247E-01		P
EU-152	1408.00	5.	7.	0.001	88.36	4.950E-01		
K-40	1460.83	59.	-13.	-0.002	115.69	-1.582E+00		P
La-140	1596.21	6.	6.	0.001	96.69	1.102E-01		
SB-124	1690.98	23.	-9.	-0.001	133.23	-3.153E-01		
Co-56	1771.35	25.	1.	0.000	714.14	1.277E-01		
Y-88	1836.06	6.	4.	0.001	163.85	6.887E-02		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	-1.2929E+00	-1.2929E+00	1.081E+02%	4.68E+00
NA-22	A	1.0279E-02	1.0279E-02	9.874E+02%	3.74E-01
K-40	#A	-1.5821E+00	-1.5821E+00	1.157E+02%	4.79E+00
Sc-46	#A	-2.2253E-01	-2.2253E-01	1.007E+02%	7.49E-01
CR-51	#A	-1.0126E+00	-1.0126E+00	1.731E+02%	5.86E+00
MN-54	#A	9.6500E-02	9.6501E-02	9.133E+01%	2.07E-01
FE-59	#A	-2.6341E-01	-2.6341E-01	5.353E+01%	6.71E-01
Co-56	#A	1.5988E-01	1.5988E-01	5.956E+01%	3.24E-01
CO-57	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.71E-01
CO-58	#A	1.4926E-01	1.4926E-01	5.340E+01%	2.57E-01
CO-60	#A	2.7637E-02	2.7637E-02	1.037E+02%	3.40E-01
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	9.30E-01
NB-94	#A	2.2189E-01	2.2189E-01	4.562E+01%	2.31E-01
ZR-95	#A	1.9715E-01	1.9715E-01	7.013E+01%	4.85E-01
NB-95	#A	4.7051E-02	4.7051E-02	1.929E+02%	3.15E-01
RU-103	#A	-7.8663E-02	-7.8664E-02	1.411E+02%	2.78E-01
RH-106	#A	-1.5215E+00	-1.5215E+00	1.541E+02%	7.87E+00
AG-108M	#A	7.8431E-02	7.8431E-02	1.507E+02%	2.56E-01
AG-110M	#A	-1.4216E-01	-1.4216E-01	5.648E+01%	1.09E+00
SN-113	#A	-1.7524E-01	-1.7524E-01	1.135E+02%	6.66E-01
SB-124	#A	1.2061E-01	1.2061E-01	1.527E+02%	6.20E-01
SB-125	#A	2.3808E-01	2.3808E-01	1.485E+02%	7.72E-01
I-131	#A	5.4446E-02	5.4448E-02	8.484E+01%	2.99E-01
Gd-153	#A	-1.2971E-01	-1.2971E-01	2.414E+02%	1.05E+00
Ga-68	#A	2.2721E+00	2.2861E+00	2.508E+02%	1.35E+01
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.16E-01
BA-133	#A	-8.8781E-02	-8.8781E-02	1.884E+02%	5.67E-01
CS-134	#A	3.0906E-01	3.0906E-01	4.060E+01%	3.20E-01
CS-137	#A	-4.0801E-02	-4.0801E-02	3.086E+02%	4.35E-01

CE-139 #A	9.0786E-02	9.0786E-02	1.098E+02%		3.33E-01
Ba-140 #A	3.9713E-01	3.9714E-01	9.747E+01%		9.26E-01
La-140 #A	2.3486E-01	2.3487E-01	5.511E+01%		2.40E-01
CE-141 #A	7.0985E-02	7.0986E-02	3.484E+02%		8.28E-01
CE-144 #A	-6.5147E-01	-6.5147E-01	1.578E+02%		3.43E+00
PM-144 #A	6.5880E-02	6.5880E-02	1.607E+02%		2.98E-01
EU-152 #A	2.9075E-01	2.9075E-01	7.304E+01%		9.52E-01
EU-154 #A	4.4998E-01	4.4998E-01	6.283E+01%		5.91E-01
EU-155 #A	2.0185E-01	2.0185E-01	1.152E+02%		1.32E+00
HF-181 #A	-1.7830E-01	-1.7830E-01	1.119E+02%		6.68E-01
Ta-182 #A	3.0240E-01	3.0240E-01	1.135E+02%		1.52E+00
Hg-203 #A	9.6237E-02	9.6238E-02	8.886E+01%		2.86E-01
TL-208 #	2.9638E-01	2.9638E-01	4.461E+01%		2.94E-01
PM-146 #A	-5.5767E-02	-5.5767E-02	2.645E+02%		3.67E-01
Y-88 #A	9.6797E-02	9.6797E-02	8.885E+01%		2.54E-01
Cd-113m#A	8.4018E+02	8.4018E+02	1.394E+02%		3.96E+03
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%		9.32E+00
Cf-251 #A	3.5399E-01	3.5399E-01	1.285E+02%		1.17E+00
Cf-249 #A	-1.5889E-01	-1.5889E-01	1.065E+02%		5.67E-01
Sn-126 #A	8.0900E-02	8.0900E-02	1.140E+03%		3.12E+00
PB-210 A	1.6328E+00	1.6328E+00	1.390E+02%		6.02E+00
PB-212 #A	-1.2115E-01	-1.2115E-01	1.691E+02%		6.93E-01
PB-214 A	3.2203E-01	3.2203E-01	5.596E+01%		5.18E-01
BI-207 #A	-3.1255E-01	-3.1255E-01	3.128E+01%		5.63E-01
BI-212 #A	1.2908E+00	1.2908E+00	8.442E+01%		3.68E+00
U-235 #A	0.0000E+00	0.0000E+00	1.000E+03%		4.44E+00
BI-214 #A	-1.8829E-02	-1.8829E-02	7.028E+01%		1.40E+00
BI-210M#A	-1.7070E-01	-1.7070E-01	9.081E+01%		5.11E-01
AC-228 #A	-1.8604E-01	-1.8604E-01	1.170E+02%		1.53E+00
TH-227 #A	1.2990E-01	1.2990E-01	8.212E+02%		2.81E+00
TH-229 #A	1.4913E+00	1.4913E+00	1.055E+02%		4.03E+00
TH-234 A	2.9734E+00	2.9734E+00	9.421E+01%		7.95E+00
PA-231 #A	0.0000E+00	0.0000E+00	7.071E+02%		3.04E+01
PA-233 #A	0.0000E+00	0.0000E+00	7.071E+02%		1.44E+00
PA-234 #A	-1.5605E-01	-1.5605E-01	1.587E+02%		2.02E+00
PA-234M#A	-3.4917E+00	-3.4917E+00	6.122E+02%		7.38E+01
AM-241 #A	-2.0502E-01	-2.0502E-01	1.302E+02%		8.91E-01
Np-237 #A	4.5385E-01	4.5385E-01	1.596E+02%		2.42E+00
Ir-192 #A	-1.3745E-01	-1.3745E-01	1.687E+02%		7.76E-01
Cs-136 #A	2.0114E-01	2.0115E-01	2.622E+01%		4.96E-01
Np-239 #A	3.0975E-01	3.0979E-01	1.361E+02%		1.41E+00
Nd-147 #A	1.1630E+00	1.1631E+00	4.341E+01%		1.19E+00
TL-210 #A	8.0618E-02	8.0618E-02	1.058E+02%		2.91E-01
Kr-85 #A	2.7676E+01	2.7676E+01	1.308E+02%		1.21E+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 (   37.7 to  1999.6 keV)     6.184E-01  Bq/Sample
Total Decayed Activity (   37.7 to  1999.6 keV) 6.1841118E-01  Bq/Sample


The library has energies which are not separable.
```

486234_Gamma_MB 160-486234~1-A. 17_Gamma_20202083.spc.

Test America St. Louis Spectrum ID: 18_Gamma_20200321

Sample Description: 486234_Gamma_LCS 160-486234~2-A
Detector: Detector #18
Batch ID: 486234
Work Order Number: Gamma
Lot Number: LCS 160-486234~2-A

Decay to Time: 11/12/2020 18:13 Live Time: 7200 sec
Acquisition Time: 11/12/2020 18:13:26 Real Time: 7322 sec
Analysis Time: 11/12/2020 20:15 Dead Time: 1.67 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 18_TCC-1L Marn.Clb
Efficiency Cal Desc: 18_TCC-1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 12:27
Energy Cal Date: 4/29/2020 11:57
Library: Client_Long_Rev15.lib
Bkgd Correction File: 18_2020-11-07_1446.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	-1.393E+01	123.9	1.726E+01	1.728E+01	5.695E+01
NA-22	0.000E+00	1.#INF	7.980E-01	7.980E-01	2.630E+00
K-40	-2.062E+00	263.6	5.436E+00	5.438E+00	1.151E+01
Sc-46	3.345E-01	136.3	4.560E-01	4.564E-01	5.513E+00
CR-51	-7.193E+00	124.5	8.955E+00	8.965E+00	2.958E+01
MN-54	3.136E+00	43.8	1.374E+00	1.386E+00	2.915E+00
FE-59	7.102E-01	453.3	3.219E+00	3.219E+00	6.653E+00
Co-56	5.079E-01	252.3	1.281E+00	1.282E+00	3.696E+00
CO-57	3.974E+00	83.4	3.315E+00	3.324E+00	9.487E+00
CO-58	-1.735E+00	78.7	1.365E+00	1.369E+00	4.504E+00
CO-60	9.298E+02	0.3	2.885E+00	5.472E+01	2.485E+00
ZN-65	0.000E+00	1.#INF	1.503E+00	1.503E+00	1.022E+01
NB-94	1.443E+00	69.2	9.980E-01	1.002E+00	3.580E+00
ZR-95	1.515E+00	65.3	9.896E-01	9.936E-01	4.640E+00
NB-95	-1.056E+00	84.2	8.890E-01	8.912E-01	2.936E+00
RU-103	-1.735E+00	93.0	1.613E+00	1.616E+00	6.873E+00
RH-106	2.014E+01	110.6	2.227E+01	2.231E+01	6.044E+01
AG-108M	-1.617E+00	91.0	1.471E+00	1.474E+00	3.369E+00
AG-110M	2.570E+00	72.7	1.869E+00	1.875E+00	8.022E+00
SN-113	1.128E+00	166.1	1.874E+00	1.875E+00	6.189E+00
SB-124	-1.356E-01	1063.4	1.442E+00	1.442E+00	4.774E+00
SB-125	-7.960E-01	140.0	1.114E+00	1.115E+00	1.021E+01
I-131	2.702E-01	70.7	1.910E-01	1.916E-01	3.072E+00
Gd-153	2.482E+00	107.1	2.658E+00	2.663E+00	9.041E+00
Ga-68	8.906E+01	102.0	9.083E+01	9.100E+01	1.873E+02
Tc-99m	0.000E+00	1.#INF	5.623E-01	5.623E-01	3.815E+00
BA-133	-1.971E+00	82.1	1.617E+00	1.621E+00	5.335E+00
CS-134	2.501E+00	61.8	1.545E+00	1.552E+00	5.076E+00
CS-137	1.631E+03	0.3	4.355E+00	9.597E+01	3.283E+00
CE-139	5.238E-01	155.4	8.137E-01	8.143E-01	2.688E+00
Ba-140	2.574E+00	177.0	4.554E+00	4.557E+00	1.046E+01
La-140	7.917E-01	83.3	6.596E-01	6.612E-01	1.305E+00
CE-141	-6.679E-02	2792.4	1.865E+00	1.865E+00	6.162E+00

CE-144	0.000E+00	1.#INF	3.571E+00	3.571E+00	2.622E+01
PM-144	2.944E-01	90.6	2.668E-01	2.673E-01	3.308E+00
EU-152	1.277E+00	78.9	1.008E+00	1.011E+00	1.996E+01
EU-154	9.587E+00	17.8	1.707E+00	1.798E+00	4.780E+00
EU-155	2.711E+00	61.5	1.667E+00	1.675E+00	5.493E+00
HF-181	8.634E-02	88.5	7.643E-02	7.660E-02	7.807E+00
Ta-182	1.294E+00	411.0	5.316E+00	5.317E+00	1.761E+01
Hg-203	3.269E-01	288.6	9.436E-01	9.438E-01	3.121E+00
TL-208	5.011E+00	49.6	2.486E+00	2.503E+00	3.371E+00
PM-146	2.469E+00	73.1	1.806E+00	1.812E+00	4.910E+00
Y-88	9.640E-01	86.9	8.377E-01	8.396E-01	1.327E+00
Cd-113m	5.997E+03	184.8	1.108E+04	1.109E+04	3.664E+04
Cd-109	1.599E+01	162.4	2.597E+01	2.599E+01	8.570E+01
Cf-251	-3.206E+00	124.3	3.987E+00	3.991E+00	9.963E+00
Cf-249	1.847E+00	99.1	1.830E+00	1.834E+00	6.040E+00
Sn-126	-1.728E+01	218.8	3.780E+01	3.782E+01	1.246E+02
PB-210	-6.693E+01	37.5	2.512E+01	2.543E+01	2.286E+02
PB-212	-2.592E+00	86.6	2.245E+00	2.250E+00	7.791E+00
PB-214	3.226E+00	54.5	1.759E+00	1.769E+00	5.276E+00
BI-207	-2.945E+00	56.8	1.673E+00	1.682E+00	4.965E+00
BI-212	2.095E+01	72.4	1.517E+01	1.522E+01	5.006E+01
U-235	4.624E+00	210.6	9.739E+00	9.743E+00	3.215E+01
BI-214	5.433E-01	115.8	6.292E-01	6.300E-01	1.073E+01
BI-210M	-1.987E+00	42.3	8.413E-01	8.494E-01	5.154E+00
AC-228	7.824E+00	84.6	6.619E+00	6.635E+00	1.409E+01
TH-227	-9.761E+00	59.9	5.848E+00	5.876E+00	3.154E+01
TH-229	4.287E+00	246.7	1.058E+01	1.058E+01	4.389E+01
TH-234	9.540E+00	296.5	2.829E+01	2.830E+01	9.341E+01
PA-231	-6.179E+01	153.6	9.493E+01	9.500E+01	3.133E+02
PA-233	-1.594E-02	9674.5	1.542E+00	1.542E+00	1.500E+01
PA-234	2.562E+00	138.7	3.554E+00	3.557E+00	1.602E+01
PA-234M	-7.468E+01	238.8	1.783E+02	1.784E+02	9.123E+02
AM-241	5.007E+03	0.2	8.816E+00	2.943E+02	1.268E+01
Np-237	-4.407E+00	169.2	7.456E+00	7.460E+00	2.460E+01
Ir-192	-6.537E-01	169.2	1.106E+00	1.107E+00	3.657E+00
Cs-136	1.494E+00	112.2	1.676E+00	1.679E+00	5.538E+00
Np-239	3.162E+00	170.0	5.374E+00	5.378E+00	1.773E+01
Nd-147	-5.713E+00	149.6	8.545E+00	8.553E+00	1.961E+01
TL-210	-1.559E+00	69.1	1.077E+00	1.081E+00	3.552E+00
Kr-85	3.075E+02	78.3	2.408E+02	2.416E+02	7.946E+02
Total	1.411E+04				

Analyst: Jacob Boyd

Sample description
486234_Gamma_LCS 160-486234~2-A

Spectrum Filename: C:\User\SPC\Det18\18_Gamma_20200321.An1

Acquisition information
Start time: 11/12/2020 6:13:26 PM
Live time: 7200
Real time: 7322
Dead time: 1.67 %
Detector ID: 18

Detector system
Ge18 SN/11164036

Calibration
Filename: 18_TCC-1L Marn.Clb
18_TCC-1L Marn_1893022-115244

Energy Calibration
Created: 4/29/2020 11:57:11 AM
Zero offset: 0.093 keV
Gain: 0.250 keV/channel
Quadratic: -2.879E-08 keV/channel^2

Efficiency Calibration
Created: 5/6/2020 12:27:45 PM
Type: TCC Polynomial
Coefficients: -0.479130 -4.387026 -0.707377
7.231555 0.000000 0.000000

Library Files
Main analysis library: Client_Long_Rev15.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.62keV)
Stop channel: 8000 (1999.62keV)
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

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Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	11/12/2020 6:13:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	18_2020-11-07_1446.PBC 11/7/2020 2:46:13 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 55 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.2332

***** 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
43.07	547.	58.56	1.02	3.794E-02				
48.79	12562.	3.76	1.00	4.143E-02				
49.86	17702.	2.81	1.00	4.201E-02	50.14	8.000	7.272E+02	TH227
59.54	595716.	0.18	0.98	4.631E-02	59.54	35.683	5.007E+03	AM241
88.01	4548.	4.75	1.07	5.133E-02	86.94	9.040	1.363E+02	Sn126
					87.57	37.500	3.283E+01	Sn126
					88.04	3.610	3.409E+02	Cd109
91.10	214.	161.97	1.04	5.144E-02	91.10	27.653	PBC<MDA	Nd147
92.59	95.	296.55	1.04	5.146E-02	92.59	2.692	PBC<MDA	TH234
93.35	219.	128.51	1.04	5.147E-02	93.35	5.561	PBC<MDA	AC228
96.64	253.	40.65	0.55	5.148E-02	97.50	27.591	2.474E+00	Gd153
99.50	216.	170.16	1.05	5.144E-02	99.50	14.371	PBC<MDA	Np239
102.79	366.	36.23	0.79	5.134E-02	103.20	19.386	5.106E+00	Gd153
					103.70	22.992	4.362E+00	Np239
105.44	206.	61.51	1.05	5.124E-02	105.31	20.607	PBC<MDA	EU155
106.13	217.	169.95	1.05	5.120E-02	106.13	18.879	PBC<MDA	Np239
109.65	142.	80.15	0.32	5.100E-02				
122.58	1418.	14.26	2.00	4.994E-02	121.78	23.590	1.669E+01	EU152
					122.06	85.341	4.617E+00	CO57
					123.10	35.921	1.099E+01	EU154
131.29	222.	138.71	1.08	4.901E-02	131.29	18.000	PBC<MDA	PA234
133.02	155.	198.96	1.08	4.881E-02	133.02	30.333	PBC<MDA	HF181
					133.54	11.102	3.986E+00	CE144
136.83	150.	83.42	1.13	4.839E-02	136.30	4.724	PBC<MDA	HF181
					136.47	10.832	3.974E+00	CO57
143.79	144.	210.61	1.09	4.747E-02	143.79	9.107	PBC<MDA	U235
165.94	128.	155.36	1.11	4.443E-02	165.85	76.603	PBC<MDA	CE139
182.59	132.	99.64	0.39	4.203E-02				

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
185.72	74.	276.25	1.13	4.158E-02	185.72	47.818	PBC<MDA	U235
210.85	98.	246.72	1.15	3.809E-02	210.85	2.990	PBC<MDA	TH229
228.12	189.	126.20	1.16	3.613E-02	227.00	6.300	PBC<MDA	Cf251
242.06	66.	386.17	1.18	3.450E-02	242.00	7.376	PBC<MDA	PB214
244.75	182.	144.24	1.18	3.423E-02	244.69	5.569	PBC<MDA	EU152
263.70	84.	184.75	1.20	3.242E-02	263.70	0.006	PBC<MDA	Cd113m
277.28	163.	96.71	1.21	3.126E-02	277.28	5.379	PBC<MDA	TL208
278.72	60.	288.65	1.21	3.110E-02	279.20	81.500	PBC<MDA	Hg203
287.33	138.	71.56	0.32	3.046E-02				
295.14	134.	84.65	1.23	2.988E-02	295.09	19.252	PBC<MDA	PB214
331.05	153.	55.52	0.39	2.747E-02				
340.25	143.	59.30	0.45	2.693E-02	340.57	38.270	1.933E+00	Cs136
346.22	130.	66.01	0.41	2.659E-02	345.83	13.085	5.185E+00	HF181
351.85	225.	68.72	1.67	2.628E-02	351.93	37.068	PBC<MDA	PB214
383.84	213.	99.42	1.30	2.467E-02	383.84	9.429	PBC<MDA	BA133
387.95	215.	99.13	1.31	2.448E-02	387.95	66.000	PBC<MDA	Cf249
391.69	127.	166.11	1.31	2.431E-02	391.69	64.226	PBC<MDA	SN113
410.89	68.	111.57	0.49	2.347E-02				
453.88	136.	160.61	1.36	2.184E-02	453.88	65.000	PBC<MDA	PM146
462.40	142.	51.15	0.47	2.155E-02	463.37	10.576	8.667E+00	SB125
491.51	215.	46.11	1.40	2.062E-02				
494.76	215.	47.15	1.40	2.052E-02				
512.36	90.	69.85	0.62	2.001E-02	511.86	19.301	3.252E+00	RH106
513.98	192.	78.34	1.41	1.996E-02	513.98	0.434	PBC<MDA	Kr85
537.26	87.	176.96	1.43	1.934E-02	537.26	24.162	PBC<MDA	Ba140
569.32	56.	178.23	1.46	1.855E-02	569.32	11.703	PBC<MDA	CS134
					569.47	8.200	5.068E+00	PA234
					569.70	97.740	PBC<MDA	BI207
569.47	16.	650.89	1.46	1.855E-02	569.32	11.703	PBC<MDA	CS134
					569.47	8.200	1.415E+00	PA234
					569.70	97.740	PBC<MDA	BI207
569.70	57.	172.41	1.46	1.854E-02	569.32	11.703	3.666E+00	CS134
					569.47	8.200	5.233E+00	PA234
					569.70	97.740	PBC<MDA	BI207
575.96	320.	37.50	0.36	1.840E-02				
583.02	147.	100.66	1.47	1.824E-02	583.02	73.813	PBC<MDA	TL208
591.70	286.	35.63	0.41	1.805E-02				
604.95	124.	135.19	1.49	1.777E-02	604.71	85.014	PBC<MDA	CS134
609.31	-24.	697.50	1.49	1.767E-02	609.31	40.483	PBC<MDA	BI214
618.06	165.	119.36	1.50	1.749E-02	618.06	99.100	PBC<MDA	PM144
621.92	163.	118.55	1.50	1.741E-02	621.92	8.430	PBC<MDA	RH106
636.97	137.	76.34	1.52	1.712E-02	635.89	11.254	PBC<MDA	SB125
					636.97	7.508	1.486E+01	I131
657.76	160.	369.03	1.53	1.673E-02	657.76	74.712	PBC<MDA	AG110M
661.63	166818.	0.27	1.51	1.666E-02	661.66	85.235	1.631E+03	CS137
698.09	171.	39.63	2.01	1.604E-02	696.54	99.000	1.492E+00	PM144
702.63	142.	77.13	1.57	1.597E-02	702.63	88.026	PBC<MDA	NB94
724.20	148.	65.31	1.59	1.563E-02	724.20	44.200	PBC<MDA	ZR95

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
727.09	152.	72.44	1.59	1.558E-02	727.17	6.463	PBC<MDA	BI212
735.72	104.	116.66	1.59	1.545E-02	735.72	22.500	PBC<MDA	PM146
747.16	131.	93.52	1.60	1.528E-02	747.16	34.000	PBC<MDA	PM146
756.73	19.	643.44	1.61	1.515E-02	756.73	54.500	PBC<MDA	ZR95
763.94	64.	146.18	1.62	1.505E-02	763.94	16.638	PBC<MDA	AG110M
778.86	98.	138.11	1.63	1.484E-02	778.92	11.031	PBC<MDA	EU152
785.37	322.	26.78	0.39	1.475E-02	785.42	1.024	PBC<MDA	BI212
794.62	159.	74.08	1.64	1.462E-02	795.87	72.594	PBC<MDA	CS134
801.95	158.	74.58	1.65	1.454E-02	801.95	6.759	PBC<MDA	CS134
817.71	120.	112.16	1.66	1.433E-02	818.50	78.053	PBC<MDA	Cs136
834.85	319.	43.81	1.67	1.413E-02	834.85	100.000	3.136E+00	MN54
847.11	32.	453.37	1.68	1.399E-02	846.77	83.952	PBC<MDA	Co56
860.56	278.	51.61	1.69	1.383E-02	860.56	13.352	PBC<MDA	TL208
871.10	130.	114.85	1.70	1.371E-02	871.10	89.055	PBC<MDA	NB94
884.68	182.	72.71	1.71	1.356E-02	884.68	55.678	PBC<MDA	AG110M
898.04	176.	86.90	1.72	1.342E-02	898.04	83.439	PBC<MDA	Y88
909.44	183.	84.59	1.73	1.328E-02	911.07	24.453	PBC<MDA	AC228
922.74	124.	50.52	0.99	1.317E-02				
946.02	25.	666.26	1.75	1.294E-02	946.02	13.400	PBC<MDA	PA234
1004.77	181.	76.01	1.80	1.240E-02	1004.77	16.049	PBC<MDA	EU154
1012.72	306.	52.54	0.63	1.233E-02				
1050.36	57.	186.69	1.83	1.201E-02	1050.36	1.316	PBC<MDA	RH106
1076.40	215.	47.72	0.58	1.181E-02				
1078.68	142.	101.99	1.85	1.180E-02	1077.40	3.300	PBC<MDA	Ga68
1099.25	33.	453.28	1.86	1.163E-02	1099.25	55.605	PBC<MDA	FE59
1121.30	31.	410.97	1.88	1.147E-02	1120.55	88.360	PBC<MDA	Sc46
					1121.30	29.022	1.294E+00	Ta182
1121.60	96.	136.32	1.88	1.147E-02	1120.55	88.360	PBC<MDA	Sc46
					1121.30	29.022	PBC<MDA	Ta182
1173.13	67230.	0.44	1.91	1.111E-02	1173.24	89.708	9.373E+02	CO60
1228.14	25.	72.77	0.38	1.075E-02				
1238.28	28.	252.26	1.96	1.068E-02	1238.28	51.615	PBC<MDA	Co56
1273.88	233.	18.17	2.26	1.047E-02	1274.53	79.339	5.152E+00	NA22
					1274.54	32.287	1.266E+01	EU154
1332.40	61134.	0.44	1.96	1.014E-02	1332.50	90.808	9.224E+02	CO60
1408.03	125.	28.65	3.31	9.740E-03	1408.00	17.314	1.030E+01	EU152
1434.63	62.	38.69	0.54	9.608E-03				
1460.83	-15.	263.59	2.10	9.482E-03	1460.83	10.700	PBC<MDA	K40
1596.21	42.	83.31	2.18	8.884E-03	1596.21	82.181	PBC<MDA	La140
1662.29	21.	58.06	0.65	8.619E-03				
1764.49	29.	115.82	2.27	8.241E-03	1764.49	15.814	PBC<MDA	BI214
1771.35	25.	108.69	2.28	8.216E-03	1771.35	12.235	PBC<MDA	Co56

********** 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	
171.81	42.88	38275.	547.	1.442E+04	58.56	1.021	-	sM
194.64	48.58	105170.	12562.	3.032E+05	3.76	0.999	-	sD
198.94	49.65	114474.	17702.	4.214E+05	2.81	1.000	-	sD
385.96	96.64	8229.	42.	8.082E+02	308.72	1.044	-	sc
411.03	102.79	7209.	387.	7.537E+03	31.44	1.050	-	sD
438.45	109.65	6876.	171.	3.351E+03	69.04	1.056	-	sc
729.54	182.59	6074.	132.	3.144E+03	99.64	0.388	-	sc
1148.33	287.33	3846.	138.	4.530E+03	71.56	0.319	-	sc
1323.14	331.05	3013.	153.	5.557E+03	55.52	0.388	-	s
1359.69	340.25	6251.	101.	3.757E+03	110.95	1.266	-	sc
1383.57	346.22	5614.	150.	5.623E+03	71.34	1.271	-	sc
1642.39	410.89	2612.	68.	2.890E+03	111.57	0.493	-	sc
1848.35	462.40	4968.	103.	4.793E+03	97.02	1.371	-	sc
1964.77	491.51	4805.	215.	1.042E+04	46.11	1.396	-	sD
1977.78	494.76	5045.	215.	1.049E+04	47.15	1.399	-	sD
2048.14	512.36	1802.	90.	4.523E+03	69.85	0.623	-	sc
2302.49	575.96	3257.	320.	1.741E+04	37.50	0.357	-	s
2365.44	591.70	2638.	286.	1.586E+04	35.63	0.408	-	s
2792.52	698.09	1448.	125.	7.792E+03	43.97	1.565	-	sD
3139.88	785.37	2207.	223.	1.512E+04	30.52	1.633	-	sD
3689.63	922.74	1508.	124.	9.381E+03	50.52	0.990	-	s
4049.63	1012.72	4133.	306.	2.480E+04	52.54	0.628	-	sM
4911.60	1228.14	153.	25.	2.326E+03	72.77	0.384	-	sc
5738.00	1434.63	110.	62.	6.453E+03	38.69	0.541	-	sM
6649.33	1662.29	46.	21.	2.456E+03	58.06	0.647	-	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: Client_Long_Rev15.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	185.66	46.54	330984.	-786.	-0.109	37.54	0.997s
TH-227	200.06	50.14	333316.	656.	0.091	124.46	1.000
AM-241	237.62	59.54	104420.	595716.	82.738	0.18	0.977
TH-234	252.61	63.29	778984.	-673.	-0.093	43.90	1.013s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Sn-126	256.58	64.28	796268.	-577.	-0.080	218.83	1.014s
BA-133	323.38	80.99	12863.	-157.	-0.022	135.67	1.029s
Np-237	345.37	86.49	64852.	-213.	-0.030	169.18	1.035
EU-155	345.58	86.54	64639.	-213.	-0.030	168.87	1.035
Sn-126	347.16	86.94	64036.	-75.	-0.010	474.65	1.035s
Sn-126	349.68	87.57	59735.	213.	0.030	73.04	1.036D
Cd-109	351.56	88.04	59921.	213.	0.030	162.38	1.036A
Nd-147	363.79	91.10	59948.	214.	0.030	161.97	1.039s
TH-234	369.75	92.59	39744.	95.	0.013	296.55	1.040s
AC-228	372.79	93.35	39578.	219.	0.030	128.51	1.041s
Gd-153	389.38	97.50	39119.	215.	0.030	130.41	1.045
Np-239	397.37	99.50	67456.	216.	0.030	170.16	1.047
Gd-153	412.17	103.20	67672.	217.	0.030	169.86	1.050
Np-239	414.16	103.70	67889.	217.	0.030	170.06	1.051
EU-155	420.61	105.31	7927.	206.	0.029	61.51	1.052D
Np-239	423.88	106.13	68106.	217.	0.030	169.95	1.053
CO-57	487.57	122.06	19070.	413.	0.057	32.34	1.068D
EU-154	491.72	123.10	17367.	1062.	0.148	17.81	1.069s
PA-234	524.48	131.29	47448.	222.	0.031	138.71	1.076s
HF-181	531.39	133.02	47671.	155.	0.022	198.96	1.078
CE-144	533.45	133.54	47826.	0.	0.000	1000.00	1.079s
HF-181	544.49	136.30	47826.	0.	0.000	1000.00	1.081
CO-57	546.59	136.83	5815.	150.	0.021	83.42	1.134
Tc-99m	561.32	140.51	47826.	0.	0.000	1000.00	1.085s
U-235	574.42	143.79	45861.	144.	0.020	210.61	1.088
Ba-140	649.87	162.66	18070.	-192.	-0.027	99.02	1.106
CE-139	662.64	165.85	19817.	128.	0.018	155.36	1.109s
Cf-251	705.60	176.60	12470.	-168.	-0.023	124.35	1.119
U-235	742.06	185.72	20975.	74.	0.010	276.25	1.127s
U-235	820.48	205.33	15124.	-76.	-0.011	317.02	1.145s
TH-229	842.53	210.85	15283.	98.	0.014	246.72	1.150
Cf-251	907.10	227.00	14792.	189.	0.026	126.20	1.164s
TH-227	942.97	235.97	36107.	-240.	-0.033	112.32	1.173s
PB-212	953.61	238.63	32401.	-280.	-0.039	86.62	1.175s
PB-214	967.06	242.00	32527.	66.	0.009	386.17	1.178s
EU-152	977.84	244.69	34341.	182.	0.025	144.24	1.181s
TH-227	1024.01	256.24	12620.	-163.	-0.023	59.92	1.191s
Cd-113m	1053.84	263.70	12000.	84.	0.012	184.75	1.198
BI-210M	1062.36	265.83	16319.	-231.	-0.032	42.33	1.199s
TL-208	1108.14	277.28	12383.	163.	0.023	96.71	1.210s
Hg-203	1115.81	279.20	14801.	60.	0.008	288.65	1.212
I-131	1136.20	284.30	14015.	-44.	-0.006	355.17	1.216s
PB-214	1179.34	295.09	6401.	134.	0.019	84.65	1.226D
TL-210	1182.98	296.00	55449.	-217.	-0.030	153.91	1.227s
PB-212	1199.09	300.03	55232.	-217.	-0.030	153.16	1.230s
PA-231	1199.25	300.07	55245.	-217.	-0.030	153.18	1.230s
PA-233	1199.69	300.18	55462.	-217.	-0.030	153.45	1.230s
PA-231	1209.57	302.65	55796.	-218.	-0.030	153.64	1.233

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BA-133	1210.37	302.85	56014.	-197.	-0.027	170.43	1.233
Ba-140	1218.36	304.85	56210.	0.	0.000	1000.00	1.234s
BI-210M	1218.55	304.90	56210.	0.	0.000	1000.00	1.234s
Ir-192	1232.72	308.44	56210.	0.	0.000	1000.00	1.238s
Ir-192	1264.91	316.49	12335.	-93.	-0.013	169.21	1.245s
CR-51	1279.28	320.08	15850.	-143.	-0.020	124.50	1.248s
La-140	1313.97	328.76	39712.	-215.	-0.030	131.17	1.256s
Cf-249	1332.68	333.44	38716.	-217.	-0.030	128.36	1.260
AC-228	1352.19	338.32	38388.	-218.	-0.030	127.39	1.264s
Cs-136	1361.19	340.57	38171.	-218.	-0.030	126.83	1.266
EU-152	1376.05	344.29	38579.	-219.	-0.030	127.17	1.269
HF-181	1382.22	345.83	37790.	217.	0.030	126.75	1.271
PB-214	1406.28	351.85	6212.	225.	0.031	68.72	1.671s
BA-133	1422.89	356.00	15590.	-216.	-0.030	82.06	1.280
I-131	1456.81	364.48	9532.	-161.	-0.022	118.99	1.287s
BA-133	1534.21	383.84	22341.	213.	0.030	99.42	1.304s
Cf-249	1550.64	387.95	22554.	215.	0.030	99.13	1.307
SN-113	1565.60	391.69	22113.	127.	0.018	166.11	1.311s
SB-125	1710.30	427.88	10887.	-143.	-0.020	147.55	1.342s
AG-108M	1734.54	433.94	11167.	-238.	-0.033	90.99	1.347
PM-146	1814.29	453.88	11475.	136.	0.019	160.61	1.364
SB-125	1852.22	463.37	20757.	86.	0.012	237.94	1.372
BE-7	1909.12	477.60	36883.	-220.	-0.030	123.87	1.384s
HF-181	1926.73	482.00	36467.	-222.	-0.031	121.99	1.388
La-140	1946.81	487.02	36267.	-222.	-0.031	121.29	1.392s
RU-103	1986.94	497.05	36896.	-227.	-0.031	92.96	1.401
RH-106	2046.17	511.86	11776.	202.	0.028	76.49	2.663
Kr-85	2054.63	513.98	11192.	192.	0.027	78.34	1.415s
Nd-147	2122.70	531.00	5932.	-105.	-0.015	149.58	1.429s
Ba-140	2147.73	537.26	5614.	87.	0.012	176.96	1.434s
CS-134	2275.95	569.32	4864.	56.	0.008	178.23	1.461
PA-234	2276.55	569.47	5082.	16.	0.002	650.89	1.461s
BI-207	2277.48	569.70	4844.	57.	0.008	172.41	1.461s
TL-208	2330.75	583.02	4833.	147.	0.020	100.66	1.472
SB-125	2400.65	600.50	14042.	-171.	-0.024	39.89	1.487s
CS-134	2417.49	604.71	14032.	124.	0.017	135.19	1.490s
BI-214	2435.89	609.31	13932.	-24.	-0.003	697.50	1.494
RU-103	2439.84	610.30	13908.	0.	0.000	1000.00	1.494s
AG-108M	2455.77	614.28	14333.	-80.	-0.011	211.93	1.498s
PM-144	2470.89	618.06	19284.	165.	0.023	119.36	1.501
RH-106	2486.31	621.92	18636.	163.	0.023	118.55	1.504s
SB-125	2542.19	635.89	4662.	-65.	-0.009	149.07	1.515s
I-131	2546.53	636.97	5400.	137.	0.019	76.34	1.516s
AG-110M	2629.67	657.76	173553.	160.	0.022	369.03	1.533s
CS-137	2645.13	661.63	5105.	166818.	23.169	0.27	1.515
PM-144	2784.79	696.54	6515.	-84.	-0.012	136.37	1.564s
NB-94	2809.13	702.63	5952.	142.	0.020	77.13	1.569s
SB-124	2889.76	722.79	6483.	-155.	-0.022	73.93	1.585

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AG-108M	2890.36	722.94	6328.	-155.	-0.022	73.06	1.585s
ZR-95	2895.41	724.20	4618.	148.	0.021	65.31	1.586s
BI-212	2907.29	727.17	5977.	152.	0.021	72.44	1.588s
PM-146	2941.49	735.72	3272.	104.	0.014	116.66	1.595s
PM-146	2987.25	747.16	3330.	131.	0.018	93.52	1.604s
ZR-95	3025.53	756.73	3435.	19.	0.003	643.44	1.611s
AG-110M	3054.39	763.94	4344.	64.	0.009	146.18	1.617
NB-95	3061.77	765.79	4546.	-114.	-0.016	84.16	1.618s
PA-234M	3064.26	766.41	5127.	-163.	-0.023	75.46	1.619
EU-152	3114.29	778.92	3770.	98.	0.014	138.11	1.628
BI-212	3140.30	785.42	7465.	-161.	-0.022	42.37	1.633
CS-134	3182.10	795.87	6828.	159.	0.022	74.08	1.641s
TL-210	3197.02	799.60	6166.	-162.	-0.022	69.09	1.644s
CS-134	3206.42	801.95	6861.	158.	0.022	74.58	1.646
CO-58	3241.72	810.78	9182.	-173.	-0.024	78.67	1.653s
La-140	3261.70	815.77	7542.	-151.	-0.021	81.60	1.657s
Cs-136	3272.62	818.50	9047.	120.	0.017	112.16	1.659s
MN-54	3338.02	834.85	3975.	319.	0.044	43.81	1.671s
Co-56	3385.71	846.77	4420.	32.	0.004	453.37	1.680s
TL-208	3440.89	860.56	4206.	278.	0.039	51.61	1.691s
NB-94	3483.03	871.10	4585.	130.	0.018	114.85	1.699
EU-154	3491.56	873.23	6163.	-23.	-0.003	637.80	1.700
PA-234	3520.77	880.53	10681.	-186.	-0.026	78.78	1.706s
PA-234	3531.61	883.24	10561.	-187.	-0.026	78.25	1.708s
AG-110M	3537.38	884.68	8653.	182.	0.025	72.71	1.709s
Sc-46	3555.77	889.28	10764.	-54.	-0.008	270.46	1.712s
Y-88	3590.82	898.04	4811.	176.	0.024	86.90	1.719s
AC-228	3642.94	911.07	4920.	183.	0.025	84.59	1.728s
AG-110M	3748.65	937.49	6070.	-212.	-0.029	81.17	1.748s
PA-234	3782.77	946.02	5735.	25.	0.003	666.26	1.754s
EU-152	3855.14	964.11	6952.	-74.	-0.010	159.78	1.767
AC-228	3874.59	968.97	8624.	-28.	-0.004	469.31	1.771s
EU-154	3984.05	996.33	7112.	-122.	-0.017	98.44	1.791
PA-234M	4002.72	1001.00	7733.	-34.	-0.005	238.77	1.794s
EU-154	4017.84	1004.77	9339.	181.	0.025	76.01	1.797
Co-56	4150.13	1037.84	4304.	-36.	-0.005	414.56	1.821
Cs-136	4191.06	1048.07	5343.	-126.	-0.018	82.52	1.828
RH-106	4200.23	1050.36	5676.	57.	0.008	186.69	1.829s
BI-207	4253.44	1063.66	4551.	-188.	-0.026	56.81	1.839
Ga-68	4308.42	1077.40	4032.	142.	0.020	101.99	1.848s
FE-59	4395.85	1099.25	4343.	33.	0.005	453.28	1.864s
EU-152	4447.16	1112.07	8472.	-58.	-0.008	223.54	1.873
ZN-65	4461.05	1115.55	8414.	0.	0.000	1000.00	1.875s
Sc-46	4481.08	1120.55	8435.	96.	0.013	136.32	1.878s
Ta-182	4484.08	1121.30	8100.	31.	0.004	410.97	1.879s
CO-60	4691.49	1173.13	2779.	67230.	9.337	0.44	1.911
Ta-182	4755.18	1189.05	1637.	-14.	-0.002	642.24	1.925s
Ta-182	4884.68	1221.41	1569.	-60.	-0.008	94.25	1.947s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Co-56	4952.19	1238.28	924.	28.	0.004	252.26	1.958
NA-22	5097.25	1274.53	1100.	0.	0.000	61.90	1.982A
EU-154	5097.29	1274.54	432.	233.	0.032	18.17	2.264A
TL-210	5251.21	1313.00	782.	-19.	-0.003	345.93	2.007s
CO-60	5328.85	1332.40	1209.	61134.	8.491	0.44	1.964
AG-110M	5536.56	1384.30	329.	-54.	-0.008	79.36	2.052s
EU-152	5631.53	1408.03	199.	125.	0.017	28.65	3.312s
K-40	5842.89	1460.83	305.	-15.	-0.002	263.59	2.100s
La-140	6384.79	1596.21	200.	42.	0.006	83.31	2.180s
SB-124	6764.20	1690.98	186.	-9.	-0.001	367.51	2.233
BI-214	7058.50	1764.49	190.	29.	0.004	115.82	2.273s
Co-56	7085.96	1771.35	361.	25.	0.003	108.69	2.277
Y-88	7345.06	1836.06	197.	-9.	-0.001	372.38	2.311s

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	R	-1.3930E+01				5.31E+01	
			477.60	-1.393E+01	(	5.695E+01 1.24E+02 1.04E+01	G
K-40	N	-2.0625E+00				4.66E+11	
			1460.83	-2.062E+00	?(P	1.151E+01 2.64E+02 1.07E+01	G
Sc-46	R	3.3447E-01				8.38E+01	
			889.28	-6.159E-01	?(	5.513E+00 2.70E+02 9.07E+01	G
			1120.55	1.309E+00	&(P	5.900E+00 1.36E+02 8.84E+01	G
CR-51	R	-7.1925E+00				2.77E+01	
			320.08	-7.193E+00	?(	2.958E+01 1.24E+02 9.83E+00	G
MN-54	C	3.1356E+00				3.12E+02	
			834.85	3.136E+00	(	2.915E+00 4.38E+01 1.00E+02	G
FE-59	R	7.1015E-01				4.45E+01	
			1099.25	7.102E-01	&(P	6.653E+00 4.53E+02 5.56E+01	G
			1291.60	-2.954E-01	% P	3.866E+00 3.06E+03 4.36E+01	G
Co-56	R	5.0789E-01				7.73E+01	
			846.77	3.815E-01	?(P	3.696E+00 4.53E+02 8.40E+01	G
			1238.28	7.135E-01	(	3.635E+00 2.52E+02 5.16E+01	G
			1037.84	-3.822E+00	+	3.274E+01 4.15E+02 1.08E+01	G
			1771.35	3.474E+00		1.260E+01 1.09E+02 1.22E+01	A

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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-57	R	3.9745E+00					2.72E+02	
			122.06	1.344E+00	}	2.104E+00	3.23E+01	8.53E+01 G
			136.47	3.974E+00	(	9.487E+00	8.34E+01	1.08E+01 G
CO-58	R	-1.7350E+00					7.09E+01	
			810.78	-1.735E+00	*(	4.504E+00	7.87E+01	9.60E+01 G
CO-60	R	9.2984E+02					1.93E+03	
			1332.50	9.224E+02	(	2.485E+00	4.40E-01	9.08E+01 G
			1173.24	9.373E+02	(P	3.463E+00	4.38E-01	8.97E+01 G
NB-94	R	1.4428E+00					7.41E+06	
			702.63	1.407E+00	(P	3.580E+00	7.71E+01	8.80E+01 G
			871.10	1.479E+00	&(	3.620E+00	1.15E+02	8.91E+01 G
ZR-95	I	1.5152E+00					6.40E+01	
			756.73	3.253E-01	?(	4.640E+00	6.43E+02	5.45E+01 G
			724.20	2.982E+00	?(	6.422E+00	6.53E+01	4.42E+01 G
NB-95	I	-1.0563E+00					6.40E+01	
			765.79	-1.056E+00	&(	2.936E+00	8.42E+01	9.98E+01 G
RU-103	R	-1.7348E+00					3.93E+01	
			497.05	-1.735E+00	&(P	6.873E+00	9.30E+01	8.87E+01 G
			610.30	0.000E+00	&	7.681E+01	1.00E+03	5.66E+00 GA
RH-106	R	2.0144E+01					3.74E+02	
			621.92	1.544E+01	?(P	6.044E+01	1.19E+02	8.43E+00 G
			1050.36	5.026E+01	?(P	3.107E+02	1.87E+02	1.32E+00 G
			511.86	7.241E+00	?	1.827E+01	7.65E+01	1.93E+01 GA
AG-108M	C	-1.6170E+00					1.53E+05	
			433.94	-1.617E+00	?(	3.369E+00	9.10E+01	9.05E+01 G
			722.94	-1.514E+00	+	3.649E+00	7.31E+01	9.08E+01 G
			614.28	-7.039E-01	&	4.932E+00	2.12E+02	8.98E+01 G
AG-110M	R	2.5700E+00					2.50E+02	
			884.68	3.345E+00	&(	8.022E+00	7.27E+01	5.57E+01 G
			657.76	1.774E+00	?(	2.160E+01	3.69E+02	7.47E+01 G
			937.49	-8.674E+00	+	1.498E+01	8.12E+01	2.60E+01 G
			1384.30	-3.988E+00	-	6.395E+00	7.94E+01	1.92E+01 G
			763.94	3.551E+00	?(	1.719E+01	1.46E+02	1.66E+01 G
SN-113	F	1.1281E+00					1.15E+02	
			391.69	1.128E+00	*(P	6.189E+00	1.66E+02	6.42E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SB-124	R	-1.3561E-01					6.02E+01	
			602.73	-1.356E-01	&(	4.774E+00	1.06E+03	9.02E+01 G
			1690.98	-3.580E-01	+	2.636E+00	3.68E+02	4.10E+01 G
			722.79	-1.548E+01	}	3.777E+01	7.39E+01	8.88E+00 G
SB-125	R	-7.9598E-01					1.01E+03	
			427.88	-2.980E+00	&(P	1.021E+01	1.48E+02	2.92E+01 G
			600.50	-7.529E+00	+ P	2.437E+01	3.99E+01	1.77E+01 G
			635.89	-4.680E+00	+	2.310E+01	1.49E+02	1.13E+01 G
			463.37	5.232E+00	&(	4.114E+01	2.38E+02	1.06E+01 G
I-131	R	2.7015E-01					8.02E+00	
			364.48	-1.081E+00	(	3.072E+00	1.19E+02	8.11E+01 G
			284.30	-3.597E+00	+ P	4.484E+01	3.55E+02	5.61E+00 G
			636.97	1.486E+01	?(	3.743E+01	7.63E+01	7.51E+00 G
Gd-153	R	2.4823E+00					2.42E+02	
			97.50	2.101E+00	?(	9.041E+00	1.30E+02	2.76E+01 G
			103.20	3.026E+00	(	1.696E+01	1.70E+02	1.94E+01 G
Ga-68	C	8.9055E+01					4.71E-02	
			1077.40	8.906E+01	&(	1.873E+02	1.02E+02	3.30E+00 G
BA-133	R	-1.9707E+00					3.85E+03	
			356.00	-1.971E+00	?(	5.335E+00	8.21E+01	5.84E+01 G
			302.85	-5.459E+00	+	3.071E+01	1.70E+02	1.71E+01 G
			383.84	1.273E+01	P	4.176E+01	9.94E+01	9.43E+00 GA
			80.99	-1.453E+00	&	4.926E+00	1.36E+02	2.95E+01 GA
CS-134	R	2.5009E+00					7.54E+02	
			795.87	2.077E+00	&(	5.076E+00	7.41E+01	7.26E+01 G
			604.71	1.142E+00	?(	5.101E+00	1.35E+02	8.50E+01 G
			569.32	3.551E+00	(	2.097E+01	1.78E+02	1.17E+01 G
			801.95	2.233E+01	(	5.494E+01	7.46E+01	6.76E+00 G
			563.24	9.519E-01	%	3.761E+01	1.72E+03	6.50E+00 G
CS-137	I	1.6314E+03					1.10E+04	
			661.66	1.631E+03	(P	3.283E+00	2.67E-01	8.52E+01 G
CE-139	R	5.2377E-01					1.38E+02	
			165.85	5.238E-01	?(P	2.688E+00	1.55E+02	7.66E+01 G
Ba-140	R	2.5737E+00					1.28E+01	
			537.26	2.574E+00	&(P	1.046E+01	1.77E+02	2.42E+01 G
			162.66	-1.036E+01	&	3.386E+01	9.90E+01	5.75E+00 G
			304.85	0.000E+00	-	1.459E+02	1.00E+03	3.61E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
La-140	R	7.9171E-01					1.28E+01	
			1596.21	7.917E-01	?(P	1.305E+00	8.33E+01	8.22E+01 G
			487.02	-3.870E+00	&	1.549E+01	1.21E+02	3.85E+01 G
			328.76	-6.781E+00	+	2.935E+01	1.31E+02	1.60E+01 G
			815.77	-6.549E+00	+	1.764E+01	8.16E+01	2.23E+01 G
CE-141	I	-6.6794E-02					3.25E+01	
			145.44	-6.679E-02	%(	6.162E+00	2.79E+03	4.84E+01 G
PM-144	C	2.9442E-01					3.63E+02	
			696.54	-7.334E-01	&(	3.308E+00	1.36E+02	9.90E+01 G
			618.06	1.321E+00	(	5.207E+00	1.19E+02	9.91E+01 G
EU-152	R	1.2772E+00					4.94E+03	
			121.78	0.000E+00	}	7.562E+00	1.34E+04	2.36E+01 G
			344.29	-4.755E+00	?(	1.996E+01	1.27E+02	2.39E+01 G
			1112.07	-6.208E+00	+	4.594E+01	2.24E+02	1.13E+01 G
			778.92	8.315E+00	?(	2.451E+01	1.38E+02	1.10E+01 G
			964.11	-6.861E+00	&	3.628E+01	1.60E+02	1.17E+01 G
			244.69	1.326E+01	?(	6.312E+01	1.44E+02	5.57E+00 G
			1408.00	1.030E+01	P	5.636E+00	2.86E+01	1.73E+01 GA
EU-154	R	9.5867E+00					3.14E+03	
			123.10	8.235E+00	?(	4.780E+00	1.78E+01	3.59E+01 G
			1274.54	9.587E+00	}	4.092E+00	1.82E+01	3.23E+01 G
			723.36	0.000E+00	}	2.027E+01	7.10E+03	1.65E+01 G
			873.23	-2.419E+00	- P	3.961E+01	6.38E+02	9.44E+00 G
			1004.77	1.261E+01	(	3.163E+01	7.60E+01	1.60E+01 G
			996.33	-1.404E+01	-	4.567E+01	9.84E+01	9.65E+00 G
EU-155	R	2.7109E+00					1.81E+03	
			105.31	2.711E+00	(P	5.493E+00	6.15E+01	2.06E+01 G
			86.54	-1.718E+00	-	9.576E+00	1.69E+02	3.36E+01 G
HF-181	R	8.6339E-02					4.24E+01	
			482.00	-1.939E+00	?(	7.807E+00	1.22E+02	7.59E+01 G
			133.02	1.457E+00	(	9.571E+00	1.99E+02	3.03E+01 G
			345.83	8.664E+00	&(	3.624E+01	1.27E+02	1.31E+01 G
			136.30	0.000E+00	-	6.205E+01	1.00E+03	4.72E+00 G
Ta-182	R	1.2936E+00					1.14E+02	
			1121.30	1.294E+00	?(	1.761E+01	4.11E+02	2.90E+01 G
			1221.41	-3.199E+00	+	9.987E+00	9.43E+01	2.41E+01 G
			1189.05	-1.067E+00	+	1.424E+01	6.42E+02	1.70E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Hg-203	F	3.2692E-01					4.66E+01	
			279.20	3.269E-01	?(	3.121E+00	2.89E+02	8.15E+01 G
TL-208	R	5.0114E+00					6.98E+02	
			583.02	1.516E+00	?(P	3.371E+00	1.01E+02	7.38E+01 G
			277.28	1.349E+01	?(P	4.306E+01	9.67E+01	5.38E+00 G
			860.56	2.092E+01	@(P	2.293E+01	5.16E+01	1.34E+01 G
PM-146	C	2.4687E+00					2.02E+03	
			453.88	1.334E+00	(	4.910E+00	1.61E+02	6.50E+01 G
			747.16	3.513E+00	*(P	7.259E+00	9.35E+01	3.40E+01 G
			735.72	4.170E+00	&(P	1.076E+01	1.17E+02	2.25E+01 G
Y-88	R	9.6403E-01					1.07E+02	
			1836.06	-1.778E-01	?(P	1.327E+00	3.72E+02	8.92E+01 G
			898.04	2.185E+00	&(P	4.043E+00	8.69E+01	8.34E+01 G
Cd-113m		5.9974E+03					5.33E+03	
			263.70	5.997E+03	&(	3.664E+04	1.85E+02	6.00E-03 K
Cd-109	R	1.5993E+01					4.53E+02	
							Derived Ave Activity	
			88.04	1.599E+01	}(	8.570E+01	1.62E+02	3.61E+00 G
Cf-251	T	-3.2062E+00					3.28E+05	
			176.60	-3.206E+00	?(	9.963E+00	1.24E+02	1.70E+01 G
			227.00	1.153E+01	&	3.475E+01	1.26E+02	6.30E+00 GA
Cf-249	T	1.8465E+00					1.28E+05	
			387.95	1.847E+00	?(	6.040E+00	9.91E+01	6.60E+01 G
			333.44	-7.113E+00	+	3.013E+01	1.28E+02	1.55E+01 G
Sn-126		-1.7276E+01					3.65E+07	
			87.57	1.540E+00	}	8.241E+00	7.30E+01	3.75E+01 GA
			64.28	-1.728E+01	&(	1.246E+02	2.19E+02	9.70E+00 G
			86.94	-2.260E+00	&	3.541E+01	4.75E+02	9.04E+00 GA
PB-210	R	-6.6932E+01					8.14E+03	
			46.54	-6.693E+01	?(P	2.286E+02	3.75E+01	4.05E+00 G
PB-212	R	-2.5919E+00					6.98E+02	
			238.63	-2.592E+00	&(P	7.791E+00	8.66E+01	4.30E+01 G
			300.03	-3.498E+01	+	1.768E+02	1.53E+02	2.92E+00 GA
PB-214	R	3.2259E+00					5.84E+05	
			351.93	3.215E+00	(P	5.276E+00	6.87E+01	3.71E+01 G
			295.09	3.247E+00	(P	9.068E+00	8.47E+01	1.93E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments
                          242.00 3.607E+00 ? P 4.602E+01 3.86E+02 7.38E+00 GA

BI-207   C  -2.9455E+00                                     1.18E+04
                         1063.66-2.945E+00 ?(P 4.965E+00 5.68E+01 7.45E+01 G
                          569.70 4.391E-01 & P 2.506E+00 1.72E+02 9.77E+01 G

BI-212   R   2.0948E+01                                     6.98E+02
                          727.17 2.095E+01 ?(  5.006E+01 7.24E+01 6.46E+00 G
                          785.42-1.481E+02 + P 3.727E+02 4.24E+01 1.02E+00 GA

U-235    R   4.6243E+00                                     2.57E+11
                          143.79 4.624E+00 ?(P 3.215E+01 2.11E+02 9.11E+00 G
                          205.33-5.773E+00 +   4.374E+01 3.17E+02 4.71E+00 G
                          163.38 1.015E+00 & P 3.938E+01 1.17E+03 4.66E+00 G
                          185.72 5.185E-01 & P 4.733E+00 2.76E+02 4.78E+01 GA

BI-214   R   5.4326E-01                                     5.84E+05
                          609.31-4.647E-01  (P 1.073E+01 6.97E+02 4.05E+01 G
                         1120.29-1.165E+00 % P 3.933E+01 1.18E+03 1.32E+01 G
                         1764.49 3.123E+00  (P 7.133E+00 1.16E+02 1.58E+01 G

BI-210M  T  -1.9874E+00                                     1.10E+09
                          265.83-1.987E+00 ?(P 5.154E+00 4.23E+01 5.00E+01 G
                          304.90 0.000E+00 +   1.883E+01 1.00E+03 2.80E+01 G

AC-228   R   7.8244E+00                                     2.10E+03
                          911.07 7.824E+00 &(  1.409E+01 8.46E+01 2.45E+01 G
                          968.97-2.093E+00 -   3.254E+01 4.69E+02 1.46E+01 G
                          338.32-9.258E+00 &   3.892E+01 1.27E+02 1.21E+01 G
                           93.35 1.064E+01 &   4.511E+01 1.29E+02 5.56E+00 XA

TH-227   R  -9.7608E+00                                     7.95E+03
                          256.24-9.761E+00 ?(P 3.154E+01 5.99E+01 7.00E+00 G
                          235.97-7.702E+00 &   2.854E+01 1.12E+02 1.23E+01 G
                           50.14 2.696E+01 +   1.106E+02 1.24E+02 8.00E+00 G

TH-229   N   4.2869E+00                                     2.68E+06
                          193.51-9.359E-01 %(  4.389E+01 1.87E+03 4.40E+00 G
                          210.85 1.197E+01  (P 7.058E+01 2.47E+02 2.99E+00 G

TH-234   R   9.5399E+00                                     1.63E+12
                           92.59 9.540E+00  (P 9.341E+01 2.97E+02 2.69E+00 G
                           63.29-6.345E+01 + P 3.880E+02 4.39E+01 3.10E+00 G

PA-231   R  -6.1787E+01                                     1.20E+07
                          302.65-6.179E+01 ?(  3.133E+02 1.54E+02 1.67E+00 G
                          300.07-4.297E+01 +   2.172E+02 1.53E+02 2.38E+00 G
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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PA-233	C	-1.5938E-02					7.82E+08	
			312.01	-1.594E-02	%(P	1.500E+01	9.67E+03	3.58E+01 G
			300.18	-1.656E+01	+	8.388E+01	1.53E+02	6.17E+00 G
PA-234	R	2.5622E+00					1.63E+12	
			131.29	3.501E+00	&(	1.602E+01	1.39E+02	1.80E+01 G
			946.02	2.003E+00	&(	2.849E+01	6.66E+02	1.34E+01 G
			569.47	1.415E+00	&(	3.058E+01	6.51E+02	8.20E+00 C
			883.24	-1.988E+01	+	5.131E+01	7.82E+01	9.60E+00 G
			880.53	-3.170E+01	+	8.239E+01	7.88E+01	6.00E+00 GA
PA-234M	R	-7.4676E+01					1.63E+12	
			1001.00	-7.468E+01	?(P	9.123E+02	2.39E+02	5.05E-01 G
			766.41	-7.600E+02	+ P	1.569E+03	7.55E+01	1.98E-01 G
AM-241	T	5.0066E+03					1.58E+05	
			59.54	5.007E+03	(	1.268E+01	1.76E-01	3.57E+01 G
Np-237	F	-4.4069E+00					2.14E+06	
			86.49	-4.407E+00	&(	2.460E+01	1.69E+02	1.31E+01 G
Ir-192	R	-6.5365E-01					7.40E+01	
			316.49	-6.537E-01	?(	3.657E+00	1.69E+02	6.96E+01 G
			468.06	1.130E-01	&	1.078E+01	2.89E+03	4.03E+01 G
			308.44	0.000E+00	+	2.471E+01	1.00E+03	2.15E+01 G
Cs-136	R	1.4944E+00					1.30E+01	
			818.50	1.494E+00	?(	5.538E+00	1.12E+02	7.81E+01 G
			1048.07	-2.393E+00	+	6.520E+00	8.25E+01	6.08E+01 G
			340.57	-2.942E+00	+	1.231E+01	1.27E+02	3.83E+01 G
Np-239	R	3.1624E+00					2.36E+00	
			103.70	2.585E+00	&	1.451E+01	1.70E+02	2.30E+01 X
			106.13	3.162E+00	(	1.773E+01	1.70E+02	1.89E+01 G
			99.50	4.110E+00		2.308E+01	1.70E+02	1.44E+01 X
Nd-147	R	-5.7129E+00					1.11E+01	
			531.00	-5.713E+00	(	1.961E+01	1.50E+02	1.31E+01 G
			91.10	2.089E+00	+	1.117E+01	1.62E+02	2.77E+01 G
TL-210	R	-1.5588E+00					5.84E+05	
			799.60	-1.559E+00	&(	3.552E+00	6.91E+01	9.90E+01 G
			296.00	-1.277E+00	+	6.488E+00	1.54E+02	7.90E+01 G
			1313.00	-1.227E+00	&	8.588E+00	3.46E+02	2.10E+01 CA

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Kr-85	I 3.0745E+02					3.92E+03	
		513.98	3.075E+02	?(	7.946E+02	7.83E+01	4.34E-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	330984.	-786.	-0.109	37.54	-6.693E+01	P
TH-234	63.29	778984.	-673.	-0.093	43.90	-6.345E+01	P
BA-133	80.99	12863.	-157.	-0.022	135.67	-1.453E+00	
Np-237	86.49	64852.	-213.	-0.030	169.18	-4.407E+00	
Nd-147	91.10	59948.	214.	0.030	161.97	2.089E+00	
TH-234	92.59	39744.	95.	0.013	296.55	9.540E+00	P
PA-234	131.29	47448.	222.	0.031	138.71	3.501E+00	
HF-181	133.02	47671.	155.	0.022	198.96	1.457E+00	
U-235	143.79	45861.	144.	0.020	210.61	4.624E+00	P
Ba-140	162.66	18070.	-192.	-0.027	99.02	-1.036E+01	
U-235	185.72	20975.	74.	0.010	276.25	5.185E-01	P
U-235	205.33	15124.	-76.	-0.011	317.02	-5.773E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-212	238.63	32401.	-280.	-0.039	86.62	-2.592E+00	P
Cd-113m	263.70	12000.	84.	0.012	184.75	5.997E+03	
BI-210M	265.83	16319.	-231.	-0.032	42.33	-1.987E+00	P
I-131	284.30	14015.	-44.	-0.006	355.17	-3.597E+00	P
TL-210	296.00	55449.	-217.	-0.030	153.91	-1.277E+00	
PB-212	300.03	55232.	-217.	-0.030	153.16	-3.498E+01	
PA-231	300.07	55245.	-217.	-0.030	153.18	-4.297E+01	
PA-233	300.18	55462.	-217.	-0.030	153.45	-1.656E+01	
PA-231	302.65	55796.	-218.	-0.030	153.64	-6.179E+01	
BA-133	302.85	56014.	-197.	-0.027	170.43	-5.459E+00	
Ir-192	316.49	12335.	-93.	-0.013	169.21	-6.537E-01	
CR-51	320.08	15850.	-143.	-0.020	124.50	-7.193E+00	
La-140	328.76	39712.	-215.	-0.030	131.17	-6.781E+00	
Cf-249	333.44	38716.	-217.	-0.030	128.36	-7.113E+00	
HF-181	345.83	37790.	217.	0.030	126.75	8.664E+00	
BA-133	356.00	15590.	-216.	-0.030	82.06	-1.971E+00	
I-131	364.48	9532.	-161.	-0.022	118.99	-1.081E+00	
BA-133	383.84	22341.	213.	0.030	99.42	1.273E+01	P
Cf-249	387.95	22554.	215.	0.030	99.13	1.847E+00	
SN-113	391.69	22113.	127.	0.018	166.11	1.128E+00	P
AG-108M	433.94	11167.	-238.	-0.033	90.99	-1.617E+00	
PM-146	453.88	11475.	136.	0.019	160.61	1.334E+00	
BE-7	477.60	36883.	-220.	-0.030	123.87	-1.393E+01	
HF-181	482.00	36467.	-222.	-0.031	121.99	-1.939E+00	
La-140	487.02	36267.	-222.	-0.031	121.29	-3.870E+00	
RU-103	497.05	36896.	-227.	-0.031	92.96	-1.735E+00	P
RH-106	511.86	11776.	202.	0.028	76.49	7.241E+00	
Kr-85	513.98	11192.	192.	0.027	78.34	3.075E+02	
Nd-147	531.00	5932.	-105.	-0.015	149.58	-5.713E+00	
Ba-140	537.26	5614.	87.	0.012	176.96	2.574E+00	P
PA-234	569.47	5082.	16.	0.002	650.89	1.415E+00	
BI-207	569.70	4844.	57.	0.008	172.41	4.391E-01	P
BI-214	609.31	13932.	-24.	-0.003	697.50	-4.647E-01	P
AG-108M	614.28	14333.	-80.	-0.011	211.93	-7.039E-01	
RH-106	621.92	18636.	163.	0.023	118.55	1.544E+01	P
I-131	636.97	5400.	137.	0.019	76.34	1.486E+01	
AG-110M	657.76	173553.	160.	0.022	369.03	1.774E+00	
NB-94	702.63	5952.	142.	0.020	77.13	1.407E+00	P
SB-124	722.79	6483.	-155.	-0.022	73.93	-1.548E+01	
AG-108M	722.94	6328.	-155.	-0.022	73.06	-1.514E+00	
ZR-95	724.20	4618.	148.	0.021	65.31	2.982E+00	
PM-146	735.72	3272.	104.	0.014	116.66	4.170E+00	P
PM-146	747.16	3330.	131.	0.018	93.52	3.513E+00	P
ZR-95	756.73	3435.	19.	0.003	643.44	3.253E-01	
AG-110M	763.94	4344.	64.	0.009	146.18	3.551E+00	
NB-95	765.79	4546.	-114.	-0.016	84.16	-1.056E+00	
PA-234M	766.41	5127.	-163.	-0.023	75.46	-7.600E+02	P
TL-210	799.60	6166.	-162.	-0.022	69.09	-1.559E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
CO-58	810.78	9182.	-173.	-0.024	78.67	-1.735E+00		
La-140	815.77	7542.	-151.	-0.021	81.60	-6.549E+00		
NB-94	871.10	4585.	130.	0.018	114.85	1.479E+00		
PA-234	880.53	10681.	-186.	-0.026	78.78	-3.170E+01		
PA-234	883.24	10561.	-187.	-0.026	78.25	-1.988E+01		
AG-110M	884.68	8653.	182.	0.025	72.71	3.345E+00		
Y-88	898.04	4811.	176.	0.024	86.90	2.185E+00		P
AG-110M	937.49	6070.	-212.	-0.029	81.17	-8.674E+00		
PA-234	946.02	5735.	25.	0.003	666.26	2.003E+00		
PA-234M	1001.00	7733.	-34.	-0.005	238.77	-7.468E+01		P
RH-106	1050.36	5676.	57.	0.008	186.69	5.026E+01		P
BI-207	1063.66	4551.	-188.	-0.026	56.81	-2.945E+00		P
FE-59	1099.25	4343.	33.	0.005	453.28	7.102E-01		P
Ta-182	1121.30	8100.	31.	0.004	410.97	1.294E+00		
Ta-182	1189.05	1637.	-14.	-0.002	642.24	-1.067E+00		
Ta-182	1221.41	1569.	-60.	-0.008	94.25	-3.199E+00		
TL-210	1313.00	782.	-19.	-0.003	345.93	-1.227E+00		
AG-110M	1384.30	329.	-54.	-0.008	79.36	-3.988E+00		
K-40	1460.83	305.	-15.	-0.002	263.59	-2.062E+00		P
La-140	1596.21	200.	42.	0.006	83.31	7.917E-01		P
SB-124	1690.98	186.	-9.	-0.001	367.51	-3.580E-01		
BI-214	1764.49	190.	29.	0.004	115.82	3.123E+00		P
Y-88	1836.06	197.	-9.	-0.001	372.38	-1.778E-01		P

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	-1.3930E+01	-1.3930E+01	1.239E+02%	5.69E+01
NA-22	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.63E+00
K-40	#A	-2.0625E+00	-2.0625E+00	2.636E+02%	1.15E+01
Sc-46	#A	3.3447E-01	3.3447E-01	1.363E+02%	5.51E+00
CR-51	#A	-7.1925E+00	-7.1925E+00	1.245E+02%	2.96E+01
MN-54	#	3.1356E+00	3.1356E+00	4.381E+01%	2.91E+00
FE-59	#A	7.1015E-01	7.1015E-01	4.533E+02%	6.65E+00
Co-56	A	5.0789E-01	5.0789E-01	2.523E+02%	3.70E+00
CO-57	A	3.9745E+00	3.9745E+00	8.342E+01%	9.49E+00
CO-58	#A	-1.7350E+00	-1.7350E+00	7.867E+01%	4.50E+00
CO-60		9.2984E+02	9.2984E+02	3.102E-01%	2.49E+00
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.02E+01
NB-94	#A	1.4428E+00	1.4428E+00	6.917E+01%	3.58E+00
ZR-95	#A	1.5152E+00	1.5152E+00	6.531E+01%	4.64E+00
NB-95	#A	-1.0562E+00	-1.0563E+00	8.416E+01%	2.94E+00
RU-103	#A	-1.7348E+00	-1.7348E+00	9.296E+01%	6.87E+00
RH-106	#A	2.0144E+01	2.0144E+01	1.106E+02%	6.04E+01

AG-108M#A	-1.6170E+00	-1.6170E+00	9.099E+01%	3.37E+00
AG-110M#A	2.5700E+00	2.5700E+00	7.271E+01%	8.02E+00
SN-113 #A	1.1281E+00	1.1281E+00	1.661E+02%	6.19E+00
SB-124 #A	-1.3561E-01	-1.3561E-01	1.063E+03%	4.77E+00
SB-125 #A	-7.9598E-01	-7.9598E-01	1.400E+02%	1.02E+01
I-131 #A	2.7014E-01	2.7015E-01	7.069E+01%	3.07E+00
Gd-153 A	2.4823E+00	2.4823E+00	1.071E+02%	9.04E+00
Ga-68 #A	8.8662E+01	8.9055E+01	1.020E+02%	1.87E+02
Tc-99m #A	0.0000E+00	0.0000E+00	1.000E+03%	3.82E+00
BA-133 #A	-1.9707E+00	-1.9707E+00	8.206E+01%	5.33E+00
CS-134 A	2.5009E+00	2.5009E+00	6.179E+01%	5.08E+00
CS-137	1.6314E+03	1.6314E+03	2.669E-01%	3.28E+00
CE-139 #A	5.2377E-01	5.2377E-01	1.554E+02%	2.69E+00
Ba-140 #A	2.5737E+00	2.5737E+00	1.770E+02%	1.05E+01
La-140 #A	7.9169E-01	7.9171E-01	8.331E+01%	1.31E+00
CE-141 #A	-6.6794E-02	-6.6794E-02	2.792E+03%	6.16E+00
CE-144 #A	0.0000E+00	0.0000E+00	1.000E+03%	2.62E+01
PM-144 A	2.9442E-01	2.9442E-01	9.061E+01%	3.31E+00
EU-152 A	1.2772E+00	1.2772E+00	7.892E+01%	2.00E+01
EU-154	9.5867E+00	9.5867E+00	1.781E+01%	4.78E+00
EU-155 A	2.7109E+00	2.7109E+00	6.151E+01%	5.49E+00
HF-181 #A	8.6339E-02	8.6339E-02	8.853E+01%	7.81E+00
Ta-182 #A	1.2936E+00	1.2936E+00	4.110E+02%	1.76E+01
Hg-203 #A	3.2692E-01	3.2692E-01	2.886E+02%	3.12E+00
TL-208 #C	5.0114E+00	5.0114E+00	4.961E+01%	3.37E+00
PM-146 #A	2.4687E+00	2.4687E+00	7.315E+01%	4.91E+00
Y-88 #A	9.6403E-01	9.6403E-01	8.690E+01%	1.33E+00
Cd-113m#A	5.9974E+03	5.9974E+03	1.848E+02%	3.66E+04
Cd-109 #A	1.5993E+01	1.5993E+01	1.624E+02%	8.57E+01
Cf-251 A	-3.2062E+00	-3.2062E+00	1.243E+02%	9.96E+00
Cf-249 #A	1.8465E+00	1.8465E+00	9.913E+01%	6.04E+00
Sn-126 #A	-1.7276E+01	-1.7276E+01	2.188E+02%	1.25E+02
PB-210 #A	-6.6932E+01	-6.6932E+01	3.754E+01%	2.29E+02
PB-212 #A	-2.5919E+00	-2.5919E+00	8.662E+01%	7.79E+00
PB-214 A	3.2259E+00	3.2259E+00	5.452E+01%	5.28E+00
BI-207 #A	-2.9455E+00	-2.9455E+00	5.681E+01%	4.96E+00
BI-212 #A	2.0948E+01	2.0948E+01	7.244E+01%	5.01E+01
U-235 #A	4.6243E+00	4.6243E+00	2.106E+02%	3.21E+01
BI-214 #A	5.4326E-01	5.4326E-01	1.158E+02%	1.07E+01
BI-210M#A	-1.9874E+00	-1.9874E+00	4.233E+01%	5.15E+00
AC-228 A	7.8244E+00	7.8244E+00	8.459E+01%	1.41E+01
TH-227 A	-9.7608E+00	-9.7608E+00	5.992E+01%	3.15E+01
TH-229 A	4.2869E+00	4.2869E+00	2.467E+02%	4.39E+01
TH-234 #A	9.5399E+00	9.5399E+00	2.965E+02%	9.34E+01
PA-231 #A	-6.1787E+01	-6.1787E+01	1.536E+02%	3.13E+02
PA-233 #A	-1.5938E-02	-1.5938E-02	9.674E+03%	1.50E+01
PA-234 #A	2.5622E+00	2.5622E+00	1.387E+02%	1.60E+01
PA-234M#A	-7.4676E+01	-7.4676E+01	2.388E+02%	9.12E+02
AM-241	5.0066E+03	5.0066E+03	1.761E-01%	1.27E+01

Np-237	#A	-4.4069E+00	-4.4069E+00	1.692E+02%	2.46E+01
Ir-192	#A	-6.5365E-01	-6.5365E-01	1.692E+02%	3.66E+00
Cs-136	#A	1.4943E+00	1.4944E+00	1.122E+02%	5.54E+00
Np-239	A	3.1621E+00	3.1624E+00	1.700E+02%	1.77E+01
Nd-147	#A	-5.7128E+00	-5.7129E+00	1.496E+02%	1.96E+01
TL-210	#A	-1.5588E+00	-1.5588E+00	6.909E+01%	3.55E+00
Kr-85	#A	3.0745E+02	3.0745E+02	7.834E+01%	7.95E+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 1999.6 keV) 7.588E+03 Bq/Sample
Total Decayed Activity (37.6 to 1999.6 keV) 7.5884390E+03 Bq/Sample

486234_Gamma_LCS 160-486234~2-A. 18_Gamma_20200321.spc.

Test America St. Louis Spectrum ID: 15_Gamma_20201169

Sample Description: 486234_Gamma_180-111757-B-2-A
Detector: Detector #15
Batch ID: 486234
Work Order Number: Gamma
Lot Number: 180-111757-B-2-A

Decay to Time: 11/12/2020 18:15 Live Time: 7200 sec
Acquisition Time: 11/12/2020 18:16:17 Real Time: 7209 sec
Analysis Time: 11/12/2020 20:16 Dead Time: 0.13 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 15_TCC-1L Marn.Clb
Efficiency Cal Desc: 15_1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 14:13
Energy Cal Date: 7/23/2020 16:17
Library: Client_Long_Rev15.lib
Bkgd Correction File: 15_2020-11-07_1044.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	-1.815E+00	63.8	1.159E+00	1.163E+00	5.643E+00
NA-22	-3.411E-01	101.3	3.454E-01	3.460E-01	7.280E-01
K-40	1.117E+00	213.8	2.387E+00	2.388E+00	5.213E+00
Sc-46	1.715E-01	121.0	2.075E-01	2.078E-01	7.056E-01
CR-51	1.395E+00	147.6	2.059E+00	2.061E+00	6.895E+00
MN-54	-3.103E-01	49.9	1.547E-01	1.558E-01	5.294E-01
FE-59	9.145E-02	175.4	1.604E-01	1.605E-01	8.102E-01
Co-56	2.157E-02	86.9	1.875E-02	1.879E-02	5.097E-01
CO-57	-1.178E-02	176.7	2.083E-02	2.084E-02	3.261E-01
CO-58	-1.465E-01	115.8	1.696E-01	1.698E-01	5.774E-01
CO-60	-7.631E-02	308.1	2.352E-01	2.352E-01	5.222E-01
ZN-65	0.000E+00	1.#INF	5.046E-02	5.046E-02	1.284E+00
NB-94	1.830E-01	78.4	1.434E-01	1.438E-01	7.310E-01
ZR-95	5.215E-02	86.4	4.504E-02	4.515E-02	8.045E-01
NB-95	6.784E-03	2429.0	1.648E-01	1.648E-01	5.789E-01
RU-103	1.592E-02	838.4	1.335E-01	1.335E-01	3.321E-01
RH-106	2.273E+00	130.7	2.971E+00	2.974E+00	9.982E+00
AG-108M	1.599E-02	809.9	1.295E-01	1.295E-01	3.202E-01
AG-110M	2.361E-01	23.6	5.573E-02	5.743E-02	1.472E+00
SN-113	1.534E-01	126.3	1.937E-01	1.939E-01	6.511E-01
SB-124	-2.272E-01	79.7	1.810E-01	1.815E-01	9.984E-01
SB-125	3.033E-01	86.2	2.614E-01	2.620E-01	1.085E+00
I-131	6.848E-02	103.2	7.064E-02	7.076E-02	4.005E-01
Gd-153	-3.589E-01	134.5	4.827E-01	4.833E-01	1.609E+00
Ga-68	-3.136E-01	3154.4	9.891E+00	9.891E+00	2.280E+01
Tc-99m	4.785E-02	358.9	1.717E-01	1.718E-01	5.769E-01
BA-133	7.175E-02	297.6	2.135E-01	2.135E-01	7.308E-01
CS-134	8.600E-02	95.0	8.167E-02	8.182E-02	7.486E-01
CS-137	4.727E-03	2964.8	1.402E-01	1.402E-01	4.995E-01
CE-139	-1.479E-02	818.5	1.210E-01	1.210E-01	4.125E-01
Ba-140	1.141E-01	166.9	1.904E-01	1.905E-01	1.341E+00
La-140	3.513E-02	134.0	4.708E-02	4.712E-02	5.488E-01
CE-141	1.897E-01	115.0	2.182E-01	2.185E-01	7.291E-01

CE-144	9.210E-02	1266.9	1.167E+00	1.167E+00	3.931E+00
PM-144	-2.097E-01	88.1	1.848E-01	1.852E-01	6.192E-01
EU-152	3.008E-02	66.9	2.013E-02	2.021E-02	1.156E+00
EU-154	5.583E-01	66.8	3.728E-01	3.743E-01	8.051E-01
EU-155	8.007E-02	121.6	9.733E-02	9.745E-02	1.504E+00
HF-181	-2.410E-01	101.0	2.433E-01	2.437E-01	8.149E-01
Ta-182	6.524E-01	55.4	3.613E-01	3.634E-01	2.001E+00
Hg-203	4.501E-02	334.2	1.504E-01	1.504E-01	5.123E-01
TL-208	1.074E-01	112.9	1.212E-01	1.214E-01	5.344E-01
PM-146	2.109E-01	110.1	2.323E-01	2.326E-01	4.171E-01
Y-88	-1.781E-01	175.6	3.127E-01	3.129E-01	6.672E-01
Cd-113m	-2.381E+03	66.5	1.584E+03	1.591E+03	5.236E+03
Cd-109	-7.300E-07	574328729.7	4.192E+00	4.192E+00	1.407E+01
Cf-251	1.520E-01	399.1	6.067E-01	6.067E-01	1.505E+00
Cf-249	2.399E-01	118.3	2.839E-01	2.842E-01	6.616E-01
Sn-126	1.038E+00	104.4	1.083E+00	1.085E+00	3.612E+00
PB-210	-1.160E+01	26.0	3.011E+00	3.088E+00	1.152E+01
PB-212	-2.999E-01	104.8	3.144E-01	3.149E-01	1.115E+00
PB-214	4.047E-01	95.2	3.854E-01	3.861E-01	1.093E+00
BI-207	1.639E-01	74.9	1.227E-01	1.231E-01	5.005E-01
BI-212	6.445E-01	334.6	2.156E+00	2.157E+00	7.548E+00
U-235	1.066E+00	102.1	1.089E+00	1.091E+00	3.668E+00
BI-214	1.035E+00	35.0	3.623E-01	3.673E-01	8.932E-01
BI-210M	2.170E-01	97.5	2.115E-01	2.119E-01	7.086E-01
AC-228	4.161E-01	155.2	6.459E-01	6.463E-01	1.848E+00
TH-227	8.631E-01	96.6	8.337E-01	8.353E-01	3.710E+00
TH-229	2.315E+00	94.1	2.179E+00	2.183E+00	5.335E+00
TH-234	-1.030E+01	56.5	5.818E+00	5.850E+00	1.943E+01
PA-231	0.000E+00	1.#INF	9.577E-01	9.578E-01	4.022E+01
PA-233	0.000E+00	1.#INF	7.467E-02	7.467E-02	1.920E+00
PA-234	8.317E-01	32.0	2.662E-01	2.706E-01	2.450E+00
PA-234M	3.642E+00	817.9	2.978E+01	2.978E+01	1.056E+02
AM-241	3.504E-01	80.5	2.819E-01	2.827E-01	9.356E-01
Np-237	7.180E-01	160.0	1.149E+00	1.150E+00	3.830E+00
Ir-192	0.000E+00	1.#INF	3.267E-02	3.268E-02	9.703E-01
Cs-136	2.191E-01	89.0	1.950E-01	1.955E-01	6.859E-01
Np-239	3.342E-01	143.1	4.783E-01	4.787E-01	1.605E+00
Nd-147	6.978E-01	129.1	9.008E-01	9.019E-01	2.122E+00
TL-210	4.196E-02	259.1	1.087E-01	1.087E-01	5.874E-01
Kr-85	-4.220E+01	115.3	4.865E+01	4.873E+01	1.632E+02
Total	2.382E+01				

Analyst: Jacob Boyd

Sample description
486234_Gamma_180-111757-B-2-A

Spectrum Filename: C:\User\SPC\Det15\15_Gamma_20201169.An1

Acquisition information

Start time:	11/12/2020 6:16:17 PM
Live time:	7200
Real time:	7209
Dead time:	0.13 %
Detector ID:	15

Detector system
Ge15 SN/11012216

Calibration

Filename:	15_TCC-1L Marn.Clb

15_1L Marn_1893022-115244

Energy Calibration

Created:	7/23/2020 4:17:28 PM
Zero offset:	0.089 keV
Gain:	0.250 keV/channel
Quadratic:	-3.102E-08 keV/channel^2

Efficiency Calibration

Created:	5/6/2020 2:13:32 PM
Type:	TCC Polynomial
Coefficients:	-0.481974 -4.786458 -0.774695
	7.208170 0.000000 0.000000

Library Files

Main analysis library:	Client_Long_Rev15.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.62keV)
Stop channel:	8000 (1999.58keV)
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

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Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	11/12/2020 6:15:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	15_2020-11-07_1044.PBC 11/7/2020 10:44:35 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 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	26.	96.60	1.11	3.416E-02	50.14	8.000	PBC<MDA	TH227
59.54	33.	80.45	1.12	3.708E-02	59.54	35.683	PBC<MDA	AM241
63.29	-45.	67.09	1.12	3.792E-02	63.29	3.100	PBC<MDA	TH234
64.28	28.	104.38	1.12	3.812E-02	64.28	9.700	PBC<MDA	Sn126
80.99	11.	246.60	1.14	4.001E-02	80.99	30.134	PBC<MDA	BA133
84.29	23.	190.74	1.14	4.019E-02	86.54	33.600	PBC<MDA	EU155
86.49	27.	160.02	1.14	4.019E-02	86.94	9.040	PBC<MDA	Sn126
92.59	-80.	56.51	1.15	4.020E-02	92.59	2.692	PBC<MDA	TH234
106.13	18.	143.10	1.16	3.968E-02	106.13	19.099	PBC<MDA	Np239
123.10	22.	111.05	1.17	3.833E-02	123.10	36.755	PBC<MDA	EU154
136.47	9.	372.60	1.18	3.695E-02	136.30	4.862	PBC<MDA	HF181
					136.47	10.835	3.263E-01	CO57
140.51	10.	358.86	1.19	3.650E-02	140.51	87.199	PBC<MDA	Tc99m
143.79	16.	166.94	1.19	3.613E-02	143.79	9.126	PBC<MDA	U235
145.44	24.	115.00	1.19	3.594E-02	145.44	48.400	PBC<MDA	CE141
162.66	14.	166.90	1.20	3.391E-02	162.66	5.814	PBC<MDA	Ba140
165.85	-3.	818.47	1.21	3.353E-02	165.85	76.670	PBC<MDA	CE139
176.60	6.	399.07	1.22	3.225E-02	176.60	17.000	PBC<MDA	Cf251
185.72	49.	54.32	1.22	3.117E-02	185.72	47.919	PBC<MDA	U235
193.51	22.	94.11	1.23	3.026E-02	193.51	4.400	PBC<MDA	TH229
205.33	18.	117.77	1.24	2.892E-02	205.33	4.713	PBC<MDA	U235
210.85	2.	918.46	1.24	2.833E-02	210.85	2.990	PBC<MDA	TH229
235.97	19.	128.45	1.26	2.594E-02	235.97	12.300	PBC<MDA	TH227
244.69	21.	107.19	1.27	2.521E-02	244.69	5.733	PBC<MDA	EU152
256.24	5.	374.43	1.28	2.431E-02	256.24	7.000	PBC<MDA	TH227
265.83	18.	97.47	1.29	2.362E-02	265.83	50.000	PBC<MDA	BI210M
277.28	18.	112.92	1.30	2.284E-02	277.28	5.608	PBC<MDA	TL208
279.42	6.	334.17	1.30	2.272E-02	279.20	81.500	PBC<MDA	Hg203

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
284.30	18.	103.16	1.30	2.239E-02	284.30	5.633	PBC<MDA	I131
295.09	20.	145.87	1.31	2.174E-02	295.09	19.249	PBC<MDA	PB214
296.00	12.	259.05	1.31	2.169E-02	296.00	79.000	PBC<MDA	TL210
300.03	-4.	431.48	1.31	2.146E-02	300.03	2.943	PBC<MDA	PB212
					300.07	2.379	PBC<MDA	PA231
					300.18	6.175	PBC<MDA	PA233
320.08	20.	147.63	1.33	2.038E-02	320.08	9.830	PBC<MDA	CR51
328.76	17.	134.02	1.33	1.995E-02	328.76	16.684	PBC<MDA	La140
333.44	19.	129.26	1.34	1.973E-02	333.44	15.510	PBC<MDA	Cf249
338.32	14.	164.82	1.34	1.950E-02	338.32	12.138	PBC<MDA	AC228
340.57	17.	137.55	1.34	1.940E-02	340.57	39.976	PBC<MDA	Cs136
344.29	17.	140.63	1.35	1.923E-02	344.29	24.316	PBC<MDA	EU152
351.93	13.	122.47	1.35	1.890E-02	351.93	37.074	PBC<MDA	PB214
356.00	6.	297.57	1.36	1.873E-02	356.00	58.572	PBC<MDA	BA133
383.84	16.	96.78	1.38	1.764E-02	383.84	9.357	PBC<MDA	BA133
387.95	8.	198.26	1.38	1.749E-02	387.95	66.000	PBC<MDA	Cf249
391.69	12.	126.26	1.38	1.736E-02	391.69	64.226	PBC<MDA	SN113
433.94	2.	809.94	1.41	1.600E-02	433.94	90.480	PBC<MDA	AG108M
453.88	11.	110.13	1.43	1.545E-02	453.88	65.000	PBC<MDA	PM146
463.37	15.	86.19	1.44	1.520E-02	463.37	10.571	PBC<MDA	SB125
497.05	1.	838.45	1.46	1.438E-02	497.05	88.704	PBC<MDA	RU103
511.86	122.	13.27	2.72	1.405E-02	511.86	19.549	6.170E+00	RH106
531.00	9.	129.10	1.49	1.365E-02	531.00	13.126	PBC<MDA	Nd147
563.24	13.	94.97	1.51	1.303E-02	563.24	6.804	PBC<MDA	CS134
569.70	15.	74.89	1.51	1.291E-02	569.32	12.273	1.303E+00	CS134
					569.47	8.200	1.951E+00	PA234
					569.70	97.740	1.637E-01	BI207
583.02	-2.	838.17	1.52	1.268E-02	583.02	75.762	PBC<MDA	TL208
609.32	39.	35.02	0.82	1.225E-02	609.31	41.351	1.066E+00	BI214
621.92	17.	130.68	1.55	1.206E-02	621.92	8.637	PBC<MDA	RH106
635.89	6.	129.91	1.56	1.185E-02	635.89	11.252	PBC<MDA	SB125
657.76	34.	23.60	1.58	1.154E-02	657.76	78.264	5.278E-01	AG110M
702.63	13.	116.88	1.61	1.097E-02	702.63	90.081	PBC<MDA	NB94
724.20	13.	86.37	1.62	1.071E-02	724.20	44.200	PBC<MDA	ZR95
727.17	3.	334.55	1.62	1.068E-02	727.17	6.507	PBC<MDA	BI212
735.72	4.	335.47	1.63	1.058E-02	735.72	22.500	PBC<MDA	PM146
747.16	8.	154.62	1.64	1.045E-02	747.16	34.000	PBC<MDA	PM146
766.41	1.	817.86	1.65	1.025E-02	765.79	99.801	PBC<MDA	NB95
					766.41	0.199	1.020E+01	PA234M
778.92	4.	254.95	1.66	1.012E-02	778.92	11.290	PBC<MDA	EU152
818.50	10.	112.94	1.69	9.741E-03	818.50	81.198	PBC<MDA	Cs136
871.10	11.	104.38	1.72	9.282E-03	871.10	91.008	PBC<MDA	NB94
889.28	10.	121.02	1.73	9.135E-03	889.28	92.513	PBC<MDA	Sc46
911.07	3.	359.93	1.75	8.966E-03	911.07	24.548	PBC<MDA	AC228
946.51	21.	32.00	1.77	8.708E-03	946.02	13.400	2.500E+00	PA234
964.11	5.	126.74	1.78	8.581E-03	964.11	11.900	PBC<MDA	EU152
968.97	4.	245.28	1.78	8.548E-03	968.97	14.668	PBC<MDA	AC228
996.33	11.	74.24	1.80	8.366E-03	996.33	9.775	PBC<MDA	EU154

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
1037.84	9.	90.70	1.83	8.105E-03	1037.84	11.373	PBC<MDA	Co56
1063.66	7.	135.27	1.84	7.952E-03	1063.66	74.500	PBC<MDA	BI207
1120.20	7.	151.24	1.88	7.638E-03	1120.29	13.581	PBC<MDA	BI214
					1120.55	90.436	PBC<MDA	Sc46
1121.30	10.	91.10	1.88	7.633E-03	1120.55	90.436	PBC<MDA	Sc46
					1121.30	29.439	6.490E-01	Ta182
1189.05	7.	87.75	1.92	7.292E-03	1189.05	16.842	PBC<MDA	Ta182
1221.41	7.	107.76	1.94	7.140E-03	1221.41	24.340	PBC<MDA	Ta182
1291.60	5.	175.40	1.98	6.834E-03	1291.60	43.576	PBC<MDA	FE59
1408.00	7.	87.07	2.04	6.383E-03	1408.00	17.496	PBC<MDA	EU152
1460.83	5.	213.78	2.07	6.199E-03	1460.83	10.700	PBC<MDA	K40
1690.98	1.	933.82	2.19	5.508E-03	1690.98	42.015	PBC<MDA	SB124

No unknown peaks passed sensitivity test.

This section based on library: Client_Long_Rev15.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	185.67	46.54	528.	-111.	-0.015	25.95	1.110
TH-227	200.06	50.14	294.	26.	0.004	96.60	1.113s
AM-241	237.62	59.54	344.	33.	0.005	80.45	1.121s
TH-234	252.62	63.29	449.	-45.	-0.006	67.09	1.124
Sn-126	256.58	64.28	402.	28.	0.004	104.38	1.125s
BA-133	323.37	80.99	176.	11.	0.001	246.60	1.138
Np-237	345.36	86.49	935.	27.	0.004	160.02	1.143s
EU-155	345.57	86.54	937.	23.	0.003	190.74	1.143s
TH-234	369.75	92.59	1018.	-80.	-0.011	56.51	1.148
AC-228	372.78	93.35	753.	-28.	-0.004	137.47	1.149
Gd-153	389.37	97.50	725.	-29.	-0.004	134.52	1.152s
Gd-153	412.16	103.20	334.	-27.	-0.004	97.80	1.156s
EU-155	420.61	105.31	340.	-10.	-0.001	150.76	1.158s
Np-239	423.87	106.13	323.	18.	0.003	143.10	1.159s
EU-152	486.43	121.78	257.	-29.	-0.004	80.15	1.172s
CO-57	487.56	122.06	254.	-13.	-0.002	176.74	1.172s
EU-154	491.71	123.10	287.	22.	0.003	111.05	1.173s
PA-234	524.47	131.29	624.	-20.	-0.003	178.75	1.179
HF-181	544.48	136.30	624.	-20.	-0.003	178.75	1.183s
CO-57	545.17	136.47	609.	9.	0.001	372.60	1.183s
Tc-99m	561.31	140.51	610.	10.	0.001	358.86	1.187s
U-235	574.40	143.79	328.	16.	0.002	166.94	1.189s
CE-141	581.02	145.44	362.	24.	0.003	115.00	1.191
Ba-140	649.86	162.66	266.	14.	0.002	166.90	1.205s
U-235	652.73	163.38	216.	-15.	-0.002	176.85	1.205s
CE-139	662.62	165.85	250.	-3.	0.000	818.47	1.207

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Cf-251	705.58	176.60	148.	6.	0.001	399.07	1.216s
U-235	742.04	185.72	172.	49.	0.007	54.32	1.223s
TH-229	773.18	193.51	108.	22.	0.003	94.11	1.229s
U-235	820.45	205.33	117.	18.	0.003	117.77	1.238
TH-229	842.51	210.85	134.	2.	0.000	918.46	1.243s
TH-227	942.94	235.97	299.	19.	0.003	128.45	1.263s
PB-212	953.58	238.63	342.	-24.	-0.003	104.82	1.265
PB-214	967.03	242.00	318.	0.	0.000	1000.00	1.268s
EU-152	977.81	244.69	236.	21.	0.003	107.19	1.270s
TH-227	1023.98	256.24	84.	5.	0.001	374.43	1.279s
Cd-113m	1053.80	263.70	120.	-24.	-0.003	66.52	1.285s
BI-210M	1062.33	265.83	152.	18.	0.003	97.47	1.286s
TL-208	1108.11	277.28	186.	18.	0.002	112.92	1.295s
Hg-203	1115.77	279.20	198.	6.	0.001	334.17	1.297s
I-131	1136.16	284.30	165.	18.	0.003	103.16	1.301s
PB-214	1179.30	295.09	430.	20.	0.003	145.87	1.309s
TL-210	1182.94	296.00	450.	12.	0.002	259.05	1.310s
PB-212	1199.05	300.03	466.	-4.	-0.001	431.48	1.313s
PA-231	1199.21	300.07	462.	0.	0.000	1000.00	1.313s
PA-233	1199.65	300.18	462.	0.	0.000	1000.00	1.313s
PA-231	1209.53	302.65	462.	0.	0.000	1000.00	1.315s
BA-133	1210.34	302.85	462.	0.	0.000	1000.00	1.315s
Ba-140	1218.32	304.85	462.	0.	0.000	1000.00	1.316
BI-210M	1218.51	304.90	462.	0.	0.000	1000.00	1.317
Ir-192	1232.68	308.44	462.	0.	0.000	1000.00	1.319s
PA-233	1246.96	312.01	462.	0.	0.000	1000.00	1.322s
Ir-192	1264.87	316.49	462.	0.	0.000	1000.00	1.325s
CR-51	1279.24	320.08	431.	20.	0.003	147.63	1.328s
La-140	1313.93	328.76	262.	17.	0.002	134.02	1.335s
Cf-249	1332.64	333.44	280.	19.	0.003	129.26	1.339s
AC-228	1352.15	338.32	246.	14.	0.002	164.82	1.342s
Cs-136	1361.15	340.57	260.	17.	0.002	137.55	1.344s
EU-152	1376.00	344.29	261.	17.	0.002	140.63	1.347s
HF-181	1382.17	345.83	309.	-17.	-0.002	134.75	1.348
PB-214	1406.58	351.93	127.	13.	0.002	122.47	1.353
BA-133	1422.84	356.00	139.	6.	0.001	297.57	1.356s
I-131	1456.76	364.48	74.	-7.	-0.001	328.82	1.362
BA-133	1534.16	383.84	110.	16.	0.002	96.78	1.377s
Cf-249	1550.59	387.95	126.	8.	0.001	198.26	1.380s
SN-113	1565.55	391.69	113.	12.	0.002	126.26	1.383s
SB-125	1710.24	427.88	54.	-6.	-0.001	271.61	1.410s
AG-108M	1734.48	433.94	43.	2.	0.000	809.94	1.414s
PM-146	1814.23	453.88	35.	11.	0.002	110.13	1.429s
SB-125	1852.17	463.37	71.	15.	0.002	86.19	1.436s
Ir-192	1870.93	468.06	97.	-4.	-0.001	315.55	1.440s
BE-7	1909.06	477.60	166.	-20.	-0.003	63.83	1.447s
HF-181	1926.67	482.00	184.	-20.	-0.003	100.97	1.450s
La-140	1946.75	487.02	191.	-3.	0.000	503.63	1.454s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RU-103	1986.88	497.05	36.	1.	0.000	838.45	1.461s
RH-106	2046.11	511.86	70.	122.	0.017	13.27	2.722s
Kr-85	2054.57	513.98	217.	-18.	-0.003	115.28	1.474s
Nd-147	2122.63	531.00	28.	9.	0.001	129.10	1.486s
Ba-140	2147.67	537.26	38.	-2.	0.000	555.94	1.490s
CS-134	2251.55	563.24	33.	13.	0.002	94.97	1.509s
CS-134	2275.88	569.32	56.	-16.	-0.002	70.71	1.513s
PA-234	2276.48	569.47	72.	0.	0.000	1000.00	1.513s
BI-207	2277.41	569.70	55.	15.	0.002	74.89	1.514s
TL-208	2330.68	583.02	54.	-2.	0.000	838.17	1.523s
SB-125	2400.58	600.50	304.	-18.	-0.003	135.35	1.536s
SB-124	2409.51	602.73	286.	-19.	-0.003	79.69	1.537s
CS-134	2417.42	604.71	300.	-20.	-0.003	124.36	1.539s
BI-214	2435.84	609.32	41.	39.	0.005	35.02	0.825s
RU-103	2439.77	610.30	280.	-20.	-0.003	119.96	1.543s
AG-108M	2455.70	614.28	282.	-20.	-0.003	120.17	1.546s
PM-144	2470.82	618.06	302.	-20.	-0.003	124.04	1.548s
RH-106	2486.24	621.92	240.	17.	0.002	130.68	1.551s
SB-125	2542.12	635.89	27.	6.	0.001	129.91	1.561s
I-131	2546.46	636.97	45.	-9.	-0.001	107.14	1.561s
AG-110M	2629.60	657.76	16.	34.	0.005	23.60	1.576s
PM-144	2784.72	696.54	98.	-16.	-0.002	88.14	1.603s
NB-94	2809.06	702.63	112.	13.	0.002	116.88	1.607s
SB-124	2889.69	722.79	74.	-16.	-0.002	82.24	1.621s
AG-108M	2890.29	722.94	89.	0.	0.000	1000.00	1.621s
EU-154	2891.98	723.36	89.	0.	0.000	1000.00	1.621s
ZR-95	2895.34	724.20	53.	13.	0.002	86.37	1.622s
BI-212	2907.22	727.17	57.	3.	0.000	334.55	1.624s
PM-146	2941.42	735.72	30.	4.	0.001	335.47	1.630s
PM-146	2987.18	747.16	30.	8.	0.001	154.62	1.638s
ZR-95	3025.46	756.73	41.	-8.	-0.001	150.14	1.644s
AG-110M	3054.31	763.94	60.	-18.	-0.002	73.25	1.649s
PA-234M	3064.19	766.41	74.	1.	0.000	817.86	1.651s
EU-152	3114.22	778.92	50.	4.	0.001	254.95	1.659s
CS-134	3182.03	795.87	64.	-5.	-0.001	223.63	1.671s
TL-210	3196.95	799.60	69.	0.	0.000	1000.00	1.673s
CO-58	3241.65	810.78	62.	-10.	-0.001	115.76	1.681s
La-140	3261.63	815.77	72.	0.	0.000	1000.00	1.684s
Cs-136	3272.55	818.50	61.	10.	0.001	112.94	1.686s
MN-54	3337.95	834.85	53.	-21.	-0.003	49.86	1.697s
Co-56	3385.64	846.77	35.	-9.	-0.001	148.31	1.705s
TL-208	3440.82	860.56	37.	-12.	-0.002	93.41	1.714s
NB-94	3482.96	871.10	25.	11.	0.002	104.38	1.721s
EU-154	3491.49	873.23	74.	-19.	-0.003	68.38	1.722
PA-234	3520.70	880.53	108.	-18.	-0.003	84.93	1.727
PA-234	3531.54	883.24	117.	-18.	-0.003	88.05	1.729s
AG-110M	3537.31	884.68	135.	-6.	-0.001	278.93	1.729s
Sc-46	3555.70	889.28	74.	10.	0.001	121.02	1.733s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Y-88	3590.75	898.04	30.	-10.	-0.001	107.51	1.738s
AC-228	3642.87	911.07	33.	3.	0.000	359.93	1.747s
AG-110M	3748.58	937.49	30.	-6.	-0.001	204.80	1.764s
PA-234	3782.70	946.02	5.	21.	0.003	32.00	1.769s
EU-152	3855.08	964.11	18.	5.	0.001	126.74	1.781s
AC-228	3874.52	968.97	41.	4.	0.001	245.28	1.784s
EU-154	3983.98	996.33	27.	11.	0.002	74.24	1.801
EU-154	4017.77	1004.77	29.	-2.	0.000	534.75	1.806s
Co-56	4150.07	1037.84	11.	9.	0.001	90.70	1.827s
Cs-136	4191.00	1048.07	24.	-7.	-0.001	105.95	1.833s
RH-106	4200.16	1050.36	42.	-9.	-0.001	89.75	1.835s
BI-207	4253.38	1063.66	16.	7.	0.001	135.27	1.843s
EU-152	4447.11	1112.07	55.	-4.	-0.001	277.92	1.872s
ZN-65	4461.00	1115.55	51.	0.	0.000	1000.00	1.875s
BI-214	4479.97	1120.29	52.	7.	0.001	151.24	1.877s
Ta-182	4484.02	1121.30	40.	10.	0.001	91.10	1.878s
CO-60	4691.85	1173.24	28.	-7.	-0.001	164.11	1.909s
Ta-182	4755.13	1189.05	5.	7.	0.001	87.75	1.918s
Ta-182	4884.63	1221.41	11.	7.	0.001	107.76	1.937s
NA-22	5097.22	1274.53	34.	-14.	-0.002	101.27	1.968s
EU-154	5097.26	1274.54	48.	0.	0.000	1000.00	1.968
FE-59	5165.51	1291.60	11.	5.	0.001	175.40	1.978s
CO-60	5329.23	1332.50	19.	-3.	0.000	308.14	2.001s
AG-110M	5536.54	1384.30	17.	-3.	0.000	327.45	2.029s
EU-152	5631.42	1408.00	6.	7.	0.001	87.07	2.042s
K-40	5842.88	1460.83	23.	5.	0.001	213.78	2.071s
La-140	6384.82	1596.21	13.	-4.	0.000	296.75	2.141s
SB-124	6764.25	1690.98	6.	1.	0.000	933.82	2.188s
BI-214	7058.56	1764.49	51.	-26.	-0.004	21.51	2.223s
Y-88	7345.14	1836.06	18.	-6.	-0.001	175.59	2.256s

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

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Peak Code	Peak MDA Value Bq/Sample	COMMENTS
BE-7	R	-1.8151E+00				5.31E+01	
			477.60	-1.815E+00	?(P	5.643E+00 6.38E+01 1.04E+01	G
NA-22	R	-3.4107E-01				9.50E+02	
			1274.53	-3.411E-01	?(	7.280E-01 1.01E+02 8.26E+01	G

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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
K-40	N	1.1168E+00					4.66E+11	
			1460.83	1.117E+00	?(	5.213E+00	2.14E+02	1.07E+01 G
Sc-46	R	1.7148E-01					8.38E+01	
			889.28	1.715E-01	?(	7.056E-01	1.21E+02	9.25E+01 G
			1120.55	6.704E-03	%	7.150E-01	2.99E+03	9.04E+01 G
CR-51	R	1.3947E+00					2.77E+01	
			320.08	1.395E+00	?(	6.895E+00	1.48E+02	9.83E+00 G
MN-54	C	-3.1034E-01					3.12E+02	
			834.85	-3.103E-01	?(P	5.294E-01	4.99E+01	1.00E+02 G
FE-59	R	9.1452E-02					4.45E+01	
			1099.25	-7.340E-03	%(P	8.102E-01	4.70E+03	5.57E+01 G
			1291.60	2.177E-01	?(	8.581E-01	1.75E+02	4.36E+01 G
Co-56	R	2.1571E-02					7.73E+01	
			846.77	-1.515E-01	?(	5.097E-01	1.48E+02	8.70E+01 G
			1238.28	4.587E-03	% P	8.702E-01	8.01E+03	5.42E+01 G
			1037.84	1.345E+00	?(P	2.708E+00	9.07E+01	1.14E+01 G
			1771.35	-1.075E-01	%	7.777E+00	2.04E+03	1.28E+01 A
CO-57	R	-1.1785E-02					2.72E+02	
			122.06	-5.472E-02	?(	3.261E-01	1.77E+02	8.53E+01 G
			136.47	3.263E-01	&(	4.085E+00	3.73E+02	1.08E+01 G
CO-58	R	-1.4654E-01					7.09E+01	
			810.78	-1.465E-01	?(	5.774E-01	1.16E+02	9.66E+01 G
CO-60	R	-7.6313E-02					1.93E+03	
			1332.50	-7.631E-02	?(P	5.222E-01	3.08E+02	9.27E+01 G
			1173.24	-1.350E-01	+ P	5.587E-01	1.64E+02	9.17E+01 G
NB-94	R	1.8299E-01					7.41E+06	
			702.63	1.851E-01	&(	7.310E-01	1.17E+02	9.01E+01 G
			871.10	1.809E-01	?(	4.276E-01	1.04E+02	9.10E+01 G
ZR-95	I	5.2148E-02					6.40E+01	
			756.73	-2.056E-01	?(P	8.045E-01	1.50E+02	5.45E+01 G
			724.20	3.699E-01	?(	1.075E+00	8.64E+01	4.42E+01 G
NB-95	I	6.7845E-03					6.40E+01	
			765.79	6.784E-03	&(	5.789E-01	2.43E+03	9.98E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
RU-103	R	1.5923E-02					3.93E+01	
			497.05	1.592E-02	&(P	3.321E-01	8.38E+02	8.87E+01 G
			610.30	-4.026E+00	&	1.618E+01	1.20E+02	5.66E+00 GA
RH-106	R	2.2734E+00					3.74E+02	
			621.92	2.273E+00	&(	9.982E+00	1.31E+02	8.64E+00 G
			1050.36	-1.205E+01	+ P	4.238E+01	8.98E+01	1.35E+00 G
			511.86	6.170E+00	?	2.109E+00	1.33E+01	1.95E+01 GA
AG-108M	C	1.5985E-02					1.53E+05	
			433.94	1.599E-02	?(	3.202E-01	8.10E+02	9.05E+01 G
			722.94	0.000E+00	-	6.654E-01	1.00E+03	9.08E+01 G
			614.28	-2.552E-01	+	1.027E+00	1.20E+02	8.98E+01 G
AG-110M	R	2.3613E-01					2.50E+02	
			884.68	-1.542E-01	?(	1.472E+00	2.79E+02	5.85E+01 G
			657.76	5.278E-01	&(	3.252E-01	2.36E+01	7.83E+01 G
			937.49	-3.470E-01	+	1.633E+00	2.05E+02	2.74E+01 G
			1384.30	-3.218E-01	+	2.352E+00	3.27E+02	2.00E+01 G
			763.94	-1.354E+00	+ P	2.979E+00	7.32E+01	1.76E+01 G
SN-113	F	1.5341E-01					1.15E+02	
			391.69	1.534E-01	?(P	6.511E-01	1.26E+02	6.42E+01 G
SB-124	R	-2.2717E-01					6.02E+01	
			602.73	-2.272E-01	?(P	9.984E-01	7.97E+01	9.17E+01 G
			1690.98	3.910E-02	+ P	8.673E-01	9.34E+02	4.20E+01 G
			722.79	-2.179E+00	+	5.998E+00	8.22E+01	9.21E+00 G
SB-125	R	3.0331E-01					1.01E+03	
			427.88	-1.714E-01	&(P	1.085E+00	2.72E+02	2.92E+01 G
			600.50	-1.170E+00	+	5.312E+00	1.35E+02	1.77E+01 G
			635.89	6.305E-01	?(P	2.802E+00	1.30E+02	1.13E+01 G
			463.37	1.266E+00	?(P	3.625E+00	8.62E+01	1.06E+01 G
I-131	R	6.8477E-02					8.02E+00	
			364.48	-6.561E-02	?(P	4.005E-01	3.29E+02	8.10E+01 G
			284.30	1.998E+00	?(	6.911E+00	1.03E+02	5.63E+00 G
			636.97	-1.464E+00	+	5.348E+00	1.07E+02	7.51E+00 G
Gd-153	R	-3.5888E-01					2.42E+02	
			97.50	-3.589E-01	&(	1.609E+00	1.35E+02	2.76E+01 G
			103.20	-4.845E-01	+	1.579E+00	9.78E+01	1.94E+01 G
Ga-68	C	-3.1358E-01					4.71E-02	
			1077.40	-3.136E-01	%(	2.280E+01	3.15E+03	3.30E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Tc-99m	R	4.7853E-02					2.51E-01	
			140.51	4.785E-02	?(	5.769E-01	3.59E+02	8.72E+01 G
BA-133	R	7.1748E-02					3.85E+03	
			356.00	7.175E-02	&(	7.308E-01	2.98E+02	5.86E+01 G
			302.85	0.000E+00	-	3.919E+00	1.00E+03	1.71E+01 G
			383.84	1.335E+00	&	4.341E+00	9.68E+01	9.36E+00 GA
			80.99	1.229E-01	? P	7.440E-01	2.47E+02	3.01E+01 GA
CS-134	R	8.5997E-02					7.54E+02	
			795.87	-9.660E-02	?(	7.486E-01	2.24E+02	7.46E+01 G
			604.71	-2.584E-01	+	1.077E+00	1.24E+02	8.73E+01 G
			569.32	-1.401E+00	+	3.291E+00	7.07E+01	1.23E+01 G
			801.95	3.313E-02	%	8.188E+00	7.01E+03	7.06E+00 G
			563.24	2.089E+00	?(	4.597E+00	9.50E+01	6.80E+00 G
CS-137	I	4.7274E-03					1.10E+04	
			661.66	4.727E-03	%(	4.995E-01	2.96E+03	8.52E+01 G
CE-139	R	-1.4786E-02					1.38E+02	
			165.85	-1.479E-02	?(P	4.125E-01	8.18E+02	7.67E+01 G
Ba-140	R	1.1408E-01					1.28E+01	
			537.26	-9.580E-02	?(P	1.341E+00	5.56E+02	2.42E+01 G
			162.66	9.862E-01	?(	5.544E+00	1.67E+02	5.81E+00 G
			304.85	0.000E+00	-	1.837E+01	1.00E+03	3.67E+00 G
La-140	R	3.5125E-02					1.28E+01	
			1596.21	-1.020E-01	?(P	5.488E-01	2.97E+02	8.43E+01 G
			487.02	-6.296E-02	+ P	1.605E+00	5.04E+02	3.97E+01 G
			328.76	7.283E-01	?(P	3.263E+00	1.34E+02	1.67E+01 G
			815.77	0.000E+00	-	2.661E+00	1.00E+03	2.26E+01 G
CE-141	I	1.8975E-01					3.25E+01	
			145.44	1.897E-01	?(	7.291E-01	1.15E+02	4.84E+01 G
CE-144	I	9.2099E-02					2.85E+02	
			133.54	9.210E-02	%(	3.931E+00	1.27E+03	1.11E+01 G
PM-144	C	-2.0969E-01					3.63E+02	
			696.54	-2.097E-01	?(	6.192E-01	8.81E+01	9.90E+01 G
			618.06	-2.329E-01	&	9.678E-01	1.24E+02	9.91E+01 G
EU-152	R	3.0080E-02					4.94E+03	
			121.78	-4.340E-01	?(	1.156E+00	8.01E+01	2.42E+01 G
			344.29	4.905E-01	+	2.318E+00	1.41E+02	2.43E+01 G
			1112.07	-6.074E-01	+	5.897E+00	2.78E+02	1.14E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		778.92	4.861E-01	+	4.334E+00	2.55E+02	1.13E+01 G
		964.11	6.876E-01	+	3.058E+00	1.27E+02	1.19E+01 G
		244.69	1.989E+00	?(	7.135E+00	1.07E+02	5.73E+00 G
		1408.00	8.836E-01	?	1.717E+00	8.71E+01	1.75E+01 GA
EU-154 R	5.5825E-01					3.14E+03	
		123.10	2.167E-01	?(	8.051E-01	1.11E+02	3.68E+01 G
		1274.54	0.000E+00	-	2.162E+00	1.00E+03	3.26E+01 G
		723.36	0.000E+00	-	3.561E+00	1.00E+03	1.70E+01 G
		873.23	-2.926E+00	+	6.627E+00	6.84E+01	9.70E+00 G
		1004.77	-2.390E-01	+	2.880E+00	5.35E+02	1.62E+01 G
		996.33	1.842E+00	(	4.573E+00	7.42E+01	9.78E+00 G
EU-155 R	8.0068E-02					1.81E+03	
		105.31	-1.723E-01	?(P	1.504E+00	1.51E+02	2.06E+01 G
		86.54	2.349E-01	&(	1.495E+00	1.91E+02	3.36E+01 G
HF-181 R	-2.4099E-01					4.24E+01	
		482.00	-2.410E-01	?(	8.149E-01	1.01E+02	7.64E+01 G
		133.02	1.145E-08	&	1.408E+00	3.64E+09	3.10E+01 G
		345.83	-9.280E-01	+ P	4.626E+00	1.35E+02	1.33E+01 G
		136.30	-1.539E+00	&	9.204E+00	1.79E+02	4.86E+00 G
Ta-182 R	6.5235E-01					1.14E+02	
		1121.30	6.490E-01	?(	2.001E+00	9.11E+01	2.94E+01 G
		1221.41	5.861E-01	?(	1.433E+00	1.08E+02	2.43E+01 G
		1189.05	7.540E-01	?(	1.524E+00	8.77E+01	1.68E+01 G
Hg-203 F	4.5013E-02					4.66E+01	
		279.20	4.501E-02	?(	5.123E-01	3.34E+02	8.15E+01 G
TL-208 R	1.0736E-01					6.98E+02	
		583.02	-2.515E-02	?(P	5.344E-01	8.38E+02	7.58E+01 G
		277.28	1.897E+00	?(	7.194E+00	1.13E+02	5.61E+00 G
		860.56	-1.295E+00	+ P	3.395E+00	9.34E+01	1.35E+01 G
PM-146 C	2.1094E-01					2.02E+03	
		453.88	1.568E-01	&(	4.171E-01	1.10E+02	6.50E+01 G
		747.16	3.126E-01	?(	1.103E+00	1.55E+02	3.40E+01 G
		735.72	2.138E-01	?(P	1.656E+00	3.35E+02	2.25E+01 G
Y-88 R	-1.7808E-01					1.07E+02	
		1836.06	-1.781E-01	?(	6.672E-01	1.76E+02	9.09E+01 G
		898.04	-1.882E-01	+ P	5.116E-01	1.08E+02	8.51E+01 G
Cd-113m	-2.3812E+03					5.33E+03	
		263.70	-2.381E+03	?(	5.236E+03	6.65E+01	6.00E-03 K

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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Cd-109	R	-7.2996E-07					4.53E+02	
			88.04	-7.300E-07	%(	1.407E+01	5.74E+08	3.61E+00 G
Cf-251	T	1.5202E-01					3.28E+05	
			176.60	1.520E-01	?(	1.505E+00	3.99E+02	1.70E+01 G
			227.00	8.244E-02	%	4.432E+00	2.15E+03	6.30E+00 GA
Cf-249	T	2.3990E-01					1.28E+05	
			387.95	9.782E-02	?(	6.616E-01	1.98E+02	6.60E+01 G
			333.44	8.445E-01	(	3.662E+00	1.29E+02	1.55E+01 G
Sn-126		1.0379E+00					3.65E+07	
			87.57	7.028E-08	%	1.355E+00	5.74E+08	3.75E+01 GA
			64.28	1.038E+00	?(	3.612E+00	1.04E+02	9.70E+00 G
			86.94	-2.916E-07	&	5.622E+00	5.74E+08	9.04E+00 GA
PB-210	R	-1.1604E+01					8.14E+03	
			46.54	-1.160E+01	?(P	1.152E+01	2.60E+01	4.05E+00 G
PB-212	R	-2.9992E-01					6.98E+02	
			238.63	-2.999E-01	(P	1.115E+00	1.05E+02	4.30E+01 G
			300.03	-9.543E-01	+ P	2.273E+01	4.31E+02	2.94E+00 GA
PB-214	R	4.0468E-01					5.84E+05	
			351.93	2.643E-01	(	1.093E+00	1.22E+02	3.71E+01 G
			295.09	6.751E-01	*(	3.297E+00	1.46E+02	1.92E+01 G
			242.00	0.000E+00	-	6.352E+00	1.00E+03	7.38E+00 GA
BI-207	C	1.6390E-01					1.18E+04	
			1063.66	1.641E-01	?(	5.005E-01	1.35E+02	7.45E+01 G
			569.70	1.637E-01	?(	4.089E-01	7.49E+01	9.77E+01 G
BI-212	R	6.4454E-01					6.98E+02	
			727.17	6.445E-01	&(	7.548E+00	3.35E+02	6.51E+00 G
			785.42	4.969E-01	& P	4.767E+01	2.72E+03	1.05E+00 GA
U-235	R	1.0663E+00					2.57E+11	
			143.79	6.568E-01	*(P	3.668E+00	1.67E+02	9.13E+00 G
			205.33	1.859E+00	&(P	5.403E+00	1.18E+02	4.71E+00 G
			163.38	-1.317E+00	+ P	6.261E+00	1.77E+02	4.67E+00 G
			185.72	4.557E-01		5.936E-01	5.43E+01	4.79E+01 GA
BI-214	R	1.0346E+00					5.84E+05	
			609.31	1.066E+00	@(P	8.932E-01	3.50E+01	4.14E+01 G
			1120.29	9.379E-01	?(P	4.848E+00	1.51E+02	1.36E+01 G
			1764.49	-4.335E+00	- P	5.971E+00	2.15E+01	1.58E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-210M	T	2.1699E-01					1.10E+09	
			265.83	2.170E-01	?(	7.086E-01	9.75E+01	5.00E+01 G
			304.90	0.000E+00	-	2.409E+00	1.00E+03	2.80E+01 G
AC-228	R	4.1606E-01					2.10E+03	
			911.07	2.192E-01	?(P	1.848E+00	3.60E+02	2.45E+01 G
			968.97	4.241E-01	&(P	3.612E+00	2.45E+02	1.47E+01 G
			338.32	8.046E-01	?(P	4.448E+00	1.65E+02	1.21E+01 G
			93.35	-1.771E+00	+	8.116E+00	1.37E+02	5.56E+00 XA
TH-227	R	8.6306E-01					7.95E+03	
			256.24	3.974E-01	?(P	3.710E+00	3.74E+02	7.00E+00 G
			235.97	8.415E-01	?(	3.623E+00	1.28E+02	1.23E+01 G
			50.14	1.304E+00	(	4.200E+00	9.66E+01	8.00E+00 G
TH-229	N	2.3153E+00					2.68E+06	
			193.51	2.315E+00	?(	5.335E+00	9.41E+01	4.40E+00 G
			210.85	4.055E-01	& P	9.275E+00	9.18E+02	2.99E+00 G
TH-234	R	-1.0297E+01					1.63E+12	
			92.59	-1.030E+01	(P	1.943E+01	5.65E+01	2.69E+00 G
			63.29	-5.309E+00	+ P	1.199E+01	6.71E+01	3.10E+00 G
PA-234	R	8.3175E-01					1.63E+12	
			131.29	-4.098E-01	&(	2.450E+00	1.79E+02	1.80E+01 G
			946.02	2.500E+00	?(	1.563E+00	3.20E+01	1.34E+01 G
			569.47	0.000E+00	-	5.539E+00	1.00E+03	8.20E+00 C
			883.24	-2.841E+00	&	8.368E+00	8.80E+01	9.60E+00 G
			880.53	-4.529E+00	&	1.286E+01	8.49E+01	6.00E+00 GA
PA-234M	R	3.6415E+00					1.63E+12	
			1001.00	1.058E+00	&(P	1.056E+02	2.81E+03	5.06E-01 G
			766.41	1.020E+01	(	2.918E+02	8.18E+02	1.99E-01 G
AM-241	T	3.5040E-01					1.58E+05	
			59.54	3.504E-01	?(	9.356E-01	8.05E+01	3.57E+01 G
Np-237	F	7.1803E-01					2.14E+06	
			86.49	7.180E-01	&(	3.830E+00	1.60E+02	1.31E+01 G
Cs-136	R	2.1913E-01					1.30E+01	
			818.50	1.785E-01	?(	6.859E-01	1.13E+02	8.12E+01 G
			1048.07	-1.903E-01	+	6.944E-01	1.06E+02	6.35E+01 G
			340.57	3.016E-01	?(	1.394E+00	1.38E+02	4.00E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

Np-239   R   3.3421E-01                                      2.36E+00
                          103.70 3.438E-02 &   1.251E+00 1.07E+03 2.31E+01 X
                          106.13 3.342E-01 ?(  1.605E+00 1.43E+02 1.91E+01 G
                           99.50-4.177E-02 &   3.054E+00 2.17E+03 1.44E+01 X

Nd-147   R   6.9779E-01                                      1.11E+01
                          531.00 6.978E-01 ?(  2.122E+00 1.29E+02 1.31E+01 G
                           91.10 9.518E-08 %   1.835E+00 5.74E+08 2.77E+01 G

TL-210   R   4.1959E-02                                      5.84E+05
                          799.60 0.000E+00 ?(  5.874E-01 1.00E+03 9.90E+01 G
                          296.00 9.452E-02 ?(  8.236E-01 2.59E+02 7.90E+01 G
                         1313.00 6.536E-02 %   1.804E+00 1.19E+03 2.10E+01 CA

Kr-85    I  -4.2204E+01                                      3.92E+03
                          513.98-4.220E+01 ?(  1.632E+02 1.15E+02 4.34E-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	528.	-111.	-0.015	25.95	-1.160E+01	P
TH-227	50.14	294.	26.	0.004	96.60	1.304E+00	
AM-241	59.54	344.	33.	0.005	80.45	3.504E-01	
TH-234	63.29	449.	-45.	-0.006	67.09	-5.309E+00	P
Sn-126	64.28	402.	28.	0.004	104.38	1.038E+00	
BA-133	80.99	176.	11.	0.001	246.60	1.229E-01	P
Np-237	86.49	935.	27.	0.004	160.02	7.180E-01	
TH-234	92.59	1018.	-80.	-0.011	56.51	-1.030E+01	P
AC-228	93.35	753.	-28.	-0.004	137.47	-1.771E+00	
Gd-153	97.50	725.	-29.	-0.004	134.52	-3.589E-01	
Gd-153	103.20	334.	-27.	-0.004	97.80	-4.845E-01	
EU-152	121.78	257.	-29.	-0.004	80.15	-4.340E-01	
HF-181	136.30	624.	-20.	-0.003	178.75	-1.539E+00	
U-235	143.79	328.	16.	0.002	166.94	6.568E-01	P
CE-141	145.44	362.	24.	0.003	115.00	1.897E-01	
Ba-140	162.66	266.	14.	0.002	166.90	9.862E-01	
U-235	163.38	216.	-15.	-0.002	176.85	-1.317E+00	P
CE-139	165.85	250.	-3.	0.000	818.47	-1.479E-02	P
Cf-251	176.60	148.	6.	0.001	399.07	1.520E-01	
U-235	185.72	172.	49.	0.007	54.32	4.557E-01	
TH-229	193.51	108.	22.	0.003	94.11	2.315E+00	
U-235	205.33	117.	18.	0.003	117.77	1.859E+00	P
TH-229	210.85	134.	2.	0.000	918.46	4.055E-01	P
TH-227	235.97	299.	19.	0.003	128.45	8.415E-01	
PB-212	238.63	342.	-24.	-0.003	104.82	-2.999E-01	P
EU-152	244.69	236.	21.	0.003	107.19	1.989E+00	
TH-227	256.24	84.	5.	0.001	374.43	3.974E-01	P
Cd-113m	263.70	120.	-24.	-0.003	66.52	-2.381E+03	
BI-210M	265.83	152.	18.	0.003	97.47	2.170E-01	
TL-208	277.28	186.	18.	0.002	112.92	1.897E+00	
I-131	284.30	165.	18.	0.003	103.16	1.998E+00	
PB-214	295.09	430.	20.	0.003	145.87	6.751E-01	
TL-210	296.00	450.	12.	0.002	259.05	9.452E-02	
PB-212	300.03	466.	-4.	-0.001	431.48	-9.543E-01	P
CR-51	320.08	431.	20.	0.003	147.63	1.395E+00	
La-140	328.76	262.	17.	0.002	134.02	7.283E-01	P
Cf-249	333.44	280.	19.	0.003	129.26	8.445E-01	
AC-228	338.32	246.	14.	0.002	164.82	8.046E-01	P
Cs-136	340.57	260.	17.	0.002	137.55	3.016E-01	
EU-152	344.29	261.	17.	0.002	140.63	4.905E-01	
HF-181	345.83	309.	-17.	-0.002	134.75	-9.280E-01	P
PB-214	351.93	127.	13.	0.002	122.47	2.643E-01	
BA-133	356.00	139.	6.	0.001	297.57	7.175E-02	
I-131	364.48	74.	-7.	-0.001	328.82	-6.561E-02	P

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BA-133	383.84	110.	16.	0.002	96.78	1.335E+00	
Cf-249	387.95	126.	8.	0.001	198.26	9.782E-02	
SN-113	391.69	113.	12.	0.002	126.26	1.534E-01	P
SB-125	427.88	54.	-6.	-0.001	271.61	-1.714E-01	P
AG-108M	433.94	43.	2.	0.000	809.94	1.599E-02	
PM-146	453.88	35.	11.	0.002	110.13	1.568E-01	
SB-125	463.37	71.	15.	0.002	86.19	1.266E+00	P
Ir-192	468.06	97.	-4.	-0.001	315.55	-1.000E-01	
BE-7	477.60	166.	-20.	-0.003	63.83	-1.815E+00	P
HF-181	482.00	184.	-20.	-0.003	100.97	-2.410E-01	
La-140	487.02	191.	-3.	0.000	503.63	-6.296E-02	P
RU-103	497.05	36.	1.	0.000	838.45	1.592E-02	P
RH-106	511.86	70.	122.	0.017	13.27	6.170E+00	
Kr-85	513.98	217.	-18.	-0.003	115.28	-4.220E+01	
Nd-147	531.00	28.	9.	0.001	129.10	6.978E-01	
Ba-140	537.26	38.	-2.	0.000	555.94	-9.580E-02	P
CS-134	563.24	33.	13.	0.002	94.97	2.089E+00	
CS-134	569.32	56.	-16.	-0.002	70.71	-1.401E+00	
BI-207	569.70	55.	15.	0.002	74.89	1.637E-01	
TL-208	583.02	54.	-2.	0.000	838.17	-2.515E-02	P
SB-125	600.50	304.	-18.	-0.003	135.35	-1.170E+00	
SB-124	602.73	286.	-19.	-0.003	79.69	-2.272E-01	P
CS-134	604.71	300.	-20.	-0.003	124.36	-2.584E-01	
RU-103	610.30	280.	-20.	-0.003	119.96	-4.026E+00	
AG-108M	614.28	282.	-20.	-0.003	120.17	-2.552E-01	
PM-144	618.06	302.	-20.	-0.003	124.04	-2.329E-01	
RH-106	621.92	240.	17.	0.002	130.68	2.273E+00	
SB-125	635.89	27.	6.	0.001	129.91	6.305E-01	P
I-131	636.97	45.	-9.	-0.001	107.14	-1.464E+00	
AG-110M	657.76	16.	34.	0.005	23.60	5.278E-01	
PM-144	696.54	98.	-16.	-0.002	88.14	-2.097E-01	
NB-94	702.63	112.	13.	0.002	116.88	1.851E-01	
SB-124	722.79	74.	-16.	-0.002	82.24	-2.179E+00	
ZR-95	724.20	53.	13.	0.002	86.37	3.699E-01	
BI-212	727.17	57.	3.	0.000	334.55	6.445E-01	
PM-146	735.72	30.	4.	0.001	335.47	2.138E-01	P
PM-146	747.16	30.	8.	0.001	154.62	3.126E-01	
ZR-95	756.73	41.	-8.	-0.001	150.14	-2.056E-01	P
AG-110M	763.94	60.	-18.	-0.002	73.25	-1.354E+00	P
PA-234M	766.41	74.	1.	0.000	817.86	1.020E+01	
EU-152	778.92	50.	4.	0.001	254.95	4.861E-01	
CS-134	795.87	64.	-5.	-0.001	223.63	-9.660E-02	
CO-58	810.78	62.	-10.	-0.001	115.76	-1.465E-01	
Cs-136	818.50	61.	10.	0.001	112.94	1.785E-01	
MN-54	834.85	53.	-21.	-0.003	49.86	-3.103E-01	P
Co-56	846.77	35.	-9.	-0.001	148.31	-1.515E-01	
TL-208	860.56	37.	-12.	-0.002	93.41	-1.295E+00	P
NB-94	871.10	25.	11.	0.002	104.38	1.809E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
AG-110M	884.68	135.	-6.	-0.001	278.93	-1.542E-01		
Sc-46	889.28	74.	10.	0.001	121.02	1.715E-01		
Y-88	898.04	30.	-10.	-0.001	107.51	-1.882E-01		P
AC-228	911.07	33.	3.	0.000	359.93	2.192E-01		P
AG-110M	937.49	30.	-6.	-0.001	204.80	-3.470E-01		
EU-152	964.11	18.	5.	0.001	126.74	6.876E-01		
AC-228	968.97	41.	4.	0.001	245.28	4.241E-01		P
Co-56	1037.84	11.	9.	0.001	90.70	1.345E+00		P
Cs-136	1048.07	24.	-7.	-0.001	105.95	-1.903E-01		
RH-106	1050.36	42.	-9.	-0.001	89.75	-1.205E+01		P
BI-207	1063.66	16.	7.	0.001	135.27	1.641E-01		
EU-152	1112.07	55.	-4.	-0.001	277.92	-6.074E-01		
Ta-182	1121.30	40.	10.	0.001	91.10	6.490E-01		
CO-60	1173.24	28.	-7.	-0.001	164.11	-1.350E-01		P
Ta-182	1189.05	5.	7.	0.001	87.75	7.540E-01		
Ta-182	1221.41	11.	7.	0.001	107.76	5.861E-01		
NA-22	1274.53	34.	-14.	-0.002	101.27	-3.411E-01		
FE-59	1291.60	11.	5.	0.001	175.40	2.177E-01		
CO-60	1332.50	19.	-3.	0.000	308.14	-7.631E-02		P
AG-110M	1384.30	17.	-3.	0.000	327.45	-3.218E-01		
EU-152	1408.00	6.	7.	0.001	87.07	8.836E-01		
K-40	1460.83	23.	5.	0.001	213.78	1.117E+00		
La-140	1596.21	13.	-4.	0.000	296.75	-1.020E-01		P
SB-124	1690.98	6.	1.	0.000	933.82	3.910E-02		P
Y-88	1836.06	18.	-6.	-0.001	175.59	-1.781E-01		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	-1.8151E+00	-1.8151E+00	6.383E+01%	5.64E+00
NA-22	#A	-3.4107E-01	-3.4107E-01	1.013E+02%	7.28E-01
K-40	#A	1.1168E+00	1.1168E+00	2.138E+02%	5.21E+00
Sc-46	#A	1.7147E-01	1.7148E-01	1.210E+02%	7.06E-01
CR-51	#A	1.3947E+00	1.3947E+00	1.476E+02%	6.89E+00
MN-54	#A	-3.1034E-01	-3.1034E-01	4.986E+01%	5.29E-01
FE-59	#A	9.1451E-02	9.1452E-02	1.754E+02%	8.10E-01
Co-56	#A	2.1570E-02	2.1571E-02	8.692E+01%	5.10E-01
CO-57	#A	-1.1785E-02	-1.1785E-02	1.767E+02%	3.26E-01
CO-58	#A	-1.4654E-01	-1.4654E-01	1.158E+02%	5.77E-01
CO-60	#A	-7.6313E-02	-7.6313E-02	3.081E+02%	5.22E-01
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.28E+00
NB-94	#A	1.8299E-01	1.8299E-01	7.835E+01%	7.31E-01
ZR-95	#A	5.2148E-02	5.2148E-02	8.637E+01%	8.04E-01
NB-95	#A	6.7844E-03	6.7845E-03	2.429E+03%	5.79E-01

RU-103 #A	1.5923E-02	1.5923E-02	8.384E+02%	3.32E-01
RH-106 #A	2.2734E+00	2.2734E+00	1.307E+02%	9.98E+00
AG-108M#A	1.5985E-02	1.5985E-02	8.099E+02%	3.20E-01
AG-110M#A	2.3613E-01	2.3613E-01	2.360E+01%	1.47E+00
SN-113 #A	1.5341E-01	1.5341E-01	1.263E+02%	6.51E-01
SB-124 #A	-2.2717E-01	-2.2717E-01	7.969E+01%	9.98E-01
SB-125 #A	3.0331E-01	3.0331E-01	8.619E+01%	1.08E+00
I-131 #A	6.8472E-02	6.8477E-02	1.032E+02%	4.00E-01
Gd-153 #A	-3.5888E-01	-3.5888E-01	1.345E+02%	1.61E+00
Ga-68 #A	-3.0949E-01	-3.1358E-01	3.154E+03%	2.28E+01
Tc-99m #A	4.7736E-02	4.7853E-02	3.589E+02%	5.77E-01
BA-133 #A	7.1748E-02	7.1748E-02	2.976E+02%	7.31E-01
CS-134 #A	8.5997E-02	8.5997E-02	9.497E+01%	7.49E-01
CS-137 #A	4.7274E-03	4.7274E-03	2.965E+03%	4.99E-01
CE-139 #A	-1.4786E-02	-1.4786E-02	8.185E+02%	4.12E-01
Ba-140 #A	1.1407E-01	1.1408E-01	1.669E+02%	1.34E+00
La-140 #A	3.5123E-02	3.5125E-02	1.340E+02%	5.49E-01
CE-141 #A	1.8974E-01	1.8975E-01	1.150E+02%	7.29E-01
CE-144 #A	9.2099E-02	9.2099E-02	1.267E+03%	3.93E+00
PM-144 #A	-2.0969E-01	-2.0969E-01	8.814E+01%	6.19E-01
EU-152 #A	3.0080E-02	3.0080E-02	6.692E+01%	1.16E+00
EU-154 A	5.5825E-01	5.5825E-01	6.679E+01%	8.05E-01
EU-155 #A	8.0067E-02	8.0068E-02	1.216E+02%	1.50E+00
HF-181 #A	-2.4098E-01	-2.4099E-01	1.010E+02%	8.15E-01
Ta-182 #A	6.5235E-01	6.5235E-01	5.539E+01%	2.00E+00
Hg-203 #A	4.5012E-02	4.5013E-02	3.342E+02%	5.12E-01
TL-208 #A	1.0736E-01	1.0736E-01	1.129E+02%	5.34E-01
PM-146 #A	2.1094E-01	2.1094E-01	1.101E+02%	4.17E-01
Y-88 #A	-1.7808E-01	-1.7808E-01	1.756E+02%	6.67E-01
Cd-113m#A	-2.3812E+03	-2.3812E+03	6.652E+01%	5.24E+03
Cd-109 #A	-7.2996E-07	-7.2996E-07	5.743E+08%	1.41E+01
Cf-251 #A	1.5202E-01	1.5202E-01	3.991E+02%	1.51E+00
Cf-249 #A	2.3990E-01	2.3990E-01	1.183E+02%	6.62E-01
Sn-126 #A	1.0379E+00	1.0379E+00	1.044E+02%	3.61E+00
PB-210 #A	-1.1604E+01	-1.1604E+01	2.595E+01%	1.15E+01
PB-212 #A	-2.9992E-01	-2.9992E-01	1.048E+02%	1.12E+00
PB-214 #A	4.0468E-01	4.0468E-01	9.523E+01%	1.09E+00
BI-207 #A	1.6390E-01	1.6390E-01	7.489E+01%	5.01E-01
BI-212 #A	6.4454E-01	6.4454E-01	3.346E+02%	7.55E+00
U-235 #A	1.0663E+00	1.0663E+00	1.021E+02%	3.67E+00
BI-214 #	1.0346E+00	1.0346E+00	3.502E+01%	8.93E-01
BI-210M#A	2.1699E-01	2.1699E-01	9.747E+01%	7.09E-01
AC-228 #A	4.1606E-01	4.1606E-01	1.552E+02%	1.85E+00
TH-227 #A	8.6306E-01	8.6306E-01	9.660E+01%	3.71E+00
TH-229 #A	2.3153E+00	2.3153E+00	9.411E+01%	5.34E+00
TH-234 #A	-1.0297E+01	-1.0297E+01	5.651E+01%	1.94E+01
PA-231 #A	0.0000E+00	0.0000E+00	7.071E+02%	4.02E+01
PA-233 #A	0.0000E+00	0.0000E+00	7.071E+02%	1.92E+00
PA-234 #A	8.3175E-01	8.3175E-01	3.200E+01%	2.45E+00

PA-234M#A	3.6415E+00	3.6415E+00	8.179E+02%	1.06E+02
AM-241 #A	3.5040E-01	3.5040E-01	8.045E+01%	9.36E-01
Np-237 #A	7.1803E-01	7.1803E-01	1.600E+02%	3.83E+00
Ir-192 #A	0.0000E+00	0.0000E+00	7.071E+02%	9.70E-01
Cs-136 #A	2.1912E-01	2.1913E-01	8.899E+01%	6.86E-01
Np-239 #A	3.3412E-01	3.3421E-01	1.431E+02%	1.60E+00
Nd-147 #A	6.9775E-01	6.9779E-01	1.291E+02%	2.12E+00
TL-210 #A	4.1959E-02	4.1959E-02	2.591E+02%	5.87E-01
Kr-85 #A	-4.2204E+01	-4.2204E+01	1.153E+02%	1.63E+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 1999.6 keV) 1.035E+00 Bq/Sample
Total Decayed Activity (37.6 to 1999.6 keV) 1.0345752E+00 Bq/Sample

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486234_Gamma_180-111757-B-2-A. 15_Gamma_20201169.spc.

Test America St. Louis Spectrum ID: 18_Gamma_20200322

Sample Description: 486234_Gamma_180-111757-B-2-B DU
Detector: Detector #18
Batch ID: 486234
Work Order Number: Gamma
Lot Number: 180-111757-B-2-B DU

Decay to Time: 11/12/2020 20:57 Live Time: 7200 sec
Acquisition Time: 11/12/2020 20:57:57 Real Time: 7207 sec
Analysis Time: 11/12/2020 22:58 Dead Time: 0.09 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 18_TCC-1L Marn.Clb
Efficiency Cal Desc: 18_TCC-1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 12:27
Energy Cal Date: 4/29/2020 11:57
Library: Client_Long_Rev15.lib
Bkgd Correction File: 18_2020-11-07_1446.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	-6.344E-02	1936.5	1.229E+00	1.229E+00	4.215E+00
NA-22	-3.051E-01	54.2	1.652E-01	1.662E-01	5.362E-01
K-40	-1.751E+00	104.0	1.821E+00	1.824E+00	4.885E+00
Sc-46	3.721E-02	405.1	1.507E-01	1.507E-01	5.227E-01
CR-51	-8.010E-01	121.5	9.729E-01	9.740E-01	3.273E+00
MN-54	8.846E-02	158.0	1.398E-01	1.399E-01	3.163E-01
FE-59	3.034E-01	44.9	1.362E-01	1.374E-01	4.087E-01
Co-56	-3.237E-01	51.0	1.652E-01	1.663E-01	5.242E-01
CO-57	1.081E-01	89.0	9.624E-02	9.645E-02	2.509E-01
CO-58	-1.629E-01	81.1	1.321E-01	1.324E-01	4.415E-01
CO-60	-2.615E-01	94.2	2.464E-01	2.469E-01	5.143E-01
ZN-65	-2.010E-01	187.4	3.767E-01	3.769E-01	1.285E+00
NB-94	-2.357E-01	27.0	6.363E-02	6.512E-02	6.533E-01
ZR-95	1.907E-01	111.0	2.117E-01	2.120E-01	4.937E-01
NB-95	0.000E+00	1.#INF	5.559E-02	5.559E-02	4.145E-01
RU-103	-1.101E-01	135.0	1.486E-01	1.487E-01	3.325E-01
RH-106	1.139E+00	209.0	2.381E+00	2.382E+00	7.847E+00
AG-108M	-4.535E-02	287.7	1.305E-01	1.305E-01	3.136E-01
AG-110M	2.968E-01	59.9	1.778E-01	1.786E-01	6.075E-01
SN-113	-1.682E-01	99.6	1.675E-01	1.678E-01	7.406E-01
SB-124	1.269E-01	139.2	1.766E-01	1.768E-01	6.938E-01
SB-125	1.854E-01	86.3	1.599E-01	1.603E-01	9.697E-01
I-131	4.699E-02	240.3	1.129E-01	1.130E-01	2.836E-01
Gd-153	0.000E+00	1.#INF	1.711E-01	1.711E-01	1.719E+00
Ga-68	-5.630E+00	178.1	1.003E+01	1.003E+01	2.189E+01
Tc-99m	0.000E+00	1.#INF	5.755E-02	5.756E-02	5.025E-01
BA-133	-1.860E-01	102.8	1.912E-01	1.915E-01	6.401E-01
CS-134	3.071E-01	60.4	1.855E-01	1.864E-01	4.796E-01
CS-137	1.321E-01	98.5	1.302E-01	1.304E-01	4.354E-01
CE-139	-6.695E-03	1318.0	8.824E-02	8.824E-02	3.279E-01
Ba-140	1.926E-02	220.5	4.246E-02	4.248E-02	1.145E+00
La-140	4.318E-02	128.8	5.562E-02	5.568E-02	4.476E-01
CE-141	-1.951E-01	144.7	2.823E-01	2.825E-01	9.396E-01

CE-144	6.732E-01	147.8	9.950E-01	9.957E-01	3.319E+00
PM-144	-1.776E-01	77.8	1.382E-01	1.386E-01	4.601E-01
EU-152	7.184E-02	116.9	8.401E-02	8.412E-02	1.021E+00
EU-154	4.693E-03	85.5	4.012E-03	4.022E-03	6.647E-01
EU-155	6.306E-02	355.2	2.240E-01	2.241E-01	2.314E+00
HF-181	1.352E-01	145.3	1.964E-01	1.965E-01	5.826E-01
Ta-182	-9.044E-01	83.9	7.588E-01	7.607E-01	2.530E+00
Hg-203	1.242E-01	86.3	1.072E-01	1.075E-01	3.576E-01
TL-208	1.362E-01	116.8	1.590E-01	1.592E-01	3.839E-01
PM-146	1.995E-01	76.7	1.530E-01	1.534E-01	3.687E-01
Y-88	3.169E-02	95.6	3.028E-02	3.034E-02	3.857E-01
Cd-113m	-1.807E+03	70.8	1.280E+03	1.285E+03	4.241E+03
Cd-109	0.000E+00	1.#INF	1.142E+00	1.142E+00	1.317E+01
Cf-251	-7.619E-02	641.5	4.888E-01	4.888E-01	1.265E+00
Cf-249	-3.014E-02	83.6	2.521E-02	2.527E-02	6.695E-01
Sn-126	-3.750E-01	280.3	1.051E+00	1.051E+00	3.527E+00
PB-210	1.682E+00	139.6	2.348E+00	2.350E+00	6.597E+00
PB-212	-1.495E-01	178.5	2.667E-01	2.669E-01	9.041E-01
PB-214	4.511E-01	57.4	2.590E-01	2.604E-01	7.915E-01
BI-207	-8.903E-02	208.2	1.854E-01	1.854E-01	4.963E-01
BI-212	-8.505E-01	222.2	1.890E+00	1.891E+00	6.499E+00
U-235	-3.038E-01	165.7	5.034E-01	5.037E-01	4.380E+00
BI-214	5.837E-01	45.7	2.670E-01	2.692E-01	6.591E-01
BI-210M	1.667E-01	92.6	1.544E-01	1.547E-01	5.129E-01
AC-228	1.751E-01	135.3	2.370E-01	2.372E-01	1.376E+00
TH-227	-1.895E+00	92.4	1.751E+00	1.755E+00	3.950E+00
TH-229	-2.172E-01	84.3	1.832E-01	1.836E-01	5.181E+00
TH-234	3.850E+00	82.8	3.186E+00	3.194E+00	8.506E+00
PA-231	0.000E+00	1.#INF	3.161E+00	3.161E+00	3.290E+01
PA-233	-1.594E-02	2967.0	4.729E-01	4.729E-01	1.571E+00
PA-234	9.195E-01	62.9	5.784E-01	5.810E-01	1.964E+00
PA-234M	1.474E-01	14852.2	2.190E+01	2.190E+01	7.352E+01
AM-241	1.033E-01	291.1	3.006E-01	3.007E-01	1.009E+00
Np-237	6.086E-01	176.6	1.075E+00	1.075E+00	3.578E+00
Ir-192	1.388E-01	120.8	1.677E-01	1.679E-01	7.106E-01
Cs-136	-8.181E-02	240.1	1.965E-01	1.965E-01	4.446E-01
Np-239	-5.216E-01	169.2	8.827E-01	8.833E-01	2.934E+00
Nd-147	-6.689E-01	140.7	9.413E-01	9.423E-01	2.252E+00
TL-210	-2.401E-01	73.8	1.771E-01	1.778E-01	5.877E-01
Kr-85	-2.030E+01	193.1	3.920E+01	3.922E+01	1.321E+02
Total	1.329E+01				

Analyst: Cassie Park

Sample description
486234_Gamma_180-111757-B-2-B DU

Spectrum Filename: C:\User\SPC\Det18\18_Gamma_20200322.An1

Acquisition information

Start time:	11/12/2020 8:57:57 PM
Live time:	7200
Real time:	7207
Dead time:	0.09 %
Detector ID:	18

Detector system
Ge18 SN/11164036

Calibration

Filename:	18_TCC-1L Marn.Clb

18_TCC-1L Marn_1893022-115244

Energy Calibration

Created:	4/29/2020 11:57:11 AM
Zero offset:	0.093 keV
Gain:	0.250 keV/channel
Quadratic:	-2.879E-08 keV/channel^2

Efficiency Calibration

Created:	5/6/2020 12:27:45 PM
Type:	TCC Polynomial
Coefficients:	-0.479130 -4.387026 -0.707377
	7.231555 0.000000 0.000000

Library Files

Main analysis library:	Client_Long_Rev15.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.62keV)
Stop channel:	8000 (1999.62keV)
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

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Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	11/12/2020 8:57:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	18_2020-11-07_1446.PBC 11/7/2020 2:46:13 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1131

***** 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
46.44	20.	139.56	1.05	4.026E-02	46.54	4.050	PBC<MDA	PB210
59.70	12.	291.11	1.01	4.631E-02	59.54	35.683	PBC<MDA	AM241
63.45	-67.	54.20	1.01	4.752E-02	63.29	3.100	PBC<MDA	TH234
80.99	28.	101.94	1.03	5.084E-02	80.99	29.460	PBC<MDA	BA133
86.54	15.	355.22	1.03	5.126E-02				
87.52	29.	176.58	1.03	5.126E-02	86.49	13.100	PBC<MDA	Np237
					87.57	37.500	2.124E-01	Sn126
92.32	162.	17.93	1.07	5.146E-02	92.59	2.692	PBC<MDA	TH234
					93.35	5.561	7.876E+00	AC228
122.06	26.	88.99	1.07	4.999E-02	121.78	23.590	3.060E-01	EU152
					122.06	85.341	8.464E-02	CO57
130.20	26.	142.82	1.08	4.901E-02	131.29	18.000	PBC<MDA	PA234
133.02	26.	145.25	1.08	4.881E-02	133.02	30.333	PBC<MDA	HF181
					133.54	11.102	6.729E-01	CE144
133.54	26.	147.79	1.08	4.875E-02	133.02	30.333	PBC<MDA	HF181
					133.54	11.102	6.732E-01	CE144
136.30	26.	149.99	1.08	4.841E-02	136.30	4.724	PBC<MDA	HF181
					136.47	10.832	6.967E-01	CO57
136.47	11.	360.55	1.08	4.839E-02	136.30	4.724	PBC<MDA	HF181
					136.47	10.832	2.933E-01	CO57
143.79	-20.	165.71	1.09	4.747E-02	143.79	9.107	PBC<MDA	U235
162.66	11.	220.53	1.11	4.489E-02	162.66	5.749	PBC<MDA	Ba140
163.38	6.	379.68	1.11	4.478E-02	163.38	4.665	PBC<MDA	U235
181.57	19.	50.17	0.45	4.218E-02				
185.72	31.	80.11	1.13	4.158E-02	185.72	47.818	PBC<MDA	U235
212.30	18.	129.08	1.15	3.809E-02	210.85	2.990	PBC<MDA	TH229
235.97	24.	113.44	1.17	3.514E-02	235.97	12.300	PBC<MDA	TH227
238.63	-16.	178.47	1.18	3.485E-02	238.63	43.041	PBC<MDA	PB212

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
242.00	-12.	244.02	1.18	3.450E-02	242.00	7.376	PBC<MDA	PB214
265.83	19.	92.59	1.20	3.223E-02	265.83	50.000	PBC<MDA	BI210M
279.50	23.	86.33	1.21	3.110E-02	279.20	81.500	PBC<MDA	Hg203
295.09	-8.	409.09	1.23	2.988E-02	295.09	19.252	PBC<MDA	PB214
310.44	16.	51.94	0.72	2.879E-02				
316.49	22.	139.73	1.24	2.839E-02	316.49	69.606	PBC<MDA	Ir192
328.76	20.	128.82	1.26	2.761E-02	328.76	15.959	PBC<MDA	La140
333.44	21.	132.13	1.26	2.733E-02	333.44	15.510	PBC<MDA	Cf249
338.32	21.	135.32	1.26	2.704E-02	338.32	12.084	PBC<MDA	AC228
351.93	32.	57.42	1.28	2.628E-02	351.93	37.068	PBC<MDA	PB214
364.48	7.	240.32	1.29	2.561E-02	364.48	81.074	PBC<MDA	I131
453.88	17.	92.83	1.36	2.184E-02	453.88	65.000	PBC<MDA	PM146
463.37	14.	86.26	1.37	2.152E-02	463.37	10.576	PBC<MDA	SB125
468.06	7.	197.01	1.38	2.136E-02	468.06	40.290	PBC<MDA	Ir192
487.02	5.	307.90	1.39	2.076E-02	487.02	38.450	PBC<MDA	La140
511.86	178.	10.86	2.66	2.002E-02	511.86	19.301	6.397E+00	RH106
563.24	16.	87.61	1.46	1.869E-02	563.24	6.504	PBC<MDA	CS134
569.32	11.	111.84	1.46	1.855E-02	569.32	11.703	PBC<MDA	CS134
					569.47	8.200	1.035E+00	PA234
					569.70	97.740	PBC<MDA	BI207
569.70	-2.	644.40	1.46	1.854E-02	569.32	11.703	PBC<MDA	CS134
					569.47	8.200	PBC<MDA	PA234
					569.70	97.740	PBC<MDA	BI207
583.02	13.	116.76	1.47	1.824E-02	583.02	73.813	PBC<MDA	TL208
600.50	10.	229.09	1.49	1.786E-02	600.50	17.714	PBC<MDA	SB125
602.73	17.	139.20	1.49	1.781E-02	602.73	90.171	PBC<MDA	SB124
604.71	10.	240.37	1.49	1.777E-02	604.71	85.014	PBC<MDA	CS134
609.11	30.	45.74	0.80	1.767E-02	609.31	40.483	PBC<MDA	BI214
621.92	8.	324.82	1.50	1.741E-02	621.92	8.430	PBC<MDA	RH106
635.89	2.	529.15	1.52	1.714E-02	635.89	11.254	PBC<MDA	SB125
661.66	14.	98.53	1.54	1.666E-02	661.66	85.235	PBC<MDA	CS137
747.16	10.	122.04	1.60	1.528E-02	747.16	34.000	PBC<MDA	PM146
756.73	11.	111.03	1.61	1.515E-02	756.73	54.500	PBC<MDA	ZR95
795.87	14.	78.36	1.64	1.462E-02	795.87	72.594	PBC<MDA	CS134
801.95	15.	84.33	1.65	1.454E-02	801.95	6.759	PBC<MDA	CS134
834.85	9.	158.05	1.67	1.413E-02	834.85	100.000	PBC<MDA	MN54
873.23	8.	154.59	1.70	1.369E-02	873.23	9.440	PBC<MDA	EU154
883.21	17.	88.92	1.71	1.358E-02	883.24	9.600	PBC<MDA	PA234
884.68	12.	82.69	1.71	1.356E-02	884.68	55.678	PBC<MDA	AG110M
889.28	3.	405.12	1.71	1.351E-02	889.28	90.651	PBC<MDA	Sc46
898.04	11.	95.56	1.72	1.342E-02	898.04	83.439	PBC<MDA	Y88
946.08	12.	85.52	1.75	1.294E-02	946.02	13.400	PBC<MDA	PA234
964.11	6.	172.35	1.77	1.276E-02	964.11	11.736	PBC<MDA	EU152
1050.36	4.	263.17	1.83	1.201E-02	1050.36	1.316	PBC<MDA	RH106
1099.25	8.	108.74	1.86	1.163E-02	1099.25	55.605	PBC<MDA	FE59
1119.28	-13.	85.69	1.88	1.148E-02	1120.29	13.249	PBC<MDA	BI214
1173.24	6.	202.40	1.91	1.110E-02	1173.24	89.708	PBC<MDA	CO60
1238.28	10.	88.08	1.96	1.068E-02	1238.28	51.615	PBC<MDA	Co56

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
1291.60	16.	44.90	1.99	1.037E-02	1291.60	43.593	4.832E-01	FE59
1384.30	7.	86.69	2.05	9.861E-03	1384.30	19.204	PBC<MDA	AG110M
1408.00	6.	98.67	2.07	9.740E-03	1408.00	17.314	PBC<MDA	EU152
1461.12	-13.	104.00	2.10	9.482E-03	1460.83	10.700	PBC<MDA	K40
1690.98	2.	424.26	2.23	8.509E-03	1690.98	41.032	PBC<MDA	SB124
1771.35	9.	83.89	2.28	8.216E-03	1771.35	12.235	PBC<MDA	Co56

********** 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
725.49	181.57	34.	19.	4.544E+02	50.17	0.452	- s
1240.71	310.44	23.	16.	5.441E+02	51.94	0.716	- sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: Client_Long_Rev15.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	185.28	46.44	257.	20.	0.003	139.56	1.049s
TH-227	200.06	50.14	567.	-29.	-0.004	118.15	1.000s
AM-241	237.62	59.54	634.	12.	0.002	291.11	1.009s
TH-234	252.61	63.29	669.	-67.	-0.009	54.20	1.013
Sn-126	256.58	64.28	610.	-13.	-0.002	280.28	1.014s
BA-133	323.38	80.99	224.	28.	0.004	101.94	1.029s
Np-237	345.37	86.49	1335.	29.	0.004	176.58	1.035
EU-155	345.58	86.54	1364.	15.	0.002	355.22	1.035
Sn-126	347.16	86.94	1379.	0.	0.000	1000.00	1.035
Sn-126	349.68	87.57	1379.	0.	0.000	1000.00	1.036
Cd-109	351.56	88.04	1379.	0.	0.000	1000.00	1.036
Nd-147	363.79	91.10	1379.	0.	0.000	1000.00	1.039s
TH-234	368.68	92.32	311.	38.	0.005	82.76	1.067s
AC-228	372.79	93.35	1379.	0.	0.000	1000.00	1.041s
Gd-153	389.38	97.50	1379.	0.	0.000	1000.00	1.045s
Np-239	397.37	99.50	1379.	0.	0.000	1000.00	1.047s
Gd-153	412.17	103.20	1379.	0.	0.000	1000.00	1.050s
Np-239	414.16	103.70	1379.	0.	0.000	1000.00	1.051s
Np-239	423.88	106.13	1822.	-36.	-0.005	169.23	1.053s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	486.44	121.78	325.	-16.	-0.002	158.12	1.068s
CO-57	487.57	122.06	255.	26.	0.004	88.99	1.068s
EU-154	491.72	123.10	318.	-30.	-0.004	85.49	1.069s
PA-234	524.48	131.29	686.	26.	0.004	142.82	1.076s
HF-181	531.39	133.02	712.	26.	0.004	145.25	1.078s
CE-144	533.45	133.54	738.	26.	0.004	147.79	1.079s
HF-181	544.49	136.30	765.	26.	0.004	149.99	1.081s
CO-57	545.18	136.47	791.	11.	0.002	360.55	1.081s
Tc-99m	561.32	140.51	802.	0.	0.000	1000.00	1.085s
U-235	574.42	143.79	822.	-20.	-0.003	165.71	1.088s
CE-141	581.03	145.44	1064.	-32.	-0.004	144.66	1.090s
Ba-140	649.87	162.66	307.	11.	0.002	220.53	1.106
U-235	652.75	163.38	219.	6.	0.001	379.68	1.106s
Cf-251	705.60	176.60	187.	-4.	-0.001	641.53	1.119s
U-235	742.06	185.72	288.	31.	0.004	80.11	1.127
TH-229	773.20	193.51	187.	-24.	-0.003	108.53	1.134s
U-235	820.48	205.33	144.	-5.	-0.001	472.02	1.145s
TH-229	842.53	210.85	139.	18.	0.003	129.08	1.150s
TH-227	942.97	235.97	351.	24.	0.003	113.44	1.173s
PB-212	953.61	238.63	415.	-16.	-0.002	178.47	1.175s
PB-214	967.06	242.00	416.	-12.	-0.002	244.02	1.178s
EU-152	977.84	244.69	436.	-26.	-0.004	116.97	1.181
TH-227	1024.01	256.24	184.	-32.	-0.004	92.43	1.191s
Cd-113m	1053.84	263.70	148.	-25.	-0.004	70.81	1.198s
BI-210M	1062.36	265.83	149.	19.	0.003	92.59	1.199s
TL-208	1108.14	277.28	152.	-29.	-0.004	63.32	1.210s
Hg-203	1115.81	279.20	180.	23.	0.003	86.33	1.212s
I-131	1136.20	284.30	121.	-15.	-0.002	125.75	1.216s
PB-214	1179.34	295.09	598.	-8.	-0.001	409.09	1.226s
TL-210	1182.98	296.00	590.	0.	0.000	1000.00	1.227s
PB-212	1199.09	300.03	590.	0.	0.000	1000.00	1.230s
PA-231	1199.25	300.07	590.	0.	0.000	1000.00	1.230s
PA-233	1199.69	300.18	590.	0.	0.000	1000.00	1.230
PA-231	1209.57	302.65	590.	0.	0.000	1000.00	1.233s
BA-133	1210.37	302.85	590.	0.	0.000	1000.00	1.233s
Ba-140	1218.36	304.85	590.	0.	0.000	1000.00	1.234
BI-210M	1218.55	304.90	590.	0.	0.000	1000.00	1.234
Ir-192	1232.72	308.44	590.	0.	0.000	1000.00	1.238s
Ir-192	1264.91	316.49	446.	22.	0.003	139.73	1.245s
CR-51	1279.28	320.08	180.	-16.	-0.002	121.46	1.248s
La-140	1313.97	328.76	337.	20.	0.003	128.82	1.256s
Cf-249	1332.68	333.44	358.	21.	0.003	132.13	1.260s
AC-228	1352.19	338.32	378.	21.	0.003	135.32	1.264s
Cs-136	1361.19	340.57	403.	-14.	-0.002	207.87	1.266s
EU-152	1376.05	344.29	389.	0.	0.000	1000.00	1.269s
PB-214	1406.62	351.93	128.	32.	0.004	57.42	1.276
BA-133	1422.89	356.00	209.	-20.	-0.003	102.82	1.280s
I-131	1456.81	364.48	72.	7.	0.001	240.32	1.287s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BA-133	1534.21	383.84	239.	-24.	-0.003	77.98	1.304s
Cf-249	1550.64	387.95	260.	-23.	-0.003	102.57	1.307s
SN-113	1565.60	391.69	299.	-19.	-0.003	99.59	1.311s
SB-125	1710.30	427.88	88.	-9.	-0.001	210.12	1.342s
AG-108M	1734.54	433.94	87.	-7.	-0.001	287.66	1.347s
PM-146	1814.29	453.88	56.	17.	0.002	92.83	1.364s
SB-125	1852.22	463.37	69.	14.	0.002	86.26	1.372s
Ir-192	1870.99	468.06	97.	7.	0.001	197.01	1.376s
HF-181	1926.73	482.00	188.	0.	0.000	1000.00	1.388s
La-140	1946.81	487.02	116.	5.	0.001	307.90	1.392s
RU-103	1986.94	497.05	76.	-14.	-0.002	134.95	1.401s
RH-106	2046.17	511.86	98.	178.	0.025	10.86	2.663
Kr-85	2054.63	513.98	293.	-13.	-0.002	193.06	1.415
Nd-147	2122.70	531.00	69.	-12.	-0.002	140.72	1.429s
Ba-140	2147.73	537.26	59.	-4.	-0.001	483.18	1.434s
CS-134	2251.62	563.24	43.	16.	0.002	87.61	1.456
CS-134	2275.95	569.32	75.	11.	0.002	111.84	1.461s
PA-234	2276.55	569.47	86.	0.	0.000	1000.00	1.461
BI-207	2277.48	569.70	64.	-2.	0.000	644.40	1.461s
TL-208	2330.75	583.02	55.	13.	0.002	116.76	1.472s
SB-125	2400.65	600.50	232.	10.	0.001	229.09	1.487s
SB-124	2409.57	602.73	277.	17.	0.002	139.20	1.488s
CS-134	2417.49	604.71	294.	10.	0.001	240.37	1.490s
BI-214	2435.07	609.11	45.	30.	0.004	45.74	0.799s
RU-103	2439.84	610.30	304.	0.	0.000	1000.00	1.494s
AG-108M	2455.77	614.28	304.	0.	0.000	1000.00	1.498s
PM-144	2470.89	618.06	286.	-9.	-0.001	277.88	1.501s
RH-106	2486.31	621.92	296.	8.	0.001	324.82	1.504s
SB-125	2542.19	635.89	55.	2.	0.000	529.15	1.515s
I-131	2546.53	636.97	74.	-14.	-0.002	87.64	1.516s
AG-110M	2629.67	657.76	82.	-16.	-0.002	86.68	1.533
CS-137	2645.26	661.66	80.	14.	0.002	98.53	1.536s
PM-144	2784.79	696.54	115.	-20.	-0.003	77.78	1.564
NB-94	2809.13	702.63	185.	-24.	-0.003	26.99	1.569s
SB-124	2889.76	722.79	78.	-8.	-0.001	154.14	1.585s
AG-108M	2890.36	722.94	87.	0.	0.000	1000.00	1.585s
EU-154	2892.05	723.36	87.	0.	0.000	1000.00	1.585s
ZR-95	2895.41	724.20	87.	0.	0.000	1000.00	1.586s
BI-212	2907.29	727.17	91.	-6.	-0.001	222.25	1.588s
PM-146	2941.49	735.72	42.	-1.	0.000	525.26	1.595s
PM-146	2987.25	747.16	30.	10.	0.001	122.04	1.604s
ZR-95	3025.53	756.73	33.	11.	0.002	111.03	1.611s
AG-110M	3054.39	763.94	70.	-12.	-0.002	105.33	1.617
NB-95	3061.77	765.79	81.	0.	0.000	1000.00	1.618
PA-234M	3064.26	766.41	85.	-5.	-0.001	264.40	1.619
EU-152	3114.29	778.92	55.	-19.	-0.003	89.85	1.628s
CS-134	3182.10	795.87	53.	14.	0.002	78.36	1.641s
TL-210	3197.02	799.60	156.	-25.	-0.003	73.77	1.644s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CS-134	3206.42	801.95	74.	15.	0.002	84.33	1.646s
CO-58	3241.72	810.78	79.	-16.	-0.002	81.06	1.653s
Cs-136	3272.62	818.50	50.	-7.	-0.001	240.13	1.659s
MN-54	3338.02	834.85	40.	9.	0.001	158.05	1.671s
Co-56	3385.71	846.77	80.	-27.	-0.004	51.03	1.680s
TL-208	3440.89	860.56	56.	-13.	-0.002	110.82	1.691s
NB-94	3483.03	871.10	77.	-15.	-0.002	86.67	1.699s
EU-154	3491.56	873.23	81.	8.	0.001	154.59	1.700s
PA-234	3520.77	880.53	108.	-18.	-0.002	86.03	1.706s
PA-234	3531.61	883.24	103.	17.	0.002	88.92	1.708s
AG-110M	3537.38	884.68	42.	12.	0.002	82.69	1.709s
Sc-46	3555.77	889.28	87.	3.	0.000	405.12	1.712s
Y-88	3590.82	898.04	21.	11.	0.002	95.56	1.719s
AC-228	3642.94	911.07	40.	-4.	-0.001	351.19	1.728s
PA-234	3782.77	946.02	20.	12.	0.002	85.52	1.754s
EU-152	3855.14	964.11	60.	6.	0.001	172.35	1.767s
AC-228	3874.59	968.97	73.	-7.	-0.001	172.88	1.771s
EU-154	4017.84	1004.77	50.	-11.	-0.002	151.20	1.797
Co-56	4150.13	1037.84	48.	-13.	-0.002	124.27	1.821s
Cs-136	4191.06	1048.07	53.	-14.	-0.002	76.74	1.828s
RH-106	4200.23	1050.36	63.	4.	0.001	263.17	1.829s
BI-207	4253.44	1063.66	39.	-6.	-0.001	208.20	1.839s
Ga-68	4308.42	1077.40	48.	-9.	-0.001	178.12	1.848s
FE-59	4395.85	1099.25	12.	8.	0.001	108.74	1.864s
EU-152	4447.16	1112.07	102.	-20.	-0.003	76.53	1.873s
ZN-65	4461.05	1115.55	122.	-8.	-0.001	187.41	1.875s
BI-214	4480.02	1120.29	143.	-13.	-0.002	85.69	1.878s
Sc-46	4481.08	1120.55	130.	0.	0.000	1000.00	1.878s
Ta-182	4484.08	1121.30	154.	-22.	-0.003	83.90	1.879s
CO-60	4691.90	1173.24	28.	6.	0.001	202.40	1.915s
Ta-182	4755.18	1189.05	32.	-15.	-0.002	89.53	1.925s
Ta-182	4884.68	1221.41	32.	-7.	-0.001	187.54	1.947s
Co-56	4952.19	1238.28	11.	10.	0.001	88.08	1.958
NA-22	5097.25	1274.53	40.	-18.	-0.003	54.16	1.982s
EU-154	5097.29	1274.54	58.	-1.	0.000	758.61	1.982s
FE-59	5165.55	1291.60	6.	16.	0.002	44.90	1.993s
TL-210	5251.21	1313.00	34.	-7.	-0.001	198.98	2.007s
CO-60	5329.26	1332.50	45.	-17.	-0.002	94.21	2.019s
AG-110M	5536.56	1384.30	6.	7.	0.001	86.69	2.052s
EU-152	5631.43	1408.00	6.	6.	0.001	98.67	2.067s
K-40	5842.89	1460.83	50.	-13.	-0.002	104.00	2.100s
La-140	6384.79	1596.21	20.	-5.	-0.001	273.66	2.180s
SB-124	6764.20	1690.98	12.	2.	0.000	424.26	2.233s
BI-214	7058.50	1764.49	44.	-15.	-0.002	45.77	2.273s
Co-56	7085.96	1771.35	24.	9.	0.001	83.89	2.277s
Y-88	7345.06	1836.06	13.	-3.	0.000	199.62	2.311s

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	R	-6.3441E-02				5.31E+01	
			477.60	-6.344E-02	%(	4.215E+00 1.94E+03 1.04E+01	G
NA-22	R	-3.0507E-01				9.50E+02	
			1274.53	-3.051E-01	?(	5.362E-01 5.42E+01 7.93E+01	G
K-40	N	-1.7510E+00				4.66E+11	
			1460.83	-1.751E+00	?(P	4.885E+00 1.04E+02 1.07E+01	G
Sc-46	R	3.7205E-02				8.38E+01	
			889.28	3.721E-02	&(	5.227E-01 4.05E+02 9.07E+01	G
			1120.55	0.000E+00	-	7.650E-01 1.00E+03 8.84E+01	G
CR-51	R	-8.0097E-01				2.77E+01	
			320.08	-8.010E-01	?(	3.273E+00 1.21E+02 9.83E+00	G
MN-54	C	8.8464E-02				3.12E+02	
			834.85	8.846E-02	&(	3.163E-01 1.58E+02 1.00E+02	G
FE-59	R	3.0343E-01				4.45E+01	
			1099.25	1.625E-01	?(P	4.087E-01 1.09E+02 5.56E+01	G
			1291.60	4.832E-01	?(P	4.422E-01 4.49E+01 4.36E+01	G
Co-56	R	-3.2372E-01				7.73E+01	
			846.77	-3.237E-01	?(P	5.242E-01 5.10E+01 8.40E+01	G
			1238.28	2.426E-01	&	4.633E-01 8.81E+01 5.16E+01	G
			1037.84	-1.380E+00	+	3.715E+00 1.24E+02 1.08E+01	G
			1771.35	1.243E+00	+	3.528E+00 8.39E+01 1.22E+01	A
CO-57	R	1.0814E-01				2.72E+02	
			122.06	8.464E-02	&(	2.509E-01 8.90E+01 8.53E+01	G
			136.47	2.933E-01	?(	3.544E+00 3.61E+02 1.08E+01	G
CO-58	R	-1.6294E-01				7.09E+01	
			810.78	-1.629E-01	?(	4.415E-01 8.11E+01 9.60E+01	G
CO-60	R	-2.6154E-01				1.93E+03	
			1332.50	-2.615E-01	?(	5.143E-01 9.42E+01 9.08E+01	G
			1173.24	8.384E-02	& P	3.815E-01 2.02E+02 8.97E+01	G

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Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
ZN-65	F -2.0103E-01					2.44E+02	
		1115.55	-2.010E-01	?(	1.285E+00	1.87E+02	5.08E+01 G
NB-94	R -2.3572E-01					7.41E+06	
		702.63	-2.357E-01	?(P	6.533E-01	2.70E+01	8.80E+01 G
		871.10	-1.706E-01	+	4.959E-01	8.67E+01	8.91E+01 G
ZR-95	I 1.9068E-01					6.40E+01	
		756.73	1.907E-01	?(	4.937E-01	1.11E+02	5.45E+01 G
		724.20	0.000E+00	-	9.269E-01	1.00E+03	4.42E+01 G
RU-103	R -1.1011E-01					3.93E+01	
		497.05	-1.101E-01	?(P	3.325E-01	1.35E+02	8.87E+01 G
		610.30	0.000E+00	+	1.168E+01	1.00E+03	5.66E+00 GA
RH-106	R 1.1390E+00					3.74E+02	
		621.92	7.154E-01	&(P	7.847E+00	3.25E+02	8.43E+00 G
		1050.36	3.852E+00	?(P	3.494E+01	2.63E+02	1.32E+00 G
		511.86	6.397E+00		1.755E+00	1.09E+01	1.93E+01 GA
AG-108M	C -4.5355E-02					1.53E+05	
		433.94	-4.535E-02	&(	3.136E-01	2.88E+02	9.05E+01 G
		722.94	0.000E+00	+	4.504E-01	1.00E+03	9.08E+01 G
		614.28	0.000E+00	&	7.387E-01	1.00E+03	8.98E+01 G
AG-110M	R 2.9679E-01					2.50E+02	
		884.68	2.185E-01	?(	6.075E-01	8.27E+01	5.57E+01 G
		657.76	-1.722E-01	&	5.004E-01	8.67E+01	7.47E+01 G
		937.49	4.096E-02	%	1.240E+00	1.30E+03	2.60E+01 G
		1384.30	5.236E-01	?(	1.012E+00	8.67E+01	1.92E+01 G
		763.94	-6.473E-01	+	2.308E+00	1.05E+02	1.66E+01 G
SN-113	F -1.6815E-01					1.15E+02	
		391.69	-1.682E-01	?(P	7.406E-01	9.96E+01	6.42E+01 G
SB-124	R 1.2688E-01					6.02E+01	
		602.73	1.484E-01	?(	6.938E-01	1.39E+02	9.02E+01 G
		1690.98	7.956E-02	?(	7.499E-01	4.24E+02	4.10E+01 G
		722.79	-8.329E-01	+	4.393E+00	1.54E+02	8.88E+00 G
SB-125	R 1.8539E-01					1.01E+03	
		427.88	-1.899E-01	?(P	9.697E-01	2.10E+02	2.92E+01 G
		600.50	4.193E-01	*(P	3.239E+00	2.29E+02	1.77E+01 G
		635.89	1.440E-01	?(	2.683E+00	5.29E+02	1.13E+01 G
		463.37	8.732E-01	&(	2.528E+00	8.63E+01	1.06E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
I-131	R	4.6990E-02					8.02E+00	
			364.48	4.699E-02	*(	2.836E-01	2.40E+02	8.11E+01 G
			284.30	-1.211E+00	& P	4.365E+00	1.26E+02	5.61E+00 G
			636.97	-1.573E+00	+	4.627E+00	8.76E+01	7.51E+00 G
Ga-68	C	-5.6298E+00					4.71E-02	
			1077.40	-5.630E+00	&(	2.189E+01	1.78E+02	3.30E+00 G
BA-133	R	-1.8597E-01					3.85E+03	
			356.00	-1.860E-01	?(	6.401E-01	1.03E+02	5.84E+01 G
			302.85	0.000E+00	&	3.219E+00	1.00E+03	1.71E+01 G
			383.84	-1.415E+00	+ P	4.460E+00	7.80E+01	9.43E+00 GA
			80.99	2.590E-01	&	6.714E-01	1.02E+02	2.95E+01 GA
CS-134	R	3.0714E-01					7.54E+02	
			795.87	1.830E-01	?(	4.796E-01	7.84E+01	7.26E+01 G
			604.71	9.354E-02	(	7.594E-01	2.40E+02	8.50E+01 G
			569.32	7.250E-01	&(	2.749E+00	1.12E+02	1.17E+01 G
			801.95	2.140E+00	&(	6.047E+00	8.43E+01	6.76E+00 G
			563.24	1.828E+00	&(	3.814E+00	8.76E+01	6.50E+00 G
CS-137	I	1.3214E-01					1.10E+04	
			661.66	1.321E-01	?(P	4.354E-01	9.85E+01	8.52E+01 G
CE-139	R	-6.6947E-03					1.38E+02	
			165.85	-6.695E-03	%(P	3.279E-01	1.32E+03	7.66E+01 G
Ba-140	R	1.9255E-02					1.28E+01	
			537.26	-1.213E-01	?(P	1.145E+00	4.83E+02	2.42E+01 G
			162.66	6.100E-01	?(	4.538E+00	2.21E+02	5.75E+00 G
			304.85	0.000E+00	&	1.527E+01	1.00E+03	3.61E+00 G
La-140	R	4.3177E-02					1.28E+01	
			1596.21	-9.422E-02	?(P	4.476E-01	2.74E+02	8.22E+01 G
			487.02	8.702E-02	?(	9.207E-01	3.08E+02	3.85E+01 G
			328.76	6.451E-01	&(	2.783E+00	1.29E+02	1.60E+01 G
			815.77	-1.785E-02	%	2.083E+00	3.35E+03	2.23E+01 G
CE-141	I	-1.9511E-01					3.25E+01	
			145.44	-1.951E-01	?(	9.396E-01	1.45E+02	4.84E+01 G
CE-144	I	6.7323E-01					2.85E+02	
			133.54	6.732E-01	&(	3.319E+00	1.48E+02	1.11E+01 G
PM-144	C	-1.7764E-01					3.63E+02	
			696.54	-1.776E-01	?(	4.601E-01	7.78E+01	9.90E+01 G
			618.06	-6.944E-02	&	6.528E-01	2.78E+02	9.91E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
EU-152	R	7.1840E-02					4.94E+03	
			121.78	-1.923E-01	?(	1.021E+00	1.58E+02	2.36E+01 G
			344.29	0.000E+00	+	2.057E+00	1.00E+03	2.39E+01 G
			1112.07	-2.079E+00	+	5.297E+00	7.65E+01	1.13E+01 G
			778.92	-1.593E+00	+	3.162E+00	8.99E+01	1.10E+01 G
			964.11	6.027E-01	?(	3.584E+00	1.72E+02	1.17E+01 G
			244.69	-1.867E+00	&	7.289E+00	1.17E+02	5.57E+00 G
			1408.00	5.304E-01	? P	1.195E+00	9.87E+01	1.73E+01 GA
EU-154	R	4.6930E-03					3.14E+03	
			123.10	-2.339E-01	(	6.647E-01	8.55E+01	3.59E+01 G
			1274.54	-5.867E-02	+	1.569E+00	7.59E+02	3.23E+01 G
			723.36	0.000E+00	+	2.478E+00	1.00E+03	1.65E+01 G
			873.23	9.124E-01	?(P	4.785E+00	1.55E+02	9.44E+00 G
			1004.77	-7.563E-01	+	2.486E+00	1.51E+02	1.60E+01 G
			996.33	5.771E-02	&	4.924E+00	2.43E+03	9.65E+00 G
EU-155	R	6.3065E-02					1.81E+03	
			105.31	-2.798E-02	%(P	2.314E+00	1.51E+03	2.06E+01 G
			86.54	1.189E-01	&(	1.410E+00	3.55E+02	3.36E+01 G
HF-181	R	1.3519E-01					4.24E+01	
			482.00	0.000E+00	?(	5.826E-01	1.00E+03	7.59E+01 G
			133.02	2.460E-01	&(	1.192E+00	1.45E+02	3.03E+01 G
			345.83	-5.983E-02	%	3.828E+00	1.89E+03	1.31E+01 G
			136.30	1.597E+00	&(	7.989E+00	1.50E+02	4.72E+00 G
Ta-182	R	-9.0441E-01					1.14E+02	
			1121.30	-9.044E-01	?(	2.530E+00	8.39E+01	2.90E+01 G
			1221.41	-3.733E-01	+	1.550E+00	1.88E+02	2.41E+01 G
			1189.05	-1.117E+00	+	2.165E+00	8.95E+01	1.70E+01 G
Hg-203	F	1.2423E-01					4.66E+01	
			279.20	1.242E-01	?(	3.576E-01	8.63E+01	8.15E+01 G
TL-208	R	1.3619E-01					6.98E+02	
			583.02	1.362E-01	?(P	3.839E-01	1.17E+02	7.38E+01 G
			277.28	-2.392E+00	+ P	4.968E+00	6.33E+01	5.38E+00 G
			860.56	-9.665E-01	& P	2.823E+00	1.11E+02	1.34E+01 G
PM-146	C	1.9951E-01					2.02E+03	
			453.88	1.672E-01	&(	3.687E-01	9.28E+01	6.50E+01 G
			747.16	2.612E-01	(P	7.572E-01	1.22E+02	3.40E+01 G
			735.72	-5.155E-02	- P	1.319E+00	5.25E+02	2.25E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

Y-88     R   3.1688E-02                                     1.07E+02
                        1836.06-6.741E-02 ?(P 3.857E-01 2.00E+02 8.92E+01 G
                         898.04 1.376E-01 &(P 2.976E-01 9.56E+01 8.34E+01 G

Cd-113m     -1.8075E+03                                     5.33E+03
                         263.70-1.807E+03 &(  4.241E+03 7.08E+01 6.00E-03   K

Cf-251   T  -7.6187E-02                                     3.28E+05
                         176.60-7.619E-02 @(  1.265E+00 6.42E+02 1.70E+01 G
                         227.00-1.220E-01 %   3.762E+00 1.24E+03 6.30E+00 GA

Cf-249   T  -3.0142E-02                                     1.28E+05
                         387.95-1.953E-01 &(  6.695E-01 1.03E+02 6.60E+01 G
                         333.44 6.728E-01 ?(  2.977E+00 1.32E+02 1.55E+01 G

Sn-126      -3.7502E-01                                     3.65E+07
                          87.57 0.000E+00 +   1.269E+00 1.00E+03 3.75E+01 GA
                          64.28-3.750E-01 ?(  3.527E+00 2.80E+02 9.70E+00 G
                          86.94 0.000E+00 &   5.266E+00 1.00E+03 9.04E+00 GA

PB-210   R   1.6822E+00                                     8.14E+03
                          46.54 1.682E+00 *(P 6.597E+00 1.40E+02 4.05E+00 G

PB-212   R  -1.4946E-01                                     6.98E+02
                         238.63-1.495E-01  (P 9.041E-01 1.78E+02 4.30E+01 G
                         300.03 0.000E+00 +   1.866E+01 1.00E+03 2.92E+00 GA

PB-214   R   4.5108E-01                                     5.84E+05
                         351.93 4.511E-01 ?(P 7.915E-01 5.74E+01 3.71E+01 G
                         295.09-2.053E-01 - P 2.818E+00 4.09E+02 1.93E+01 G
                         242.00-6.470E-01 & P 5.334E+00 2.44E+02 7.38E+00 GA

BI-207   C  -8.9033E-02                                     1.18E+04
                        1063.66-8.903E-02 ?(P 4.963E-01 2.08E+02 7.45E+01 G
                         569.70-1.406E-02 + P 3.054E-01 6.44E+02 9.77E+01 G

BI-212   R  -8.5049E-01                                     6.98E+02
                         727.17-8.505E-01 ?(  6.499E+00 2.22E+02 6.46E+00 G
                         785.42 5.478E-03 % P 2.925E+01 2.25E+05 1.02E+00 GA

U-235    R  -3.0378E-01                                     2.57E+11
                         143.79-6.501E-01 &(P 4.380E+00 1.66E+02 9.11E+00 G
                         205.33-3.798E-01 +   4.453E+00 4.72E+02 4.71E+00 G
                         163.38 3.723E-01 ?(P 4.769E+00 3.80E+02 4.66E+00 G
                         185.72 2.193E-01   P 5.709E-01 8.01E+01 4.78E+01 GA
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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-214	R	5.8374E-01					5.84E+05	
			609.31	5.837E-01	(P	6.591E-01	4.57E+01	4.05E+01 G
			1120.29	-1.165E+00	& P	5.334E+00	8.57E+01	1.32E+01 G
			1764.49	-1.551E+00	& P	3.566E+00	4.58E+01	1.58E+01 G
BI-210M	T	1.6675E-01					1.10E+09	
			265.83	1.667E-01	?(P	5.129E-01	9.26E+01	5.00E+01 G
			304.90	0.000E+00	&	1.971E+00	1.00E+03	2.80E+01 G
AC-228	R	1.7515E-01					2.10E+03	
			911.07	-1.710E-01	&(	1.376E+00	3.51E+02	2.45E+01 G
			968.97	-5.356E-01	&	3.181E+00	1.73E+02	1.46E+01 G
			338.32	8.757E-01	?(	3.968E+00	1.35E+02	1.21E+01 G
			93.35	0.000E+00	-	8.528E+00	1.00E+03	5.56E+00 XA
TH-227	R	-1.8947E+00					7.95E+03	
			256.24	-1.895E+00	?(P	3.950E+00	9.24E+01	7.00E+00 G
			235.97	7.636E-01	&	2.894E+00	1.13E+02	1.23E+01 G
			50.14	-1.186E+00	+	4.670E+00	1.18E+02	8.00E+00 G
TH-229	N	-2.1722E-01					2.68E+06	
			193.51	-1.872E+00	?(	5.181E+00	1.09E+02	4.40E+00 G
			210.85	2.218E+00	&(P	7.025E+00	1.29E+02	2.99E+00 G
TH-234	R	3.8501E+00					1.63E+12	
			92.59	3.850E+00	*(P	8.506E+00	8.28E+01	2.69E+00 G
			63.29	-6.333E+00	+ P	1.162E+01	5.42E+01	3.10E+00 G
PA-233	C	-1.5938E-02					7.82E+08	
			312.01	-1.594E-02	%(P	1.571E+00	2.97E+03	3.58E+01 G
			300.18	0.000E+00	+	8.837E+00	1.00E+03	6.17E+00 G
PA-234	R	9.1948E-01					1.63E+12	
			131.29	4.122E-01	&(	1.964E+00	1.43E+02	1.80E+01 G
			946.02	9.776E-01	?(	1.887E+00	8.55E+01	1.34E+01 G
			569.47	0.000E+00	-	4.194E+00	1.00E+03	8.20E+00 C
			883.24	1.790E+00	?(	5.331E+00	8.89E+01	9.60E+00 G
			880.53	-3.027E+00	&	8.709E+00	8.60E+01	6.00E+00 GA
PA-234M	R	1.4744E-01					1.63E+12	
			1001.00	1.474E-01	%(P	7.352E+01	1.49E+04	5.05E-01 G
			766.41	-2.193E+01	& P	2.131E+02	2.64E+02	1.98E-01 G
AM-241	T	1.0328E-01					1.58E+05	
			59.54	1.033E-01	?(	1.009E+00	2.91E+02	3.57E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

Np-237   F   6.0860E-01                                      2.14E+06
                          86.49 6.086E-01 &(  3.578E+00 1.77E+02 1.31E+01 G

Ir-192   R   1.3884E-01                                      7.40E+01
                         316.49 1.520E-01 &(  7.106E-01 1.40E+02 6.96E+01 G
                         468.06 1.161E-01 ?(  7.837E-01 1.97E+02 4.03E+01 G
                         308.44 0.000E+00 &   2.586E+00 1.00E+03 2.15E+01 G

Cs-136   R  -8.1811E-02                                      1.30E+01
                         818.50-8.181E-02 ?(  4.446E-01 2.40E+02 7.81E+01 G
                        1048.07-2.722E-01 +   6.977E-01 7.67E+01 6.08E+01 G
                         340.57-1.857E-01 +   1.298E+00 2.08E+02 3.83E+01 G

Np-239   R  -5.2161E-01                                      2.36E+00
                         103.70 0.000E+00 +   2.095E+00 1.00E+03 2.30E+01 X
                         106.13-5.216E-01 ?(  2.934E+00 1.69E+02 1.89E+01 G
                          99.50 0.000E+00 +   3.344E+00 1.00E+03 1.44E+01 X

Nd-147   R  -6.6893E-01                                      1.11E+01
                         531.00-6.689E-01 ?(  2.252E+00 1.41E+02 1.31E+01 G
                          91.10 0.000E+00 +   1.716E+00 1.00E+03 2.77E+01 G

TL-210   R  -2.4007E-01                                      5.84E+05
                         799.60-2.401E-01 ?(  5.877E-01 7.38E+01 9.90E+01 G
                         296.00 0.000E+00 +   6.836E-01 1.00E+03 7.90E+01 G
                        1313.00-4.519E-01 +   1.929E+00 1.99E+02 2.10E+01 CA

Kr-85    I  -2.0304E+01                                      3.92E+03
                         513.98-2.030E+01 &(  1.321E+02 1.93E+02 4.34E-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
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} - 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	
TH-227	50.14	567.	-29.	-0.004	118.15	-1.186E+00	
Sn-126	64.28	610.	-13.	-0.002	280.28	-3.750E-01	
BA-133	80.99	224.	28.	0.004	101.94	2.590E-01	
EU-155	86.54	1364.	15.	0.002	355.22	1.189E-01	
Np-239	106.13	1822.	-36.	-0.005	169.23	-5.216E-01	
EU-152	121.78	325.	-16.	-0.002	158.12	-1.923E-01	
CO-57	122.06	255.	26.	0.004	88.99	8.464E-02	
EU-154	123.10	318.	-30.	-0.004	85.49	-2.339E-01	
HF-181	133.02	712.	26.	0.004	145.25	2.460E-01	
CE-144	133.54	738.	26.	0.004	147.79	6.732E-01	
HF-181	136.30	765.	26.	0.004	149.99	1.597E+00	
CO-57	136.47	791.	11.	0.002	360.55	2.933E-01	
U-235	143.79	822.	-20.	-0.003	165.71	-6.501E-01	P
CE-141	145.44	1064.	-32.	-0.004	144.66	-1.951E-01	
Ba-140	162.66	307.	11.	0.002	220.53	6.100E-01	
U-235	163.38	219.	6.	0.001	379.68	3.723E-01	P
Cf-251	176.60	187.	-4.	-0.001	641.53	-7.619E-02	
U-235	185.72	288.	31.	0.004	80.11	2.193E-01	P
U-235	205.33	144.	-5.	-0.001	472.02	-3.798E-01	
TH-227	235.97	351.	24.	0.003	113.44	7.636E-01	
PB-212	238.63	415.	-16.	-0.002	178.47	-1.495E-01	P
PB-214	242.00	416.	-12.	-0.002	244.02	-6.470E-01	P
EU-152	244.69	436.	-26.	-0.004	116.97	-1.867E+00	
TH-227	256.24	184.	-32.	-0.004	92.43	-1.895E+00	P
Cd-113m	263.70	148.	-25.	-0.004	70.81	-1.807E+03	
BI-210M	265.83	149.	19.	0.003	92.59	1.667E-01	P
TL-208	277.28	152.	-29.	-0.004	63.32	-2.392E+00	P
I-131	284.30	121.	-15.	-0.002	125.75	-1.211E+00	P
PB-214	295.09	598.	-8.	-0.001	409.09	-2.053E-01	P
Ir-192	316.49	446.	22.	0.003	139.73	1.520E-01	
CR-51	320.08	180.	-16.	-0.002	121.46	-8.010E-01	
La-140	328.76	337.	20.	0.003	128.82	6.451E-01	
Cf-249	333.44	358.	21.	0.003	132.13	6.728E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AC-228	338.32	378.	21.	0.003	135.32	8.757E-01	
Cs-136	340.57	403.	-14.	-0.002	207.87	-1.857E-01	
PB-214	351.93	128.	32.	0.004	57.42	4.511E-01	P
BA-133	356.00	209.	-20.	-0.003	102.82	-1.860E-01	
I-131	364.48	72.	7.	0.001	240.32	4.699E-02	
BA-133	383.84	239.	-24.	-0.003	77.98	-1.415E+00	P
Cf-249	387.95	260.	-23.	-0.003	102.57	-1.953E-01	
SN-113	391.69	299.	-19.	-0.003	99.59	-1.682E-01	P
SB-125	427.88	88.	-9.	-0.001	210.12	-1.899E-01	P
AG-108M	433.94	87.	-7.	-0.001	287.66	-4.535E-02	
PM-146	453.88	56.	17.	0.002	92.83	1.672E-01	
SB-125	463.37	69.	14.	0.002	86.26	8.732E-01	
Ir-192	468.06	97.	7.	0.001	197.01	1.161E-01	
La-140	487.02	116.	5.	0.001	307.90	8.702E-02	
RU-103	497.05	76.	-14.	-0.002	134.95	-1.101E-01	P
RH-106	511.86	98.	178.	0.025	10.86	6.397E+00	
Kr-85	513.98	293.	-13.	-0.002	193.06	-2.030E+01	
Nd-147	531.00	69.	-12.	-0.002	140.72	-6.689E-01	
Ba-140	537.26	59.	-4.	-0.001	483.18	-1.213E-01	P
CS-134	563.24	43.	16.	0.002	87.61	1.828E+00	
CS-134	569.32	75.	11.	0.002	111.84	7.250E-01	
BI-207	569.70	64.	-2.	0.000	644.40	-1.406E-02	P
TL-208	583.02	55.	13.	0.002	116.76	1.362E-01	P
SB-125	600.50	232.	10.	0.001	229.09	4.193E-01	P
SB-124	602.73	277.	17.	0.002	139.20	1.484E-01	
CS-134	604.71	294.	10.	0.001	240.37	9.354E-02	
PM-144	618.06	286.	-9.	-0.001	277.88	-6.944E-02	
RH-106	621.92	296.	8.	0.001	324.82	7.154E-01	P
SB-125	635.89	55.	2.	0.000	529.15	1.440E-01	
I-131	636.97	74.	-14.	-0.002	87.64	-1.573E+00	
AG-110M	657.76	82.	-16.	-0.002	86.68	-1.722E-01	
CS-137	661.66	80.	14.	0.002	98.53	1.321E-01	P
PM-144	696.54	115.	-20.	-0.003	77.78	-1.776E-01	
NB-94	702.63	185.	-24.	-0.003	26.99	-2.357E-01	P
SB-124	722.79	78.	-8.	-0.001	154.14	-8.329E-01	
BI-212	727.17	91.	-6.	-0.001	222.25	-8.505E-01	
PM-146	735.72	42.	-1.	0.000	525.26	-5.155E-02	P
PM-146	747.16	30.	10.	0.001	122.04	2.612E-01	P
ZR-95	756.73	33.	11.	0.002	111.03	1.907E-01	
AG-110M	763.94	70.	-12.	-0.002	105.33	-6.473E-01	
PA-234M	766.41	85.	-5.	-0.001	264.40	-2.193E+01	P
EU-152	778.92	55.	-19.	-0.003	89.85	-1.593E+00	
CS-134	795.87	53.	14.	0.002	78.36	1.830E-01	
TL-210	799.60	156.	-25.	-0.003	73.77	-2.401E-01	
CS-134	801.95	74.	15.	0.002	84.33	2.140E+00	
CO-58	810.78	79.	-16.	-0.002	81.06	-1.629E-01	
Cs-136	818.50	50.	-7.	-0.001	240.13	-8.181E-02	
MN-54	834.85	40.	9.	0.001	158.05	8.846E-02	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Co-56	846.77	80.	-27.	-0.004	51.03	-3.237E-01	P
TL-208	860.56	56.	-13.	-0.002	110.82	-9.665E-01	P
NB-94	871.10	77.	-15.	-0.002	86.67	-1.706E-01	
EU-154	873.23	81.	8.	0.001	154.59	9.124E-01	P
AG-110M	884.68	42.	12.	0.002	82.69	2.185E-01	
Sc-46	889.28	87.	3.	0.000	405.12	3.721E-02	
Y-88	898.04	21.	11.	0.002	95.56	1.376E-01	P
AC-228	911.07	40.	-4.	-0.001	351.19	-1.710E-01	
EU-152	964.11	60.	6.	0.001	172.35	6.027E-01	
AC-228	968.97	73.	-7.	-0.001	172.88	-5.356E-01	
EU-154	1004.77	50.	-11.	-0.002	151.20	-7.563E-01	
Co-56	1037.84	48.	-13.	-0.002	124.27	-1.380E+00	
Cs-136	1048.07	53.	-14.	-0.002	76.74	-2.722E-01	
RH-106	1050.36	63.	4.	0.001	263.17	3.852E+00	P
BI-207	1063.66	39.	-6.	-0.001	208.20	-8.903E-02	P
Ga-68	1077.40	48.	-9.	-0.001	178.12	-5.630E+00	
FE-59	1099.25	12.	8.	0.001	108.74	1.625E-01	P
EU-152	1112.07	102.	-20.	-0.003	76.53	-2.079E+00	
ZN-65	1115.55	122.	-8.	-0.001	187.41	-2.010E-01	
Ta-182	1121.30	154.	-22.	-0.003	83.90	-9.044E-01	
CO-60	1173.24	28.	6.	0.001	202.40	8.384E-02	P
Ta-182	1189.05	32.	-15.	-0.002	89.53	-1.117E+00	
Ta-182	1221.41	32.	-7.	-0.001	187.54	-3.733E-01	
Co-56	1238.28	11.	10.	0.001	88.08	2.426E-01	
NA-22	1274.53	40.	-18.	-0.003	54.16	-3.051E-01	
EU-154	1274.54	58.	-1.	0.000	758.61	-5.867E-02	
FE-59	1291.60	6.	16.	0.002	44.90	4.832E-01	P
TL-210	1313.00	34.	-7.	-0.001	198.98	-4.519E-01	
CO-60	1332.50	45.	-17.	-0.002	94.21	-2.615E-01	
AG-110M	1384.30	6.	7.	0.001	86.69	5.236E-01	
EU-152	1408.00	6.	6.	0.001	98.67	5.304E-01	P
K-40	1460.83	50.	-13.	-0.002	104.00	-1.751E+00	P
La-140	1596.21	20.	-5.	-0.001	273.66	-9.422E-02	P
SB-124	1690.98	12.	2.	0.000	424.26	7.956E-02	
Co-56	1771.35	24.	9.	0.001	83.89	1.243E+00	
Y-88	1836.06	13.	-3.	0.000	199.62	-6.741E-02	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	-6.3441E-02	-6.3441E-02	1.936E+03%	4.21E+00
NA-22	#A	-3.0507E-01	-3.0507E-01	5.416E+01%	5.36E-01
K-40	#A	-1.7510E+00	-1.7510E+00	1.040E+02%	4.88E+00
Sc-46	#A	3.7205E-02	3.7205E-02	4.051E+02%	5.23E-01

CR-51	#A	-8.0096E-01	-8.0097E-01	1.215E+02%	3.27E+00
MN-54	#A	8.8464E-02	8.8464E-02	1.580E+02%	3.16E-01
FE-59	#A	3.0343E-01	3.0343E-01	4.490E+01%	4.09E-01
Co-56	#A	-3.2371E-01	-3.2372E-01	5.103E+01%	5.24E-01
CO-57	#A	1.0814E-01	1.0814E-01	8.899E+01%	2.51E-01
CO-58	#A	-1.6294E-01	-1.6294E-01	8.106E+01%	4.41E-01
CO-60	#A	-2.6154E-01	-2.6154E-01	9.421E+01%	5.14E-01
ZN-65	#A	-2.0103E-01	-2.0103E-01	1.874E+02%	1.28E+00
NB-94	#A	-2.3572E-01	-2.3572E-01	2.699E+01%	6.53E-01
ZR-95	#A	1.9068E-01	1.9068E-01	1.110E+02%	4.94E-01
NB-95	#A	0.0000E+00	0.0000E+00	1.000E+03%	4.14E-01
RU-103	#A	-1.1011E-01	-1.1011E-01	1.350E+02%	3.33E-01
RH-106	#A	1.1390E+00	1.1390E+00	2.090E+02%	7.85E+00
AG-108M	#A	-4.5355E-02	-4.5355E-02	2.877E+02%	3.14E-01
AG-110M	#A	2.9679E-01	2.9679E-01	5.990E+01%	6.07E-01
SN-113	#A	-1.6815E-01	-1.6815E-01	9.959E+01%	7.41E-01
SB-124	#A	1.2688E-01	1.2688E-01	1.392E+02%	6.94E-01
SB-125	#A	1.8539E-01	1.8539E-01	8.626E+01%	9.70E-01
I-131	#A	4.6987E-02	4.6990E-02	2.403E+02%	2.84E-01
Gd-153	#A	0.0000E+00	0.0000E+00	7.071E+02%	1.72E+00
Ga-68	#A	-5.5754E+00	-5.6298E+00	1.781E+02%	2.19E+01
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.02E-01
BA-133	#A	-1.8597E-01	-1.8597E-01	1.028E+02%	6.40E-01
CS-134	#A	3.0714E-01	3.0714E-01	6.040E+01%	4.80E-01
CS-137	#A	1.3214E-01	1.3214E-01	9.853E+01%	4.35E-01
CE-139	#A	-6.6946E-03	-6.6947E-03	1.318E+03%	3.28E-01
Ba-140	#A	1.9254E-02	1.9255E-02	2.205E+02%	1.15E+00
La-140	#A	4.3175E-02	4.3177E-02	1.288E+02%	4.48E-01
CE-141	#A	-1.9511E-01	-1.9511E-01	1.447E+02%	9.40E-01
CE-144	#A	6.7323E-01	6.7323E-01	1.478E+02%	3.32E+00
PM-144	#A	-1.7764E-01	-1.7764E-01	7.778E+01%	4.60E-01
EU-152	#A	7.1840E-02	7.1840E-02	1.169E+02%	1.02E+00
EU-154	#A	4.6930E-03	4.6930E-03	8.549E+01%	6.65E-01
EU-155	#A	6.3065E-02	6.3065E-02	3.552E+02%	2.31E+00
HF-181	#A	1.3519E-01	1.3519E-01	1.453E+02%	5.83E-01
Ta-182	#A	-9.0441E-01	-9.0441E-01	8.390E+01%	2.53E+00
Hg-203	#A	1.2423E-01	1.2423E-01	8.633E+01%	3.58E-01
TL-208	#A	1.3619E-01	1.3619E-01	1.168E+02%	3.84E-01
PM-146	#A	1.9951E-01	1.9951E-01	7.667E+01%	3.69E-01
Y-88	#A	3.1688E-02	3.1688E-02	9.556E+01%	3.86E-01
Cd-113m	#A	-1.8075E+03	-1.8075E+03	7.081E+01%	4.24E+03
Cd-109	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.32E+01
Cf-251	#A	-7.6187E-02	-7.6187E-02	6.415E+02%	1.27E+00
Cf-249	#A	-3.0142E-02	-3.0142E-02	8.363E+01%	6.70E-01
Sn-126	#A	-3.7502E-01	-3.7502E-01	2.803E+02%	3.53E+00
PB-210	#A	1.6822E+00	1.6822E+00	1.396E+02%	6.60E+00
PB-212	#A	-1.4946E-01	-1.4946E-01	1.785E+02%	9.04E-01
PB-214	#A	4.5108E-01	4.5108E-01	5.742E+01%	7.92E-01
BI-207	#A	-8.9033E-02	-8.9033E-02	2.082E+02%	4.96E-01

BI-212	#A	-8.5049E-01	-8.5049E-01	2.222E+02%	6.50E+00
U-235	#A	-3.0378E-01	-3.0378E-01	1.657E+02%	4.38E+00
BI-214	A	5.8374E-01	5.8374E-01	4.574E+01%	6.59E-01
BI-210M	#A	1.6675E-01	1.6675E-01	9.259E+01%	5.13E-01
AC-228	#A	1.7515E-01	1.7515E-01	1.353E+02%	1.38E+00
TH-227	#A	-1.8947E+00	-1.8947E+00	9.243E+01%	3.95E+00
TH-229	#A	-2.1722E-01	-2.1722E-01	8.432E+01%	5.18E+00
TH-234	#A	3.8501E+00	3.8501E+00	8.276E+01%	8.51E+00
PA-231	#A	0.0000E+00	0.0000E+00	7.071E+02%	3.29E+01
PA-233	#A	-1.5938E-02	-1.5938E-02	2.967E+03%	1.57E+00
PA-234	#A	9.1948E-01	9.1948E-01	6.291E+01%	1.96E+00
PA-234M	#A	1.4744E-01	1.4744E-01	1.485E+04%	7.35E+01
AM-241	#A	1.0328E-01	1.0328E-01	2.911E+02%	1.01E+00
Np-237	#A	6.0860E-01	6.0860E-01	1.766E+02%	3.58E+00
Ir-192	#A	1.3884E-01	1.3884E-01	1.208E+02%	7.11E-01
Cs-136	#A	-8.1809E-02	-8.1811E-02	2.401E+02%	4.45E-01
Np-239	#A	-5.2151E-01	-5.2161E-01	1.692E+02%	2.93E+00
Nd-147	#A	-6.6890E-01	-6.6893E-01	1.407E+02%	2.25E+00
TL-210	#A	-2.4007E-01	-2.4007E-01	7.377E+01%	5.88E-01
Kr-85	#A	-2.0304E+01	-2.0304E+01	1.931E+02%	1.32E+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 1999.6 keV) 5.837E-01 Bq/Sample
Total Decayed Activity (37.6 to 1999.6 keV) 5.8374125E-01 Bq/Sample

486234_Gamma_180-111757-B-2-B DU. 18_Gamma_20200322.spc.

Test America St. Louis Spectrum ID: 17_Gamma_20202084

Sample Description: 486234_Gamma_180-111757-C-3-A
Detector: Detector #17
Batch ID: 486234
Work Order Number: Gamma
Lot Number: 180-111757-C-3-A

Decay to Time: 11/12/2020 20:58 Live Time: 7200 sec
Acquisition Time: 11/12/2020 20:58:46 Real Time: 7224 sec
Analysis Time: 11/13/2020 14:15 Dead Time: 0.33 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 17_TCC-1L Marn.Clb
Efficiency Cal Desc: 17_1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 14:27
Energy Cal Date: 7/23/2020 16:21
Library: Client_Long_Rev15.lib
Bkgd Correction File: 17_2020-11-07_2216.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	8.576E-01	109.2	9.364E-01	9.377E-01	3.155E+00
NA-22	1.383E-01	61.4	8.488E-02	8.526E-02	2.764E-01
K-40	2.035E-01	670.7	1.365E+00	1.365E+00	3.886E+00
Sc-46	1.149E-01	96.7	1.111E-01	1.113E-01	3.762E-01
CR-51	-1.169E+00	165.7	1.938E+00	1.939E+00	6.467E+00
MN-54	-1.805E-01	88.9	1.605E-01	1.609E-01	3.658E-01
FE-59	-3.224E-01	76.8	2.475E-01	2.483E-01	6.706E-01
Co-56	5.621E-02	129.3	7.269E-02	7.276E-02	3.637E-01
CO-57	7.554E-02	103.1	7.789E-02	7.802E-02	2.602E-01
CO-58	1.759E-01	34.2	6.024E-02	6.112E-02	1.392E-01
CO-60	5.910E-03	91.2	5.390E-03	5.401E-03	3.746E-01
ZN-65	1.844E-01	121.9	2.248E-01	2.251E-01	7.697E-01
NB-94	1.249E-02	1150.2	1.437E-01	1.437E-01	3.519E-01
ZR-95	-4.663E-02	532.3	2.482E-01	2.482E-01	5.842E-01
NB-95	8.843E-02	114.9	1.016E-01	1.018E-01	3.455E-01
RU-103	-1.001E-01	118.4	1.185E-01	1.187E-01	2.942E-01
RH-106	-5.314E-01	334.2	1.776E+00	1.776E+00	6.048E+00
AG-108M	1.940E-01	43.1	8.365E-02	8.443E-02	1.971E-01
AG-110M	8.763E-02	82.7	7.247E-02	7.266E-02	6.907E-01
SN-113	1.375E-01	109.1	1.499E-01	1.501E-01	5.039E-01
SB-124	-6.500E-02	334.6	2.175E-01	2.175E-01	7.346E-01
SB-125	1.233E-01	124.0	1.528E-01	1.530E-01	7.945E-01
I-131	7.010E-02	185.3	1.299E-01	1.299E-01	3.048E-01
Gd-153	5.869E-01	32.1	1.886E-01	1.922E-01	5.956E-01
Ga-68	4.008E+00	106.3	4.259E+00	4.267E+00	9.989E+00
Tc-99m	0.000E+00	1.#INF	6.682E-02	6.682E-02	4.843E-01
BA-133	-1.418E-01	111.3	1.578E-01	1.581E-01	5.305E-01
CS-134	2.463E-01	83.7	2.062E-01	2.067E-01	4.388E-01
CS-137	-1.799E-03	6427.7	1.156E-01	1.156E-01	4.053E-01
CE-139	-5.015E-02	207.6	1.041E-01	1.042E-01	3.508E-01
Ba-140	1.538E-01	192.4	2.959E-01	2.960E-01	7.340E-01
La-140	1.516E-01	75.3	1.142E-01	1.146E-01	2.402E-01
CE-141	-1.555E-01	154.6	2.404E-01	2.406E-01	8.020E-01

CE-144	0.000E+00	1.#INF	4.619E-01	4.619E-01	3.337E+00
PM-144	2.542E-01	25.1	6.375E-02	6.548E-02	1.256E-01
EU-152	4.681E-01	88.6	4.149E-01	4.158E-01	9.095E-01
EU-154	3.202E-01	60.4	1.935E-01	1.944E-01	6.673E-01
EU-155	9.699E-02	171.1	1.660E-01	1.661E-01	1.472E+00
HF-181	1.183E-01	115.0	1.360E-01	1.362E-01	4.585E-01
Ta-182	-6.350E-02	73.8	4.685E-02	4.700E-02	1.673E+00
Hg-203	1.043E-02	868.9	9.062E-02	9.062E-02	3.117E-01
TL-208	1.522E-01	116.0	1.766E-01	1.768E-01	3.895E-01
PM-146	1.025E-01	95.2	9.755E-02	9.774E-02	3.209E-01
Y-88	1.132E-01	73.5	8.317E-02	8.343E-02	2.538E-01
Cd-113m	1.133E+03	87.1	9.871E+02	9.898E+02	3.306E+03
Cd-109	0.000E+00	1.#INF	1.320E+00	1.320E+00	9.857E+00
Cf-251	-2.236E-01	215.1	4.810E-01	4.812E-01	1.238E+00
Cf-249	0.000E+00	1.#INF	7.841E-02	7.841E-02	5.148E-01
Sn-126	-7.262E-01	138.9	1.008E+00	1.009E+00	3.368E+00
PB-210	-7.819E+00	33.3	2.604E+00	2.644E+00	8.856E+00
PB-212	-1.318E-01	147.3	1.941E-01	1.943E-01	6.584E-01
PB-214	1.269E-01	135.9	1.725E-01	1.726E-01	5.080E-01
BI-207	5.142E-02	345.7	1.778E-01	1.778E-01	4.136E-01
BI-212	1.534E+00	83.3	1.279E+00	1.282E+00	4.299E+00
U-235	1.841E+00	33.8	6.227E-01	6.320E-01	1.551E+00
BI-214	3.795E-01	71.9	2.730E-01	2.739E-01	7.010E-01
BI-210M	1.233E-01	99.5	1.227E-01	1.230E-01	4.091E-01
AC-228	-9.323E-01	58.2	5.425E-01	5.452E-01	1.535E+00
TH-227	2.784E-01	91.1	2.536E-01	2.542E-01	3.132E+00
TH-229	-1.592E+00	123.8	1.971E+00	1.973E+00	5.038E+00
TH-234	2.833E+00	74.6	2.114E+00	2.120E+00	8.312E+00
PA-231	0.000E+00	1.#INF	2.588E+00	2.589E+00	3.038E+01
PA-233	0.000E+00	1.#INF	5.442E-02	5.442E-02	1.444E+00
PA-234	3.144E-01	41.7	1.312E-01	1.325E-01	2.202E+00
PA-234M	-6.228E+01	49.0	3.051E+01	3.073E+01	1.185E+02
AM-241	1.802E-01	147.4	2.656E-01	2.658E-01	8.883E-01
Np-237	5.105E-01	154.7	7.898E-01	7.904E-01	2.636E+00
Ir-192	-2.954E-02	96.9	2.863E-02	2.869E-02	7.660E-01
Cs-136	2.115E-01	29.9	6.323E-02	6.465E-02	5.052E-01
Np-239	-2.587E-01	189.3	4.897E-01	4.899E-01	1.640E+00
Nd-147	1.011E-01	591.6	5.983E-01	5.984E-01	1.551E+00
TL-210	1.140E-01	92.4	1.053E-01	1.056E-01	3.550E-01
Kr-85	2.718E+01	131.9	3.584E+01	3.588E+01	1.203E+02
Total	1.178E+03				

Analyst: Jacob Boyd

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Sample description
486234_Gamma_180-111757-C-3-A

Spectrum Filename: C:\User\SPC\Det17\17_Gamma_20202084.An1

Acquisition information

Start time:	11/12/2020 8:58:46 PM
Live time:	7200
Real time:	7224
Dead time:	0.33 %
Detector ID:	17

Detector system
Ge17 SN/11080671

Calibration

Filename:	17_TCC-1L Marn.Clb

17_1L Marn_1893022-115244

Energy Calibration

Created:	7/23/2020 4:21:49 PM
Zero offset:	0.168 keV
Gain:	0.250 keV/channel
Quadratic:	-2.402E-08 keV/channel^2

Efficiency Calibration

Created:	5/6/2020 2:27:38 PM
Type:	TCC Polynomial
Coefficients:	-0.423753 -4.300989 -0.683475
	6.999694 0.000000 0.000000

Library Files

Main analysis library:	Client_Long_Rev15.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.69keV)
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

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Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	11/12/2020 8:58:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	17_2020-11-07_2216.PBC 11/7/2020 10:16:38 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1558

***** 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
46.83	122.	18.50	0.70	4.202E-02	46.54	4.050	PBC<MDA	PB210
50.14	25.	117.66	0.87	4.368E-02	50.14	8.000	PBC<MDA	TH227
59.54	22.	147.39	0.88	4.730E-02	59.54	35.683	PBC<MDA	AM241
63.55	136.	20.64	0.74	4.843E-02	63.29	3.100	PBC<MDA	TH234
					64.28	9.700	4.005E+00	Sn126
86.49	25.	154.71	0.91	5.160E-02	86.49	13.100	PBC<MDA	Np237
					86.54	33.600	1.990E-01	EU155
					86.94	9.040	7.395E-01	Sn126
86.54	23.	171.12	0.91	5.160E-02	86.49	13.100	PBC<MDA	Np237
					86.54	33.600	1.828E-01	EU155
					86.94	9.040	6.793E-01	Sn126
92.77	33.	90.50	1.11	5.176E-02	92.59	2.692	PBC<MDA	TH234
					93.35	5.561	1.608E+00	AC228
98.72	60.	32.13	0.92	5.174E-02	97.50	27.591	PBC<MDA	Gd153
105.31	-3.	930.17	0.93	5.151E-02	105.31	20.609	PBC<MDA	EU155
121.78	23.	98.90	0.94	5.037E-02	121.78	23.381	PBC<MDA	EU152
					122.06	85.300	7.553E-02	CO57
122.06	23.	103.11	0.94	5.034E-02	121.78	23.381	2.755E-01	EU152
					122.06	85.300	7.554E-02	CO57
143.97	58.	33.82	0.78	4.803E-02	143.79	9.108	1.841E+00	U235
164.42	6.	413.64	0.98	4.558E-02	163.38	4.668	PBC<MDA	U235
185.71	110.	17.13	0.71	4.265E-02	185.72	47.821	7.491E-01	U235
227.00	12.	164.21	1.04	3.757E-02	227.00	6.300	PBC<MDA	Cf251
235.97	12.	169.56	1.05	3.662E-02	235.97	12.300	PBC<MDA	TH227
238.64	20.	71.87	0.95	3.634E-02	238.63	43.042	PBC<MDA	PB212
242.00	19.	131.86	1.05	3.601E-02	242.00	7.376	PBC<MDA	PB214
244.69	13.	210.23	1.05	3.574E-02	244.69	5.531	PBC<MDA	EU152
263.70	17.	87.11	1.07	3.398E-02	263.70	0.006	PBC<MDA	Cd113m

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
265.83	15.	99.55	1.07	3.379E-02	265.83	50.000	PBC<MDA	BI210M
277.28	15.	116.05	1.08	3.284E-02	277.28	5.259	PBC<MDA	TL208
279.20	2.	868.91	1.08	3.268E-02	279.20	81.500	PBC<MDA	Hg203
294.54	-14.	250.19	1.10	3.146E-02	295.09	19.256	PBC<MDA	PB214
300.23	4.	925.46	1.10	3.111E-02	300.03	2.930	PBC<MDA	PB212
					300.07	2.379	PBC<MDA	PA231
					300.18	6.175	PBC<MDA	PA233
338.32	12.	174.70	1.14	2.862E-02	338.32	12.069	PBC<MDA	AC228
340.57	8.	270.77	1.14	2.849E-02	340.57	37.446	PBC<MDA	Cs136
351.92	9.	135.87	1.53	2.785E-02	351.93	37.067	PBC<MDA	PB214
364.48	3.	688.22	1.16	2.718E-02	364.48	81.085	PBC<MDA	I131
383.84	3.	613.73	1.17	2.621E-02	383.84	9.463	PBC<MDA	BA133
391.69	16.	109.06	1.18	2.585E-02	391.69	64.226	PBC<MDA	SN113
433.94	30.	43.11	1.22	2.406E-02	433.94	90.480	PBC<MDA	AG108M
463.37	10.	123.95	1.24	2.299E-02	463.37	10.591	PBC<MDA	SB125
468.06	11.	103.70	1.25	2.283E-02	468.06	40.073	PBC<MDA	Ir192
477.60	14.	109.18	1.25	2.251E-02	477.60	10.400	PBC<MDA	BE7
482.00	14.	115.01	1.26	2.237E-02	482.00	76.121	PBC<MDA	HF181
487.02	13.	121.85	1.26	2.221E-02	487.02	37.952	PBC<MDA	La140
511.86	162.	12.80	2.53	2.145E-02	511.86	19.226	5.444E+00	RH106
513.98	18.	131.86	1.28	2.139E-02	513.98	0.434	PBC<MDA	Kr85
531.00	2.	591.61	1.30	2.091E-02	531.00	13.133	PBC<MDA	Nd147
537.26	6.	192.38	1.30	2.075E-02	537.26	24.146	PBC<MDA	Ba140
563.24	9.	138.32	1.32	2.008E-02	563.24	6.402	PBC<MDA	CS134
569.32	5.	232.12	1.33	1.993E-02	569.32	11.481	PBC<MDA	CS134
					569.47	8.200	3.967E-01	PA234
					569.70	97.740	3.329E-02	BI207
569.47	2.	617.51	1.33	1.993E-02	569.32	11.481	PBC<MDA	CS134
					569.47	8.200	1.558E-01	PA234
					569.70	97.740	1.308E-02	BI207
596.14	58.	20.30	0.80	1.931E-02				
609.51	21.	71.94	1.17	1.902E-02	609.31	40.151	PBC<MDA	BI214
618.00	-4.	476.68	1.37	1.883E-02	618.06	99.100	PBC<MDA	PM144
635.89	3.	368.51	1.38	1.847E-02	635.89	11.253	PBC<MDA	SB125
636.97	6.	185.26	1.38	1.845E-02	636.97	7.508	PBC<MDA	I131
657.76	13.	82.70	1.40	1.804E-02	657.76	73.473	PBC<MDA	AG110M
696.58	31.	25.08	0.54	1.735E-02	696.54	99.000	2.542E-01	PM144
727.17	12.	83.33	1.45	1.685E-02	727.17	6.448	PBC<MDA	BI212
735.72	5.	226.66	1.46	1.671E-02	735.72	22.500	PBC<MDA	PM146
747.16	10.	95.15	1.47	1.654E-02	747.16	34.000	PBC<MDA	PM146
765.79	10.	114.91	1.48	1.626E-02	765.79	99.801	PBC<MDA	NB95
					766.41	0.198	PBC<MDA	PA234M
766.41	-3.	435.03	1.48	1.625E-02	765.79	99.801	PBC<MDA	NB95
					766.41	0.198	PBC<MDA	PA234M
778.92	5.	231.42	1.49	1.607E-02	778.92	10.974	PBC<MDA	EU152
795.87	13.	83.69	1.50	1.584E-02	795.87	71.916	PBC<MDA	CS134
799.60	13.	92.39	1.51	1.579E-02	799.60	98.960	PBC<MDA	TL210
801.95	3.	375.95	1.51	1.576E-02	801.95	6.654	PBC<MDA	CS134

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
810.67	19.	34.24	0.38	1.564E-02	810.78	95.909	1.759E-01	CO58
818.50	10.	134.94	1.52	1.554E-02	818.50	77.379	PBC<MDA	Cs136
860.56	9.	121.17	1.55	1.502E-02	860.56	13.237	PBC<MDA	TL208
873.23	14.	79.78	1.56	1.487E-02	873.23	9.411	PBC<MDA	EU154
880.53	8.	144.27	1.56	1.478E-02	880.53	6.000	PBC<MDA	PA234
891.03	11.	96.69	1.57	1.469E-02	889.28	89.920	PBC<MDA	Sc46
898.04	8.	115.31	1.58	1.459E-02	898.04	82.381	PBC<MDA	Y88
937.49	3.	378.59	1.61	1.417E-02	937.49	25.557	PBC<MDA	AG110M
946.02	19.	41.73	1.61	1.408E-02	946.02	13.400	1.374E+00	PA234
968.97	3.	400.75	1.63	1.385E-02	968.97	14.607	PBC<MDA	AC228
1004.77	13.	129.00	1.65	1.351E-02	1004.77	16.090	PBC<MDA	EU154
1037.84	4.	254.21	1.67	1.322E-02	1037.84	10.562	PBC<MDA	Co56
1048.07	23.	29.90	1.68	1.313E-02	1048.07	60.119	4.107E-01	Cs136
1063.66	4.	345.75	1.69	1.299E-02	1063.66	74.500	PBC<MDA	BI207
1077.40	7.	106.27	1.70	1.288E-02	1077.40	3.300	PBC<MDA	Ga68
1112.07	7.	134.84	1.72	1.260E-02	1112.07	11.344	PBC<MDA	EU152
1115.55	8.	121.90	1.72	1.258E-02	1115.55	50.796	PBC<MDA	ZN65
1120.24	0.	734.85	1.73	1.254E-02	1120.29	13.140	PBC<MDA	BI214
					1120.55	87.531	PBC<MDA	Sc46
1120.51	3.	254.99	1.73	1.254E-02	1120.29	13.140	PBC<MDA	BI214
					1120.55	87.531	3.483E-02	Sc46
					1121.30	29.171	1.046E-01	Ta182
1173.24	9.	119.04	1.76	1.215E-02	1173.24	88.790	PBC<MDA	CO60
1189.05	9.	100.31	1.77	1.204E-02	1189.05	17.088	PBC<MDA	Ta182
1221.41	6.	123.77	1.79	1.181E-02	1221.41	24.251	PBC<MDA	Ta182
1238.28	8.	129.33	1.80	1.170E-02	1238.28	50.670	PBC<MDA	Co56
1274.43	9.	61.36	1.82	1.147E-02	1274.53	78.543	PBC<MDA	NA22
					1274.54	32.389	3.354E-01	EU154
1274.54	1.	468.29	1.82	1.147E-02	1274.53	78.543	PBC<MDA	NA22
					1274.54	32.389	5.090E-02	EU154
1291.60	6.	91.30	1.83	1.136E-02	1291.60	43.606	PBC<MDA	FE59
1313.00	4.	177.92	1.85	1.123E-02	1313.00	21.000	PBC<MDA	TL210
1461.29	2.	670.65	1.93	1.042E-02	1460.83	10.700	PBC<MDA	K40
1596.21	7.	88.62	2.00	9.778E-03	1596.21	81.621	PBC<MDA	La140
1764.61	-3.	252.80	2.08	9.086E-03	1764.49	15.819	PBC<MDA	BI214
1836.06	7.	91.18	2.12	8.820E-03	1836.06	88.406	PBC<MDA	Y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
2383.24	596.14	18.	58.	2.978E+03	20.30	0.798	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

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This section based on library: Client_Long_Rev15.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	185.39	46.54	512.	-95.	-0.013	33.30	0.870
TH-227	199.79	50.14	428.	25.	0.004	117.66	0.874s
AM-241	237.36	59.54	510.	22.	0.003	147.39	0.883s
TH-234	253.39	63.55	280.	26.	0.004	118.64	0.744
Sn-126	256.33	64.28	574.	-25.	-0.003	138.86	0.887s
BA-133	323.13	80.99	220.	-12.	-0.002	265.70	0.903s
Np-237	345.13	86.49	726.	25.	0.003	154.71	0.908s
EU-155	345.34	86.54	751.	23.	0.003	171.12	0.908s
Sn-126	346.93	86.94	774.	0.	0.000	1000.00	0.908s
Sn-126	349.44	87.57	774.	0.	0.000	1000.00	0.909s
Cd-109	351.32	88.04	774.	0.	0.000	1000.00	0.909s
Nd-147	363.56	91.10	893.	-29.	-0.004	148.33	0.912s
TH-234	370.22	92.77	300.	33.	0.005	90.50	1.115s
AC-228	372.55	93.35	864.	-29.	-0.004	145.63	0.915s
Gd-153	389.15	97.50	158.	60.	0.008	32.13	0.918
Np-239	397.14	99.50	284.	-17.	-0.002	139.66	0.920s
Gd-153	411.94	103.20	575.	-23.	-0.003	148.91	0.924
Np-239	413.94	103.70	552.	0.	0.000	1000.00	0.924
EU-155	420.39	105.31	555.	-3.	0.000	930.17	0.926s
Np-239	423.65	106.13	561.	-18.	-0.002	189.29	0.927s
EU-152	486.23	121.78	255.	23.	0.003	98.90	0.941s
CO-57	487.35	122.06	278.	23.	0.003	103.11	0.941s
EU-154	491.50	123.10	320.	-26.	-0.004	99.24	0.942s
PA-234	524.27	131.29	882.	-26.	-0.004	164.06	0.950s
HF-181	531.18	133.02	779.	-18.	-0.002	174.72	0.951s
CE-144	533.24	133.54	761.	0.	0.000	1000.00	0.952s
HF-181	544.28	136.30	761.	0.	0.000	1000.00	0.954s
CO-57	544.97	136.47	761.	0.	0.000	1000.00	0.955s
Tc-99m	561.12	140.51	761.	0.	0.000	1000.00	0.958s
U-235	574.93	143.97	98.	58.	0.008	33.82	0.777
CE-141	580.83	145.44	790.	-26.	-0.004	154.59	0.963s
Ba-140	649.68	162.66	252.	-21.	-0.003	107.51	0.979s
U-235	652.56	163.38	268.	6.	0.001	413.64	0.980
CE-139	662.45	165.85	330.	-12.	-0.002	207.62	0.982s
Cf-251	705.42	176.60	187.	-12.	-0.002	215.14	0.991s
U-235	741.86	185.71	70.	110.	0.015	17.13	0.711s
TH-229	773.03	193.51	187.	-21.	-0.003	123.76	1.007s
U-235	820.31	205.33	148.	-11.	-0.001	162.84	1.018s
TH-229	842.37	210.85	147.	-6.	-0.001	402.03	1.023
Cf-251	906.95	227.00	114.	12.	0.002	164.21	1.037
TH-227	942.82	235.97	201.	12.	0.002	169.56	1.045s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-212	953.46	238.63	235.	-15.	-0.002	147.28	1.048
PB-214	966.92	242.00	304.	19.	0.003	131.86	1.051
EU-152	977.70	244.69	366.	13.	0.002	210.23	1.053s
TH-227	1023.87	256.24	124.	-12.	-0.002	179.11	1.064s
Cd-113m	1053.70	263.70	97.	17.	0.002	87.11	1.070s
BI-210M	1062.23	265.83	102.	15.	0.002	99.55	1.072s
TL-208	1108.02	277.28	144.	15.	0.002	116.05	1.082s
Hg-203	1115.69	279.20	150.	2.	0.000	868.91	1.084s
I-131	1136.08	284.30	121.	-14.	-0.002	108.21	1.088s
PB-214	1179.23	295.09	570.	-14.	-0.002	250.19	1.098s
TL-210	1182.87	296.00	556.	0.	0.000	1000.00	1.099s
PB-212	1198.98	300.03	552.	4.	0.001	925.46	1.102s
PA-231	1199.14	300.07	556.	0.	0.000	1000.00	1.102s
PA-233	1199.58	300.18	556.	0.	0.000	1000.00	1.102s
PA-231	1209.46	302.65	556.	0.	0.000	1000.00	1.104s
BA-133	1210.27	302.85	556.	0.	0.000	1000.00	1.105s
Ba-140	1218.25	304.85	556.	0.	0.000	1000.00	1.106s
BI-210M	1218.44	304.90	556.	0.	0.000	1000.00	1.106s
Ir-192	1232.61	308.44	556.	0.	0.000	1000.00	1.110s
PA-233	1246.90	312.01	556.	0.	0.000	1000.00	1.113s
Ir-192	1264.81	316.49	575.	-21.	-0.003	163.71	1.117s
CR-51	1279.18	320.08	820.	-25.	-0.003	165.74	1.120s
La-140	1313.87	328.76	265.	-24.	-0.003	137.27	1.127s
Cf-249	1332.59	333.44	222.	-21.	-0.003	101.76	1.132s
AC-228	1352.10	338.32	208.	12.	0.002	174.70	1.136s
Cs-136	1361.10	340.57	220.	8.	0.001	270.77	1.138s
EU-152	1375.96	344.29	285.	-23.	-0.003	106.85	1.141s
HF-181	1382.13	345.83	269.	-22.	-0.003	108.72	1.142s
PB-214	1406.50	351.92	57.	9.	0.001	135.87	1.534s
BA-133	1422.80	356.00	160.	-16.	-0.002	111.34	1.151s
I-131	1456.73	364.48	95.	3.	0.000	688.22	1.158s
BA-133	1534.14	383.84	168.	3.	0.000	613.73	1.175s
Cf-249	1550.58	387.95	171.	0.	0.000	1000.00	1.179s
SN-113	1565.53	391.69	152.	16.	0.002	109.06	1.182s
SB-125	1710.25	427.88	66.	-3.	0.000	645.13	1.212
AG-108M	1734.49	433.94	37.	30.	0.004	43.11	1.217s
SB-125	1852.19	463.37	64.	10.	0.001	123.95	1.242
Ir-192	1870.96	468.06	55.	11.	0.001	103.70	1.246
BE-7	1909.10	477.59	117.	14.	0.002	109.18	1.254s
HF-181	1926.70	482.00	132.	14.	0.002	115.01	1.258s
La-140	1946.79	487.02	122.	13.	0.002	121.85	1.262s
RU-103	1986.92	497.05	68.	-14.	-0.002	118.38	1.270
RH-106	2046.16	511.86	133.	162.	0.022	12.80	2.532
Kr-85	2054.62	513.98	278.	18.	0.003	131.86	1.284s
Nd-147	2122.69	531.00	36.	2.	0.000	591.61	1.298s
Ba-140	2147.73	537.26	26.	6.	0.001	192.38	1.303s
CS-134	2251.63	563.24	36.	9.	0.001	138.32	1.324s
CS-134	2275.96	569.32	56.	5.	0.001	232.12	1.329s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PA-234	2276.56	569.47	63.	2.	0.000	617.51	1.329s
BI-207	2277.49	569.70	65.	0.	0.000	1000.00	1.329s
SB-125	2400.67	600.50	373.	-16.	-0.002	169.44	1.354
SB-124	2409.60	602.73	357.	-8.	-0.001	334.58	1.356s
BI-214	2436.72	609.51	59.	21.	0.003	71.94	1.171s
RU-103	2439.86	610.30	470.	-22.	-0.003	139.76	1.361s
AG-108M	2455.79	614.28	188.	-11.	-0.001	184.73	1.365s
PM-144	2470.92	618.06	181.	-4.	-0.001	476.68	1.368s
RH-106	2486.34	621.92	198.	-6.	-0.001	334.17	1.371s
SB-125	2542.23	635.89	57.	3.	0.000	368.51	1.381s
I-131	2546.57	636.97	66.	6.	0.001	185.26	1.383s
AG-110M	2629.71	657.76	50.	13.	0.002	82.70	1.399s
PM-144	2785.00	696.58	8.	31.	0.004	25.08	0.542s
AG-108M	2890.43	722.94	61.	0.	0.000	1000.00	1.449s
EU-154	2892.11	723.36	61.	0.	0.000	1000.00	1.449s
ZR-95	2895.47	724.20	61.	0.	0.000	1000.00	1.450s
BI-212	2907.36	727.17	44.	12.	0.002	83.33	1.452s
PM-146	2941.56	735.72	26.	5.	0.001	226.66	1.458s
PM-146	2987.32	747.16	19.	10.	0.001	95.15	1.467s
ZR-95	3025.60	756.73	56.	-3.	0.000	532.29	1.474s
AG-110M	3054.46	763.94	62.	-11.	-0.002	102.90	1.479s
NB-95	3061.84	765.79	65.	10.	0.001	114.91	1.481s
PA-234M	3064.34	766.41	60.	-3.	0.000	435.03	1.481s
EU-152	3114.37	778.92	33.	5.	0.001	231.42	1.491s
BI-212	3140.37	785.42	42.	-5.	-0.001	278.57	1.495s
CS-134	3182.18	795.87	51.	13.	0.002	83.69	1.503s
TL-210	3197.10	799.60	64.	13.	0.002	92.39	1.506s
CS-134	3206.50	801.95	79.	3.	0.000	375.95	1.508s
CO-58	3241.39	810.67	7.	19.	0.003	34.24	0.377s
La-140	3261.79	815.77	128.	-20.	-0.003	59.72	1.518s
Cs-136	3272.71	818.50	77.	10.	0.001	134.94	1.520s
MN-54	3338.11	834.85	65.	-20.	-0.003	88.91	1.532s
Co-56	3385.80	846.77	42.	-5.	-0.001	278.57	1.541s
TL-208	3440.99	860.56	26.	9.	0.001	121.17	1.550s
NB-94	3483.13	871.10	64.	-15.	-0.002	78.98	1.558s
EU-154	3491.66	873.23	58.	14.	0.002	79.78	1.560s
PA-234	3520.87	880.53	57.	8.	0.001	144.27	1.565s
PA-234	3531.71	883.24	65.	0.	0.000	1000.00	1.567s
Sc-46	3555.87	889.28	50.	11.	0.002	96.69	1.571s
Y-88	3590.92	898.04	19.	8.	0.001	115.31	1.577s
AC-228	3643.05	911.07	61.	-24.	-0.003	58.19	1.586s
AG-110M	3748.76	937.49	28.	3.	0.000	378.59	1.605s
PA-234	3782.88	946.02	9.	19.	0.003	41.73	1.611
EU-152	3855.25	964.11	86.	-19.	-0.003	73.83	1.623s
AC-228	3874.70	968.97	90.	3.	0.000	400.75	1.627s
EU-154	3984.16	996.33	112.	-19.	-0.003	82.08	1.646s
PA-234M	4002.84	1001.00	142.	-31.	-0.004	48.99	1.649s
EU-154	4017.95	1004.77	134.	13.	0.002	129.00	1.651s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Co-56	4150.25	1037.84	16.	4.	0.000	254.21	1.674
Cs-136	4191.18	1048.07	13.	23.	0.003	29.90	1.680
RH-106	4200.35	1050.36	56.	-13.	-0.002	85.40	1.682s
BI-207	4253.56	1063.66	31.	4.	0.000	345.75	1.691s
Ga-68	4308.54	1077.40	10.	7.	0.001	106.27	1.700s
FE-59	4395.97	1099.25	45.	-16.	-0.002	76.78	1.714s
EU-152	4447.29	1112.07	42.	7.	0.001	134.84	1.723s
ZN-65	4461.18	1115.55	49.	8.	0.001	121.90	1.725s
BI-214	4480.15	1120.29	62.	0.	0.000	734.85	1.728D
Sc-46	4481.20	1120.55	47.	3.	0.000	254.99	1.728D
Ta-182	4484.20	1121.30	79.	-12.	-0.002	108.22	1.728s
CO-60	4692.03	1173.24	21.	9.	0.001	119.04	1.762s
Ta-182	4755.30	1189.05	15.	9.	0.001	100.31	1.771s
Ta-182	4884.80	1221.41	11.	6.	0.001	123.77	1.792s
Co-56	4952.31	1238.28	17.	8.	0.001	129.33	1.802s
NA-22	5097.38	1274.53	11.	9.	0.001	61.36	1.824s
EU-154	5097.42	1274.54	20.	1.	0.000	468.29	1.824s
FE-59	5165.67	1291.60	5.	6.	0.001	91.30	1.834s
TL-210	5251.33	1313.00	11.	4.	0.001	177.92	1.847s
CO-60	5329.38	1332.50	27.	-7.	-0.001	138.20	1.858s
AG-110M	5536.67	1384.30	17.	-5.	-0.001	223.16	1.888s
EU-152	5631.54	1408.00	27.	-4.	-0.001	324.36	1.902s
K-40	5842.99	1460.83	37.	2.	0.000	670.65	1.931
La-140	6384.87	1596.21	6.	7.	0.001	88.62	2.003s
SB-124	6764.24	1690.98	17.	-11.	-0.002	92.93	2.050s
BI-214	7058.52	1764.49	30.	-3.	0.000	252.80	2.085s
Co-56	7085.98	1771.35	48.	-15.	-0.002	72.57	2.088s
Y-88	7345.05	1836.06	6.	7.	0.001	91.18	2.117s

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	R	8.5762E-01				5.31E+01	
			477.60	8.576E-01	?(	3.155E+00 1.09E+02 1.04E+01	G
NA-22	R	1.3833E-01				9.50E+02	
			1274.53	1.383E-01	?(	2.764E-01 6.14E+01 7.85E+01	G
K-40	N	2.0347E-01				4.66E+11	
			1460.83	2.035E-01	?(P	3.886E+00 6.71E+02 1.07E+01	G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

Sc-46    R   1.1491E-01                                     8.38E+01
                          889.28 1.149E-01 &(  3.762E-01 9.67E+01 8.99E+01 G
                         1120.55 3.483E-02 }   4.406E-01 2.55E+02 8.75E+01 G

CR-51    R  -1.1693E+00                                     2.77E+01
                          320.08-1.169E+00 ?(  6.467E+00 1.66E+02 9.83E+00 G

MN-54    C  -1.8054E-01                                     3.12E+02
                          834.85-1.805E-01 ?(  3.658E-01 8.89E+01 1.00E+02 G

FE-59    R  -3.2239E-01                                     4.45E+01
                         1099.25-3.224E-01 ?(P 6.706E-01 7.68E+01 5.56E+01 G
                         1291.60 1.788E-01 +   3.776E-01 9.13E+01 4.36E+01 G

Co-56    R   5.6205E-02                                     7.73E+01
                          846.77-5.526E-02 ?(  3.637E-01 2.79E+02 8.28E+01 G
                         1238.28 1.767E-01 &(P 5.196E-01 1.29E+02 5.07E+01 G
                         1037.84 3.516E-01 ?(P 2.151E+00 2.54E+02 1.06E+01 G
                         1771.35-1.856E+00 +   4.485E+00 7.26E+01 1.20E+01  A

CO-57    R   7.5544E-02                                     2.72E+02
                          122.06 7.554E-02 ?(  2.602E-01 1.03E+02 8.53E+01 G
                          136.47 0.000E+00 -   3.426E+00 1.00E+03 1.09E+01 G

CO-58    R   1.7592E-01                                     7.09E+01
                          810.78 1.759E-01  (  1.392E-01 3.42E+01 9.59E+01 G

CO-60    R   5.9096E-03                                     1.93E+03
                         1332.50-9.984E-02 ?(P 3.746E-01 1.38E+02 9.01E+01 G
                         1173.24 1.132E-01 ?(P 3.113E-01 1.19E+02 8.88E+01 G

ZN-65    F   1.8442E-01                                     2.44E+02
                         1115.55 1.844E-01 ?(  7.697E-01 1.22E+02 5.08E+01 G

NB-94    R   1.2491E-02                                     7.41E+06
                          702.63 1.249E-02 %(P 3.519E-01 1.15E+03 8.72E+01 G
                          871.10-1.599E-01 +   4.222E-01 7.90E+01 8.84E+01 G

ZR-95    I  -4.6634E-02                                     6.40E+01
                          756.73-4.663E-02 ?(  5.842E-01 5.32E+02 5.45E+01 G
                          724.20 0.000E+00 +   7.274E-01 1.00E+03 4.42E+01 G

NB-95    I   8.8433E-02                                     6.40E+01
                          765.79 8.843E-02 ?(  3.455E-01 1.15E+02 9.98E+01 G
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Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
RU-103	R -1.0012E-01					3.93E+01	
		497.05	-1.001E-01	?(	2.942E-01	1.18E+02	8.87E+01 G
		610.30	-2.868E+00	&	1.340E+01	1.40E+02	5.66E+00 GA
RH-106	R -5.3141E-01					3.74E+02	
		621.92	-5.314E-01	?(	6.048E+00	3.34E+02	8.36E+00 G
		1050.36	-1.061E+01	+	3.044E+01	8.54E+01	1.31E+00 G
		511.86	5.444E+00		1.903E+00	1.28E+01	1.92E+01 GA
AG-108M	C 1.9403E-01					1.53E+05	
		433.94	1.940E-01	?(P	1.971E-01	4.31E+01	9.05E+01 G
		722.94	0.000E+00	-	3.535E-01	1.00E+03	9.08E+01 G
		614.28	-8.691E-02	&	5.439E-01	1.85E+02	8.98E+01 G
AG-110M	R 8.7634E-02					2.50E+02	
		884.68	1.149E-02	%(	6.907E-01	1.71E+03	5.47E+01 G
		657.76	1.348E-01	?(	3.742E-01	8.27E+01	7.35E+01 G
		937.49	1.151E-01	?(	1.050E+00	3.79E+02	2.56E+01 G
		1384.30	-3.079E-01	+ P	1.470E+00	2.23E+02	1.89E+01 G
		763.94	-5.940E-01	+	2.070E+00	1.03E+02	1.63E+01 G
SN-113	F 1.3747E-01					1.15E+02	
		391.69	1.375E-01	?(	5.039E-01	1.09E+02	6.42E+01 G
SB-124	R -6.5005E-02					6.02E+01	
		602.73	-6.500E-02	(	7.346E-01	3.35E+02	8.96E+01 G
		1690.98	-4.002E-01	+	7.976E-01	9.29E+01	4.07E+01 G
		722.79	-9.367E-02	%	3.635E+00	1.10E+03	8.76E+00 G
SB-125	R 1.2329E-01					1.01E+03	
		427.88	-5.874E-02	?(P	7.945E-01	6.45E+02	2.92E+01 G
		600.50	-6.655E-01	&	3.786E+00	1.69E+02	1.77E+01 G
		635.89	1.986E-01	*(P	2.533E+00	3.69E+02	1.13E+01 G
		463.37	5.448E-01	?(P	2.281E+00	1.24E+02	1.06E+01 G
I-131	R 7.0095E-02					8.02E+00	
		364.48	1.756E-02	(P	3.048E-01	6.88E+02	8.11E+01 G
		284.30	-1.078E+00	+ P	4.146E+00	1.08E+02	5.62E+00 G
		636.97	6.374E-01	&(	4.073E+00	1.85E+02	7.51E+00 G
Gd-153	R 5.8694E-01					2.42E+02	
		97.50	5.869E-01	&(	5.956E-01	3.21E+01	2.76E+01 G
		103.20	-3.193E-01	-	1.589E+00	1.49E+02	1.94E+01 G
Ga-68	C 4.0079E+00					4.71E-02	
		1077.40	4.008E+00	?(	9.989E+00	1.06E+02	3.30E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BA-133	R	-1.4176E-01					3.85E+03	
			356.00	-1.418E-01	&(	5.305E-01	1.11E+02	5.85E+01 G
			302.85	0.000E+00	+	2.962E+00	1.00E+03	1.71E+01 G
			383.84	1.680E-01	&	3.534E+00	6.14E+02	9.46E+00 GA
			80.99	-1.084E-01	& P	6.625E-01	2.66E+02	2.94E+01 GA
CS-134	R	2.4633E-01					7.54E+02	
			795.87	1.561E-01	(	4.388E-01	8.37E+01	7.19E+01 G
			604.71	-6.576E-08	&	7.737E-01	3.46E+08	8.43E+01 G
			569.32	2.833E-01	?(	2.288E+00	2.32E+02	1.15E+01 G
			801.95	4.465E-01	?(	5.832E+00	3.76E+02	6.65E+00 G
			563.24	9.856E-01	?(P	3.309E+00	1.38E+02	6.40E+00 G
CS-137	I	-1.7987E-03					1.10E+04	
			661.66	-1.799E-03	&(	4.053E-01	6.43E+03	8.52E+01 G
CE-139	R	-5.0150E-02					1.38E+02	
			165.85	-5.015E-02	?(	3.508E-01	2.08E+02	7.65E+01 G
Ba-140	R	1.5381E-01					1.28E+01	
			537.26	1.538E-01	?(	7.340E-01	1.92E+02	2.41E+01 G
			162.66	-1.130E+00	&	4.064E+00	1.08E+02	5.74E+00 G
			304.85	0.000E+00	-	1.404E+01	1.00E+03	3.62E+00 G
La-140	R	1.5161E-01					1.28E+01	
			1596.21	1.213E-01	&(	2.402E-01	8.86E+01	8.16E+01 G
			487.02	2.168E-01	?(	8.927E-01	1.22E+02	3.80E+01 G
			328.76	-7.431E-01	+ P	2.393E+00	1.37E+02	1.56E+01 G
			815.77	-7.944E-01	+ P	2.226E+00	5.97E+01	2.22E+01 G
CE-141	I	-1.5550E-01					3.25E+01	
			145.44	-1.555E-01	?(	8.020E-01	1.55E+02	4.84E+01 G
PM-144	C	2.5416E-01					3.63E+02	
			696.54	2.542E-01	*(P	1.256E-01	2.51E+01	9.90E+01 G
			618.06	-2.966E-02	- P	4.867E-01	4.77E+02	9.91E+01 G
EU-152	R	4.6812E-01					4.94E+03	
			121.78	2.754E-01	?(	9.095E-01	9.89E+01	2.34E+01 G
			344.29	-4.700E-01	+	1.679E+00	1.07E+02	2.38E+01 G
			1112.07	6.954E-01	?(P	3.199E+00	1.35E+02	1.13E+01 G
			778.92	4.199E-01	?(	2.311E+00	2.31E+02	1.10E+01 G
			964.11	-1.592E+00	+	3.909E+00	7.38E+01	1.18E+01 G
			244.69	9.122E-01	?(	6.454E+00	2.10E+02	5.53E+00 G
			1408.00	-2.744E-01	-	2.003E+00	3.24E+02	1.74E+01 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
EU-154	R	3.2020E-01					3.14E+03	
			123.10	-2.016E-01	?(	6.673E-01	9.92E+01	3.56E+01 G
			1274.54	5.090E-02	+	8.734E-01	4.68E+02	3.24E+01 G
			723.36	0.000E+00	+	1.961E+00	1.00E+03	1.64E+01 G
			873.23	1.424E+00	?(	3.802E+00	7.98E+01	9.41E+00 G
			1004.77	8.301E-01	?(	3.619E+00	1.29E+02	1.61E+01 G
			996.33	-2.019E+00	+	5.532E+00	8.21E+01	9.61E+00 G
EU-155	R	9.6986E-02					1.81E+03	
			105.31	-4.296E-02	(P	1.472E+00	9.30E+02	2.06E+01 G
			86.54	1.828E-01	?(	1.045E+00	1.71E+02	3.36E+01 G
HF-181	R	1.1827E-01					4.24E+01	
			482.00	1.183E-01	?(	4.585E-01	1.15E+02	7.61E+01 G
			133.02	-1.666E-01	+ P	1.248E+00	1.75E+02	3.00E+01 G
			345.83	-8.158E-01	+	2.967E+00	1.09E+02	1.31E+01 G
			136.30	0.000E+00	-	7.903E+00	1.00E+03	4.72E+00 G
Ta-182	R	-6.3504E-02					1.14E+02	
			1121.30	-4.568E-01	&(	1.673E+00	1.08E+02	2.92E+01 G
			1221.41	3.070E-01	+	8.692E-01	1.24E+02	2.43E+01 G
			1189.05	6.078E-01	?(	1.402E+00	1.00E+02	1.71E+01 G
Hg-203	F	1.0429E-02					4.66E+01	
			279.20	1.043E-02	?(	3.117E-01	8.69E+02	8.15E+01 G
TL-208	R	1.5218E-01					6.98E+02	
			583.02	-1.185E-02	%(P	3.895E-01	1.30E+03	7.29E+01 G
			277.28	1.206E+00	?(	4.715E+00	1.16E+02	5.26E+00 G
			860.56	6.368E-01	?(P	1.858E+00	1.21E+02	1.32E+01 G
PM-146	C	1.0252E-01					2.02E+03	
			453.88	-7.963E-04	%(P	3.209E-01	1.53E+04	6.50E+01 G
			747.16	2.520E-01	&(	5.643E-01	9.52E+01	3.40E+01 G
			735.72	1.752E-01	*(P	9.821E-01	2.27E+02	2.25E+01 G
Y-88	R	1.1315E-01					1.07E+02	
			1836.06	1.288E-01	?(P	2.538E-01	9.12E+01	8.84E+01 G
			898.04	9.631E-02	?(	2.640E-01	1.15E+02	8.24E+01 G
Cd-113m		1.1332E+03					5.33E+03	
			263.70	1.133E+03	?(	3.306E+03	8.71E+01	6.00E-03 K
Cf-251	T	-2.2357E-01					3.28E+05	
			176.60	-2.236E-01	(	1.238E+00	2.15E+02	1.70E+01 G
			227.00	7.237E-01	?	3.074E+00	1.64E+02	6.30E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Sn-126		-7.2622E-01					3.65E+07	
			87.57	0.000E+00	+	9.492E-01	1.00E+03	3.75E+01 GA
			64.28	-7.262E-01	?(	3.368E+00	1.39E+02	9.70E+00 G
			86.94	0.000E+00	&	3.940E+00	1.00E+03	9.04E+00 GA
PB-210	R	-7.8187E+00					8.14E+03	
			46.54	-7.819E+00	(P	8.856E+00	3.33E+01	4.05E+00 G
PB-212	R	-1.3178E-01					6.98E+02	
			238.63	-1.318E-01	?(P	6.584E-01	1.47E+02	4.30E+01 G
			300.03	5.492E-01	? P	1.710E+01	9.25E+02	2.93E+00 GA
PB-214	R	1.2693E-01					5.84E+05	
			351.93	1.269E-01	(P	5.080E-01	1.36E+02	3.71E+01 G
			295.09	-3.118E-01	& P	2.612E+00	2.50E+02	1.93E+01 G
			242.00	9.925E-01		4.388E+00	1.32E+02	7.38E+00 GA
BI-207	C	5.1418E-02					1.18E+04	
			1063.66	5.142E-02	?(P	4.136E-01	3.46E+02	7.45E+01 G
			569.70	0.000E+00	-	2.873E-01	1.00E+03	9.77E+01 G
BI-212	R	1.5343E+00					6.98E+02	
			727.17	1.534E+00	(	4.299E+00	8.33E+01	6.45E+00 G
			785.42	-4.282E+00	+	2.818E+01	2.79E+02	1.01E+00 GA
U-235	R	1.8414E+00					2.57E+11	
			143.79	1.841E+00	(	1.551E+00	3.38E+01	9.11E+00 G
			205.33	-7.865E-01	& P	4.349E+00	1.63E+02	4.73E+00 G
			163.38	3.698E-01	& P	5.156E+00	4.14E+02	4.67E+00 G
			185.72	7.491E-01	-	2.840E-01	1.71E+01	4.78E+01 GA
BI-214	R	3.7952E-01					5.84E+05	
			609.31	3.795E-01	@(P	7.010E-01	7.19E+01	4.02E+01 G
			1120.29	0.000E+00	} P	3.309E+00	7.35E+02	1.31E+01 G
			1764.49	-3.044E-01	- P	2.734E+00	2.53E+02	1.58E+01 G
BI-210M	T	1.2330E-01					1.10E+09	
			265.83	1.233E-01	&(P	4.091E-01	9.95E+01	5.00E+01 G
			304.90	0.000E+00	-	1.815E+00	1.00E+03	2.80E+01 G
AC-228	R	-9.3231E-01					2.10E+03	
			911.07	-9.323E-01	?(P	1.535E+00	5.82E+01	2.44E+01 G
			968.97	2.334E-01	+ P	3.222E+00	4.01E+02	1.46E+01 G
			338.32	4.789E-01	& P	2.813E+00	1.75E+02	1.21E+01 G
			93.35	-1.389E+00	+	6.739E+00	1.46E+02	5.56E+00 XA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
TH-227	R	2.7844E-01					7.95E+03	
			256.24	-7.100E-01	&(P	3.132E+00	1.79E+02	7.00E+00 G
			235.97	3.701E-01	(	2.121E+00	1.70E+02	1.23E+01 G
			50.14	1.002E+00	&(	3.938E+00	1.18E+02	8.00E+00 G
TH-229	N	-1.5924E+00					2.68E+06	
			193.51	-1.592E+00	?(	5.038E+00	1.24E+02	4.40E+00 G
			210.85	-6.677E-01	+	6.969E+00	4.02E+02	2.99E+00 G
TH-234	R	2.8329E+00					1.63E+12	
			92.59	3.322E+00	(P	8.312E+00	9.05E+01	2.69E+00 G
			63.29	2.408E+00	(P	7.473E+00	1.19E+02	3.10E+00 G
PA-234	R	3.1442E-01					1.63E+12	
			131.29	-4.023E-01	&(	2.202E+00	1.64E+02	1.80E+01 G
			946.02	1.374E+00	?(	1.248E+00	4.17E+01	1.34E+01 G
			569.47	1.558E-01	?(	3.378E+00	6.18E+02	8.20E+00 C
			883.24	0.000E+00	-	3.950E+00	1.00E+03	9.60E+00 G
			880.53	1.200E+00	*	5.949E+00	1.44E+02	6.00E+00 GA
PA-234M	R	-6.2276E+01					1.63E+12	
			1001.00	-6.228E+01	?(P	1.185E+02	4.90E+01	5.05E-01 G
			766.41	-1.136E+01	+ P	1.669E+02	4.35E+02	1.98E-01 G
AM-241	T	1.8022E-01					1.58E+05	
			59.54	1.802E-01	(	8.883E-01	1.47E+02	3.57E+01 G
Np-237	F	5.1052E-01					2.14E+06	
			86.49	5.105E-01	?(	2.636E+00	1.55E+02	1.31E+01 G
Ir-192	R	-2.9544E-02					7.40E+01	
			316.49	-1.399E-01	?(	7.660E-01	1.64E+02	6.92E+01 G
			468.06	1.611E-01	&(	5.669E-01	1.04E+02	4.01E+01 G
			308.44	0.000E+00	+	2.411E+00	1.00E+03	2.13E+01 G
Cs-136	R	2.1147E-01					1.30E+01	
			818.50	1.098E-01	?(	5.052E-01	1.35E+02	7.74E+01 G
			1048.07	4.107E-01	?(	3.396E-01	2.99E+01	6.01E+01 G
			340.57	1.018E-01	?(	9.355E-01	2.71E+02	3.74E+01 G
Np-239	R	-2.5869E-01					2.36E+00	
			103.70	0.000E+00	&	1.328E+00	1.00E+03	2.30E+01 X
			106.13	-2.587E-01	?(	1.640E+00	1.89E+02	1.88E+01 G
			99.50	-3.275E-01	+	1.536E+00	1.40E+02	1.44E+01 X

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

Nd-147   R   1.0114E-01                                      1.11E+01
                          531.00 1.011E-01 ?(  1.551E+00 5.92E+02 1.31E+01 G
                           91.10-2.788E-01 +   1.378E+00 1.48E+02 2.76E+01 G

TL-210   R   1.1401E-01                                      5.84E+05
                          799.60 1.140E-01  (  3.550E-01 9.24E+01 9.90E+01 G
                          296.00 0.000E+00 -   6.305E-01 1.00E+03 7.90E+01 G
                         1313.00 2.551E-01 ?   1.056E+00 1.78E+02 2.10E+01 CA

Kr-85    I   2.7177E+01                                      3.92E+03
                          513.98 2.718E+01 ?(  1.203E+02 1.32E+02 4.34E-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	512.	-95.	-0.013	33.30	-7.819E+00	P
TH-227	50.14	428.	25.	0.004	117.66	1.002E+00	
AM-241	59.54	510.	22.	0.003	147.39	1.802E-01	
Sn-126	64.28	574.	-25.	-0.003	138.86	-7.262E-01	
BA-133	80.99	220.	-12.	-0.002	265.70	-1.084E-01	P
Np-237	86.49	726.	25.	0.003	154.71	5.105E-01	
EU-155	86.54	751.	23.	0.003	171.12	1.828E-01	
Nd-147	91.10	893.	-29.	-0.004	148.33	-2.788E-01	
AC-228	93.35	864.	-29.	-0.004	145.63	-1.389E+00	
Np-239	99.50	284.	-17.	-0.002	139.66	-3.275E-01	
EU-155	105.31	555.	-3.	0.000	930.17	-4.296E-02	P
Np-239	106.13	561.	-18.	-0.002	189.29	-2.587E-01	
EU-152	121.78	255.	23.	0.003	98.90	2.754E-01	
CO-57	122.06	278.	23.	0.003	103.11	7.554E-02	
EU-154	123.10	320.	-26.	-0.004	99.24	-2.016E-01	
PA-234	131.29	882.	-26.	-0.004	164.06	-4.023E-01	
HF-181	133.02	779.	-18.	-0.002	174.72	-1.666E-01	P
CE-141	145.44	790.	-26.	-0.004	154.59	-1.555E-01	
Ba-140	162.66	252.	-21.	-0.003	107.51	-1.130E+00	
CE-139	165.85	330.	-12.	-0.002	207.62	-5.015E-02	
Cf-251	176.60	187.	-12.	-0.002	215.14	-2.236E-01	
TH-229	193.51	187.	-21.	-0.003	123.76	-1.592E+00	
TH-229	210.85	147.	-6.	-0.001	402.03	-6.677E-01	
Cf-251	227.00	114.	12.	0.002	164.21	7.237E-01	
TH-227	235.97	201.	12.	0.002	169.56	3.701E-01	
EU-152	244.69	366.	13.	0.002	210.23	9.122E-01	
TH-227	256.24	124.	-12.	-0.002	179.11	-7.100E-01	P
Cd-113m	263.70	97.	17.	0.002	87.11	1.133E+03	
BI-210M	265.83	102.	15.	0.002	99.55	1.233E-01	P
TL-208	277.28	144.	15.	0.002	116.05	1.206E+00	
Hg-203	279.20	150.	2.	0.000	868.91	1.043E-02	
I-131	284.30	121.	-14.	-0.002	108.21	-1.078E+00	P
Ir-192	316.49	575.	-21.	-0.003	163.71	-1.399E-01	
CR-51	320.08	820.	-25.	-0.003	165.74	-1.169E+00	
La-140	328.76	265.	-24.	-0.003	137.27	-7.431E-01	P
Cf-249	333.44	222.	-21.	-0.003	101.76	-6.560E-01	
AC-228	338.32	208.	12.	0.002	174.70	4.789E-01	P
Cs-136	340.57	220.	8.	0.001	270.77	1.018E-01	
EU-152	344.29	285.	-23.	-0.003	106.85	-4.700E-01	
HF-181	345.83	269.	-22.	-0.003	108.72	-8.158E-01	
BA-133	356.00	160.	-16.	-0.002	111.34	-1.418E-01	
I-131	364.48	95.	3.	0.000	688.22	1.756E-02	P
BA-133	383.84	168.	3.	0.000	613.73	1.680E-01	
SN-113	391.69	152.	16.	0.002	109.06	1.375E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
SB-125	427.88	66.	-3.	0.000	645.13	-5.874E-02	P
AG-108M	433.94	37.	30.	0.004	43.11	1.940E-01	P
SB-125	463.37	64.	10.	0.001	123.95	5.448E-01	P
Ir-192	468.06	55.	11.	0.001	103.70	1.611E-01	
BE-7	477.59	117.	14.	0.002	109.18	8.576E-01	
HF-181	482.00	132.	14.	0.002	115.01	1.183E-01	
La-140	487.02	122.	13.	0.002	121.85	2.168E-01	
RU-103	497.05	68.	-14.	-0.002	118.38	-1.001E-01	
RH-106	511.86	133.	162.	0.022	12.80	5.444E+00	
Kr-85	513.98	278.	18.	0.003	131.86	2.718E+01	
Nd-147	531.00	36.	2.	0.000	591.61	1.011E-01	
Ba-140	537.26	26.	6.	0.001	192.38	1.538E-01	
CS-134	563.24	36.	9.	0.001	138.32	9.856E-01	P
CS-134	569.32	56.	5.	0.001	232.12	2.833E-01	
PA-234	569.47	63.	2.	0.000	617.51	1.558E-01	
SB-125	600.50	373.	-16.	-0.002	169.44	-6.655E-01	
SB-124	602.73	357.	-8.	-0.001	334.58	-6.500E-02	
RU-103	610.30	470.	-22.	-0.003	139.76	-2.868E+00	
AG-108M	614.28	188.	-11.	-0.001	184.73	-8.691E-02	
RH-106	621.92	198.	-6.	-0.001	334.17	-5.314E-01	
SB-125	635.89	57.	3.	0.000	368.51	1.986E-01	P
I-131	636.97	66.	6.	0.001	185.26	6.374E-01	
AG-110M	657.76	50.	13.	0.002	82.70	1.348E-01	
BI-212	727.17	44.	12.	0.002	83.33	1.534E+00	
PM-146	735.72	26.	5.	0.001	226.66	1.752E-01	P
PM-146	747.16	19.	10.	0.001	95.15	2.520E-01	
ZR-95	756.73	56.	-3.	0.000	532.29	-4.663E-02	
AG-110M	763.94	62.	-11.	-0.002	102.90	-5.940E-01	
NB-95	765.79	65.	10.	0.001	114.91	8.843E-02	
PA-234M	766.41	60.	-3.	0.000	435.03	-1.136E+01	P
EU-152	778.92	33.	5.	0.001	231.42	4.199E-01	
BI-212	785.42	42.	-5.	-0.001	278.57	-4.282E+00	
CS-134	795.87	51.	13.	0.002	83.69	1.561E-01	
TL-210	799.60	64.	13.	0.002	92.39	1.140E-01	
CS-134	801.95	79.	3.	0.000	375.95	4.465E-01	
La-140	815.77	128.	-20.	-0.003	59.72	-7.944E-01	P
Cs-136	818.50	77.	10.	0.001	134.94	1.098E-01	
MN-54	834.85	65.	-20.	-0.003	88.91	-1.805E-01	
Co-56	846.77	42.	-5.	-0.001	278.57	-5.526E-02	
TL-208	860.56	26.	9.	0.001	121.17	6.368E-01	P
NB-94	871.10	64.	-15.	-0.002	78.98	-1.599E-01	
EU-154	873.23	58.	14.	0.002	79.78	1.424E+00	
PA-234	880.53	57.	8.	0.001	144.27	1.200E+00	
Y-88	898.04	19.	8.	0.001	115.31	9.631E-02	
AC-228	911.07	61.	-24.	-0.003	58.19	-9.323E-01	P
AG-110M	937.49	28.	3.	0.000	378.59	1.151E-01	
PA-234	946.02	9.	19.	0.003	41.73	1.374E+00	
EU-152	964.11	86.	-19.	-0.003	73.83	-1.592E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
AC-228	968.97	90.	3.	0.000	400.75	2.334E-01		P
EU-154	996.33	112.	-19.	-0.003	82.08	-2.019E+00		
PA-234M	1001.00	142.	-31.	-0.004	48.99	-6.228E+01		P
EU-154	1004.77	134.	13.	0.002	129.00	8.301E-01		
Co-56	1037.84	16.	4.	0.000	254.21	3.516E-01		P
Cs-136	1048.07	13.	23.	0.003	29.90	4.107E-01		
RH-106	1050.36	56.	-13.	-0.002	85.40	-1.061E+01		
BI-207	1063.66	31.	4.	0.000	345.75	5.142E-02		P
Ga-68	1077.40	10.	7.	0.001	106.27	4.008E+00		
FE-59	1099.25	45.	-16.	-0.002	76.78	-3.224E-01		P
EU-152	1112.07	42.	7.	0.001	134.84	6.954E-01		P
ZN-65	1115.55	49.	8.	0.001	121.90	1.844E-01		
Ta-182	1121.30	79.	-12.	-0.002	108.22	-4.568E-01		
CO-60	1173.24	21.	9.	0.001	119.04	1.132E-01		P
Ta-182	1189.05	15.	9.	0.001	100.31	6.078E-01		
Ta-182	1221.41	11.	6.	0.001	123.77	3.070E-01		
Co-56	1238.28	17.	8.	0.001	129.33	1.767E-01		P
EU-154	1274.54	20.	1.	0.000	468.29	5.090E-02		
FE-59	1291.60	5.	6.	0.001	91.30	1.788E-01		
TL-210	1313.00	11.	4.	0.001	177.92	2.551E-01		
CO-60	1332.50	27.	-7.	-0.001	138.20	-9.984E-02		P
AG-110M	1384.30	17.	-5.	-0.001	223.16	-3.079E-01		P
EU-152	1408.00	27.	-4.	-0.001	324.36	-2.744E-01		
La-140	1596.21	6.	7.	0.001	88.62	1.213E-01		
SB-124	1690.98	17.	-11.	-0.002	92.93	-4.002E-01		
Co-56	1771.35	48.	-15.	-0.002	72.57	-1.856E+00		
Y-88	1836.06	6.	7.	0.001	91.18	1.288E-01		P

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	8.5761E-01	8.5762E-01	1.092E+02%	3.16E+00
NA-22	#A	1.3833E-01	1.3833E-01	6.136E+01%	2.76E-01
K-40	#A	2.0347E-01	2.0347E-01	6.707E+02%	3.89E+00
Sc-46	#A	1.1491E-01	1.1491E-01	9.669E+01%	3.76E-01
CR-51	#A	-1.1693E+00	-1.1693E+00	1.657E+02%	6.47E+00
MN-54	#A	-1.8054E-01	-1.8054E-01	8.891E+01%	3.66E-01
FE-59	#A	-3.2239E-01	-3.2239E-01	7.678E+01%	6.71E-01
Co-56	#A	5.6205E-02	5.6205E-02	1.293E+02%	3.64E-01
CO-57	#A	7.5544E-02	7.5544E-02	1.031E+02%	2.60E-01
CO-58		1.7592E-01	1.7592E-01	3.424E+01%	1.39E-01
CO-60	#A	5.9096E-03	5.9096E-03	9.120E+01%	3.75E-01
ZN-65	#A	1.8442E-01	1.8442E-01	1.219E+02%	7.70E-01
NB-94	#A	1.2491E-02	1.2491E-02	1.150E+03%	3.52E-01

ZR-95	#A	-4.6634E-02	-4.6634E-02	5.323E+02%	5.84E-01
NB-95	#A	8.8432E-02	8.8433E-02	1.149E+02%	3.46E-01
RU-103	#A	-1.0012E-01	-1.0012E-01	1.184E+02%	2.94E-01
RH-106	#A	-5.3141E-01	-5.3141E-01	3.342E+02%	6.05E+00
AG-108M	#A	1.9403E-01	1.9403E-01	4.311E+01%	1.97E-01
AG-110M	#A	8.7634E-02	8.7634E-02	8.270E+01%	6.91E-01
SN-113	#A	1.3747E-01	1.3747E-01	1.091E+02%	5.04E-01
SB-124	#A	-6.5004E-02	-6.5005E-02	3.346E+02%	7.35E-01
SB-125	#A	1.2329E-01	1.2329E-01	1.240E+02%	7.95E-01
I-131	#A	7.0092E-02	7.0095E-02	1.853E+02%	3.05E-01
Gd-153	#A	5.8694E-01	5.8694E-01	3.213E+01%	5.96E-01
Ga-68	#A	3.9766E+00	4.0079E+00	1.063E+02%	9.99E+00
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%	4.84E-01
BA-133	#A	-1.4176E-01	-1.4176E-01	1.113E+02%	5.31E-01
CS-134	#A	2.4633E-01	2.4633E-01	8.369E+01%	4.39E-01
CS-137	#A	-1.7987E-03	-1.7987E-03	6.428E+03%	4.05E-01
CE-139	#A	-5.0150E-02	-5.0150E-02	2.076E+02%	3.51E-01
Ba-140	#A	1.5381E-01	1.5381E-01	1.924E+02%	7.34E-01
La-140	#A	1.5160E-01	1.5161E-01	7.533E+01%	2.40E-01
CE-141	#A	-1.5550E-01	-1.5550E-01	1.546E+02%	8.02E-01
CE-144	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.34E+00
PM-144	#	2.5416E-01	2.5416E-01	2.508E+01%	1.26E-01
EU-152	#A	4.6811E-01	4.6812E-01	8.864E+01%	9.10E-01
EU-154	#A	3.2020E-01	3.2020E-01	6.042E+01%	6.67E-01
EU-155	#A	9.6986E-02	9.6986E-02	1.711E+02%	1.47E+00
HF-181	#A	1.1827E-01	1.1827E-01	1.150E+02%	4.58E-01
Ta-182	#A	-6.3504E-02	-6.3504E-02	7.378E+01%	1.67E+00
Hg-203	#A	1.0429E-02	1.0429E-02	8.689E+02%	3.12E-01
TL-208	#A	1.5218E-01	1.5218E-01	1.160E+02%	3.90E-01
PM-146	#A	1.0252E-01	1.0252E-01	9.515E+01%	3.21E-01
Y-88	#A	1.1315E-01	1.1315E-01	7.350E+01%	2.54E-01
Cd-113m	#A	1.1332E+03	1.1332E+03	8.711E+01%	3.31E+03
Cd-109	#A	0.0000E+00	0.0000E+00	1.000E+03%	9.86E+00
Cf-251	#A	-2.2357E-01	-2.2357E-01	2.151E+02%	1.24E+00
Cf-249	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.15E-01
Sn-126	#A	-7.2622E-01	-7.2622E-01	1.389E+02%	3.37E+00
PB-210	#A	-7.8187E+00	-7.8187E+00	3.330E+01%	8.86E+00
PB-212	#A	-1.3178E-01	-1.3178E-01	1.473E+02%	6.58E-01
PB-214	A	1.2693E-01	1.2693E-01	1.359E+02%	5.08E-01
BI-207	#A	5.1418E-02	5.1418E-02	3.457E+02%	4.14E-01
BI-212	#A	1.5343E+00	1.5343E+00	8.333E+01%	4.30E+00
U-235		1.8414E+00	1.8414E+00	3.382E+01%	1.55E+00
BI-214	#A	3.7952E-01	3.7952E-01	7.194E+01%	7.01E-01
BI-210M	#A	1.2330E-01	1.2330E-01	9.955E+01%	4.09E-01
AC-228	#A	-9.3231E-01	-9.3231E-01	5.819E+01%	1.53E+00
TH-227	#A	2.7844E-01	2.7844E-01	9.109E+01%	3.13E+00
TH-229	#A	-1.5924E+00	-1.5924E+00	1.238E+02%	5.04E+00
TH-234	A	2.8329E+00	2.8329E+00	7.461E+01%	8.31E+00
PA-231	#A	0.0000E+00	0.0000E+00	7.071E+02%	3.04E+01

PA-233 #A	0.0000E+00	0.0000E+00	7.071E+02%		1.44E+00
PA-234 #A	3.1442E-01	3.1442E-01	4.173E+01%		2.20E+00
PA-234M#A	-6.2276E+01	-6.2276E+01	4.899E+01%		1.18E+02
AM-241 #A	1.8022E-01	1.8022E-01	1.474E+02%		8.88E-01
Np-237 #A	5.1052E-01	5.1052E-01	1.547E+02%		2.64E+00
Ir-192 #A	-2.9544E-02	-2.9544E-02	9.689E+01%		7.66E-01
Cs-136 #A	2.1147E-01	2.1147E-01	2.990E+01%		5.05E-01
Np-239 #A	-2.5865E-01	-2.5869E-01	1.893E+02%		1.64E+00
Nd-147 #A	1.0113E-01	1.0114E-01	5.916E+02%		1.55E+00
TL-210 #A	1.1401E-01	1.1401E-01	9.239E+01%		3.55E-01
Kr-85 #A	2.7177E+01	2.7177E+01	1.319E+02%		1.20E+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 (37.7 to 1999.6 keV) 3.376E+00 Bq/Sample
Total Decayed Activity (37.7 to 1999.6 keV) 3.3762381E+00 Bq/Sample

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486234_Gamma_180-111757-C-3-A. 17_Gamma_20202084.spc.

Prep Batch: 486236

Fill Geometry, 21-Day In-Growth

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 486236

Lab Id: MB 160-486236/1-A | Analyzed: 11/12/20 13:18 | Ts: 30 | Sigma: 2
Client ID: | Detector: GV12 | Decay Corrected: No | Ingrowth:

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	0.06956	0.0622	0.0626	U	pCi/g	1.00	0.422	488940
Radium 226 and 228 (positive only)	0.2037	0.189	0.190	U	pCi/g		0.422	488940
Radium-228	0.1341	0.179	0.179	U	pCi/g		0.230	488940

Lab Id: LCS 160-486236/2-A | Analyzed: 11/12/20 13:19 | Ts: 30 | Sigma: 2
Client ID: | Detector: GV13 | Decay Corrected: No | Ingrowth:

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Americium-241	90.96	1.49	9.56		pCi/g		1.07	488941
Cesium-137	25.23	0.551	2.68		pCi/g		0.156	488941
Cobalt-60	8.824	0.272	0.927		pCi/g		0.0624	488941

Lab Id: 180-111757-1 | Analyzed: 11/12/20 13:17 | Ts: 30 | Sigma: 2
Client ID: JOF-SES-01-20201001 ~ AOI1 | Detector: GV9 | Decay Corrected: No | Ingrowth:

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.25	0.224	0.259		pCi/g	1.00	0.169	488942
Radium-228	0.944	0.232	0.251		pCi/g		0.142	488942
Radium 226 and 228 (positive only)	2.19	0.322	0.361		pCi/g		0.169	488942

Lab Id: 180-111757-1 DU | Analyzed: 11/12/20 13:58 | Ts: 30 | Sigma: 2
Client ID: JOF-SES-01-20201001 ~ AOI1 | Detector: GV15 | Decay Corrected: No | Ingrowth:

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	1.507	0.256	0.300		pCi/g	1.00	0.140	488953
Radium-228	0.9422	0.287	0.303		pCi/g		0.156	488953
Radium 226 and 228 (positive only)	2.449	0.385	0.426		pCi/g		0.156	488953

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 486236

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 160-486236/1-A	Radium-226			0.06956	U	pCi/g							2.2217
MB 160-486236/1-A	Radium 226 and 228 (positive only)			0.2037	U	pCi/g							
MB 160-486236/1-A	Radium-228			0.1341	U	pCi/g							1.4962
Lab Control Sample ID:	**Analyte**	**Parent Result**	**Spike Added**	**LCS Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**RER Limit**	**Z Factor**
LCS 160-486236/2-A	Americium-241		96.4	90.96		pCi/g	94	87 - 116					-1.079
LCS 160-486236/2-A	Cesium-137		26.8	25.23		pCi/g	94	87 - 120					-1.0918
LCS 160-486236/2-A	Cobalt-60		9.57	8.824		pCi/g	92	87 - 115					-1.521
Duplicate ID:	**Analyte**	**Parent Result**	**Spike Added**	**DU Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**RER Limit**	**Z Factor**
180-111757-1	Radium-226	1.25		1.507		pCi/g			19	0.46	1.29	1	1.2872
180-111757-1	Radium-228	0.944		0.9422		pCi/g			0.2	0	0.01	1	.0081
180-111757-1	Radium 226 and 228 (positive only)	2.19		2.449		pCi/g			11	0.32	0.91		

Glossary:

Ts = Count Duration, Sample

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, St. Loui Job No.: 180-111757-1

SDG No.:

Batch Number: 486236 Batch Start Date: 10/19/20 18:37 Batch Analyst: Tomasovic, Hannah R

Batch Method: Fill_Geo-21 Batch End Date: 10/19/20 19:06

Lab Sample ID	Client Sample ID	Method Chain	Basis	TareWeight	GrossWeight	InitialAmount	IngDecDate1	IngDecDate3	Geometry
MB 160-486236/1		Fill_Geo-21, 901.1				291.18 g	10/19/2020 19:05	11/09/2020 19:05	Tuna Can
LCS 160-486236/2		Fill_Geo-21, 901.1				341.9 g	10/19/2020 19:05	11/09/2020 19:05	Tuna Can
180-111757-A-1-B	JOF-SES-01-20201001 ~ AOI1	Fill_Geo-21, 901.1	T	47.1 g	325.5 g	278.4 g	10/19/2020 19:05	11/09/2020 19:05	Tuna Can
180-111757-A-1-A DU	JOF-SES-01-20201001 ~ AOI1	Fill_Geo-21, 901.1	T	47.1 g	325.5 g	278.4 g	10/19/2020 19:05	11/09/2020 19:05	Tuna Can

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00010					
MB 160-486236/1		Fill_Geo-21, 901.1							
LCS 160-486236/2		Fill_Geo-21, 901.1		# g					
180-111757-A-1-B	JOF-SES-01-20201001 ~ AOI1	Fill_Geo-21, 901.1	T						
180-111757-A-1-A DU	JOF-SES-01-20201001 ~ AOI1	Fill_Geo-21, 901.1	T						

Batch Notes	
Balance ID	1121432711
SOP Number	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: 12_Gamma_20202454

Sample Description: 486236_Gamma_MB 160-486236~1-A
Detector: Detector #12
Batch ID: 486236
Work Order Number: Gamma
Lot Number: MB 160-486236~1-A

Decay to Time: 11/12/2020 13:17 Live Time: 1800 sec
Acquisition Time: 11/12/2020 13:18:01 Real Time: 1801 sec
Analysis Time: 11/12/2020 13:48 Dead Time: 0.05 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 12_Soil_TunaCan.Clb
Efficiency Cal Desc: 12_TunaCan_108513
Efficiency Cal Date: 4/20/2018 11:53
Energy Cal Date: 7/23/2020 16:01
Library: Client_Long_Rev15.lib
Bkgd Correction File: 12_2020-11-07_1440.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	1.622E-01	1618.6	2.625E+00	2.625E+00	9.495E+00
NA-22	-2.341E-01	153.0	3.582E-01	3.584E-01	1.292E+00
K-40	4.392E+00	40.8	1.793E+00	1.807E+00	5.395E+00
Sc-46	0.000E+00	1.#INF	5.381E-02	5.381E-02	1.026E+00
CR-51	2.323E+00	211.4	4.910E+00	4.912E+00	1.667E+01
MN-54	2.056E-01	132.7	2.729E-01	2.731E-01	6.750E-01
FE-59	-1.000E+00	106.4	1.064E+00	1.065E+00	2.373E+00
Co-56	1.407E-01	206.2	2.901E-01	2.902E-01	1.079E+00
CO-57	1.510E-01	112.7	1.702E-01	1.703E-01	5.818E-01
CO-58	-4.927E-01	85.1	4.195E-01	4.203E-01	1.418E+00
CO-60	0.000E+00	1.#INF	7.266E-02	7.267E-02	5.355E-01
ZN-65	0.000E+00	1.#INF	1.255E-01	1.255E-01	2.094E+00
NB-94	3.674E-01	30.2	1.108E-01	1.124E-01	1.265E+00
ZR-95	0.000E+00	1.#INF	8.792E-02	8.792E-02	6.480E-01
NB-95	-8.066E-03	2846.1	2.296E-01	2.296E-01	8.848E-01
RU-103	3.094E-01	35.4	1.094E-01	1.105E-01	2.851E-01
RH-106	5.575E-01	458.9	2.558E+00	2.559E+00	6.869E+00
AG-108M	2.455E-01	37.8	9.278E-02	9.360E-02	2.584E-01
AG-110M	1.777E-01	76.5	1.360E-01	1.363E-01	1.823E+00
SN-113	2.813E-01	133.6	3.760E-01	3.762E-01	1.305E+00
SB-124	-3.155E-01	131.6	4.153E-01	4.156E-01	1.851E+00
SB-125	1.570E+00	25.0	3.925E-01	4.004E-01	2.498E+00
I-131	-1.360E-01	202.1	2.747E-01	2.748E-01	7.257E-01
Gd-153	4.135E-01	136.6	5.650E-01	5.655E-01	1.936E+00
Ga-68	1.100E+01	44.7	4.920E+00	4.958E+00	1.622E+01
Tc-99m	0.000E+00	1.#INF	3.541E-02	3.541E-02	1.103E+00
BA-133	-5.871E-01	97.6	5.731E-01	5.738E-01	1.932E+00
CS-134	9.066E-01	27.7	2.514E-01	2.557E-01	4.279E-01
CS-137	2.209E-01	137.8	3.045E-01	3.047E-01	1.078E+00
CE-139	1.467E-01	105.3	1.544E-01	1.546E-01	5.311E-01
Ba-140	-1.528E+00	108.8	1.662E+00	1.664E+00	4.045E+00
La-140	0.000E+00	1.#INF	8.802E-02	8.802E-02	6.487E-01
CE-141	0.000E+00	1.#INF	1.017E-01	1.017E-01	2.004E+00

CE-144	0.000E+00	1.#INF	6.687E-01	6.687E-01	8.508E+00
PM-144	6.073E-02	692.8	4.208E-01	4.208E-01	1.040E+00
EU-152	1.037E+00	33.3	3.457E-01	3.498E-01	1.861E+00
EU-154	1.705E-01	316.2	5.393E-01	5.394E-01	1.178E+00
EU-155	-9.221E-01	176.4	1.626E+00	1.627E+00	5.483E+00
HF-181	0.000E+00	1.#INF	6.036E-02	6.036E-02	1.258E+00
Ta-182	-1.184E+00	106.3	1.259E+00	1.260E+00	4.348E+00
Hg-203	6.497E-02	347.3	2.257E-01	2.257E-01	8.057E-01
TL-208	8.496E-01	43.8	3.718E-01	3.743E-01	5.815E-01
PM-146	4.197E-01	83.7	3.514E-01	3.520E-01	6.268E-01
Y-88	0.000E+00	1.#INF	9.547E-02	9.547E-02	7.036E-01
Cd-113m	-4.264E+03	90.7	3.866E+03	3.874E+03	1.305E+04
Cd-109	-5.444E+00	132.4	7.206E+00	7.212E+00	2.434E+01
Cf-251	3.298E-02	2848.7	9.396E-01	9.396E-01	2.604E+00
Cf-249	2.701E-01	124.1	3.351E-01	3.354E-01	1.164E+00
Sn-126	1.435E+00	176.9	2.537E+00	2.539E+00	8.697E+00
PB-210	-1.171E+00	789.3	9.240E+00	9.241E+00	3.226E+01
PB-212	-5.675E-01	126.7	7.191E-01	7.197E-01	2.435E+00
PB-214	6.890E-02	991.6	6.832E-01	6.832E-01	2.418E+00
BI-207	-2.743E-02	1584.3	4.345E-01	4.345E-01	1.108E+00
BI-212	-4.519E+00	102.0	4.611E+00	4.617E+00	1.583E+01
U-235	8.420E-01	134.4	1.132E+00	1.133E+00	8.779E+00
BI-214	7.494E-01	44.7	3.351E-01	3.373E-01	4.544E+00
BI-210M	4.209E-01	59.8	2.519E-01	2.529E-01	8.179E-01
AC-228	1.445E+00	66.6	9.627E-01	9.655E-01	2.479E+00
TH-227	2.054E+00	99.7	2.047E+00	2.050E+00	5.528E+00
TH-229	5.294E+00	32.9	1.744E+00	1.765E+00	1.058E+01
TH-234	-8.151E+00	58.0	4.731E+00	4.753E+00	1.702E+01
PA-231	-1.016E+01	186.7	1.897E+01	1.898E+01	6.404E+01
PA-233	0.000E+00	1.#INF	9.687E-02	9.687E-02	5.440E+00
PA-234	9.046E-01	70.2	6.349E-01	6.366E-01	4.927E+00
PA-234M	2.136E+00	696.4	1.488E+01	1.488E+01	1.321E+02
AM-241	5.605E-01	117.4	6.581E-01	6.589E-01	2.239E+00
Np-237	1.480E+00	128.6	1.903E+00	1.905E+00	6.439E+00
Ir-192	0.000E+00	1.#INF	1.343E-01	1.343E-01	2.275E+00
Cs-136	1.881E-01	40.8	7.677E-02	7.751E-02	1.713E+00
Np-239	-2.093E-01	736.2	1.541E+00	1.541E+00	5.240E+00
Nd-147	-3.843E+00	93.0	3.572E+00	3.578E+00	8.567E+00
TL-210	0.000E+00	1.#INF	5.035E-02	5.035E-02	9.824E-01
Kr-85	0.000E+00	1.#INF	2.651E+01	2.652E+01	3.934E+02
Total	4.406E+01				

Analyst: Amanda Kraus

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Sample description
486236_Gamma_MB 160-486236~1-A

Spectrum Filename: C:\User\SPC\Det12\12_Gamma_20202454.An1

Acquisition information

Start time:	11/12/2020 1:18:01 PM
Live time:	1800
Real time:	1801
Dead time:	0.05 %
Detector ID:	12

Detector system
Ge12 S/N10034336

Calibration

Filename:	12_Soil_TunaCan.Clb

12_TunaCan_108513

Energy Calibration

Created:	7/23/2020 4:01:50 PM
Zero offset:	0.081 keV
Gain:	0.250 keV/channel
Quadratic:	-3.747E-08 keV/channel^2

Efficiency Calibration

Created:	4/20/2018 11:53:09 AM
Type:	Polynomial
Uncertainty:	1.020 %
Coefficients:	-0.363508 -4.707999 0.462125
	-0.051256 0.002384 -0.000043

Library Files

Main analysis library:	Client_Long_Rev15.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	100 (25.10keV)
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

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Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	11/12/2020 1:17:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2020-11-07_1440.PBC 11/7/2020 2:40:48 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 1 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
46.54	-2.	789.28	0.92	1.805E-02	46.54	4.250	PBC<MDA	PB210
59.54	10.	117.42	0.93	2.817E-02	59.54	35.900	PBC<MDA	AM241
63.29	-11.	125.77	0.93	2.978E-02	63.29	3.810	PBC<MDA	TH234
64.28	8.	176.87	0.93	3.015E-02	64.28	9.700	PBC<MDA	Sn126
80.99	4.	285.03	0.95	3.466E-02	80.99	34.060	PBC<MDA	BA133
86.49	12.	128.60	0.96	3.559E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	6.313E-01	EU155
					86.94	9.040	2.140E+00	Sn126
86.54	5.	314.77	0.96	3.560E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	2.667E-01	EU155
					86.94	9.040	9.042E-01	Sn126
92.59	-30.	58.05	0.96	3.637E-02	92.59	5.584	PBC<MDA	TH234
93.35	2.	973.03	0.96	3.645E-02	93.35	5.561	PBC<MDA	AC228
97.50	8.	136.61	0.97	3.683E-02	97.50	30.000	PBC<MDA	Gd153
99.50	8.	144.95	0.97	3.697E-02	99.50	15.000	PBC<MDA	Np239
122.06	9.	112.66	0.99	3.724E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.510E-01	CO57
165.85	7.	105.26	1.03	3.405E-02	165.85	79.900	PBC<MDA	CE139
185.72	7.	152.05	1.05	3.215E-02	185.72	54.000	PBC<MDA	U235
205.33	7.	134.42	1.07	3.030E-02	205.33	5.010	PBC<MDA	U235
210.85	21.	32.94	1.08	2.980E-02	210.85	2.990	1.289E+01	TH229
227.00	7.	102.06	1.09	2.839E-02	227.00	6.300	PBC<MDA	Cf251
244.69	9.	145.56	1.11	2.695E-02	244.69	7.580	PBC<MDA	EU152
256.24	7.	99.69	1.12	2.608E-02	256.24	7.000	PBC<MDA	TH227
265.83	10.	59.84	1.13	2.539E-02	265.83	50.000	PBC<MDA	BI210M
277.28	5.	134.16	1.14	2.462E-02	277.28	6.310	PBC<MDA	TL208
279.20	2.	347.29	1.14	2.449E-02	279.20	81.460	PBC<MDA	Hg203

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
320.08	9.	211.41	1.18	2.210E-02	320.08	9.940	PBC<MDA	CR51
344.29	5.	196.98	1.20	2.090E-02	344.29	26.500	PBC<MDA	EU152
351.93	1.	991.61	1.21	2.055E-02	351.93	37.600	PBC<MDA	PB214
383.84	6.	110.48	1.24	1.923E-02	383.84	8.940	PBC<MDA	BA133
387.95	6.	124.09	1.25	1.907E-02	387.95	66.000	PBC<MDA	Cf249
391.69	6.	133.63	1.25	1.893E-02	391.69	64.000	PBC<MDA	SN113
433.94	7.	37.80	1.29	1.751E-02	433.94	90.480	PBC<MDA	AG108M
453.88	5.	104.74	1.31	1.692E-02	453.88	65.000	PBC<MDA	PM146
463.37	16.	25.00	1.31	1.666E-02	463.37	10.470	5.096E+00	SB125
497.05	8.	35.36	1.35	1.580E-02	497.05	90.900	3.094E-01	RU103
511.86	76.	13.42	2.61	1.546E-02	511.86	20.000	1.366E+01	RH106
563.24	4.	190.67	1.40	1.439E-02	563.24	8.350	PBC<MDA	CS134
569.32	5.	75.17	1.41	1.428E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.325E+00	PA234
					569.70	97.740	1.951E-01	BI207
569.47	5.	101.12	1.41	1.428E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.262E+00	PA234
					569.70	97.740	1.898E-01	BI207
583.02	13.	43.76	1.42	1.403E-02	583.02	84.500	5.935E-01	TL208
610.30	7.	194.80	1.45	1.357E-02	610.30	5.750	PBC<MDA	RU103
621.92	1.	458.94	1.46	1.338E-02	621.92	9.930	PBC<MDA	RH106
635.89	7.	74.03	1.47	1.317E-02	635.89	11.310	PBC<MDA	SB125
657.76	1.	591.61	1.49	1.284E-02	657.76	94.640	PBC<MDA	AG110M
661.66	4.	137.82	1.49	1.279E-02	661.66	85.210	PBC<MDA	CS137
696.54	1.	692.82	1.52	1.232E-02	696.54	99.000	PBC<MDA	PM144
702.63	3.	242.22	1.53	1.224E-02	702.63	97.900	PBC<MDA	NB94
722.79	1.	415.33	1.54	1.199E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	6.800E-02	AG108M
					723.36	20.220	3.056E-01	EU154
735.72	5.	96.22	1.55	1.184E-02	735.72	22.500	PBC<MDA	PM146
747.16	2.	207.02	1.56	1.171E-02	747.16	34.000	PBC<MDA	PM146
763.94	5.	76.55	1.58	1.152E-02	763.94	22.280	PBC<MDA	AG110M
766.41	0.	969.54	1.58	1.150E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	8.218E+00	PA234M
785.42	11.	30.15	1.60	1.129E-02	785.42	1.280	4.227E+01	BI212
795.87	13.	27.74	1.60	1.119E-02	795.87	85.530	7.548E-01	CS134
834.85	4.	132.68	1.64	1.081E-02	834.85	99.980	PBC<MDA	MN54
860.56	5.	44.72	1.66	1.057E-02	860.56	12.420	PBC<MDA	TL208
871.10	11.	30.15	1.67	1.048E-02	871.10	99.890	5.837E-01	NB94
880.53	6.	89.50	1.67	1.040E-02	880.53	6.000	PBC<MDA	PA234
883.24	6.	106.85	1.68	1.038E-02	883.24	9.600	PBC<MDA	PA234
884.68	1.	988.68	1.68	1.036E-02	884.68	72.680	PBC<MDA	AG110M
911.07	6.	92.80	1.70	1.015E-02	911.07	29.000	PBC<MDA	AC228
968.97	6.	95.67	1.75	9.703E-03	968.97	17.460	PBC<MDA	AC228
996.33	2.	316.23	1.77	9.508E-03	996.33	10.600	PBC<MDA	EU154
1037.84	3.	206.16	1.80	9.228E-03	1037.84	14.130	PBC<MDA	Co56
1048.07	6.	40.82	1.81	9.162E-03	1048.07	80.000	PBC<MDA	Cs136
1077.40	5.	44.72	1.83	8.978E-03	1077.40	3.300	PBC<MDA	Ga68

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
1112.07	9.	33.33	1.86	8.770E-03	1112.07	13.644	4.179E+00	EU152
1221.41	1.	796.87	1.94	8.175E-03	1221.41	27.000	PBC<MDA	Ta182
1313.00	7.	37.80	2.01	7.735E-03	1313.00	21.000	PBC<MDA	TL210
1408.00	6.	40.82	2.07	7.324E-03	1408.00	21.005	PBC<MDA	EU152
1460.83	6.	40.82	2.11	7.112E-03	1460.83	10.670	PBC<MDA	K40
1764.07	5.	44.72	2.31	6.075E-03	1764.49	15.400	PBC<MDA	BI214

No unknown peaks passed sensitivity test.

This section based on library: Client_Long_Rev15.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	185.67	46.54	81.	-2.	-0.001	789.28	0.916
TH-227	200.06	50.14	95.	-4.	-0.002	378.88	0.919s
AM-241	237.61	59.54	67.	10.	0.006	117.42	0.929s
TH-234	252.61	63.29	98.	-11.	-0.006	125.77	0.933s
Sn-126	256.57	64.28	85.	8.	0.004	176.87	0.934s
BA-133	323.35	80.99	33.	4.	0.002	285.03	0.950s
Np-237	345.34	86.49	121.	12.	0.007	128.60	0.956s
EU-155	345.55	86.54	134.	5.	0.003	314.77	0.956s
Sn-126	347.14	86.94	139.	0.	0.000	1000.00	0.956s
Sn-126	349.66	87.57	139.	0.	0.000	1000.00	0.957s
Cd-109	351.53	88.04	148.	-13.	-0.007	132.36	0.957s
Nd-147	363.76	91.10	135.	-7.	-0.004	236.73	0.960
TH-234	369.72	92.59	163.	-30.	-0.017	58.05	0.962s
AC-228	372.76	93.35	131.	2.	0.001	973.03	0.963s
Gd-153	389.34	97.50	59.	8.	0.005	136.61	0.966s
Np-239	397.34	99.50	67.	8.	0.005	144.95	0.968s
Gd-153	412.13	103.20	265.	-13.	-0.007	178.32	0.972s
Np-239	414.12	103.70	252.	-13.	-0.007	173.89	0.973s
EU-155	420.57	105.31	261.	-13.	-0.007	176.35	0.974s
Np-239	423.84	106.13	274.	-3.	-0.002	736.16	0.975
EU-152	486.39	121.78	50.	-6.	-0.003	171.59	0.991s
CO-57	487.51	122.06	43.	9.	0.005	112.66	0.991s
PA-234	524.42	131.29	145.	-12.	-0.006	150.65	1.000
HF-181	531.33	133.02	156.	-7.	-0.004	244.62	1.002s
CE-144	533.39	133.54	164.	0.	0.000	1000.00	1.002s
HF-181	544.42	136.30	164.	0.	0.000	1000.00	1.005s
CO-57	545.12	136.47	164.	0.	0.000	1000.00	1.005
Tc-99m	561.25	140.51	164.	0.	0.000	1000.00	1.009s
U-235	574.34	143.79	164.	0.	0.000	1000.00	1.012
CE-141	580.96	145.44	164.	0.	0.000	1000.00	1.014s
Ba-140	649.79	162.66	44.	-1.	-0.001	711.51	1.031s
CE-139	662.55	165.85	25.	7.	0.004	105.26	1.034s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
U-235	741.96	185.72	33.	7.	0.004	152.05	1.053s
U-235	820.36	205.33	26.	7.	0.004	134.42	1.072s
TH-229	842.41	210.85	7.	21.	0.011	32.94	1.077
Cf-251	906.97	227.00	11.	7.	0.004	102.06	1.093s
TH-227	942.83	235.97	100.	-12.	-0.007	120.30	1.102s
PB-212	953.47	238.63	112.	-12.	-0.007	126.72	1.104s
PB-214	966.92	242.00	128.	-6.	-0.003	168.98	1.108s
EU-152	977.70	244.69	74.	9.	0.005	145.56	1.110s
TH-227	1023.86	256.24	11.	7.	0.004	99.69	1.121
Cd-113m	1053.68	263.70	51.	-12.	-0.007	90.68	1.128s
BI-210M	1062.20	265.83	12.	10.	0.005	59.84	1.130s
TL-208	1107.98	277.28	20.	5.	0.003	134.16	1.141s
Hg-203	1115.65	279.20	32.	2.	0.001	347.29	1.143s
I-131	1136.03	284.30	28.	-2.	-0.001	522.81	1.148s
PB-214	1179.17	295.09	198.	-19.	-0.011	57.39	1.158s
TL-210	1182.81	296.00	203.	-12.	-0.007	169.05	1.159s
PB-212	1198.92	300.03	215.	-12.	-0.007	173.32	1.163
PA-231	1199.08	300.07	227.	-12.	-0.007	178.02	1.163
PA-233	1199.52	300.18	239.	-12.	-0.007	182.56	1.163
PA-231	1209.39	302.65	251.	-12.	-0.007	186.68	1.165s
BA-133	1210.20	302.85	263.	-8.	-0.004	295.21	1.166s
Ba-140	1218.18	304.85	271.	0.	0.000	1000.00	1.167s
BI-210M	1218.37	304.90	271.	0.	0.000	1000.00	1.167s
Ir-192	1232.54	308.44	271.	0.	0.000	1000.00	1.171s
PA-233	1246.82	312.01	271.	0.	0.000	1000.00	1.174s
Ir-192	1264.72	316.49	271.	0.	0.000	1000.00	1.179s
CR-51	1279.09	320.08	184.	9.	0.005	211.41	1.182s
La-140	1313.78	328.76	124.	-12.	-0.006	137.78	1.190s
Cf-249	1332.49	333.44	136.	-12.	-0.007	143.36	1.194s
Cs-136	1360.99	340.57	59.	-3.	-0.002	319.79	1.201s
EU-152	1375.85	344.29	46.	5.	0.003	196.98	1.205s
HF-181	1382.02	345.83	54.	-8.	-0.004	142.67	1.206s
PB-214	1406.42	351.93	44.	1.	0.001	991.61	1.212
BA-133	1422.68	356.00	78.	-13.	-0.007	97.62	1.216s
I-131	1456.60	364.48	16.	-4.	-0.002	202.07	1.224s
BA-133	1533.99	383.84	20.	6.	0.003	110.48	1.241s
Cf-249	1550.42	387.95	26.	6.	0.003	124.09	1.245s
SN-113	1565.37	391.69	31.	6.	0.003	133.63	1.249s
SB-125	1710.06	427.88	20.	-1.	-0.001	881.29	1.282s
AG-108M	1734.29	433.94	0.	7.	0.004	37.80	1.288s
PM-146	1814.04	453.88	4.	5.	0.003	104.74	1.306s
SB-125	1851.97	463.37	0.	16.	0.009	25.00	1.315s
Ir-192	1870.73	468.06	16.	0.	0.000	1000.00	1.319s
HF-181	1926.46	482.00	33.	0.	0.000	1000.00	1.331s
La-140	1946.55	487.02	24.	-1.	-0.001	700.00	1.336s
RU-103	1986.67	497.05	0.	8.	0.004	35.36	1.345s
RH-106	2045.90	511.86	14.	76.	0.042	13.42	2.608s
Kr-85	2054.36	513.98	90.	0.	0.000	1000.00	1.360s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Nd-147	2122.42	531.00	35.	-14.	-0.008	92.95	1.376s
Ba-140	2147.45	537.26	26.	-10.	-0.006	108.78	1.381s
CS-134	2251.33	563.24	13.	4.	0.002	190.67	1.404s
CS-134	2275.66	569.32	4.	5.	0.003	75.17	1.410s
PA-234	2276.26	569.47	9.	5.	0.003	101.12	1.410s
BI-207	2277.18	569.70	19.	-4.	-0.002	174.63	1.410s
TL-208	2330.45	583.02	4.	13.	0.007	43.76	1.422s
SB-125	2400.35	600.50	92.	-10.	-0.006	139.17	1.437s
SB-124	2409.27	602.73	82.	-10.	-0.006	131.61	1.439s
CS-134	2417.19	604.71	78.	-4.	-0.002	343.40	1.441s
RU-103	2439.54	610.30	88.	7.	0.004	194.80	1.446s
RH-106	2486.00	621.92	9.	1.	0.001	458.94	1.456s
SB-125	2541.89	635.89	11.	7.	0.004	74.03	1.468s
I-131	2546.22	636.97	29.	-10.	-0.005	85.48	1.469s
AG-110M	2629.36	657.76	17.	1.	0.001	591.61	1.487s
CS-137	2644.95	661.66	16.	4.	0.002	137.82	1.491s
PM-144	2784.47	696.54	19.	1.	0.001	692.82	1.521s
NB-94	2808.82	702.63	28.	3.	0.002	242.22	1.526s
SB-124	2889.44	722.79	15.	1.	0.001	415.33	1.543s
AG-108M	2890.04	722.94	16.	0.	0.000	1000.00	1.543s
EU-154	2891.73	723.36	16.	0.	0.000	1000.00	1.544s
ZR-95	2895.09	724.20	16.	0.	0.000	1000.00	1.544s
BI-212	2906.97	727.17	24.	-7.	-0.004	102.05	1.547s
PM-146	2941.17	735.72	5.	5.	0.003	96.22	1.554s
PM-146	2986.93	747.16	5.	2.	0.001	207.02	1.564s
ZR-95	3025.20	756.73	0.	0.	0.000	1000.00	1.572s
AG-110M	3054.06	763.94	6.	5.	0.003	76.55	1.578s
PA-234M	3063.94	766.41	12.	0.	0.000	969.54	1.580s
EU-152	3113.97	778.92	9.	-1.	-0.001	493.71	1.591s
BI-212	3139.97	785.42	0.	11.	0.006	30.15	1.596s
CS-134	3181.77	795.87	0.	13.	0.007	27.74	1.605s
TL-210	3196.69	799.60	13.	0.	0.000	1000.00	1.608s
CS-134	3206.10	801.95	13.	0.	0.000	1000.00	1.610s
CO-58	3241.39	810.78	30.	-10.	-0.005	85.14	1.617s
La-140	3261.38	815.77	39.	-5.	-0.003	191.57	1.621s
MN-54	3337.69	834.85	5.	4.	0.002	132.68	1.637s
Co-56	3385.39	846.77	15.	0.	0.000	1000.00	1.647s
TL-208	3440.57	860.56	0.	5.	0.003	44.72	1.658s
NB-94	3482.71	871.10	0.	11.	0.006	30.15	1.667s
EU-154	3491.24	873.23	11.	0.	0.000	1000.00	1.669s
PA-234	3520.44	880.53	11.	6.	0.003	89.50	1.675s
PA-234	3531.28	883.24	16.	6.	0.003	106.85	1.677s
AG-110M	3537.06	884.68	22.	1.	0.000	988.68	1.678s
Sc-46	3555.45	889.28	12.	0.	0.000	1000.00	1.682s
Y-88	3590.49	898.04	15.	-6.	-0.003	147.67	1.689s
AC-228	3642.62	911.07	5.	6.	0.003	92.80	1.700s
AG-110M	3748.33	937.49	10.	-4.	-0.002	180.85	1.721s
PA-234	3782.45	946.02	15.	-5.	-0.003	176.07	1.728s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	3854.83	964.11	13.	-6.	-0.003	98.25	1.742s
AC-228	3874.28	968.97	14.	6.	0.003	95.67	1.746s
EU-154	3983.74	996.33	10.	2.	0.001	316.23	1.768s
PA-234M	4002.42	1001.00	12.	0.	0.000	1000.00	1.771s
EU-154	4017.53	1004.77	2.	0.	0.000	1000.00	1.774s
Co-56	4149.83	1037.84	5.	3.	0.001	206.16	1.800s
Cs-136	4190.77	1048.07	0.	6.	0.003	40.82	1.808s
RH-106	4199.93	1050.36	6.	0.	0.000	1000.00	1.810s
Ga-68	4308.13	1077.40	0.	5.	0.003	44.72	1.831s
FE-59	4395.57	1099.25	16.	-9.	-0.005	106.38	1.848s
EU-152	4446.88	1112.07	0.	9.	0.005	33.33	1.858s
ZN-65	4460.77	1115.55	9.	0.	0.000	1000.00	1.860s
BI-214	4479.75	1120.29	9.	0.	0.000	1000.00	1.864s
Sc-46	4480.80	1120.55	9.	0.	0.000	1000.00	1.864s
Ta-182	4483.80	1121.30	20.	-6.	-0.004	106.25	1.865s
Ta-182	4754.93	1189.05	0.	0.	0.000	1000.00	1.916s
Ta-182	4884.44	1221.41	5.	1.	0.000	796.87	1.940s
Co-56	4951.96	1238.28	6.	-3.	-0.001	218.12	1.952s
NA-22	5097.04	1274.53	11.	-3.	-0.002	152.97	1.979
EU-154	5097.08	1274.54	15.	0.	0.000	1000.00	1.979
FE-59	5165.35	1291.60	11.	-4.	-0.002	188.42	1.991s
TL-210	5251.02	1313.00	0.	7.	0.004	37.80	2.007s
CO-60	5329.08	1332.50	0.	0.	0.000	1000.00	2.021s
EU-152	5631.30	1408.00	0.	6.	0.003	40.82	2.074s
K-40	5842.79	1460.83	0.	6.	0.003	40.82	2.111s
La-140	6384.80	1596.21	0.	0.	0.000	1000.00	2.201s
SB-124	6764.29	1690.98	0.	0.	0.000	1000.00	2.262s
BI-214	7058.67	1764.49	0.	5.	0.003	44.72	2.308s
Co-56	7086.14	1771.35	5.	0.	0.000	1000.00	2.313s
Y-88	7345.30	1836.06	0.	0.	0.000	1000.00	2.352s

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	1.6217E-01				5.31E+01	
			477.60	1.622E-01	%(	9.495E+00 1.62E+03 1.05E+01	G
NA-22	C	-2.3414E-01				9.50E+02	
			1274.53	-2.341E-01	?(	1.292E+00 1.53E+02 9.99E+01	G

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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
K-40	N	4.3925E+00					4.66E+11	
			1460.83	4.392E+00	?(	5.395E+00	4.08E+01	1.07E+01 G
CR-51	F	2.3225E+00					2.77E+01	
			320.08	2.323E+00	?(	1.667E+01	2.11E+02	9.94E+00 G
MN-54	C	2.0565E-01					3.12E+02	
			834.85	2.056E-01	?(	6.750E-01	1.33E+02	1.00E+02 G
FE-59	F	-1.0005E+00					4.45E+01	
			1099.25	-1.000E+00	?(	2.373E+00	1.06E+02	5.65E+01 G
			1291.60	-7.114E-01	+	3.020E+00	1.88E+02	4.32E+01 G
Co-56	C	1.4074E-01					7.73E+01	
			846.77	0.000E+00	?(	1.079E+00	1.00E+03	9.99E+01 G
			1238.28	-2.772E-01	+	1.435E+00	2.18E+02	6.61E+01 G
			1037.84	1.136E+00	?(	5.740E+00	2.06E+02	1.41E+01 G
			1771.35	0.000E+00	-	7.783E+00	1.00E+03	1.55E+01 A
CO-57	C	1.5104E-01					2.72E+02	
			122.06	1.510E-01	?(	5.818E-01	1.13E+02	8.56E+01 G
			136.47	0.000E+00	-	8.879E+00	1.00E+03	1.07E+01 G
CO-58	C	-4.9273E-01					7.09E+01	
			810.78	-4.927E-01	?(	1.418E+00	8.51E+01	9.95E+01 G
NB-94	I	3.6743E-01					7.41E+06	
			702.63	1.468E-01	?(	1.265E+00	2.42E+02	9.79E+01 G
			871.10	5.837E-01	?(	3.911E-01	3.02E+01	9.99E+01 G
NB-95	I	-8.0663E-03					6.40E+01	
			765.79	-8.066E-03	%(	8.848E-01	2.85E+03	9.98E+01 G
RU-103	I	3.0945E-01					3.93E+01	
			497.05	3.094E-01	&(	2.851E-01	3.54E+01	9.09E+01 G
			610.30	4.953E+00	+	3.311E+01	1.95E+02	5.75E+00 GA
RH-106	I	5.5747E-01					3.74E+02	
			621.92	5.575E-01	?(	6.869E+00	4.59E+02	9.93E+00 G
			1050.36	0.000E+00	-	5.499E+01	1.00E+03	1.56E+00 G
			511.86	1.366E+01	?	3.621E+00	1.34E+01	2.00E+01 GA
AG-108M	C	2.4547E-01					1.53E+05	
			433.94	2.455E-01	?(	2.584E-01	3.78E+01	9.05E+01 G
			722.94	0.000E+00	-	1.089E+00	1.00E+03	9.08E+01 G
			614.28	4.367E-08	%	2.049E+00	1.34E+09	8.98E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AG-110M	F	1.7768E-01					2.50E+02	
			884.68	5.022E-02	?(	1.823E+00	9.89E+02	7.27E+01 G
			657.76	4.570E-02	?(	1.002E+00	5.92E+02	9.46E+01 G
			937.49	-6.507E-01	+	2.838E+00	1.81E+02	3.44E+01 G
			1384.30	1.027E-01	%	4.253E+00	1.68E+03	2.43E+01 G
			763.94	1.154E+00	?(	2.987E+00	7.65E+01	2.23E+01 G
SN-113	F	2.8133E-01					1.15E+02	
			391.69	2.813E-01	?(	1.305E+00	1.34E+02	6.40E+01 G
SB-124	F	-3.1554E-01					6.02E+01	
			602.73	-4.131E-01	?(	1.851E+00	1.32E+02	9.83E+01 G
			1690.98	0.000E+00	+	1.359E+00	1.00E+03	4.78E+01 G
			722.79	5.713E-01	?(	8.808E+00	4.15E+02	1.08E+01 G
SB-125	I	1.5702E+00					1.01E+03	
			427.88	-1.061E-01	?(	2.498E+00	8.81E+02	2.96E+01 G
			600.50	-2.263E+00	&	1.072E+01	1.39E+02	1.79E+01 G
			635.89	2.693E+00	?(	6.690E+00	7.40E+01	1.13E+01 G
			463.37	5.096E+00	?(	2.347E+00	2.50E+01	1.05E+01 G
I-131	I	-1.3596E-01					8.02E+00	
			364.48	-1.360E-01	?(	7.257E-01	2.02E+02	8.17E+01 G
			284.30	-7.489E-01	+	1.025E+01	5.23E+02	6.14E+00 G
			636.97	-5.628E+00	+	1.627E+01	8.55E+01	7.17E+00 G
Gd-153	F	4.1354E-01					2.42E+02	
			97.50	4.135E-01	?(	1.936E+00	1.37E+02	3.00E+01 G
			103.20	-8.967E-01	+	5.391E+00	1.78E+02	2.18E+01 G
Ga-68	C	1.1002E+01					4.71E-02	
			1077.40	1.100E+01	?(	1.622E+01	4.47E+01	3.30E+00 G
BA-133	F	-5.8706E-01					3.85E+03	
			356.00	-5.871E-01	?(	1.932E+00	9.76E+01	6.20E+01 G
			302.85	-1.030E+00	+	1.030E+01	2.95E+02	1.83E+01 G
			383.84	1.972E+00	&	7.554E+00	1.10E+02	8.94E+00 GA
			80.99	1.726E-01	+	1.394E+00	2.85E+02	3.41E+01 GA
CS-134	I	9.0661E-01					7.54E+02	
			795.87	7.548E-01	?(	4.279E-01	2.77E+01	8.55E+01 G
			604.71	-1.530E-01	-	1.824E+00	3.43E+02	9.76E+01 G
			569.32	1.239E+00	?(	3.139E+00	7.52E+01	1.54E+01 G
			801.95	0.000E+00	-	1.121E+01	1.00E+03	8.69E+00 G
			563.24	1.849E+00	?(	9.019E+00	1.91E+02	8.35E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CS-137	I	2.2091E-01					1.10E+04	
			661.66	2.209E-01	?(	1.078E+00	1.38E+02	8.52E+01 G
CE-139	F	1.4670E-01					1.38E+02	
			165.85	1.467E-01	?(	5.311E-01	1.05E+02	7.99E+01 G
Ba-140	I	-1.5280E+00					1.28E+01	
			537.26	-1.528E+00	?(	4.045E+00	1.09E+02	2.44E+01 G
			162.66	-3.467E-01	&	8.773E+00	7.12E+02	6.22E+00 G
			304.85	0.000E+00	+	4.486E+01	1.00E+03	4.29E+00 G
PM-144	C	6.0732E-02					3.63E+02	
			696.54	6.073E-02	?(	1.040E+00	6.93E+02	9.90E+01 G
			618.06	-3.977E-08	%	1.327E+00	9.26E+08	9.91E+01 G
EU-152	F	1.0371E+00					4.94E+03	
			121.78	-3.131E-01	?(	1.861E+00	1.72E+02	2.86E+01 G
			344.29	5.015E-01	?(	3.442E+00	1.97E+02	2.65E+01 G
			1112.07	4.179E+00	?(	3.422E+00	3.33E+01	1.36E+01 G
			778.92	-5.038E-01	+	6.403E+00	4.94E+02	1.29E+01 G
			964.11	-2.213E+00	+	7.537E+00	9.83E+01	1.46E+01 G
			244.69	2.346E+00	?(	1.168E+01	1.46E+02	7.58E+00 G
			1408.00	2.167E+00	?	2.662E+00	4.08E+01	2.10E+01 GA
EU-154	I	1.7055E-01					3.14E+03	
			123.10	-8.728E-09	%(	1.178E+00	3.75E+09	4.08E+01 G
			1274.54	0.000E+00	+	4.101E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	+	4.894E+00	1.00E+03	2.02E+01 G
			873.23	0.000E+00	+	7.861E+00	1.00E+03	1.23E+01 G
			1004.77	0.000E+00	+	2.748E+00	1.00E+03	1.80E+01 G
			996.33	8.268E-01	?(	9.817E+00	3.16E+02	1.06E+01 G
EU-155	I	-9.2205E-01					1.81E+03	
			105.31	-9.221E-01	?(	5.483E+00	1.76E+02	2.12E+01 G
			86.54	2.667E-01	+	2.877E+00	3.15E+02	3.07E+01 G
Ta-182	F	-1.1844E+00					1.14E+02	
			1121.30	-1.184E+00	?(	4.348E+00	1.06E+02	3.49E+01 G
			1221.41	1.678E-01	+	3.391E+00	7.97E+02	2.70E+01 G
			1189.05	0.000E+00	+	3.030E+00	1.00E+03	1.62E+01 G
Hg-203	F	6.4975E-02					4.66E+01	
			279.20	6.497E-02	?(	8.057E-01	3.47E+02	8.15E+01 G
TL-208	N	8.4961E-01					6.98E+02	
			583.02	5.935E-01	&(	5.815E-01	4.38E+01	8.45E+01 G
			277.28	1.788E+00	?(	8.423E+00	1.34E+02	6.31E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			860.56	2.115E+00	?(	3.118E+00	4.47E+01	1.24E+01 G
PM-146	C	4.1969E-01					2.02E+03	
			453.88	2.292E-01	?(	6.268E-01	1.05E+02	6.50E+01 G
			747.16	3.256E-01	?(	1.783E+00	2.07E+02	3.40E+01 G
			735.72	1.112E+00	?(	2.664E+00	9.62E+01	2.25E+01 G
Cd-113m		-4.2639E+03					5.33E+03	
			263.70	-4.264E+03	(	1.305E+04	9.07E+01	6.00E-03 K
Cd-109	F	-5.4441E+00					4.53E+02	
			88.04	-5.444E+00	(	2.434E+01	1.32E+02	3.79E+00 G
Cf-251	T	3.2984E-02					3.28E+05	
			176.60	3.298E-02	%(	2.604E+00	2.85E+03	1.70E+01 G
			227.00	2.044E+00	?	5.643E+00	1.02E+02	6.30E+00 GA
Cf-249	T	2.7005E-01					1.28E+05	
			387.95	2.701E-01	?(	1.164E+00	1.24E+02	6.60E+01 G
			333.44	-1.963E+00	+	9.531E+00	1.43E+02	1.55E+01 G
Sn-126		1.4346E+00					3.65E+07	
			87.57	0.000E+00	-	2.389E+00	1.00E+03	3.75E+01 GA
			64.28	1.435E+00	?(	8.697E+00	1.77E+02	9.70E+00 G
			86.94	0.000E+00	-	9.936E+00	1.00E+03	9.04E+00 GA
PB-210	N	-1.1707E+00					8.14E+03	
			46.54	-1.171E+00	?(P	3.226E+01	7.89E+02	4.25E+00 G
PB-212	N	-5.6752E-01					6.98E+02	
			238.63	-5.675E-01	?(	2.435E+00	1.27E+02	4.33E+01 G
			300.03	-8.847E+00	+	5.181E+01	1.73E+02	3.28E+00 GA
PB-214	N	6.8896E-02					5.84E+05	
			351.93	6.890E-02	?(P	2.418E+00	9.92E+02	3.76E+01 G
			295.09	-2.386E+00	+ P	8.362E+00	5.74E+01	1.93E+01 G
			242.00	-1.682E+00	+ P	1.524E+01	1.69E+02	7.43E+00 GA
BI-207	C	-2.7427E-02					1.18E+04	
			1063.66	-2.743E-02	%(	1.108E+00	1.58E+03	7.45E+01 G
			569.70	-1.460E-01	+	9.097E-01	1.75E+02	9.77E+01 G
BI-212	N	-4.5187E+00					6.98E+02	
			727.17	-4.519E+00	?(	1.583E+01	1.02E+02	7.55E+00 G
			785.42	4.227E+01	?	2.832E+01	3.02E+01	1.28E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
U-235	N	8.4199E-01					2.57E+11	
			143.79	0.000E+00	?(	8.779E+00	1.00E+03	1.10E+01 G
			205.33	2.684E+00	?(	9.632E+00	1.34E+02	5.01E+00 G
			163.38	-1.063E-01	%	9.532E+00	2.48E+03	5.08E+00 G
			185.72	2.087E-01	P	9.496E-01	1.52E+02	5.40E+01 GA
BI-214	N	7.4939E-01					5.84E+05	
			609.31	7.741E-03	%(P	4.544E+00	1.69E+04	4.61E+01 G
			1120.29	0.000E+00	-	7.040E+00	1.00E+03	1.51E+01 G
			1764.49	2.969E+00	?(	4.376E+00	4.47E+01	1.54E+01 G
BI-210M	T	4.2095E-01					1.10E+09	
			265.83	4.209E-01	?(	8.179E-01	5.98E+01	5.00E+01 G
			304.90	0.000E+00	-	6.873E+00	1.00E+03	2.80E+01 G
AC-228	N	1.4446E+00					2.10E+03	
			911.07	1.116E+00	?(	2.479E+00	9.28E+01	2.90E+01 G
			968.97	1.991E+00	?(	6.572E+00	9.57E+01	1.75E+01 G
			338.32	-1.237E-01	%	1.295E+01	3.03E+03	1.20E+01 G
			93.35	4.567E-01	&	1.534E+01	9.73E+02	5.56E+00 XA
TH-227	N	2.0535E+00					7.95E+03	
			256.24	2.054E+00	?(	5.528E+00	9.97E+01	7.00E+00 G
			235.97	-1.978E+00	-	8.057E+00	1.20E+02	1.23E+01 G
			50.14	-1.161E+00	&	1.521E+01	3.79E+02	8.00E+00 G
TH-229	N	5.2941E+00					2.68E+06	
			193.51	1.340E-01	%(	1.058E+01	2.85E+03	4.40E+00 G
			210.85	1.289E+01	?(	9.559E+00	3.29E+01	2.99E+00 G
TH-234	N	-8.1508E+00					1.63E+12	
			92.59	-8.151E+00	*(P	1.702E+01	5.80E+01	5.58E+00 G
			63.29	-5.351E+00	+ P	2.392E+01	1.26E+02	3.81E+00 G
PA-231	N	-1.0163E+01					1.20E+07	
			302.65	-1.016E+01	?(	6.404E+01	1.87E+02	2.88E+00 G
			300.07	-1.180E+01	+	7.093E+01	1.78E+02	2.46E+00 G
PA-234	N	9.0455E-01					1.63E+12	
			131.29	-9.654E-01	?(	4.927E+00	1.51E+02	1.80E+01 G
			946.02	-2.100E+00	+	8.716E+00	1.76E+02	1.34E+01 G
			569.47	2.262E+00	?(	8.005E+00	1.01E+02	8.20E+00 G
			883.24	3.251E+00	?(	1.206E+01	1.07E+02	9.60E+00 G
			880.53	5.184E+00	?	1.596E+01	8.95E+01	6.00E+00 GA

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PA-234M  N   2.1363E+00                                      1.63E+12
                         1001.00 0.000E+00 ?(  1.321E+02 1.00E+03 8.37E-01 G
                          766.41 8.218E+00 ?(  3.043E+02 9.70E+02 2.94E-01 G

AM-241   T   5.6048E-01                                      1.58E+05
                           59.54 5.605E-01 &(  2.239E+00 1.17E+02 3.59E+01 G

Np-237   F   1.4798E+00                                      2.14E+06
                           86.49 1.480E+00 ?(  6.439E+00 1.29E+02 1.31E+01 G

Cs-136   F   1.8805E-01                                      1.30E+01
                          818.50-2.534E-02 %(  1.713E+00 1.89E+03 1.00E+02 G
                         1048.07 4.548E-01 ?(  5.586E-01 4.08E+01 8.00E+01 G
                          340.57-1.930E-01 +   2.157E+00 3.20E+02 4.69E+01 G

Np-239   T  -2.0930E-01                                      2.36E+00
                          103.70-8.146E-01 &   4.777E+00 1.74E+02 2.40E+01 X
                          106.13-2.093E-01 &(  5.240E+00 7.36E+02 2.27E+01 G
                           99.50 8.258E-01 ?   4.100E+00 1.45E+02 1.50E+01 X

Nd-147      -3.8425E+00                                      1.11E+01
                          531.00-3.843E+00 ?(  8.567E+00 9.30E+01 1.30E+01 G
                           91.10-3.813E-01 &   3.083E+00 2.37E+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
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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	
PB-210	46.54	81.	-2.	-0.001	789.28	-1.171E+00	P
TH-227	50.14	95.	-4.	-0.002	378.88	-1.161E+00	
AM-241	59.54	67.	10.	0.006	117.42	5.605E-01	
TH-234	63.29	98.	-11.	-0.006	125.77	-5.351E+00	P
Sn-126	64.28	85.	8.	0.004	176.87	1.435E+00	
BA-133	80.99	33.	4.	0.002	285.03	1.726E-01	
Np-237	86.49	121.	12.	0.007	128.60	1.480E+00	
EU-155	86.54	134.	5.	0.003	314.77	2.667E-01	
Cd-109	88.04	148.	-13.	-0.007	132.36	-5.444E+00	
Nd-147	91.10	135.	-7.	-0.004	236.73	-3.813E-01	
TH-234	92.59	163.	-30.	-0.017	58.05	-8.151E+00	P
AC-228	93.35	131.	2.	0.001	973.03	4.567E-01	
Gd-153	97.50	59.	8.	0.005	136.61	4.135E-01	
Np-239	99.50	67.	8.	0.005	144.95	8.258E-01	
Gd-153	103.20	265.	-13.	-0.007	178.32	-8.967E-01	
Np-239	103.70	252.	-13.	-0.007	173.89	-8.146E-01	
EU-155	105.31	261.	-13.	-0.007	176.35	-9.221E-01	
Np-239	106.13	274.	-3.	-0.002	736.16	-2.093E-01	
EU-152	121.78	50.	-6.	-0.003	171.59	-3.131E-01	
CO-57	122.06	43.	9.	0.005	112.66	1.510E-01	
PA-234	131.29	145.	-12.	-0.006	150.65	-9.654E-01	
HF-181	133.02	156.	-7.	-0.004	244.62	-2.555E-01	
Ba-140	162.66	44.	-1.	-0.001	711.51	-3.467E-01	
CE-139	165.85	25.	7.	0.004	105.26	1.467E-01	
U-235	185.72	33.	7.	0.004	152.05	2.087E-01	P
U-235	205.33	26.	7.	0.004	134.42	2.684E+00	
TH-229	210.85	7.	21.	0.011	32.94	1.289E+01	
Cf-251	227.00	11.	7.	0.004	102.06	2.044E+00	
TH-227	235.97	100.	-12.	-0.007	120.30	-1.978E+00	
PB-212	238.63	112.	-12.	-0.007	126.72	-5.675E-01	
PB-214	242.00	128.	-6.	-0.003	168.98	-1.682E+00	P
EU-152	244.69	74.	9.	0.005	145.56	2.346E+00	
TH-227	256.24	11.	7.	0.004	99.69	2.054E+00	
Cd-113m	263.70	51.	-12.	-0.007	90.68	-4.264E+03	
BI-210M	265.83	12.	10.	0.005	59.84	4.209E-01	
Hg-203	279.20	32.	2.	0.001	347.29	6.497E-02	
I-131	284.30	28.	-2.	-0.001	522.81	-7.489E-01	
PB-214	295.09	198.	-19.	-0.011	57.39	-2.386E+00	P
TL-210	296.00	203.	-12.	-0.007	169.05	-3.624E-01	
PB-212	300.03	215.	-12.	-0.007	173.32	-8.847E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PA-231	300.07	227.	-12.	-0.007	178.02	-1.180E+01	
PA-233	300.18	239.	-12.	-0.007	182.56	-4.683E+00	
PA-231	302.65	251.	-12.	-0.007	186.68	-1.016E+01	
BA-133	302.85	263.	-8.	-0.004	295.21	-1.030E+00	
CR-51	320.08	184.	9.	0.005	211.41	2.323E+00	
La-140	328.76	124.	-12.	-0.006	137.78	-1.478E+00	
Cf-249	333.44	136.	-12.	-0.007	143.36	-1.963E+00	
Cs-136	340.57	59.	-3.	-0.002	319.79	-1.930E-01	
EU-152	344.29	46.	5.	0.003	196.98	5.015E-01	
HF-181	345.83	54.	-8.	-0.004	142.67	-1.327E+00	
PB-214	351.93	44.	1.	0.001	991.61	6.890E-02	P
BA-133	356.00	78.	-13.	-0.007	97.62	-5.871E-01	
I-131	364.48	16.	-4.	-0.002	202.07	-1.360E-01	
BA-133	383.84	20.	6.	0.003	110.48	1.972E+00	
Cf-249	387.95	26.	6.	0.003	124.09	2.701E-01	
SN-113	391.69	31.	6.	0.003	133.63	2.813E-01	
SB-125	427.88	20.	-1.	-0.001	881.29	-1.061E-01	
AG-108M	433.94	0.	7.	0.004	37.80	2.455E-01	
PM-146	453.88	4.	5.	0.003	104.74	2.292E-01	
SB-125	463.37	0.	16.	0.009	25.00	5.096E+00	
La-140	487.02	24.	-1.	-0.001	700.00	-7.610E-02	
RH-106	511.86	14.	76.	0.042	13.42	1.366E+01	
Nd-147	531.00	35.	-14.	-0.008	92.95	-3.843E+00	
Ba-140	537.26	26.	-10.	-0.006	108.78	-1.528E+00	
PA-234	569.47	9.	5.	0.003	101.12	2.262E+00	
BI-207	569.70	19.	-4.	-0.002	174.63	-1.460E-01	
SB-125	600.50	92.	-10.	-0.006	139.17	-2.263E+00	
SB-124	602.73	82.	-10.	-0.006	131.61	-4.131E-01	
RH-106	621.92	9.	1.	0.001	458.94	5.575E-01	
SB-125	635.89	11.	7.	0.004	74.03	2.693E+00	
I-131	636.97	29.	-10.	-0.005	85.48	-5.628E+00	
AG-110M	657.76	17.	1.	0.001	591.61	4.570E-02	
CS-137	661.66	16.	4.	0.002	137.82	2.209E-01	
PM-144	696.54	19.	1.	0.001	692.82	6.073E-02	
NB-94	702.63	28.	3.	0.002	242.22	1.468E-01	
SB-124	722.79	15.	1.	0.001	415.33	5.713E-01	
BI-212	727.17	24.	-7.	-0.004	102.05	-4.519E+00	
PM-146	735.72	5.	5.	0.003	96.22	1.112E+00	
PM-146	747.16	5.	2.	0.001	207.02	3.256E-01	
AG-110M	763.94	6.	5.	0.003	76.55	1.154E+00	
PA-234M	766.41	12.	0.	0.000	969.54	8.218E+00	
EU-152	778.92	9.	-1.	-0.001	493.71	-5.038E-01	
BI-212	785.42	0.	11.	0.006	30.15	4.227E+01	
CO-58	810.78	30.	-10.	-0.005	85.14	-4.927E-01	
La-140	815.77	39.	-5.	-0.003	191.57	-1.034E+00	
MN-54	834.85	5.	4.	0.002	132.68	2.056E-01	
NB-94	871.10	0.	11.	0.006	30.15	5.837E-01	
PA-234	880.53	11.	6.	0.003	89.50	5.184E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PA-234	883.24	16.	6.	0.003	106.85	3.251E+00	
AG-110M	884.68	22.	1.	0.000	988.68	5.022E-02	
Y-88	898.04	15.	-6.	-0.003	147.67	-3.470E-01	
AC-228	911.07	5.	6.	0.003	92.80	1.116E+00	
AG-110M	937.49	10.	-4.	-0.002	180.85	-6.507E-01	
PA-234	946.02	15.	-5.	-0.003	176.07	-2.100E+00	
EU-152	964.11	13.	-6.	-0.003	98.25	-2.213E+00	
AC-228	968.97	14.	6.	0.003	95.67	1.991E+00	
EU-154	996.33	10.	2.	0.001	316.23	8.268E-01	
Co-56	1037.84	5.	3.	0.001	206.16	1.136E+00	
Cs-136	1048.07	0.	6.	0.003	40.82	4.548E-01	
Ga-68	1077.40	0.	5.	0.003	44.72	1.100E+01	
FE-59	1099.25	16.	-9.	-0.005	106.38	-1.000E+00	
EU-152	1112.07	0.	9.	0.005	33.33	4.179E+00	
Ta-182	1121.30	20.	-6.	-0.004	106.25	-1.184E+00	
Ta-182	1221.41	5.	1.	0.000	796.87	1.678E-01	
Co-56	1238.28	6.	-3.	-0.001	218.12	-2.772E-01	
NA-22	1274.53	11.	-3.	-0.002	152.97	-2.341E-01	
FE-59	1291.60	11.	-4.	-0.002	188.42	-7.114E-01	
TL-210	1313.00	0.	7.	0.004	37.80	2.394E+00	
EU-152	1408.00	0.	6.	0.003	40.82	2.167E+00	
K-40	1460.83	0.	6.	0.003	40.82	4.392E+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	1.6217E-01	1.6217E-01	1.619E+03%	9.50E+00
NA-22	#A	-2.3414E-01	-2.3414E-01	1.530E+02%	1.29E+00
K-40	#A	4.3925E+00	4.3925E+00	4.082E+01%	5.40E+00
Sc-46	#A	0.0000E+00	0.0000E+00	7.071E+02%	1.03E+00
CR-51	#A	2.3225E+00	2.3225E+00	2.114E+02%	1.67E+01
MN-54	#A	2.0565E-01	2.0565E-01	1.327E+02%	6.75E-01
FE-59	#A	-1.0005E+00	-1.0005E+00	1.064E+02%	2.37E+00
Co-56	#A	1.4074E-01	1.4074E-01	2.062E+02%	1.08E+00
CO-57	#A	1.5104E-01	1.5104E-01	1.127E+02%	5.82E-01
CO-58	#A	-4.9273E-01	-4.9273E-01	8.514E+01%	1.42E+00
CO-60	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.36E-01
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.09E+00
NB-94	#A	3.6743E-01	3.6743E-01	3.015E+01%	1.27E+00
ZR-95	#A	0.0000E+00	0.0000E+00	7.071E+02%	6.48E-01
NB-95	#A	-8.0662E-03	-8.0663E-03	2.846E+03%	8.85E-01
RU-103	#	3.0944E-01	3.0945E-01	3.536E+01%	2.85E-01
RH-106	#A	5.5747E-01	5.5747E-01	4.589E+02%	6.87E+00
AG-108M	#A	2.4547E-01	2.4547E-01	3.780E+01%	2.58E-01

AG-110M#A	1.7768E-01	1.7768E-01	7.655E+01%	1.82E+00
SN-113 #A	2.8133E-01	2.8133E-01	1.336E+02%	1.31E+00
SB-124 #A	-3.1553E-01	-3.1554E-01	1.316E+02%	1.85E+00
SB-125 #A	1.5702E+00	1.5702E+00	2.500E+01%	2.50E+00
I-131 #A	-1.3595E-01	-1.3596E-01	2.021E+02%	7.26E-01
Gd-153 #A	4.1354E-01	4.1354E-01	1.366E+02%	1.94E+00
Ga-68 #A	1.0888E+01	1.1002E+01	4.472E+01%	1.62E+01
Tc-99m #A	0.0000E+00	0.0000E+00	1.000E+03%	1.10E+00
BA-133 #A	-5.8706E-01	-5.8706E-01	9.762E+01%	1.93E+00
CS-134 #	9.0661E-01	9.0661E-01	2.774E+01%	4.28E-01
CS-137 #A	2.2091E-01	2.2091E-01	1.378E+02%	1.08E+00
CE-139 #A	1.4669E-01	1.4670E-01	1.053E+02%	5.31E-01
Ba-140 #A	-1.5279E+00	-1.5280E+00	1.088E+02%	4.04E+00
La-140 #A	0.0000E+00	0.0000E+00	1.000E+03%	6.49E-01
CE-141 #A	0.0000E+00	0.0000E+00	1.000E+03%	2.00E+00
CE-144 #A	0.0000E+00	0.0000E+00	1.000E+03%	8.51E+00
PM-144 #A	6.0731E-02	6.0732E-02	6.928E+02%	1.04E+00
EU-152 #A	1.0371E+00	1.0371E+00	3.333E+01%	1.86E+00
EU-154 #A	1.7055E-01	1.7055E-01	3.162E+02%	1.18E+00
EU-155 #A	-9.2205E-01	-9.2205E-01	1.764E+02%	5.48E+00
HF-181 #A	0.0000E+00	0.0000E+00	7.071E+02%	1.26E+00
Ta-182 #A	-1.1844E+00	-1.1844E+00	1.063E+02%	4.35E+00
Hg-203 #A	6.4974E-02	6.4975E-02	3.473E+02%	8.06E-01
TL-208 #	8.4961E-01	8.4961E-01	4.376E+01%	5.81E-01
PM-146 #A	4.1969E-01	4.1969E-01	8.372E+01%	6.27E-01
Y-88 #A	0.0000E+00	0.0000E+00	1.000E+03%	7.04E-01
Cd-113m#A	-4.2639E+03	-4.2639E+03	9.068E+01%	1.30E+04
Cd-109 #A	-5.4441E+00	-5.4441E+00	1.324E+02%	2.43E+01
Cf-251 #A	3.2984E-02	3.2984E-02	2.849E+03%	2.60E+00
Cf-249 #A	2.7005E-01	2.7005E-01	1.241E+02%	1.16E+00
Sn-126 #A	1.4346E+00	1.4346E+00	1.769E+02%	8.70E+00
PB-210 #A	-1.1707E+00	-1.1707E+00	7.893E+02%	3.23E+01
PB-212 #A	-5.6752E-01	-5.6752E-01	1.267E+02%	2.43E+00
PB-214 #A	6.8896E-02	6.8896E-02	9.916E+02%	2.42E+00
BI-207 #A	-2.7427E-02	-2.7427E-02	1.584E+03%	1.11E+00
BI-212 #A	-4.5187E+00	-4.5187E+00	1.020E+02%	1.58E+01
U-235 #A	8.4199E-01	8.4199E-01	1.344E+02%	8.78E+00
BI-214 #A	7.4939E-01	7.4939E-01	4.472E+01%	4.54E+00
BI-210M#A	4.2095E-01	4.2095E-01	5.984E+01%	8.18E-01
AC-228 #A	1.4446E+00	1.4446E+00	6.664E+01%	2.48E+00
TH-227 #A	2.0535E+00	2.0535E+00	9.969E+01%	5.53E+00
TH-229 #A	5.2941E+00	5.2941E+00	3.294E+01%	1.06E+01
TH-234 #A	-8.1508E+00	-8.1508E+00	5.805E+01%	1.70E+01
PA-231 #A	-1.0163E+01	-1.0163E+01	1.867E+02%	6.40E+01
PA-233 #A	0.0000E+00	0.0000E+00	1.000E+03%	5.44E+00
PA-234 #A	9.0455E-01	9.0455E-01	7.019E+01%	4.93E+00
PA-234M#A	2.1363E+00	2.1363E+00	6.964E+02%	1.32E+02
AM-241 #A	5.6048E-01	5.6048E-01	1.174E+02%	2.24E+00
Np-237 #A	1.4798E+00	1.4798E+00	1.286E+02%	6.44E+00

Ir-192	#A	0.0000E+00	0.0000E+00	5.774E+02%	2.27E+00
Cs-136	#A	1.8804E-01	1.8805E-01	4.082E+01%	1.71E+00
Np-239	#A	-2.0926E-01	-2.0930E-01	7.362E+02%	5.24E+00
Nd-147	#A	-3.8424E+00	-3.8425E+00	9.295E+01%	8.57E+00
TL-210	#A	0.0000E+00	0.0000E+00	1.000E+03%	9.82E-01
Kr-85	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.93E+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 (25.1 to 1999.5 keV) 0.000E+00 Bq/Sample
Total Decayed Activity (25.1 to 1999.5 keV) 0.0000000E+00 Bq/Sample

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486236_Gamma_MB 160-486236~1-A. 12_Gamma_20202454.spc.

Test America St. Louis Spectrum ID: 13_Gamma_20201418

Sample Description: 486236_Gamma_LCS 160-486236~2-A
Detector: Detector #13
Batch ID: 486236
Work Order Number: Gamma
Lot Number: LCS 160-486236~2-A

Decay to Time: 11/12/2020 13:18 Live Time: 1800 sec
Acquisition Time: 11/12/2020 13:19:11 Real Time: 1813 sec
Analysis Time: 11/12/2020 13:49 Dead Time: 0.71 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 13_Soil_TunaCan.Clb
Efficiency Cal Desc: 13_Soil_TunaCan_90099_032712
Efficiency Cal Date: 3/29/2012 07:50
Energy Cal Date: 2/23/2012 09:31
Library: Client_Long_Rev15.lib
Bkgd Correction File: 13_2020-11-07_1446.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	1.042E+01	98.8	1.030E+01	1.031E+01	3.416E+01
NA-22	-6.506E-02	571.2	3.716E-01	3.716E-01	1.343E+00
K-40	-1.020E+00	595.8	6.076E+00	6.076E+00	1.302E+01
Sc-46	-1.310E+00	83.8	1.098E+00	1.100E+00	3.644E+00
CR-51	-1.741E-01	7480.0	1.302E+01	1.302E+01	4.337E+01
MN-54	9.806E-01	94.8	9.297E-01	9.311E-01	2.026E+00
FE-59	1.124E+00	82.6	9.278E-01	9.295E-01	4.339E+00
Co-56	6.253E-01	110.8	6.927E-01	6.934E-01	2.151E+00
CO-57	0.000E+00	1.#INF	3.534E-01	3.534E-01	2.146E+00
CO-58	1.053E+00	80.8	8.513E-01	8.531E-01	2.827E+00
CO-60	1.116E+02	1.5	1.719E+00	5.862E+00	7.890E-01
ZN-65	-2.958E+00	87.1	2.577E+00	2.581E+00	8.561E+00
NB-94	6.331E-01	85.7	5.425E-01	5.434E-01	2.685E+00
ZR-95	-2.386E-01	663.7	1.583E+00	1.583E+00	3.508E+00
NB-95	-3.504E-01	198.0	6.937E-01	6.939E-01	2.347E+00
RU-103	1.871E-01	371.0	6.940E-01	6.941E-01	2.346E+00
RH-106	4.325E+00	273.2	1.182E+01	1.182E+01	3.953E+01
AG-108M	5.215E-01	162.4	8.471E-01	8.475E-01	2.459E+00
AG-110M	3.223E-01	106.7	3.440E-01	3.444E-01	4.646E+00
SN-113	1.469E+00	81.2	1.193E+00	1.196E+00	3.953E+00
SB-124	1.950E-01	604.9	1.180E+00	1.180E+00	3.955E+00
SB-125	3.992E+00	75.1	2.997E+00	3.004E+00	7.833E+00
I-131	-4.572E-01	76.1	3.481E-01	3.489E-01	4.565E+00
Gd-153	2.273E+00	118.4	2.691E+00	2.695E+00	1.089E+01
Ga-68	-2.689E+01	169.8	4.565E+01	4.567E+01	9.678E+01
Tc-99m	-4.783E-01	213.4	1.021E+00	1.021E+00	3.388E+00
BA-133	-1.547E+00	110.2	1.704E+00	1.706E+00	5.651E+00
CS-134	-3.817E-02	64.8	2.473E-02	2.481E-02	3.387E+00
CS-137	3.192E+02	1.1	3.484E+00	1.697E+01	1.978E+00
CE-139	7.050E-01	90.4	6.369E-01	6.405E-01	2.111E+00
Ba-140	1.648E+00	211.9	3.493E+00	3.494E+00	7.900E+00
La-140	7.949E-01	86.1	6.847E-01	6.860E-01	8.846E-01
CE-141	1.250E+00	138.5	1.732E+00	1.733E+00	5.739E+00

CE-144	-5.474E+00	139.8	7.654E+00	7.659E+00	2.536E+01
PM-144	-1.042E+00	77.5	8.078E-01	8.096E-01	2.679E+00
EU-152	6.535E-01	75.7	4.947E-01	4.959E-01	6.313E+00
EU-154	2.595E+00	48.5	1.259E+00	1.266E+00	4.231E+00
EU-155	2.309E+00	118.0	2.725E+00	2.728E+00	1.553E+01
HF-181	9.925E-01	139.0	1.380E+00	1.381E+00	4.590E+00
Ta-182	3.892E+00	80.5	3.132E+00	3.138E+00	1.204E+01
Hg-203	-2.587E-02	2962.6	7.664E-01	7.664E-01	2.577E+00
TL-208	3.570E+00	22.5	8.044E-01	8.255E-01	1.691E+00
PM-146	-1.150E+00	148.7	1.711E+00	1.712E+00	3.971E+00
Y-88	4.184E-01	111.3	4.656E-01	4.662E-01	9.740E-01
Cd-113m	-1.372E+04	105.7	1.450E+04	1.453E+04	4.808E+04
Cd-109	1.607E+01	165.8	2.663E+01	2.665E+01	8.823E+01
Cf-251	5.428E-01	652.2	3.540E+00	3.540E+00	8.597E+00
Cf-249	0.000E+00	1.#INF	7.754E-01	7.754E-01	4.960E+00
Sn-126	-1.715E+01	223.6	3.835E+01	3.836E+01	1.266E+02
PB-210	9.183E+03	0.9	7.954E+01	5.450E+02	1.445E+02
PB-212	6.848E+00	22.2	1.518E+00	1.581E+00	3.449E+00
PB-214	5.162E+00	29.9	1.544E+00	1.567E+00	3.795E+00
BI-207	1.324E+00	109.9	1.454E+00	1.456E+00	3.082E+00
BI-212	9.739E-01	869.5	8.468E+00	8.468E+00	2.896E+01
U-235	7.725E+00	52.6	4.065E+00	4.084E+00	9.927E+00
BI-214	6.892E+00	16.6	1.141E+00	1.196E+00	3.253E+00
BI-210M	-1.659E+00	110.6	1.835E+00	1.838E+00	6.084E+00
AC-228	1.602E+01	19.9	3.188E+00	3.291E+00	6.092E+00
TH-227	-1.147E+01	111.0	1.273E+01	1.275E+01	4.221E+01
TH-229	1.269E+01	97.1	1.232E+01	1.236E+01	3.829E+01
TH-234	1.072E+01	165.5	1.774E+01	1.775E+01	5.877E+01
PA-231	0.000E+00	1.#INF	1.384E+01	1.384E+01	1.456E+02
PA-233	0.000E+00	1.#INF	1.240E+00	1.240E+00	1.190E+01
PA-234	1.376E+00	86.2	1.186E+00	1.188E+00	1.565E+01
PA-234M	0.000E+00	1.#INF	6.809E+01	6.809E+01	4.510E+02
AM-241	1.151E+03	0.8	9.396E+00	6.045E+01	1.353E+01
Np-237	3.349E+00	82.0	2.748E+00	2.754E+00	9.109E+00
Ir-192	0.000E+00	1.#INF	4.330E-01	4.330E-01	4.971E+00
Cs-136	6.922E-01	144.3	9.988E-01	9.996E-01	2.964E+00
Np-239	-2.662E+00	167.8	4.466E+00	4.469E+00	1.479E+01
Nd-147	-6.068E+00	109.6	6.652E+00	6.661E+00	1.550E+01
TL-210	-2.025E-01	451.1	9.135E-01	9.136E-01	3.090E+00
Kr-85	8.160E+01	230.5	1.880E+02	1.881E+02	6.309E+02
Total	1.098E+04				

Analyst: Amanda Kraus

Sample description
486236_Gamma_LCS 160-486236~2-A

Spectrum Filename: C:\User\SPC\Det13\13_Gamma_20201418.An1

Acquisition information
Start time: 11/12/2020 1:19:11 PM
Live time: 1800
Real time: 1813
Dead time: 0.71 %
Detector ID: 13

Detector system
Ge13 S/N10064006

Calibration
Filename: 13_Soil_TunaCan.Clb
13_Soil_TunaCan_90099_032712

Energy Calibration
Created: 2/23/2012 9:31:24 AM
Zero offset: 0.036 keV
Gain: 0.250 keV/channel
Quadratic: -2.347E-08 keV/channel^2

Efficiency Calibration
Created: 3/29/2012 7:50:26 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.91 %
Log(Eff): -5.308398E-01 + (-3.057754E-01*Log(E)) +
(-3.437570E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.60 %
Log(Eff): -2.292218E+01 + (8.455931E+00*Log(E)) +
(-8.924057E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev15.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 100 (25.05keV)
Stop channel: 8000 (1999.54keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	11/12/2020 1:18:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	13_2020-11-07_1446.PBC 11/7/2020 2:46:17 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 32 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.1803

***** 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
32.14	174.	26.94	0.76	1.323E-02				
36.59	479.	9.61	1.01	1.745E-02				
40.09	145.	33.31	1.01	2.085E-02				
46.54	19004.	0.87	1.02	2.701E-02	46.54	4.250	9.183E+03	PB210
49.84	284.	30.73	1.02	3.002E-02	50.14	8.000	6.503E+01	TH227
59.50	28270.	0.82	0.83	3.799E-02	59.54	35.900	1.151E+03	AM241
65.84	73.	52.89	0.32	4.235E-02				
74.54	104.	39.26	1.04	4.715E-02				
77.19	128.	28.23	1.05	4.837E-02				
80.99	11.	690.82	1.05	4.996E-02	80.99	34.060	PBC<MDA	BA133
86.34	41.	82.03	1.06	5.181E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	1.429E+00	EU155
86.54	57.	163.86	1.06	5.183E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	1.997E+00	EU155
					86.94	9.040	6.767E+00	Sn126
86.94	57.	164.89	1.06	5.195E-02	86.54	30.700	PBC<MDA	EU155
					86.94	9.040	6.768E+00	Sn126
					87.57	37.500	1.626E+00	Sn126
87.42	43.	87.88	1.06	5.213E-02	86.94	9.040	PBC<MDA	Sn126
					87.57	37.500	1.233E+00	Sn126
					88.04	3.790	1.217E+01	Cd109
87.89	57.	165.76	1.06	5.226E-02	87.57	37.500	PBC<MDA	Sn126

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					88.04	3.790	1.607E+01	Cd109
91.10	57.	166.21	1.06	5.304E-02	91.10	28.300	PBC<MDA	Nd147
92.54	58.	165.48	1.06	5.337E-02	92.59	5.584	PBC<MDA	TH234
93.33	58.	166.42	1.06	5.353E-02	93.35	5.561	PBC<MDA	AC228
97.50	58.	166.83	1.07	5.428E-02	97.50	30.000	PBC<MDA	Gd153
99.50	58.	167.57	1.07	5.458E-02	99.50	15.000	PBC<MDA	Np239
103.20	58.	168.08	1.07	5.500E-02	103.20	21.800	PBC<MDA	Gd153
					103.70	24.000	2.441E+00	Np239
103.70	58.	169.03	1.07	5.505E-02	103.20	21.800	PBC<MDA	Gd153
					103.70	24.000	2.442E+00	Np239
105.31	58.	169.79	1.07	5.518E-02	105.31	21.200	PBC<MDA	EU155
143.48	81.	52.62	0.39	5.293E-02	143.79	10.960	PBC<MDA	U235
145.44	57.	138.52	1.11	5.268E-02	145.44	48.200	PBC<MDA	CE141
165.85	51.	90.35	1.13	5.020E-02	165.85	79.900	PBC<MDA	CE139
176.60	8.	652.16	1.14	4.817E-02	176.60	17.000	PBC<MDA	Cf251
185.45	170.	28.74	3.18	4.658E-02	185.72	54.000	3.754E+00	U235
193.51	18.	315.38	1.16	4.533E-02	193.51	4.400	PBC<MDA	TH229
210.85	55.	97.11	1.17	4.279E-02	210.85	2.990	PBC<MDA	TH229
227.00	28.	184.91	1.19	4.071E-02	227.00	6.300	PBC<MDA	Cf251
238.23	206.	22.67	1.21	3.939E-02	238.63	43.300	6.701E+00	PB212
244.69	54.	111.68	1.20	3.868E-02	244.69	7.580	PBC<MDA	EU152
260.47	48.	71.12	0.53	3.706E-02				
338.32	49.	127.39	1.29	3.088E-02	338.32	12.010	PBC<MDA	AC228
340.57	26.	240.26	1.29	3.074E-02	340.57	46.900	PBC<MDA	Cs136
351.54	115.	27.12	1.17	3.005E-02	351.93	37.600	5.162E+00	PB214
360.36	24.	79.93	1.31	2.953E-02				
363.72	23.	88.28	1.31	2.934E-02	364.48	81.700	5.431E-01	I131
391.69	47.	81.21	1.34	2.782E-02	391.69	64.000	PBC<MDA	SN113
427.88	29.	161.58	1.37	2.611E-02	427.88	29.600	PBC<MDA	SB125
433.83	18.	246.46	1.37	2.585E-02	433.94	90.480	PBC<MDA	AG108M
477.60	48.	98.83	1.41	2.411E-02	477.60	10.520	PBC<MDA	BE7
482.00	34.	139.00	1.42	2.395E-02	482.00	80.500	PBC<MDA	HF181
495.87	66.	34.55	0.75	2.345E-02	497.05	90.900	1.732E+00	RU103
511.86	77.	41.60	2.69	2.292E-02	511.86	20.000	PBC<MDA	RH106
513.98	14.	230.45	1.44	2.285E-02	513.98	0.430	PBC<MDA	Kr85
537.26	16.	211.95	1.46	2.211E-02	537.26	24.390	PBC<MDA	Ba140
569.32	34.	64.78	1.49	2.118E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	1.104E+01	PA234
					569.70	97.740	9.261E-01	BI207
569.70	14.	154.75	1.49	2.117E-02	569.32	15.380	2.472E+00	CS134
					569.47	8.200	4.638E+00	PA234
					569.70	97.740	3.893E-01	BI207
583.33	113.	22.54	1.34	2.081E-02	583.02	84.500	3.570E+00	TL208
600.50	32.	130.58	1.52	2.036E-02	600.50	17.860	PBC<MDA	SB125
602.73	7.	604.95	1.52	2.030E-02	602.73	98.260	PBC<MDA	SB124
609.22	115.	16.55	1.53	2.014E-02	609.31	46.090	6.892E+00	BI214
614.19	20.	211.67	1.53	2.002E-02	614.28	89.850	PBC<MDA	AG108M
621.92	15.	273.19	1.54	1.983E-02	621.92	9.930	PBC<MDA	RH106

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
635.89	30.	87.10	1.55	1.951E-02	635.89	11.310	PBC<MDA	SB125
636.97	20.	99.80	1.55	1.948E-02	636.97	7.170	PBC<MDA	I131
661.62	9269.	1.09	1.41	1.893E-02	661.66	85.210	3.192E+02	CS137
702.63	21.	120.93	1.60	1.809E-02	702.63	97.900	PBC<MDA	NB94
723.36	13.	145.57	1.62	1.770E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	4.375E-01	AG108M
					723.36	20.220	1.966E+00	EU154
727.17	2.	869.55	1.62	1.763E-02	727.17	7.550	PBC<MDA	BI212
785.42	3.	802.91	1.67	1.663E-02	785.42	1.280	PBC<MDA	BI212
801.95	7.	383.06	1.69	1.636E-02	801.95	8.690	PBC<MDA	CS134
810.78	31.	80.81	1.69	1.623E-02	810.78	99.460	PBC<MDA	CO58
815.77	14.	184.32	1.70	1.615E-02	815.77	23.280	PBC<MDA	La140
820.07	16.	159.83	1.70	1.611E-02	818.50	100.000	PBC<MDA	Cs136
834.85	28.	94.81	1.71	1.587E-02	834.85	99.980	PBC<MDA	MN54
846.77	19.	145.87	1.72	1.569E-02	846.77	99.935	PBC<MDA	Co56
858.88	3.	821.36	1.73	1.550E-02	860.56	12.420	PBC<MDA	TL208
871.10	17.	121.39	1.74	1.536E-02	871.10	99.890	PBC<MDA	NB94
880.53	33.	77.85	1.75	1.523E-02	880.53	6.000	PBC<MDA	PA234
883.24	27.	99.19	1.75	1.519E-02	883.24	9.600	PBC<MDA	PA234
911.07	124.	19.91	1.51	1.483E-02	911.07	29.000	1.602E+01	AC228
967.54	36.	72.28	1.82	1.414E-02	968.97	17.460	PBC<MDA	AC228
996.33	30.	91.22	1.84	1.384E-02	996.33	10.600	PBC<MDA	EU154
1004.77	31.	78.62	1.85	1.374E-02	1004.77	18.010	PBC<MDA	EU154
1063.66	23.	109.86	1.90	1.315E-02	1063.66	74.500	PBC<MDA	BI207
1099.25	12.	226.87	1.92	1.281E-02	1099.25	56.500	PBC<MDA	FE59
1121.30	36.	80.47	1.94	1.261E-02	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	1.573E+00	Sc46
					1121.30	34.900	4.509E+00	Ta182
1173.17	2408.	2.21	1.73	1.217E-02	1173.24	99.900	1.100E+02	CO60
1189.05	9.	217.45	1.99	1.204E-02	1189.05	16.200	PBC<MDA	Ta182
1221.41	3.	472.11	2.02	1.179E-02	1221.41	27.000	PBC<MDA	Ta182
1238.28	8.	166.78	2.03	1.166E-02	1238.28	66.070	PBC<MDA	Co56
1291.60	12.	82.55	2.07	1.127E-02	1291.60	43.200	PBC<MDA	FE59
1332.36	2240.	2.14	2.01	1.100E-02	1332.50	99.980	1.132E+02	CO60
1384.30	6.	106.72	2.14	1.066E-02	1384.30	24.290	PBC<MDA	AG110M
1596.21	8.	86.13	2.29	9.505E-03	1596.21	95.400	PBC<MDA	La140
1764.16	27.	19.25	2.40	8.758E-03	1764.49	15.400	1.112E+01	BI214
1836.06	6.	111.28	2.45	8.477E-03	1836.06	99.200	PBC<MDA	Y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
128.35	32.14	604.	174.	1.313E+04	26.94	0.758	- s
146.16	36.56	822.	479.	2.747E+04	9.61	1.009	- D
160.14	40.06	1090.	145.	6.942E+03	33.31	1.012	- sD

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Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
198.96	49.79	3952.	284.	9.459E+03	31.86	1.021	- sD
263.02	65.84	812.	44.	1.032E+03	93.43	1.036	- sc
297.87	74.45	788.	104.	2.214E+03	39.26	1.045	- sD
308.45	77.10	589.	128.	2.648E+03	28.23	1.047	- sD
1041.30	260.47	312.	48.	1.282E+03	71.12	0.533	- s
1440.75	360.29	165.	24.	7.964E+02	79.93	1.307	- sc
1454.22	363.66	202.	23.	7.973E+02	88.28	1.310	- sc
1982.70	495.87	138.	66.	2.828E+03	34.55	0.749	- sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: Client_Long_Rev15.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.92	46.54	4044.	19004.	10.558	0.87	1.018D
TH-227	200.32	50.14	30761.	-145.	-0.081	170.74	1.021s
AM-241	237.73	59.50	5004.	28270.	15.706	0.82	0.831
TH-234	252.89	63.29	38426.	-124.	-0.069	224.31	1.034
Sn-126	256.85	64.28	38263.	-124.	-0.069	223.63	1.035
BA-133	323.66	80.99	2903.	11.	0.006	690.82	1.051s
Np-237	345.65	86.49	543.	41.	0.023	82.03	1.056D
EU-155	345.86	86.54	4364.	57.	0.032	163.86	1.056
Sn-126	347.45	86.94	4421.	57.	0.032	164.89	1.056
Sn-126	349.97	87.57	4470.	43.	0.024	87.88	1.057D
Cd-109	351.85	88.04	4478.	57.	0.032	165.76	1.057A
Nd-147	364.09	91.10	4527.	57.	0.032	166.21	1.060s
TH-234	370.04	92.59	4499.	58.	0.032	165.48	1.062s
AC-228	373.08	93.35	4556.	58.	0.032	166.42	1.062s
Gd-153	389.67	97.50	4614.	58.	0.032	166.83	1.066s
Np-239	397.67	99.50	4672.	58.	0.032	167.57	1.068s
Gd-153	412.46	103.20	4729.	58.	0.032	168.08	1.071s
Np-239	414.46	103.70	4787.	58.	0.032	169.03	1.072s
EU-155	420.91	105.31	4846.	58.	0.032	169.79	1.074s
Np-239	424.18	106.13	5049.	-60.	-0.033	167.76	1.074s
EU-152	486.75	121.78	1441.	-53.	-0.029	102.22	1.089s
CO-57	487.88	122.06	1494.	0.	0.000	1000.00	1.089s
EU-154	492.03	123.10	1313.	-63.	-0.035	81.81	1.090s
PA-234	524.80	131.29	3455.	-59.	-0.033	140.94	1.098s
HF-181	531.71	133.02	3395.	-59.	-0.033	139.53	1.100
CE-144	533.77	133.54	3412.	-59.	-0.033	139.81	1.100

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
HF-181	544.81	136.30	3471.	-59.	-0.033	140.68	1.103
CO-57	545.50	136.47	3531.	-59.	-0.033	141.84	1.103s
Tc-99m	561.64	140.51	3590.	-40.	-0.022	213.45	1.106s
U-235	573.52	143.48	469.	81.	0.045	52.62	0.387s
CE-141	581.36	145.44	3103.	57.	0.032	138.52	1.111s
Ba-140	650.21	162.66	1228.	-53.	-0.030	94.03	1.127s
CE-139	662.98	165.85	1032.	51.	0.028	90.35	1.130s
Cf-251	705.95	176.60	708.	8.	0.004	652.16	1.140
U-235	741.33	185.45	532.	170.	0.094	28.74	3.181s
TH-229	773.56	193.51	836.	18.	0.010	315.38	1.156
U-235	820.84	205.33	820.	-15.	-0.008	374.66	1.167
TH-229	842.90	210.85	736.	55.	0.031	97.11	1.172s
Cf-251	907.48	227.00	692.	28.	0.016	184.91	1.186s
TH-227	943.34	235.97	1119.	-44.	-0.025	107.78	1.195s
PB-212	952.39	238.23	489.	210.	0.117	22.16	1.205
PB-214	967.44	242.00	1936.	-22.	-0.012	207.91	1.200
EU-152	978.22	244.69	1760.	54.	0.030	111.68	1.203s
TH-227	1024.40	256.24	1780.	-54.	-0.030	111.01	1.213s
Cd-113m	1054.23	263.70	1629.	-54.	-0.030	105.68	1.220s
BI-210M	1062.75	265.83	1794.	-55.	-0.030	110.62	1.222s
TL-208	1108.54	277.28	904.	-53.	-0.030	80.91	1.232s
I-131	1136.60	284.30	572.	-29.	-0.016	162.53	1.239
PB-214	1179.75	295.09	2800.	-56.	-0.031	39.80	1.249s
TL-210	1183.39	296.00	2844.	-19.	-0.011	394.61	1.249s
PB-212	1199.51	300.03	2863.	0.	0.000	1000.00	1.253
PA-231	1199.67	300.07	2863.	0.	0.000	1000.00	1.253s
PA-233	1200.11	300.18	2863.	0.	0.000	1000.00	1.253s
PA-231	1209.98	302.65	2863.	0.	0.000	1000.00	1.255s
BA-133	1210.79	302.85	2863.	0.	0.000	1000.00	1.256s
Ba-140	1218.78	304.85	2863.	0.	0.000	1000.00	1.257s
BI-210M	1218.97	304.90	2863.	0.	0.000	1000.00	1.257s
Ir-192	1233.14	308.44	2863.	0.	0.000	1000.00	1.261s
PA-233	1247.42	312.01	2863.	0.	0.000	1000.00	1.264s
Ir-192	1265.33	316.49	2863.	0.	0.000	1000.00	1.268s
La-140	1314.40	328.76	1935.	-49.	-0.027	128.56	1.279s
Cf-249	1333.11	333.44	1886.	-38.	-0.021	162.17	1.283s
AC-228	1352.63	338.32	1926.	49.	0.027	127.39	1.288s
Cs-136	1361.62	340.57	1898.	26.	0.014	240.26	1.290s
PB-214	1405.51	351.54	255.	105.	0.058	29.91	1.166
BA-133	1423.33	356.00	1581.	-51.	-0.029	110.18	1.303s
I-131	1457.25	364.48	1732.	-52.	-0.029	115.01	1.311
Cf-249	1551.10	387.95	1214.	0.	0.000	1000.00	1.332s
SN-113	1566.06	391.69	708.	47.	0.026	81.21	1.335
SB-125	1710.77	427.88	520.	29.	0.016	161.58	1.367s
AG-108M	1735.01	433.94	468.	18.	0.010	246.46	1.373s
PM-146	1814.77	453.88	594.	-34.	-0.019	148.73	1.390s
SB-125	1852.71	463.37	1360.	-63.	-0.035	83.22	1.399
Ir-192	1871.48	468.06	1237.	-42.	-0.023	119.58	1.403s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BE-7	1909.62	477.60	1081.	48.	0.026	98.83	1.411s
HF-181	1927.22	482.00	1129.	34.	0.019	139.00	1.415s
La-140	1947.31	487.02	1405.	-55.	-0.031	96.66	1.419s
RU-103	1987.44	497.05	350.	7.	0.004	370.97	1.428
RH-106	2046.68	511.86	469.	77.	0.043	41.60	2.691s
Kr-85	2055.14	513.98	546.	14.	0.008	230.45	1.443s
Nd-147	2123.21	531.00	282.	-32.	-0.018	109.63	1.458s
Ba-140	2148.25	537.26	252.	16.	0.009	211.95	1.463s
CS-134	2276.48	569.32	232.	34.	0.019	64.78	1.491
PA-234	2277.07	569.47	267.	0.	0.000	1000.00	1.491s
BI-207	2278.00	569.70	244.	14.	0.008	154.75	1.491s
TL-208	2332.51	583.33	119.	113.	0.063	22.54	1.336s
SB-125	2401.19	600.50	862.	32.	0.018	130.58	1.518s
SB-124	2410.11	602.73	894.	7.	0.004	604.95	1.519s
CS-134	2418.03	604.71	901.	0.	0.000	1000.00	1.521s
BI-214	2436.43	609.31	123.	115.	0.064	16.55	1.525D
RU-103	2440.38	610.30	901.	0.	0.000	1000.00	1.526
AG-108M	2456.31	614.28	881.	20.	0.011	211.67	1.529
PM-144	2471.43	618.06	901.	0.	0.000	1000.00	1.533s
RH-106	2486.85	621.92	870.	15.	0.009	273.19	1.536s
SB-125	2542.74	635.89	145.	30.	0.017	87.10	1.548s
I-131	2547.08	636.97	190.	20.	0.011	99.80	1.549
AG-110M	2630.23	657.76	9558.	-32.	-0.018	435.81	1.566s
CS-137	2645.66	661.62	138.	9269.	5.149	1.09	1.413
PM-144	2785.35	696.54	327.	-34.	-0.019	77.54	1.599
NB-94	2809.70	702.63	316.	21.	0.012	120.93	1.604s
SB-124	2890.33	722.79	215.	-14.	-0.008	154.01	1.621s
AG-108M	2890.93	722.94	228.	0.	0.000	1000.00	1.621
EU-154	2892.62	723.36	164.	13.	0.007	145.57	1.622s
ZR-95	2895.98	724.20	151.	0.	0.000	1000.00	1.622s
BI-212	2907.86	727.17	205.	2.	0.001	869.55	1.625s
PM-146	2987.83	747.16	160.	-3.	-0.002	928.76	1.641s
ZR-95	3026.11	756.73	145.	-4.	-0.002	663.72	1.649s
AG-110M	3054.97	763.94	185.	-15.	-0.008	130.81	1.655s
NB-95	3062.35	765.79	218.	-11.	-0.006	197.99	1.657s
PA-234M	3064.84	766.41	246.	-3.	-0.002	667.23	1.657s
EU-152	3114.88	778.92	290.	-35.	-0.020	70.31	1.668s
BI-212	3140.88	785.42	343.	3.	0.002	802.91	1.673s
CS-134	3182.68	795.87	318.	-35.	-0.019	73.84	1.682s
TL-210	3197.60	799.60	353.	-6.	-0.003	451.09	1.685s
CS-134	3207.01	801.95	356.	7.	0.004	383.06	1.687s
CO-58	3242.31	810.78	290.	31.	0.017	80.81	1.694
La-140	3262.29	815.77	321.	14.	0.008	184.32	1.698s
Cs-136	3273.21	818.50	319.	16.	0.009	159.83	1.700s
MN-54	3338.61	834.85	140.	28.	0.016	94.81	1.714s
Co-56	3386.31	846.77	155.	19.	0.011	145.87	1.723
TL-208	3441.49	860.56	125.	3.	0.002	821.36	1.735s
NB-94	3483.63	871.10	196.	17.	0.009	121.39	1.743s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-154	3492.16	873.23	232.	-17.	-0.009	129.01	1.745s
PA-234	3521.37	880.53	309.	33.	0.018	77.85	1.751s
PA-234	3532.21	883.24	342.	27.	0.015	99.19	1.753s
AG-110M	3537.98	884.68	369.	0.	0.000	1000.00	1.754s
Sc-46	3556.37	889.28	428.	-36.	-0.020	83.78	1.758s
Y-88	3591.42	898.04	190.	-25.	-0.014	122.85	1.765s
AC-228	3643.54	911.07	91.	124.	0.069	19.91	1.514
AG-110M	3749.25	937.49	272.	-31.	-0.017	122.25	1.797s
PA-234	3783.37	946.02	235.	-17.	-0.009	210.35	1.803s
EU-152	3855.75	964.11	353.	-47.	-0.026	57.99	1.818s
AC-228	3875.20	968.97	328.	36.	0.020	72.28	1.822s
EU-154	3984.66	996.33	351.	30.	0.016	91.22	1.844s
PA-234M	4003.33	1001.00	381.	0.	0.000	1000.00	1.847s
EU-154	4018.45	1004.77	279.	31.	0.017	78.62	1.850s
Co-56	4150.74	1037.84	181.	-24.	-0.014	127.41	1.876s
Cs-136	4191.67	1048.07	160.	-9.	-0.005	201.54	1.884
BI-207	4254.05	1063.66	123.	23.	0.013	109.86	1.896s
Ga-68	4309.03	1077.40	171.	-18.	-0.010	169.76	1.907s
FE-59	4396.46	1099.25	133.	12.	0.006	226.87	1.924s
EU-152	4447.77	1112.07	385.	-39.	-0.022	72.56	1.934s
ZN-65	4461.66	1115.55	425.	-34.	-0.019	87.12	1.937s
BI-214	4480.63	1120.29	459.	0.	0.000	1000.00	1.940s
Sc-46	4481.68	1120.55	459.	0.	0.000	1000.00	1.941
Ta-182	4484.68	1121.30	395.	36.	0.020	80.47	1.941
CO-60	4692.25	1173.17	51.	2408.	1.338	2.21	1.733
Ta-182	4755.78	1189.05	68.	9.	0.005	217.45	1.993s
Ta-182	4885.27	1221.41	28.	3.	0.001	472.11	2.017s
Co-56	4952.78	1238.28	28.	8.	0.004	166.78	2.030s
NA-22	5097.85	1274.53	28.	-1.	-0.001	571.18	2.057s
EU-154	5097.89	1274.54	30.	0.	0.000	1000.00	2.057s
FE-59	5166.14	1291.60	17.	12.	0.007	82.55	2.070s
TL-210	5251.80	1313.00	34.	-5.	-0.003	277.13	2.086s
CO-60	5329.29	1332.36	8.	2240.	1.245	2.14	2.013
AG-110M	5537.14	1384.30	6.	6.	0.003	106.72	2.138s
EU-152	5632.00	1408.00	18.	-4.	-0.002	261.01	2.155s
K-40	5843.44	1460.83	24.	-2.	-0.001	595.82	2.193s
La-140	6385.31	1596.21	6.	8.	0.004	86.13	2.288s
BI-214	7058.94	1764.49	0.	27.	0.015	19.25	2.402s
Co-56	7086.40	1771.35	27.	0.	0.000	1000.00	2.407s
Y-88	7345.46	1836.06	7.	6.	0.004	111.28	2.449s

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

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	1.0419E+01				5.31E+01	
			477.60	1.042E+01	&(	3.416E+01	9.88E+01 1.05E+01 G
NA-22	C	-6.5057E-02				9.50E+02	
			1274.53	-6.506E-02	?(	1.343E+00	5.71E+02 9.99E+01 G
K-40	N	-1.0197E+00				4.66E+11	
			1460.83	-1.020E+00	&(	1.302E+01	5.96E+02 1.07E+01 G
Sc-46	F	-1.3104E+00				8.38E+01	
			889.28	-1.310E+00	?(	3.644E+00	8.38E+01 1.00E+02 G
			1120.55	0.000E+00	&	4.514E+00	1.00E+03 1.00E+02 G
CR-51	F	-1.7407E-01				2.77E+01	
			320.08	-1.741E-01	&(	4.337E+01	7.48E+03 9.94E+00 G
MN-54	C	9.8062E-01				3.12E+02	
			834.85	9.806E-01	&(	2.026E+00	9.48E+01 1.00E+02 G
FE-59	F	1.1239E+00				4.45E+01	
			1099.25	8.956E-01	&(	4.339E+00	2.27E+02 5.65E+01 G
			1291.60	1.423E+00	&(	2.501E+00	8.26E+01 4.32E+01 G
Co-56	C	6.2525E-01				7.73E+01	
			846.77	6.730E-01	&(	2.151E+00	1.46E+02 9.99E+01 G
			1238.28	5.530E-01	?(	1.985E+00	1.67E+02 6.61E+01 G
			1037.84	-7.139E+00	+	1.921E+01	1.27E+02 1.41E+01 G
			1771.35	0.000E+00	-	1.107E+01	1.00E+03 1.55E+01 A
CO-58	C	1.0535E+00				7.09E+01	
			810.78	1.053E+00	&(	2.827E+00	8.08E+01 9.95E+01 G
CO-60	F	1.1163E+02				1.93E+03	
			1332.50	1.132E+02	(	7.890E-01	2.14E+00 1.00E+02 G
			1173.24	1.100E+02	(	1.650E+00	2.21E+00 9.99E+01 G
ZN-65	F	-2.9581E+00				2.44E+02	
			1115.55	-2.958E+00	?(	8.561E+00	8.71E+01 5.06E+01 G
NB-94	I	6.3315E-01				7.41E+06	
			702.63	6.632E-01	&(	2.685E+00	1.21E+02 9.79E+01 G
			871.10	6.037E-01	&(	2.463E+00	1.21E+02 9.99E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
ZR-95	I	-2.3857E-01					6.40E+01	
			756.73	-2.386E-01	?(	3.508E+00	6.64E+02	5.45E+01 G
			724.20	0.000E+00	+	4.267E+00	1.00E+03	4.42E+01 G
NB-95	I	-3.5035E-01					6.40E+01	
			765.79	-3.504E-01	&(	2.347E+00	1.98E+02	9.98E+01 G
RU-103	I	1.8707E-01					3.93E+01	
			497.05	1.871E-01	(	2.346E+00	3.71E+02	9.09E+01 G
			610.30	0.000E+00	-	6.849E+01	1.00E+03	5.75E+00 GA
RH-106	I	4.3251E+00					3.74E+02	
			621.92	4.325E+00	(	3.953E+01	2.73E+02	9.93E+00 G
			1050.36	-5.365E+00	%	1.901E+02	1.04E+03	1.56E+00 G
			511.86	9.282E+00	?	1.256E+01	4.16E+01	2.00E+01 GA
AG-108M	C	5.2148E-01					1.53E+05	
			433.94	4.276E-01	?(	2.459E+00	2.46E+02	9.05E+01 G
			722.94	0.000E+00	-	2.525E+00	1.00E+03	9.08E+01 G
			614.28	6.160E-01	?(	4.356E+00	2.12E+02	8.98E+01 G
AG-110M	F	3.2235E-01					2.50E+02	
			884.68	0.000E+00	?(	4.646E+00	1.00E+03	7.27E+01 G
			657.76	-9.801E-01	+	1.415E+01	4.36E+02	9.46E+01 G
			937.49	-3.455E+00	&	8.868E+00	1.22E+02	3.44E+01 G
			1384.30	1.287E+00	?(	3.029E+00	1.07E+02	2.43E+01 G
			763.94	-2.203E+00	+	9.705E+00	1.31E+02	2.23E+01 G
SN-113	F	1.4695E+00					1.15E+02	
			391.69	1.469E+00	?(	3.953E+00	8.12E+01	6.40E+01 G
SB-124	F	1.9502E-01					6.02E+01	
			602.73	1.950E-01	&(	3.955E+00	6.05E+02	9.83E+01 G
			1690.98	-4.273E-02	&	1.851E+00	1.88E+03	4.78E+01 G
			722.79	-3.966E+00	+	2.060E+01	1.54E+02	1.08E+01 G
SB-125	I	3.9917E+00					1.01E+03	
			427.88	2.085E+00	&(	7.833E+00	1.62E+02	2.96E+01 G
			600.50	4.903E+00	?(	2.132E+01	1.31E+02	1.79E+01 G
			635.89	7.544E+00	?(	1.480E+01	8.71E+01	1.13E+01 G
			463.37	-1.365E+01	+	3.758E+01	8.32E+01	1.05E+01 G
I-131	I	-4.5721E-01					8.02E+00	
			364.48	-1.197E+00	(	4.565E+00	1.15E+02	8.17E+01 G
			284.30	-7.523E+00	+	2.962E+01	1.63E+02	6.14E+00 G
			636.97	7.970E+00	(	2.662E+01	9.98E+01	7.17E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Gd-153	F	2.2729E+00					2.42E+02	
			97.50	1.970E+00	&(	1.089E+01	1.67E+02	3.00E+01 G
			103.20	2.689E+00	(	1.497E+01	1.68E+02	2.18E+01 G
Ga-68	C	-2.6889E+01					4.71E-02	
			1077.40	-2.689E+01	?(	9.678E+01	1.70E+02	3.30E+00 G
Tc-99m	I	-4.7834E-01					2.51E-01	
			140.51	-4.783E-01	&(	3.388E+00	2.13E+02	8.93E+01 G
BA-133	F	-1.5466E+00					3.85E+03	
			356.00	-1.547E+00	?(	5.651E+00	1.10E+02	6.20E+01 G
			302.85	0.000E+00	&	2.289E+01	1.00E+03	1.83E+01 G
			383.84	9.172E-01	%	3.628E+01	1.18E+03	8.94E+00 GA
			80.99	3.604E-01	+	8.286E+00	6.91E+02	3.41E+01 GA
CS-134	I	-3.8173E-02					7.54E+02	
			795.87	-1.385E+00	?(	3.387E+00	7.38E+01	8.55E+01 G
			604.71	0.000E+00	+	4.006E+00	1.00E+03	9.76E+01 G
			569.32	5.883E+00	?(	1.258E+01	6.48E+01	1.54E+01 G
			801.95	2.735E+00	&(	3.541E+01	3.83E+02	8.69E+00 G
			563.24	9.347E-01	%	2.324E+01	1.09E+03	8.35E+00 G
CS-137	I	3.1918E+02					1.10E+04	
			661.66	3.192E+02	(	1.978E+00	1.09E+00	8.52E+01 G
CE-139	F	7.0496E-01					1.38E+02	
			165.85	7.050E-01	&(	2.111E+00	9.04E+01	7.99E+01 G
Ba-140	I	1.6482E+00					1.28E+01	
			537.26	1.648E+00	?(	7.900E+00	2.12E+02	2.44E+01 G
			162.66	-9.586E+00	+	2.987E+01	9.40E+01	6.22E+00 G
			304.85	0.000E+00	&	9.825E+01	1.00E+03	4.29E+00 G
La-140	I	7.9489E-01					1.28E+01	
			1596.21	4.878E-01	?(	8.846E-01	8.61E+01	9.54E+01 G
			487.02	-2.845E+00	&	9.114E+00	9.67E+01	4.55E+01 G
			328.76	-4.229E+00	+	1.804E+01	1.29E+02	2.03E+01 G
			815.77	2.054E+00	?(	1.274E+01	1.84E+02	2.33E+01 G
CE-141	I	1.2501E+00					3.25E+01	
			145.44	1.250E+00	?(	5.739E+00	1.39E+02	4.82E+01 G
CE-144	I	-5.4743E+00					2.85E+02	
			133.54	-5.474E+00	&(	2.536E+01	1.40E+02	1.11E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PM-144	C	-1.0418E+00					3.63E+02	
			696.54	-1.042E+00	(	2.679E+00	7.75E+01	9.90E+01 G
			618.06	0.000E+00	+	4.011E+00	1.00E+03	9.91E+01 G
EU-152	F	6.5351E-01					4.94E+03	
			121.78	-1.863E+00	(	6.313E+00	1.02E+02	2.86E+01 G
			344.29	2.622E-07	%	1.404E+01	1.60E+09	2.65E+01 G
			1112.07	-1.258E+01	+	3.021E+01	7.26E+01	1.36E+01 G
			778.92	-9.051E+00	+	2.105E+01	7.03E+01	1.29E+01 G
			964.11	-1.268E+01	+	2.418E+01	5.80E+01	1.46E+01 G
			244.69	1.014E+01	?(	3.756E+01	1.12E+02	7.58E+00 G
			1408.00	-1.006E+00	+	5.652E+00	2.61E+02	2.10E+01 GA
EU-154	I	2.5946E+00					3.14E+03	
			123.10	-1.563E+00	&(	4.231E+00	8.18E+01	4.08E+01 G
			1274.54	0.000E+00	+	3.893E+00	1.00E+03	3.52E+01 G
			723.36	1.966E+00	&	9.674E+00	1.46E+02	2.02E+01 G
			873.23	-5.022E+00	&	2.177E+01	1.29E+02	1.23E+01 G
			1004.77	6.925E+00	&(	1.807E+01	7.86E+01	1.80E+01 G
			996.33	1.124E+01	(	3.411E+01	9.12E+01	1.06E+01 G
EU-155	I	2.3094E+00					1.81E+03	
			105.31	2.762E+00	?(	1.553E+01	1.70E+02	2.12E+01 G
			86.54	1.997E+00	(	1.084E+01	1.64E+02	3.07E+01 G
HF-181	F	9.9251E-01					4.24E+01	
			482.00	9.925E-01	?(	4.590E+00	1.39E+02	8.05E+01 G
			133.02	-1.400E+00	+	6.473E+00	1.40E+02	4.33E+01 G
			345.83	-4.625E-07	%	2.478E+01	1.60E+09	1.51E+01 G
			136.30	-1.047E+01	+	4.879E+01	1.41E+02	5.85E+00 G
Ta-182	F	3.8924E+00					1.14E+02	
			1121.30	4.509E+00	?(	1.204E+01	8.05E+01	3.49E+01 G
			1221.41	4.656E-01	-	4.804E+00	4.72E+02	2.70E+01 G
			1189.05	2.564E+00	?(	1.172E+01	2.17E+02	1.62E+01 G
Hg-203	F	-2.5869E-02					4.66E+01	
			279.20	-2.587E-02	%(	2.577E+00	2.96E+03	8.15E+01 G
TL-208	N	3.5695E+00					6.98E+02	
			583.02	3.570E+00	(	1.691E+00	2.25E+01	8.45E+01 G
			277.28	-1.323E+01	&	3.543E+01	8.09E+01	6.31E+00 G
			860.56	8.658E-01	&	1.582E+01	8.21E+02	1.24E+01 G
PM-146	C	-1.1501E+00					2.02E+03	
			453.88	-1.150E+00	?(	3.971E+00	1.49E+02	6.50E+01 G
			747.16	-2.838E-01	+	5.833E+00	9.29E+02	3.40E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			735.72	-2.826E-01	%	8.581E+00	1.37E+03	2.25E+01 G
Y-88	F	4.1843E-01					1.07E+02	
			1836.06	4.184E-01	?(	9.740E-01	1.11E+02	9.92E+01 G
			898.04	-9.883E-01	&	2.646E+00	1.23E+02	9.37E+01 G
Cd-113m		-1.3724E+04					5.33E+03	
			263.70	-1.372E+04	&(	4.808E+04	1.06E+02	6.00E-03 K
Cd-109	F	1.6066E+01					4.53E+02	
							Derived Ave Activity	
			88.04	1.607E+01	}(	8.823E+01	1.66E+02	3.79E+00 G
Cf-251	T	5.4278E-01					3.28E+05	
			176.60	5.428E-01	(	8.597E+00	6.52E+02	1.70E+01 G
			227.00	6.066E+00	?	2.714E+01	1.85E+02	6.30E+00 GA
Sn-126		-1.7149E+01					3.65E+07	
			87.57	1.233E+00	}	8.931E+00	8.79E+01	3.75E+01 GA
			64.28	-1.715E+01	?(	1.266E+02	2.24E+02	9.70E+00 G
			86.94	6.768E+00		3.698E+01	1.65E+02	9.04E+00 GA
PB-210	N	9.1830E+03					8.14E+03	
			46.54	9.183E+03	(	1.445E+02	8.66E-01	4.25E+00 G
PB-212	N	6.8478E+00					6.98E+02	
			238.63	6.848E+00	(	3.449E+00	2.22E+01	4.33E+01 G
			300.03	0.000E+00	-	1.271E+02	1.00E+03	3.28E+00 GA
PB-214	N	5.1620E+00					5.84E+05	
			351.93	5.162E+00	(P	3.795E+00	2.99E+01	3.76E+01 G
			295.09	-4.702E+00	- P	2.111E+01	3.98E+01	1.93E+01 G
			242.00	-4.309E+00	- P	3.986E+01	2.08E+02	7.43E+00 GA
BI-207	C	1.3237E+00					1.18E+04	
			1063.66	1.324E+00	?(	3.082E+00	1.10E+02	7.45E+01 G
			569.70	3.893E-01	&	2.029E+00	1.55E+02	9.77E+01 G
BI-212	N	9.7386E-01					6.98E+02	
			727.17	9.739E-01	?(	2.896E+01	8.70E+02	7.55E+00 G
			785.42	8.540E+00	&	2.325E+02	8.03E+02	1.28E+00 GA
U-235	N	7.7248E+00					2.57E+11	
			143.79	7.725E+00	(	9.927E+00	5.26E+01	1.10E+01 G
			205.33	-3.818E+00	-	3.466E+01	3.75E+02	5.01E+00 G
			163.38	2.841E-01	&	3.538E+01	3.72E+03	5.08E+00 G
			185.72	3.754E+00	-	2.434E+00	2.87E+01	5.40E+01 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-214	N	6.8918E+00					5.84E+05	
			609.31	6.892E+00	(P	3.253E+00	1.66E+01	4.61E+01 G
			1120.29	0.000E+00	-	2.989E+01	1.00E+03	1.51E+01 G
			1764.49	1.112E+01	+	3.036E+00	1.92E+01	1.54E+01 G
BI-210M	T	-1.6589E+00					1.10E+09	
			265.83	-1.659E+00	&(	6.084E+00	1.11E+02	5.00E+01 G
			304.90	0.000E+00	&	1.505E+01	1.00E+03	2.80E+01 G
AC-228	N	1.6016E+01					2.10E+03	
			911.07	1.602E+01	(	6.092E+00	1.99E+01	2.90E+01 G
			968.97	8.190E+00	&	1.960E+01	7.23E+01	1.75E+01 G
			338.32	7.344E+00	&	3.104E+01	1.27E+02	1.20E+01 G
			93.35	1.074E+01	-	5.921E+01	1.66E+02	5.56E+00 XA
TH-227	N	-1.1469E+01					7.95E+03	
			256.24	-1.147E+01	?(	4.221E+01	1.11E+02	7.00E+00 G
			235.97	-5.050E+00	+	1.807E+01	1.08E+02	1.23E+01 G
			50.14	-3.330E+01	+	1.877E+02	1.71E+02	8.00E+00 G
TH-229	N	1.2688E+01					2.68E+06	
			193.51	5.014E+00	?(	3.829E+01	3.15E+02	4.40E+00 G
			210.85	2.398E+01	(	5.607E+01	9.71E+01	2.99E+00 G
TH-234	N	1.0719E+01					1.63E+12	
			92.59	1.072E+01	?(	5.877E+01	1.65E+02	5.58E+00 G
			63.29	-4.433E+01	&	3.284E+02	2.24E+02	3.81E+00 G
PA-234	N	1.3762E+00					1.63E+12	
			131.29	-3.351E+00	?(	1.565E+01	1.41E+02	1.80E+01 G
			946.02	-4.797E+00	+	2.133E+01	2.10E+02	1.34E+01 G
			569.47	0.000E+00	&	2.522E+01	1.00E+03	8.20E+00 G
			883.24	1.024E+01	?(	3.387E+01	9.92E+01	9.60E+00 G
			880.53	1.993E+01	?	5.148E+01	7.79E+01	6.00E+00 GA
AM-241	T	1.1506E+03					1.58E+05	
			59.54	1.151E+03	(	1.353E+01	8.17E-01	3.59E+01 G
Np-237	F	3.3494E+00					2.14E+06	
			86.49	3.349E+00	(	9.109E+00	8.20E+01	1.31E+01 G
Cs-136	F	6.9224E-01					1.30E+01	
			818.50	5.518E-01	&(	2.964E+00	1.60E+02	1.00E+02 G
			1048.07	-4.700E-01	+	3.220E+00	2.02E+02	8.00E+01 G
			340.57	9.916E-01	&(	7.929E+00	2.40E+02	4.69E+01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

Np-239   T  -2.6622E+00                                      2.36E+00
                         103.70 2.442E+00     1.368E+01 1.69E+02 2.40E+01 X
                         106.13-2.662E+00 ?(  1.479E+01 1.68E+02 2.27E+01 G
                          99.50 3.928E+00 ?   2.180E+01 1.68E+02 1.50E+01 X

Nd-147      -6.0676E+00                                      1.11E+01
                         531.00-6.068E+00 ?(  1.550E+01 1.10E+02 1.30E+01 G
                          91.10 2.126E+00 &   1.171E+01 1.66E+02 2.83E+01 G

TL-210   N  -2.0251E-01                                      5.84E+05
                         799.60-2.025E-01 ?(  3.090E+00 4.51E+02 9.90E+01 G
                         296.00-3.970E-01 &   5.209E+00 3.95E+02 7.90E+01 G
                        1313.00-1.189E+00 +   7.106E+00 2.77E+02 2.10E+01 GA

Kr-85    I   8.1595E+01                                      3.92E+03
                         513.98 8.160E+01 ?(  6.309E+02 2.30E+02 4.30E-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
TH-227	50.14	30761.	-145.	-0.081	170.74	-3.330E+01
BA-133	80.99	2903.	11.	0.006	690.82	3.604E-01
EU-155	86.54	4364.	57.	0.032	163.86	1.997E+00
Nd-147	91.10	4527.	57.	0.032	166.21	2.126E+00
Gd-153	97.50	4614.	58.	0.032	166.83	1.970E+00
Np-239	99.50	4672.	58.	0.032	167.57	3.928E+00
Gd-153	103.20	4729.	58.	0.032	168.08	2.689E+00
Np-239	103.70	4787.	58.	0.032	169.03	2.442E+00
EU-155	105.31	4846.	58.	0.032	169.79	2.762E+00
Np-239	106.13	5049.	-60.	-0.033	167.76	-2.662E+00
EU-152	121.78	1441.	-53.	-0.029	102.22	-1.863E+00
EU-154	123.10	1313.	-63.	-0.035	81.81	-1.563E+00
PA-234	131.29	3455.	-59.	-0.033	140.94	-3.351E+00
HF-181	133.02	3395.	-59.	-0.033	139.53	-1.400E+00
CE-144	133.54	3412.	-59.	-0.033	139.81	-5.474E+00
HF-181	136.30	3471.	-59.	-0.033	140.68	-1.047E+01
CO-57	136.47	3531.	-59.	-0.033	141.84	-5.736E+00
Tc-99m	140.51	3590.	-40.	-0.022	213.45	-4.783E-01
CE-141	145.44	3103.	57.	0.032	138.52	1.250E+00
Ba-140	162.66	1228.	-53.	-0.030	94.03	-9.586E+00
Cf-251	176.60	708.	8.	0.004	652.16	5.428E-01
TH-229	193.51	836.	18.	0.010	315.38	5.014E+00
TH-229	210.85	736.	55.	0.031	97.11	2.398E+01
Cf-251	227.00	692.	28.	0.016	184.91	6.066E+00
TH-227	235.97	1119.	-44.	-0.025	107.78	-5.050E+00
EU-152	244.69	1760.	54.	0.030	111.68	1.014E+01
TH-227	256.24	1780.	-54.	-0.030	111.01	-1.147E+01
Cd-113m	263.70	1629.	-54.	-0.030	105.68	-1.372E+04
BI-210M	265.83	1794.	-55.	-0.030	110.62	-1.659E+00
TL-210	296.00	2844.	-19.	-0.011	394.61	-3.970E-01
La-140	328.76	1935.	-49.	-0.027	128.56	-4.229E+00
Cf-249	333.44	1886.	-38.	-0.021	162.17	-4.370E+00
BA-133	356.00	1581.	-51.	-0.029	110.18	-1.547E+00
SN-113	391.69	708.	47.	0.026	81.21	1.469E+00
SB-125	427.88	520.	29.	0.016	161.58	2.085E+00
PM-146	453.88	594.	-34.	-0.019	148.73	-1.150E+00
SB-125	463.37	1360.	-63.	-0.035	83.22	-1.365E+01
Ir-192	468.06	1237.	-42.	-0.023	119.58	-1.840E+00
BE-7	477.60	1081.	48.	0.026	98.83	1.042E+01
HF-181	482.00	1129.	34.	0.019	139.00	9.925E-01
La-140	487.02	1405.	-55.	-0.031	96.66	-2.845E+00
RH-106	511.86	469.	77.	0.043	41.60	9.282E+00
Kr-85	513.98	546.	14.	0.008	230.45	8.160E+01
Nd-147	531.00	282.	-32.	-0.018	109.63	-6.068E+00

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ba-140	537.26	252.	16.	0.009	211.95	1.648E+00	
CS-134	569.32	232.	34.	0.019	64.78	5.883E+00	
BI-207	569.70	244.	14.	0.008	154.75	3.893E-01	
SB-125	600.50	862.	32.	0.018	130.58	4.903E+00	
SB-124	602.73	894.	7.	0.004	604.95	1.950E-01	
RH-106	621.92	870.	15.	0.009	273.19	4.325E+00	
SB-125	635.89	145.	30.	0.017	87.10	7.544E+00	
AG-110M	657.76	9558.	-32.	-0.018	435.81	-9.801E-01	
PM-144	696.54	327.	-34.	-0.019	77.54	-1.042E+00	
NB-94	702.63	316.	21.	0.012	120.93	6.632E-01	
SB-124	722.79	215.	-14.	-0.008	154.01	-3.966E+00	
EU-154	723.36	164.	13.	0.007	145.57	1.966E+00	
BI-212	727.17	205.	2.	0.001	869.55	9.739E-01	
PM-146	747.16	160.	-3.	-0.002	928.76	-2.838E-01	
ZR-95	756.73	145.	-4.	-0.002	663.72	-2.386E-01	
AG-110M	763.94	185.	-15.	-0.008	130.81	-2.203E+00	
NB-95	765.79	218.	-11.	-0.006	197.99	-3.504E-01	
PA-234M	766.41	246.	-3.	-0.002	667.23	-3.718E+01	
EU-152	778.92	290.	-35.	-0.020	70.31	-9.051E+00	
BI-212	785.42	343.	3.	0.002	802.91	8.540E+00	
CS-134	795.87	318.	-35.	-0.019	73.84	-1.385E+00	
TL-210	799.60	353.	-6.	-0.003	451.09	-2.025E-01	
CS-134	801.95	356.	7.	0.004	383.06	2.735E+00	
CO-58	810.78	290.	31.	0.017	80.81	1.053E+00	
La-140	815.77	321.	14.	0.008	184.32	2.054E+00	
MN-54	834.85	140.	28.	0.016	94.81	9.806E-01	
Co-56	846.77	155.	19.	0.011	145.87	6.730E-01	
NB-94	871.10	196.	17.	0.009	121.39	6.037E-01	
EU-154	873.23	232.	-17.	-0.009	129.01	-5.022E+00	
PA-234	880.53	309.	33.	0.018	77.85	1.993E+01	
PA-234	883.24	342.	27.	0.015	99.19	1.024E+01	
Sc-46	889.28	428.	-36.	-0.020	83.78	-1.310E+00	
Y-88	898.04	190.	-25.	-0.014	122.85	-9.883E-01	
AG-110M	937.49	272.	-31.	-0.017	122.25	-3.455E+00	
PA-234	946.02	235.	-17.	-0.009	210.35	-4.797E+00	
EU-152	964.11	353.	-47.	-0.026	57.99	-1.268E+01	
EU-154	996.33	351.	30.	0.016	91.22	1.124E+01	
EU-154	1004.77	279.	31.	0.017	78.62	6.925E+00	
Co-56	1037.84	181.	-24.	-0.014	127.41	-7.139E+00	
BI-207	1063.66	123.	23.	0.013	109.86	1.324E+00	
Ga-68	1077.40	171.	-18.	-0.010	169.76	-2.689E+01	
FE-59	1099.25	133.	12.	0.006	226.87	8.956E-01	
EU-152	1112.07	385.	-39.	-0.022	72.56	-1.258E+01	
ZN-65	1115.55	425.	-34.	-0.019	87.12	-2.958E+00	
Ta-182	1121.30	395.	36.	0.020	80.47	4.509E+00	
Ta-182	1189.05	68.	9.	0.005	217.45	2.564E+00	
Ta-182	1221.41	28.	3.	0.001	472.11	4.656E-01	
Co-56	1238.28	28.	8.	0.004	166.78	5.530E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
NA-22	1274.53	28.	-1.	-0.001	571.18	-6.506E-02	
FE-59	1291.60	17.	12.	0.007	82.55	1.423E+00	
TL-210	1313.00	34.	-5.	-0.003	277.13	-1.189E+00	
AG-110M	1384.30	6.	6.	0.003	106.72	1.287E+00	
EU-152	1408.00	18.	-4.	-0.002	261.01	-1.006E+00	
K-40	1460.83	24.	-2.	-0.001	595.82	-1.020E+00	
La-140	1596.21	6.	8.	0.004	86.13	4.878E-01	
Y-88	1836.06	7.	6.	0.004	111.28	4.184E-01	

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	1.0419E+01	1.0419E+01	9.883E+01%	3.42E+01
NA-22	#A	-6.5057E-02	-6.5057E-02	5.712E+02%	1.34E+00
K-40	#A	-1.0197E+00	-1.0197E+00	5.958E+02%	1.30E+01
Sc-46	#A	-1.3104E+00	-1.3104E+00	8.378E+01%	3.64E+00
CR-51	#A	-1.7407E-01	-1.7407E-01	7.480E+03%	4.34E+01
MN-54	#A	9.8062E-01	9.8062E-01	9.481E+01%	2.03E+00
FE-59	#A	1.1239E+00	1.1239E+00	8.255E+01%	4.34E+00
Co-56	#A	6.2525E-01	6.2525E-01	1.108E+02%	2.15E+00
CO-57	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.15E+00
CO-58	#A	1.0535E+00	1.0535E+00	8.081E+01%	2.83E+00
CO-60		1.1163E+02	1.1163E+02	1.540E+00%	7.89E-01
ZN-65	#A	-2.9581E+00	-2.9581E+00	8.712E+01%	8.56E+00
NB-94	#A	6.3315E-01	6.3315E-01	8.568E+01%	2.68E+00
ZR-95	#A	-2.3856E-01	-2.3857E-01	6.637E+02%	3.51E+00
NB-95	#A	-3.5035E-01	-3.5035E-01	1.980E+02%	2.35E+00
RU-103	A	1.8707E-01	1.8707E-01	3.710E+02%	2.35E+00
RH-106	#A	4.3251E+00	4.3251E+00	2.732E+02%	3.95E+01
AG-108M	#A	5.2148E-01	5.2148E-01	1.624E+02%	2.46E+00
AG-110M	#A	3.2235E-01	3.2235E-01	1.067E+02%	4.65E+00
SN-113	#A	1.4695E+00	1.4695E+00	8.121E+01%	3.95E+00
SB-124	#A	1.9502E-01	1.9502E-01	6.049E+02%	3.96E+00
SB-125	#A	3.9917E+00	3.9917E+00	7.509E+01%	7.83E+00
I-131	A	-4.5717E-01	-4.5721E-01	7.614E+01%	4.57E+00
Gd-153	#A	2.2729E+00	2.2729E+00	1.184E+02%	1.09E+01
Ga-68	#A	-2.6566E+01	-2.6889E+01	1.698E+02%	9.68E+01
Tc-99m	#A	-4.7725E-01	-4.7834E-01	2.134E+02%	3.39E+00
BA-133	#A	-1.5466E+00	-1.5466E+00	1.102E+02%	5.65E+00
CS-134	#A	-3.8173E-02	-3.8173E-02	6.478E+01%	3.39E+00
CS-137		3.1918E+02	3.1918E+02	1.091E+00%	1.98E+00
CE-139	A	7.0496E-01	7.0496E-01	9.035E+01%	2.11E+00
Ba-140	#A	1.6482E+00	1.6482E+00	2.119E+02%	7.90E+00
La-140	#A	7.9486E-01	7.9489E-01	8.613E+01%	8.85E-01

CE-141 #A	1.2501E+00	1.2501E+00	1.385E+02%		5.74E+00
CE-144 #A	-5.4743E+00	-5.4743E+00	1.398E+02%		2.54E+01
PM-144 #A	-1.0418E+00	-1.0418E+00	7.754E+01%		2.68E+00
EU-152 #A	6.5351E-01	6.5351E-01	7.570E+01%		6.31E+00
EU-154 #A	2.5946E+00	2.5946E+00	4.853E+01%		4.23E+00
EU-155 #A	2.3094E+00	2.3094E+00	1.180E+02%		1.55E+01
HF-181 #A	9.9250E-01	9.9251E-01	1.390E+02%		4.59E+00
Ta-182 #A	3.8924E+00	3.8924E+00	8.047E+01%		1.20E+01
Hg-203 #A	-2.5869E-02	-2.5869E-02	2.963E+03%		2.58E+00
TL-208 #	3.5695E+00	3.5695E+00	2.254E+01%		1.69E+00
PM-146 #A	-1.1501E+00	-1.1501E+00	1.487E+02%		3.97E+00
Y-88 #A	4.1843E-01	4.1843E-01	1.113E+02%		9.74E-01
Cd-113m#A	-1.3724E+04	-1.3724E+04	1.057E+02%		4.81E+04
Cd-109 #A	1.6066E+01	1.6066E+01	1.658E+02%		8.82E+01
Cf-251 #A	5.4278E-01	5.4278E-01	6.522E+02%		8.60E+00
Cf-249 #A	0.0000E+00	0.0000E+00	1.000E+03%		4.96E+00
Sn-126 A	-1.7149E+01	-1.7149E+01	2.236E+02%		1.27E+02
PB-210	9.1830E+03	9.1830E+03	8.661E-01%		1.45E+02
PB-212	6.8478E+00	6.8478E+00	2.216E+01%		3.45E+00
PB-214	5.1620E+00	5.1620E+00	2.991E+01%		3.80E+00
BI-207 #A	1.3237E+00	1.3237E+00	1.099E+02%		3.08E+00
BI-212 #A	9.7386E-01	9.7386E-01	8.695E+02%		2.90E+01
U-235 A	7.7248E+00	7.7248E+00	5.262E+01%		9.93E+00
BI-214	6.8918E+00	6.8918E+00	1.655E+01%		3.25E+00
BI-210M#A	-1.6589E+00	-1.6589E+00	1.106E+02%		6.08E+00
AC-228	1.6016E+01	1.6016E+01	1.991E+01%		6.09E+00
TH-227 #A	-1.1469E+01	-1.1469E+01	1.110E+02%		4.22E+01
TH-229 #A	1.2688E+01	1.2688E+01	9.711E+01%		3.83E+01
TH-234 #A	1.0719E+01	1.0719E+01	1.655E+02%		5.88E+01
PA-231 #A	0.0000E+00	0.0000E+00	7.071E+02%		1.46E+02
PA-233 #A	0.0000E+00	0.0000E+00	7.071E+02%		1.19E+01
PA-234 #A	1.3762E+00	1.3762E+00	8.618E+01%		1.57E+01
PA-234M#A	0.0000E+00	0.0000E+00	1.000E+03%		4.51E+02
AM-241	1.1506E+03	1.1506E+03	8.166E-01%		1.35E+01
Np-237 A	3.3494E+00	3.3494E+00	8.203E+01%		9.11E+00
Ir-192 #A	0.0000E+00	0.0000E+00	7.071E+02%		4.97E+00
Cs-136 #A	6.9221E-01	6.9224E-01	1.443E+02%		2.96E+00
Np-239 #A	-2.6616E+00	-2.6622E+00	1.678E+02%		1.48E+01
Nd-147 #A	-6.0673E+00	-6.0676E+00	1.096E+02%		1.55E+01
TL-210 #A	-2.0251E-01	-2.0251E-01	4.511E+02%		3.09E+00
Kr-85 #A	8.1595E+01	8.1595E+01	2.305E+02%		6.31E+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 (25.0 to 1999.5 keV) 1.081E+04 Bq/Sample
Total Decayed Activity (25.0 to 1999.5 keV) 1.0810686E+04 Bq/Sample

486236_Gamma_LCS 160-486236~2-A. 13_Gamma_20201418.spc.

Counts
Channels
1.0e6
1.0e5
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Pb-210
Am-241
Th-227
Cs-137
Co-60
Co-60
Bi-214
Y-88
Sb-124
La-140
K-40
Ag-110M
Eu-152
Tl-210
Fe-59
Na-22
Co-56
Ta-182
Ta-182
Ac-228
Ac-228
Eu-152
Eu-154
Pa-234
Pa-234
Y-88
Sc-46
Tl-208
Mn-54
Co-58
La-140
Cs-136
Co-56
Ag-110M
Nb-94
Tl-208
Bi-214
Ag-108M
Ru-106
Kr-85
Ba-140
Sn-113
Th-228
Ce-141
Sn-126
Pb-214
Pb-214
Tl-210
Cd-109
Ga-68
Bi-207
Cs-134
Pm-146
Eu-152
Eu-154
Eu-155
Ag-110M
Ag-108M
Ag-111
Sb-124
Sb-125
Sb-122
Sb-125
Sn-126
Sn-113
Sn-117m
Sn-119m
Sn-121m
Sn-123
Sn-125
Sn-126
Te-123m
Te-125m
Te-127m
Te-129m
Te-131m
Te-132
Te-134
Te-129
Te-131
Te-132
Te-134
Te-129
Te-131
Te-132
Te-134
Te-129
Te-131

Test America St. Louis Spectrum ID: 9_Gamma_20202019

Sample Description: 486236_Gamma_180-111757-A-1-C
Detector: Detector # 9
Batch ID: 486236
Work Order Number: Gamma
Lot Number: 180-111757-A-1-C

Decay to Time: 11/12/2020 13:16 Live Time: 1800 sec
Acquisition Time: 11/12/2020 13:17:10 Real Time: 1803 sec
Analysis Time: 11/12/2020 13:47 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_Rev15.lib
Bkgd Correction File: 9_2020-11-07_1440.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	2.172E+00	105.4	2.288E+00	2.291E+00	7.786E+00
NA-22	-5.278E-01	79.2	4.181E-01	4.189E-01	1.405E+00
K-40	6.896E+01	9.3	6.445E+00	7.348E+00	8.437E+00
Sc-46	4.681E-01	64.1	3.002E-01	3.012E-01	1.058E+00
CR-51	2.492E+00	96.4	2.403E+00	2.407E+00	8.088E+00
MN-54	3.716E-01	89.7	3.333E-01	3.339E-01	7.606E-01
FE-59	-5.354E-02	1120.3	5.998E-01	5.998E-01	1.440E+00
Co-56	-4.995E-01	68.0	3.398E-01	3.408E-01	1.054E+00
CO-57	0.000E+00	1.#INF	1.427E-01	1.427E-01	7.680E-01
CO-58	2.953E-01	84.6	2.500E-01	2.504E-01	8.479E-01
CO-60	3.953E-01	39.2	1.550E-01	1.563E-01	3.900E-01
ZN-65	-1.389E-02	8625.4	1.198E+00	1.198E+00	4.193E+00
NB-94	4.033E-01	82.7	3.334E-01	3.341E-01	1.120E+00
ZR-95	-2.495E-01	305.2	7.614E-01	7.615E-01	1.761E+00
NB-95	3.900E-01	86.3	3.366E-01	3.372E-01	1.135E+00
RU-103	1.123E-01	237.2	2.665E-01	2.666E-01	6.701E-01
RH-106	-1.420E+00	383.8	5.452E+00	5.452E+00	8.678E+00
AG-108M	-1.772E-01	296.9	5.263E-01	5.264E-01	9.132E-01
AG-110M	6.655E-01	36.7	2.439E-01	2.463E-01	1.867E+00
SN-113	4.495E-01	105.1	4.724E-01	4.730E-01	1.593E+00
SB-124	-4.295E-01	178.7	7.676E-01	7.679E-01	2.581E+00
SB-125	3.302E-01	91.6	3.025E-01	3.030E-01	2.840E+00
I-131	3.663E-01	76.3	2.794E-01	2.800E-01	9.158E-01
Gd-153	0.000E+00	1.#INF	3.904E-01	3.904E-01	4.567E+00
Ga-68	-1.060E+01	180.3	1.912E+01	1.913E+01	4.259E+01
Tc-99m	0.000E+00	1.#INF	1.222E-01	1.222E-01	1.371E+00
BA-133	-4.230E-01	215.8	9.130E-01	9.132E-01	3.070E+00
CS-134	8.480E-01	78.8	6.680E-01	6.694E-01	1.402E+00
CS-137	-6.965E-01	75.7	5.270E-01	5.282E-01	1.754E+00
CE-139	-2.422E-01	119.2	2.888E-01	2.897E-01	1.013E+00
Ba-140	1.383E+00	98.0	1.355E+00	1.357E+00	3.262E+00
La-140	3.374E-01	102.8	3.467E-01	3.471E-01	9.097E-01
CE-141	-5.590E-01	137.6	7.691E-01	7.697E-01	2.569E+00

CE-144	0.000E+00	1.#INF	4.923E-01	4.923E-01	1.050E+01
PM-144	6.983E-02	517.7	3.615E-01	3.615E-01	1.268E+00
EU-152	4.153E-01	158.0	6.562E-01	6.565E-01	2.223E+00
EU-154	1.614E+00	28.6	4.624E-01	4.701E-01	1.563E+00
EU-155	-3.065E-02	3080.0	9.439E-01	9.439E-01	6.370E+00
HF-181	5.677E-01	88.4	5.019E-01	5.027E-01	1.124E+00
Ta-182	1.513E+00	87.3	1.321E+00	1.323E+00	4.454E+00
Hg-203	2.577E-01	113.5	2.926E-01	2.929E-01	9.892E-01
TL-208	4.020E+00	10.3	4.158E-01	4.651E-01	4.960E-01
PM-146	2.625E-01	134.7	3.537E-01	3.539E-01	8.735E-01
Y-88	3.995E-02	1095.6	4.377E-01	4.377E-01	1.007E+00
Cd-113m	3.892E+03	78.1	3.041E+03	3.052E+03	1.016E+04
Cd-109	0.000E+00	1.#INF	1.130E+01	1.130E+01	3.786E+01
Cf-251	-8.382E-01	165.1	1.384E+00	1.386E+00	3.587E+00
Cf-249	0.000E+00	1.#INF	1.410E-01	1.410E-01	1.694E+00
Sn-126	-3.205E+00	113.5	3.639E+00	3.643E+00	1.217E+01
PB-210	8.063E+00	110.8	8.931E+00	8.943E+00	3.004E+01
PB-212	8.400E+00	11.4	9.585E-01	1.102E+00	2.704E+00
PB-214	1.748E+01	6.2	1.089E+00	1.418E+00	1.358E+00
BI-207	-3.956E-02	1120.3	4.432E-01	4.432E-01	1.064E+00
BI-212	3.420E+00	160.2	5.479E+00	5.482E+00	1.878E+01
U-235	0.000E+00	1.#INF	1.182E+00	1.182E+00	1.094E+01
BI-214	1.289E+01	9.0	1.154E+00	1.334E+00	1.746E+00
BI-210M	-2.057E-01	434.3	8.932E-01	8.933E-01	1.559E+00
AC-228	9.722E+00	12.3	1.196E+00	1.295E+00	1.462E+00
TH-227	1.133E+00	95.1	1.077E+00	1.079E+00	9.903E+00
TH-229	-7.494E+00	77.5	5.805E+00	5.836E+00	1.818E+01
TH-234	2.167E+00	148.4	3.216E+00	3.218E+00	2.494E+01
PA-231	0.000E+00	1.#INF	2.273E+00	2.273E+00	6.538E+01
PA-233	-5.152E-03	15185.1	7.823E-01	7.823E-01	5.342E+00
PA-234	2.959E-01	122.9	3.635E-01	3.639E-01	6.350E+00
PA-234M	2.435E+01	84.5	2.057E+01	2.060E+01	1.505E+02
AM-241	-9.276E-01	117.0	1.086E+00	1.087E+00	3.632E+00
Np-237	-1.929E+00	176.5	3.405E+00	3.406E+00	1.137E+01
Ir-192	2.941E-01	174.9	5.145E-01	5.148E-01	1.732E+00
Cs-136	0.000E+00	1.#INF	3.607E-02	3.607E-02	1.106E+00
Np-239	1.226E-01	1449.1	1.777E+00	1.777E+00	5.976E+00
Nd-147	1.169E+00	102.7	1.200E+00	1.202E+00	5.310E+00
TL-210	1.122E-01	279.2	3.134E-01	3.134E-01	1.366E+00
Kr-85	0.000E+00	1.#INF	3.020E+01	3.020E+01	3.518E+02
Total	4.071E+03				

Analyst: Amanda Kraus

Sample description
486236_Gamma_180-111757-A-1-C

Spectrum Filename: C:\User\SPC\Det9\9_Gamma_20202019.An1

Acquisition information
Start time: 11/12/2020 1:17:10 PM
Live time: 1800
Real time: 1803
Dead time: 0.15 %
Detector ID: 9

Detector system
Ge9 S/N09363993

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_Rev15.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 100 (25.08keV)
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	11/12/2020 1:16:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	9_2020-11-07_1440.PBC 11/7/2020 2:40:49 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 24 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1931

***** 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	16.	110.76	1.00	2.577E-02	46.54	4.250	PBC<MDA	PB210
50.14	12.	144.94	1.00	2.900E-02	50.14	8.000	PBC<MDA	TH227
63.28	43.	29.69	1.26	3.921E-02	63.29	3.810	1.599E+01	TH234
					64.28	9.700	6.178E+00	Sn126
74.67	117.	14.18	1.02	4.566E-02				
77.17	212.	8.71	1.03	4.678E-02				
86.94	23.	69.17	1.04	5.021E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	8.262E-01	EU155
					86.94	9.040	2.800E+00	Sn126
87.57	23.	72.22	1.04	5.038E-02	87.57	37.500	PBC<MDA	Sn126
					88.04	3.790	6.618E+00	Cd109
91.10	23.	166.46	1.04	5.124E-02	91.10	28.300	PBC<MDA	Nd147
93.06	58.	32.70	1.45	5.171E-02	92.59	5.584	PBC<MDA	TH234
					93.35	5.561	1.129E+01	AC228
100.58	11.	347.72	1.05	5.266E-02	99.50	15.000	PBC<MDA	Np239
121.78	11.	158.00	1.07	5.305E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.387E-01	CO57
162.66	20.	98.01	1.11	4.690E-02	162.66	6.220	PBC<MDA	Ba140
185.72	56.	40.36	1.13	4.403E-02	185.72	54.000	1.301E+00	U235
210.85	13.	161.78	1.15	4.052E-02	210.85	2.990	PBC<MDA	TH229
226.64	6.	301.85	1.17	3.858E-02	227.00	6.300	PBC<MDA	Cf251
235.97	17.	184.67	1.18	3.760E-02	235.97	12.300	PBC<MDA	TH227

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
238.35	197.	11.72	1.12	3.735E-02	238.63	43.300	6.573E+00	PB212
241.75	67.	20.79	1.18	3.697E-02	242.00	7.430	1.358E+01	PB214
264.01	29.	35.16	0.71	3.486E-02	263.70	0.006	7.740E+03	Cd113m
277.92	15.	89.17	1.21	3.372E-02	277.28	6.310	PBC<MDA	TL208
279.20	13.	113.52	1.22	3.356E-02	279.20	81.460	PBC<MDA	Hg203
284.30	13.	114.80	1.22	3.315E-02	284.30	6.140	PBC<MDA	I131
295.08	183.	10.34	1.08	3.232E-02	295.09	19.300	1.628E+01	PB214
					296.00	79.000	3.985E+00	TL210
299.87	27.	32.17	1.23	3.195E-02	300.03	3.280	1.411E+01	PB212
					300.07	2.460	1.882E+01	PA231
					300.18	6.200	7.469E+00	PA233
316.49	14.	174.93	1.25	3.080E-02	316.49	87.040	PBC<MDA	Ir192
320.08	14.	96.44	1.25	3.056E-02	320.08	9.940	PBC<MDA	CR51
327.68	20.	44.24	0.50	3.006E-02	328.76	20.300	1.871E+00	La140
338.02	49.	22.61	0.52	2.940E-02	338.32	12.010	7.727E+00	AC228
345.83	17.	131.34	1.28	2.896E-02	345.83	15.070	PBC<MDA	HF181
351.72	338.	6.23	1.32	2.862E-02	351.93	37.600	1.748E+01	PB214
383.84	12.	127.65	1.31	2.691E-02	383.84	8.940	PBC<MDA	BA133
391.69	14.	105.09	1.32	2.653E-02	391.69	64.000	PBC<MDA	SN113
453.88	7.	134.72	1.37	2.388E-02	453.88	65.000	PBC<MDA	PM146
463.37	12.	91.62	1.38	2.352E-02	463.37	10.470	PBC<MDA	SB125
477.60	9.	105.36	1.39	2.301E-02	477.60	10.520	PBC<MDA	BE7
482.00	9.	118.37	1.40	2.286E-02	482.00	80.500	PBC<MDA	HF181
497.05	4.	237.21	1.41	2.236E-02	497.05	90.900	PBC<MDA	RU103
511.86	78.	18.93	2.67	2.188E-02	511.86	20.000	9.901E+00	RH106
531.00	9.	120.36	1.44	2.130E-02	531.00	13.000	PBC<MDA	Nd147
537.26	7.	174.33	1.44	2.112E-02	537.26	24.390	PBC<MDA	Ba140
563.24	10.	103.87	1.47	2.040E-02	563.24	8.350	PBC<MDA	CS134
569.32	7.	113.39	1.47	2.024E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.344E+00	PA234
					569.70	97.740	PBC<MDA	BI207
582.79	122.	10.34	1.86	1.989E-02	583.02	84.500	4.035E+00	TL208
609.25	206.	8.95	1.62	1.925E-02	609.31	46.090	1.289E+01	BI214
636.97	9.	76.26	1.53	1.862E-02	636.97	7.170	PBC<MDA	I131
696.54	2.	517.73	1.58	1.741E-02	696.54	99.000	PBC<MDA	PM144
702.63	12.	82.67	1.58	1.730E-02	702.63	97.900	PBC<MDA	NB94
727.17	8.	160.21	1.60	1.686E-02	727.17	7.550	PBC<MDA	BI212
765.79	11.	86.32	1.63	1.621E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	1.324E+02	PA234M
766.41	8.	84.47	1.63	1.620E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	9.367E+01	PA234M
785.42	2.	549.39	1.65	1.590E-02	785.42	1.280	PBC<MDA	BI212
795.87	13.	78.77	1.66	1.574E-02	795.87	85.530	PBC<MDA	CS134
801.95	2.	543.14	1.66	1.565E-02	801.95	8.690	PBC<MDA	CS134
810.78	8.	84.64	1.67	1.551E-02	810.78	99.460	PBC<MDA	CO58
815.77	8.	102.76	1.67	1.544E-02	815.77	23.280	PBC<MDA	La140
834.85	10.	89.71	1.69	1.517E-02	834.85	99.980	PBC<MDA	MN54
856.25	12.	36.88	0.67	1.488E-02				

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
860.45	8.	102.27	1.71	1.482E-02	860.56	12.420	PBC<MDA	TL208
871.10	4.	162.02	1.71	1.468E-02	871.10	99.890	PBC<MDA	NB94
889.28	9.	94.94	1.73	1.445E-02	889.28	99.984	PBC<MDA	Sc46
910.97	72.	12.30	1.44	1.418E-02	911.07	29.000	9.722E+00	AC228
937.49	18.	36.66	1.77	1.387E-02	937.49	34.360	2.073E+00	AG110M
946.02	6.	122.85	1.77	1.377E-02	946.02	13.400	PBC<MDA	PA234
968.70	11.	85.18	1.79	1.352E-02	968.97	17.460	PBC<MDA	AC228
996.33	23.	28.64	1.81	1.323E-02	996.33	10.600	9.246E+00	EU154
1120.19	10.	107.04	1.90	1.206E-02	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
1120.55	13.	86.24	1.90	1.206E-02	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	6.092E-01	Sc46
					1121.30	34.900	1.746E+00	Ta182
1121.40	11.	87.32	1.90	1.205E-02	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	1.513E+00	Ta182
1238.28	9.	93.62	1.98	1.114E-02	1238.28	66.070	PBC<MDA	Co56
1332.50	7.	39.21	2.05	1.050E-02	1332.50	99.980	3.953E-01	CO60
1408.00	4.	221.56	2.10	1.004E-02	1408.00	21.005	PBC<MDA	EU152
1460.42	129.	9.35	2.39	9.749E-03	1460.83	10.670	6.896E+01	K40
1596.21	2.	311.43	2.22	9.069E-03	1596.21	95.400	PBC<MDA	La140
1764.54	10.	93.47	2.31	8.350E-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 Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
252.17	63.28	45.	44.	1.110E+03	26.59	1.014	-	sD
298.30	74.66	78.	117.	2.553E+03	14.18	1.025	-	D
308.29	77.16	65.	212.	4.537E+03	8.71	1.027	-	D
1310.10	327.68	20.	20.	6.819E+02	44.24	0.499	-	s
3424.08	856.25	4.	16.	1.050E+03	30.87	1.703	-	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_Rev15.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	147.	16.	0.009	110.76	0.998s
TH-227	200.20	50.14	148.	12.	0.007	144.94	1.001s
AM-241	237.77	59.54	318.	-22.	-0.012	117.04	1.010s
TH-234	252.77	63.29	233.	15.	0.008	148.38	1.014s
Sn-126	256.74	64.28	310.	-22.	-0.012	113.54	1.015s
BA-133	323.56	80.99	738.	-26.	-0.014	81.43	1.031s
Np-237	345.55	86.49	797.	-23.	-0.013	176.50	1.036
EU-155	345.76	86.54	774.	-23.	-0.013	173.99	1.036
Sn-126	347.35	86.94	114.	23.	0.013	69.17	1.037D
Sn-126	349.87	87.57	691.	23.	0.013	72.22	1.037D
Cd-109	351.75	88.04	751.	0.	0.000	271.04	1.038A
Nd-147	363.99	91.10	714.	23.	0.013	166.46	1.041s
AC-228	371.84	93.06	88.	58.	0.032	32.70	1.453s
Gd-153	389.58	97.50	737.	0.	0.000	1000.00	1.047s
Np-239	397.58	99.50	726.	11.	0.006	347.72	1.049s
Gd-153	412.37	103.20	737.	0.	0.000	1000.00	1.052s
Np-239	414.37	103.70	737.	0.	0.000	1000.00	1.053
EU-152	486.67	121.78	155.	11.	0.006	158.00	1.070s
CO-57	487.80	122.06	166.	0.	0.000	1000.00	1.070s
EU-154	491.95	123.10	155.	-14.	-0.008	125.77	1.071s
PA-234	524.72	131.29	504.	-14.	-0.008	228.35	1.079s
HF-181	531.64	133.02	518.	0.	0.000	1000.00	1.081s
CE-144	533.69	133.54	518.	0.	0.000	1000.00	1.081s
HF-181	544.74	136.30	518.	0.	0.000	1000.00	1.084s
CO-57	545.43	136.47	518.	0.	0.000	1000.00	1.084s
Tc-99m	561.57	140.51	518.	0.	0.000	1000.00	1.088s
U-235	574.67	143.79	518.	0.	0.000	1000.00	1.091s
CE-141	581.29	145.44	547.	-24.	-0.014	137.58	1.092s
Ba-140	650.15	162.66	182.	20.	0.011	98.01	1.108s
CE-139	662.92	165.85	202.	-16.	-0.009	119.23	1.111s
Cf-251	705.90	176.60	103.	-12.	-0.006	165.10	1.122s
U-235	742.37	185.72	128.	56.	0.031	40.36	1.130
TH-229	773.52	193.51	160.	-25.	-0.014	77.46	1.137s
U-235	820.80	205.33	128.	-11.	-0.006	203.62	1.148s
TH-229	842.87	210.85	112.	13.	0.007	161.78	1.153s
Cf-251	907.45	227.00	84.	6.	0.003	301.85	1.168s
TH-227	943.33	235.97	476.	17.	0.009	184.67	1.176s
PB-212	953.97	238.63	266.	244.	0.136	11.41	1.179
PB-214	967.43	242.00	64.	67.	0.037	20.79	1.182D
EU-152	978.21	244.69	511.	-11.	-0.006	283.73	1.185s
TH-227	1024.39	256.24	80.	-11.	-0.006	162.03	1.195s
Cd-113m	1054.23	263.70	58.	15.	0.008	78.14	1.202s
BI-210M	1062.75	265.83	97.	-6.	-0.004	434.29	1.204s
TL-208	1108.55	277.28	78.	15.	0.008	89.17	1.215s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Hg-203	1116.22	279.20	97.	13.	0.007	113.52	1.216s
I-131	1136.61	284.30	52.	13.	0.007	114.80	1.221
PB-214	1179.77	295.09	42.	162.	0.090	9.73	1.230D
TL-210	1183.41	296.00	496.	11.	0.006	279.24	1.231s
PB-212	1199.52	300.03	23.	27.	0.015	32.17	1.235D
PA-231	1199.68	300.07	507.	0.	0.000	1000.00	1.235s
PA-233	1200.12	300.18	507.	0.	0.000	1000.00	1.235s
PA-231	1210.00	302.65	507.	0.	0.000	1000.00	1.237s
BA-133	1210.81	302.85	507.	0.	0.000	1000.00	1.238s
Ba-140	1218.80	304.85	507.	0.	0.000	1000.00	1.240
BI-210M	1218.99	304.90	507.	0.	0.000	1000.00	1.240
Ir-192	1233.16	308.44	507.	0.	0.000	1000.00	1.243s
Ir-192	1265.35	316.49	301.	14.	0.008	174.93	1.250s
CR-51	1279.73	320.08	79.	14.	0.008	96.44	1.253s
La-140	1314.43	328.76	334.	-18.	-0.010	144.97	1.261s
Cf-249	1333.15	333.44	316.	-18.	-0.010	140.63	1.265s
AC-228	1351.47	338.02	21.	49.	0.027	22.61	0.515s
Cs-136	1361.66	340.57	298.	-18.	-0.010	135.96	1.272
EU-152	1376.53	344.29	280.	-18.	-0.010	131.52	1.275s
HF-181	1382.70	345.83	229.	17.	0.009	131.34	1.276s
PB-214	1406.24	351.72	26.	338.	0.188	6.23	1.319
BA-133	1423.37	356.00	412.	-13.	-0.007	215.83	1.285s
I-131	1457.31	364.48	56.	-7.	-0.004	212.69	1.293s
BA-133	1534.73	383.84	108.	12.	0.007	127.65	1.310s
Cf-249	1551.17	387.95	120.	0.	0.000	1000.00	1.314s
SN-113	1566.12	391.69	97.	14.	0.008	105.09	1.317s
SB-125	1710.86	427.88	56.	-6.	-0.004	245.15	1.349s
AG-108M	1735.10	433.94	53.	-7.	-0.004	296.95	1.354s
PM-146	1814.87	453.88	22.	7.	0.004	134.72	1.372s
SB-125	1852.82	463.37	50.	12.	0.006	91.62	1.380s
Ir-192	1871.59	468.06	80.	-7.	-0.004	180.59	1.384s
BE-7	1909.73	477.60	45.	9.	0.005	105.36	1.392s
HF-181	1927.34	482.00	55.	9.	0.005	118.37	1.396s
La-140	1947.43	487.02	114.	-15.	-0.008	106.59	1.400s
RU-103	1987.56	497.05	22.	4.	0.002	237.21	1.409s
RH-106	2046.81	511.86	70.	78.	0.043	18.93	2.672s
Kr-85	2055.27	513.98	148.	0.	0.000	1000.00	1.424s
Nd-147	2123.35	531.00	26.	9.	0.005	120.36	1.438
Ba-140	2148.39	537.26	35.	7.	0.004	174.33	1.444s
CS-134	2252.30	563.24	24.	10.	0.006	103.87	1.466s
CS-134	2276.64	569.32	28.	7.	0.004	113.39	1.471s
PA-234	2277.24	569.47	35.	0.	0.000	1000.00	1.471s
BI-207	2278.16	569.70	45.	-9.	-0.005	128.63	1.471s
TL-208	2330.50	582.79	7.	122.	0.068	10.34	1.856s
SB-125	2401.36	600.50	354.	-15.	-0.008	85.58	1.497s
SB-124	2410.29	602.73	340.	-15.	-0.008	178.73	1.499s
CS-134	2418.21	604.71	325.	-3.	-0.002	889.07	1.500
BI-214	2436.36	609.25	29.	206.	0.114	8.95	1.615

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RU-103	2440.56	610.30	322.	0.	0.000	1000.00	1.505s
AG-108M	2456.49	614.28	322.	0.	0.000	1000.00	1.508
RH-106	2487.04	621.92	33.	-5.	-0.003	383.80	1.515s
SB-125	2542.94	635.89	28.	-4.	-0.002	193.65	1.526s
I-131	2547.28	636.97	20.	9.	0.005	76.26	1.527s
AG-110M	2630.43	657.76	60.	-2.	-0.001	552.27	1.544s
CS-137	2646.03	661.66	97.	-19.	-0.011	75.67	1.548s
PM-144	2785.58	696.54	62.	2.	0.001	517.73	1.576s
NB-94	2809.93	702.63	46.	12.	0.007	82.67	1.581s
SB-124	2890.57	722.79	40.	0.	0.000	1000.00	1.598s
AG-108M	2891.17	722.94	40.	0.	0.000	1000.00	1.598s
EU-154	2892.86	723.36	61.	-16.	-0.009	74.85	1.598s
ZR-95	2896.22	724.20	77.	-7.	-0.004	191.61	1.599s
BI-212	2908.11	727.17	75.	8.	0.004	160.21	1.601s
PM-146	2988.08	747.16	38.	-14.	-0.008	134.58	1.617s
ZR-95	3026.36	756.73	30.	-4.	-0.002	305.16	1.625s
AG-110M	3055.23	763.94	54.	-17.	-0.009	65.77	1.631s
NB-95	3062.61	765.79	42.	11.	0.006	86.32	1.632s
PA-234M	3065.10	766.41	19.	8.	0.004	84.47	1.633s
EU-152	3115.14	778.92	25.	-8.	-0.004	141.88	1.643s
BI-212	3141.15	785.42	65.	2.	0.001	549.39	1.648
CS-134	3182.96	795.87	45.	13.	0.007	78.77	1.656s
CS-134	3207.29	801.95	58.	2.	0.001	543.14	1.661s
CO-58	3242.59	810.78	20.	8.	0.005	84.64	1.668s
La-140	3262.58	815.77	28.	8.	0.004	102.76	1.672s
Cs-136	3273.50	818.50	36.	0.	0.000	1000.00	1.674s
MN-54	3338.91	834.85	15.	10.	0.006	89.71	1.687s
Co-56	3386.61	846.77	30.	-13.	-0.007	68.03	1.696s
TL-208	3441.80	860.56	29.	8.	0.004	102.27	1.707s
NB-94	3483.94	871.10	19.	4.	0.002	162.02	1.715s
EU-154	3492.47	873.23	36.	-12.	-0.006	78.09	1.717s
PA-234	3521.68	880.53	43.	-7.	-0.004	143.87	1.722s
PA-234	3532.53	883.24	49.	0.	0.000	1000.00	1.724s
AG-110M	3538.30	884.68	49.	0.	0.000	1000.00	1.725s
Sc-46	3556.69	889.28	28.	9.	0.005	94.94	1.729s
Y-88	3591.74	898.04	25.	-8.	-0.005	98.63	1.736s
AC-228	3643.49	910.97	3.	72.	0.040	12.30	1.440
AG-110M	3749.60	937.49	5.	18.	0.010	36.66	1.766s
PA-234	3783.72	946.02	10.	6.	0.003	122.85	1.772s
EU-152	3856.11	964.11	78.	-10.	-0.006	125.06	1.786
AC-228	3875.56	968.97	36.	11.	0.006	85.18	1.790s
EU-154	3985.03	996.33	11.	23.	0.013	28.64	1.810s
PA-234M	4003.71	1001.00	34.	0.	0.000	1000.00	1.814s
Co-56	4151.13	1037.84	27.	-3.	-0.001	444.41	1.841s
Ga-68	4309.44	1077.40	27.	-7.	-0.004	180.28	1.870s
EU-152	4448.20	1112.07	100.	-13.	-0.007	110.95	1.895s
BI-214	4481.06	1120.29	49.	10.	0.005	107.04	1.901s
Sc-46	4482.12	1120.55	58.	13.	0.007	86.24	1.901s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ta-182	4485.12	1121.30	44.	11.	0.006	87.32	1.901
CO-60	4692.96	1173.24	21.	-7.	-0.004	147.85	1.938s
Ta-182	4756.25	1189.05	23.	-4.	-0.002	308.96	1.949
Ta-182	4885.75	1221.41	28.	-8.	-0.005	153.75	1.972
Co-56	4953.27	1238.28	12.	9.	0.005	93.62	1.984s
NA-22	5098.35	1274.53	28.	-10.	-0.006	79.21	2.008s
EU-154	5098.39	1274.54	39.	0.	0.000	1000.00	2.008s
TL-210	5252.32	1313.00	17.	0.	0.000	1000.00	2.034s
CO-60	5330.37	1332.50	1.	7.	0.004	39.21	2.047s
EU-152	5632.56	1408.00	11.	4.	0.002	221.56	2.097s
K-40	5842.39	1460.42	8.	129.	0.072	9.35	2.394
La-140	6385.95	1596.21	6.	2.	0.001	311.43	2.215s
SB-124	6765.35	1690.98	13.	-4.	-0.002	152.82	2.272s
BI-214	7059.65	1764.49	35.	10.	0.005	93.47	2.314s

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

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	2.1717E+00				5.31E+01	
			477.60	2.172E+00	?(P	7.786E+00 1.05E+02 1.05E+01	G
NA-22	C	-5.2779E-01				9.50E+02	
			1274.53	-5.278E-01	?(	1.405E+00 7.92E+01 9.99E+01	G
K-40	N	6.8958E+01				4.66E+11	
			1460.83	6.896E+01	(P	8.437E+00 9.35E+00 1.07E+01	G
Sc-46	F	4.6812E-01				8.38E+01	
			889.28	3.270E-01	?(	1.058E+00 9.49E+01 1.00E+02	G
			1120.55	6.092E-01	?(	1.766E+00 8.62E+01 1.00E+02	G
CR-51	F	2.4921E+00				2.77E+01	
			320.08	2.492E+00	(P	8.088E+00 9.64E+01 9.94E+00	G
MN-54	C	3.7160E-01				3.12E+02	
			834.85	3.716E-01	&(P	7.606E-01 8.97E+01 1.00E+02	G
FE-59	F	-5.3542E-02				4.45E+01	
			1099.25	-5.354E-02	%(	1.440E+00 1.12E+03 5.65E+01	G
			1291.60	3.797E-02	% P	1.650E+00 1.77E+03 4.32E+01	G

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Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Co-56	C -4.9946E-01					7.73E+01	
		846.77	-4.995E-01	?(P	1.054E+00	6.80E+01	9.99E+01 G
		1238.28	6.882E-01	+ P	1.422E+00	9.36E+01	6.61E+01 G
		1037.84	-8.184E-01	+	8.217E+00	4.44E+02	1.41E+01 G
		1771.35	2.383E-01	%	1.486E+01	1.75E+03	1.55E+01 A
CO-58	C 2.9531E-01					7.09E+01	
		810.78	2.953E-01	?(	8.479E-01	8.46E+01	9.95E+01 G
CO-60	F 3.9534E-01					1.93E+03	
		1332.50	3.953E-01	?(P	3.900E-01	3.92E+01	1.00E+02 G
		1173.24	-3.507E-01	-	1.159E+00	1.48E+02	9.99E+01 G
ZN-65	F -1.3893E-02					2.44E+02	
		1115.55	-1.389E-02	%(	4.193E+00	8.63E+03	5.06E+01 G
NB-94	I 4.0330E-01					7.41E+06	
		702.63	4.033E-01	?(	1.120E+00	8.27E+01	9.79E+01 G
		871.10	1.515E-01	-	8.721E-01	1.62E+02	9.99E+01 G
ZR-95	I -2.4952E-01					6.40E+01	
		756.73	-2.495E-01	?(	1.761E+00	3.05E+02	5.45E+01 G
		724.20	-4.924E-01	+	3.246E+00	1.92E+02	4.42E+01 G
NB-95	I 3.8995E-01					6.40E+01	
		765.79	3.900E-01	?(	1.135E+00	8.63E+01	9.98E+01 G
RU-103	I 1.1235E-01					3.93E+01	
		497.05	1.123E-01	?(P	6.701E-01	2.37E+02	9.09E+01 G
		610.30	0.000E+00	-	4.339E+01	1.00E+03	5.75E+00 GA
RH-106	I -1.4205E+00					3.74E+02	
		621.92	-1.420E+00	?(P	8.678E+00	3.84E+02	9.93E+00 G
		1050.36	1.416E+00	% P	5.130E+01	1.51E+03	1.56E+00 G
		511.86	9.901E+00	?	5.293E+00	1.89E+01	2.00E+01 GA
AG-108M	C -1.7724E-01					1.53E+05	
		433.94	-1.772E-01	?(P	9.132E-01	2.97E+02	9.05E+01 G
		722.94	0.000E+00	+	1.163E+00	1.00E+03	9.08E+01 G
		614.28	0.000E+00	+	2.790E+00	1.00E+03	8.98E+01 G
AG-110M	F 6.6546E-01					2.50E+02	
		884.68	0.000E+00	&(	1.867E+00	1.00E+03	7.27E+01 G
		657.76	-6.458E-02	+	1.253E+00	5.52E+02	9.46E+01 G
		937.49	2.073E+00	&(P	1.557E+00	3.67E+01	3.44E+01 G
		1384.30	3.695E-02	% P	4.209E+00	4.85E+03	2.43E+01 G
		763.94	-2.611E+00	+	5.675E+00	6.58E+01	2.23E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SN-113	F	4.4953E-01					1.15E+02	
			391.69	4.495E-01	*(	1.593E+00	1.05E+02	6.40E+01 G
SB-124	F	-4.2949E-01					6.02E+01	
			602.73	-4.295E-01	?(	2.581E+00	1.79E+02	9.83E+01 G
			1690.98	-5.419E-01	+ P	2.625E+00	1.53E+02	4.78E+01 G
			722.79	0.000E+00	+	9.768E+00	1.00E+03	1.08E+01 G
SB-125	I	3.3016E-01					1.01E+03	
			427.88	-4.772E-01	?(	2.840E+00	2.45E+02	2.96E+01 G
			600.50	-2.362E+00	+ P	1.446E+01	8.56E+01	1.79E+01 G
			635.89	-1.054E+00	&	7.210E+00	1.94E+02	1.13E+01 G
			463.37	2.613E+00	?(P	8.075E+00	9.16E+01	1.05E+01 G
I-131	I	3.6634E-01					8.02E+00	
			364.48	-1.706E-01	?(	9.158E-01	2.13E+02	8.17E+01 G
			284.30	3.469E+00	(P	9.937E+00	1.15E+02	6.14E+00 G
			636.97	3.828E+00	&(	9.800E+00	7.63E+01	7.17E+00 G
Ga-68	C	-1.0605E+01					4.71E-02	
			1077.40	-1.060E+01	?(	4.259E+01	1.80E+02	3.30E+00 G
BA-133	F	-4.2299E-01					3.85E+03	
			356.00	-4.230E-01	&(	3.070E+00	2.16E+02	6.20E+01 G
			302.85	0.000E+00	+	1.028E+01	1.00E+03	1.83E+01 G
			383.84	2.733E+00	?	1.182E+01	1.28E+02	8.94E+00 GA
			80.99	-8.764E-01	+ P	4.367E+00	8.14E+01	3.41E+01 GA
CS-134	I	8.4803E-01					7.54E+02	
			795.87	5.315E-01	?(	1.402E+00	7.88E+01	8.55E+01 G
			604.71	-8.448E-02	-	2.549E+00	8.89E+02	9.76E+01 G
			569.32	1.249E+00	?(	4.884E+00	1.13E+02	1.54E+01 G
			801.95	8.172E-01	?(	1.561E+01	5.43E+02	8.69E+00 G
			563.24	3.383E+00	?(P	8.271E+00	1.04E+02	8.35E+00 G
CS-137	I	-6.9646E-01					1.10E+04	
			661.66	-6.965E-01	&(	1.754E+00	7.57E+01	8.52E+01 G
CE-139	F	-2.4221E-01					1.38E+02	
			165.85	-2.422E-01	*(P	1.013E+00	1.19E+02	7.99E+01 G
Ba-140	I	1.3830E+00					1.28E+01	
			537.26	7.633E-01	&(P	3.262E+00	1.74E+02	2.44E+01 G
			162.66	3.813E+00	&(P	1.250E+01	9.80E+01	6.22E+00 G
			304.85	0.000E+00	&	4.411E+01	1.00E+03	4.29E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
La-140	I	3.3737E-01					1.28E+01	
			1596.21	1.256E-01	?(P	9.097E-01	3.11E+02	9.54E+01 G
			487.02	-7.860E-01	&	2.822E+00	1.07E+02	4.55E+01 G
			328.76	-1.649E+00	&	8.020E+00	1.45E+02	2.03E+01 G
			815.77	1.205E+00	?(	4.243E+00	1.03E+02	2.33E+01 G
CE-141	I	-5.5902E-01					3.25E+01	
			145.44	-5.590E-01	&(	2.569E+00	1.38E+02	4.82E+01 G
PM-144	C	6.9826E-02					3.63E+02	
			696.54	6.983E-02	?(	1.268E+00	5.18E+02	9.90E+01 G
			618.06	-1.068E-02	& P	2.543E+00	5.09E+03	9.91E+01 G
EU-152	F	4.1528E-01					4.94E+03	
			121.78	4.153E-01	&(	2.223E+00	1.58E+02	2.86E+01 G
			344.29	-1.319E+00	&	5.821E+00	1.32E+02	2.65E+01 G
			1112.07	-4.424E+00	+	1.658E+01	1.11E+02	1.36E+01 G
			778.92	-2.147E+00	+	6.980E+00	1.42E+02	1.29E+01 G
			964.11	-2.896E+00	+	1.232E+01	1.25E+02	1.46E+01 G
			244.69	-2.264E+00	+	2.159E+01	2.84E+02	7.58E+00 G
			1408.00	9.655E-01	?	4.845E+00	2.22E+02	2.10E+01 GA
EU-154	I	1.6144E+00					3.14E+03	
			123.10	-3.686E-01	&(	1.563E+00	1.26E+02	4.08E+01 G
			1274.54	0.000E+00	+	4.596E+00	1.00E+03	3.52E+01 G
			723.36	-2.552E+00	+	6.365E+00	7.48E+01	2.02E+01 G
			873.23	-3.605E+00	+	9.436E+00	7.81E+01	1.23E+01 G
			1004.77	-7.825E-02	%	7.046E+00	2.49E+03	1.80E+01 G
			996.33	9.246E+00	?(	7.104E+00	2.86E+01	1.06E+01 G
EU-155	I	-3.0647E-02					1.81E+03	
			105.31	-3.065E-02	%(P	6.370E+00	3.08E+03	2.12E+01 G
			86.54	-8.229E-01	+	4.781E+00	1.74E+02	3.07E+01 G
HF-181	F	5.6771E-01					4.24E+01	
			482.00	2.783E-01	?(P	1.124E+00	1.18E+02	8.05E+01 G
			133.02	0.000E+00	-	2.686E+00	1.00E+03	4.33E+01 G
			345.83	2.114E+00	?(	9.332E+00	1.31E+02	1.51E+01 G
			136.30	0.000E+00	-	2.005E+01	1.00E+03	5.85E+00 G
Ta-182	F	1.5128E+00					1.14E+02	
			1121.30	1.513E+00	(	4.454E+00	8.73E+01	3.49E+01 G
			1221.41	-1.523E+00	-	5.028E+00	1.54E+02	2.70E+01 G
			1189.05	-1.093E+00	-	7.421E+00	3.09E+02	1.62E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Hg-203	F 2.5772E-01					4.66E+01	
		279.20	2.577E-01	&(	9.892E-01	1.14E+02	8.15E+01 G
TL-208	N 4.0200E+00					6.98E+02	
		583.02	4.035E+00	(P	4.960E-01	1.03E+01	8.45E+01 G
		277.28	3.825E+00	&(	1.145E+01	8.92E+01	6.31E+00 G
		860.56	2.413E+00	- P	8.439E+00	1.02E+02	1.24E+01 G
PM-146	C 2.6251E-01					2.02E+03	
		453.88	2.625E-01	?(	8.735E-01	1.35E+02	6.50E+01 G
		747.16	-1.360E+00	+ P	3.101E+00	1.35E+02	3.40E+01 G
		735.72	4.926E-02	%	3.376E+00	2.76E+03	2.25E+01 G
Y-88	F 3.9952E-02					1.07E+02	
		1836.06	3.995E-02	%(P	1.007E+00	1.10E+03	9.92E+01 G
		898.04	-3.456E-01	+ P	1.082E+00	9.86E+01	9.37E+01 G
Cd-113m	3.8921E+03					5.33E+03	
		263.70	3.892E+03	?(	1.016E+04	7.81E+01	6.00E-03 K
Cf-251	T -8.3819E-01					3.28E+05	
		176.60	-8.382E-01	?(	3.587E+00	1.65E+02	1.70E+01 G
		227.00	1.371E+00	?	1.038E+01	3.02E+02	6.30E+00 GA
Sn-126	-3.2054E+00					3.65E+07	
		87.57	6.705E-01	}	3.681E+00	7.22E+01	3.75E+01 GA
		64.28	-3.205E+00	?(	1.217E+01	1.14E+02	9.70E+00 G
		86.94	2.800E+00		6.414E+00	6.92E+01	9.04E+00 GA
PB-210	N 8.0632E+00					8.14E+03	
		46.54	8.063E+00	*(	3.004E+01	1.11E+02	4.25E+00 G
PB-212	N 8.4004E+00					6.98E+02	
		238.63	8.400E+00	?(P	2.704E+00	1.14E+01	4.33E+01 G
		300.03	1.411E+01	+	1.338E+01	3.22E+01	3.28E+00 GA
PB-214	N 1.7480E+01					5.84E+05	
		351.93	1.748E+01	(P	1.358E+00	6.23E+00	3.76E+01 G
		295.09	1.441E+01	- P	2.939E+00	9.73E+00	1.93E+01 G
		242.00	1.358E+01	-	8.079E+00	2.08E+01	7.43E+00 GA
BI-207	C -3.9564E-02					1.18E+04	
		1063.66	-3.956E-02	%(	1.064E+00	1.12E+03	7.45E+01 G
		569.70	-2.454E-01	+ P	9.519E-01	1.29E+02	9.77E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-212	N	3.4196E+00					6.98E+02	
			727.17	3.420E+00	(	1.878E+01	1.60E+02	7.55E+00 G
			785.42	5.710E+00	? P	1.099E+02	5.49E+02	1.28E+00 GA
BI-214	N	1.2891E+01					5.84E+05	
			609.31	1.289E+01	(P	1.746E+00	8.95E+00	4.61E+01 G
			1120.29	2.965E+00	- P	1.078E+01	1.07E+02	1.51E+01 G
			1764.49	4.161E+00	- P	1.314E+01	9.35E+01	1.54E+01 G
BI-210M	T	-2.0567E-01					1.10E+09	
			265.83	-2.057E-01	?(P	1.559E+00	4.34E+02	5.00E+01 G
			304.90	0.000E+00	&	6.759E+00	1.00E+03	2.80E+01 G
AC-228	N	9.7223E+00					2.10E+03	
			911.07	9.722E+00	(P	1.462E+00	1.23E+01	2.90E+01 G
			968.97	2.527E+00	- P	7.254E+00	8.52E+01	1.75E+01 G
			338.32	7.727E+00	- P	3.777E+00	2.26E+01	1.20E+01 G
			93.35	1.129E+01	P	8.949E+00	3.27E+01	5.56E+00 XA
TH-227	N	1.1329E+00					7.95E+03	
			256.24	-2.454E+00	&(	9.903E+00	1.62E+02	7.00E+00 G
			235.97	2.025E+00	&(	1.254E+01	1.85E+02	1.23E+01 G
			50.14	2.899E+00	(	1.422E+01	1.45E+02	8.00E+00 G
TH-229	N	-7.4942E+00					2.68E+06	
			193.51	-7.494E+00	&(P	1.818E+01	7.75E+01	4.40E+00 G
			210.85	5.961E+00	&	2.386E+01	1.62E+02	2.99E+00 G
TH-234	N	2.1672E+00					1.63E+12	
			92.59	-1.051E-01	%(P	2.494E+01	7.05E+03	5.58E+00 G
			63.29	5.498E+00	(	2.747E+01	1.48E+02	3.81E+00 G
PA-233	C	-5.1515E-03					7.82E+08	
			312.01	-5.152E-03	%(P	5.342E+00	1.52E+04	3.60E+01 G
			300.18	0.000E+00	+	3.020E+01	1.00E+03	6.20E+00 G
PA-234	N	2.9591E-01					1.63E+12	
			131.29	-8.284E-01	&(	6.350E+00	2.28E+02	1.80E+01 G
			946.02	1.806E+00	?(	5.252E+00	1.23E+02	1.34E+01 G
			569.47	0.000E+00	-	1.014E+01	1.00E+03	8.20E+00 G
			883.24	0.000E+00	-	1.412E+01	1.00E+03	9.60E+00 G
			880.53	-4.239E+00	+	2.108E+01	1.44E+02	6.00E+00 GA
PA-234M	N	2.4350E+01					1.63E+12	
			1001.00	0.000E+00	?(	1.505E+02	1.00E+03	8.37E-01 G
			766.41	9.367E+01	?(	2.685E+02	8.45E+01	2.94E-01 G

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241   T  -9.2764E-01                                     1.58E+05
                          59.54-9.276E-01 ?(  3.632E+00 1.17E+02 3.59E+01 G

Np-237   F  -1.9290E+00                                     2.14E+06
                          86.49-1.929E+00  (  1.137E+01 1.76E+02 1.31E+01 G

Ir-192   F   2.9411E-01                                     7.40E+01
                         316.49 2.941E-01 ?(  1.732E+00 1.75E+02 8.70E+01 G
                         468.06-3.295E-01 +   2.043E+00 1.81E+02 5.18E+01 G
                         308.44 0.000E+00 &   6.008E+00 1.00E+03 3.18E+01 G

Np-239   T   1.2264E-01                                     2.36E+00
                         103.70 0.000E+00 -   5.638E+00 1.00E+03 2.40E+01 X
                         106.13 1.226E-01 %(  5.976E+00 1.45E+03 2.27E+01 G
                          99.50 7.738E-01 &   9.024E+00 3.48E+02 1.50E+01 X

Nd-147       1.1688E+00                                     1.11E+01
                         531.00 1.805E+00 &(  5.310E+00 1.20E+02 1.30E+01 G
                          91.10 8.764E-01 ?(  4.873E+00 1.66E+02 2.83E+01 G

TL-210   N   1.1222E-01                                     5.84E+05
                         799.60 4.409E-03 %(  1.366E+00 8.74E+03 9.90E+01 G
                         296.00 2.473E-01 ?(  2.321E+00 2.79E+02 7.90E+01 G
                        1313.00 0.000E+00 -   5.458E+00 1.00E+03 2.10E+01 GA
   ( - 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
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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

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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	147.	16.	0.009	110.76	8.063E+00	
TH-227	50.14	148.	12.	0.007	144.94	2.899E+00	
AM-241	59.54	318.	-22.	-0.012	117.04	-9.276E-01	
TH-234	63.29	233.	15.	0.008	148.38	5.498E+00	
BA-133	80.99	738.	-26.	-0.014	81.43	-8.764E-01	P
Np-237	86.49	797.	-23.	-0.013	176.50	-1.929E+00	
EU-155	86.54	774.	-23.	-0.013	173.99	-8.229E-01	
Nd-147	91.10	714.	23.	0.013	166.46	8.764E-01	
EU-152	121.78	155.	11.	0.006	158.00	4.153E-01	
PA-234	131.29	504.	-14.	-0.008	228.35	-8.284E-01	
CE-141	145.44	547.	-24.	-0.014	137.58	-5.590E-01	
Ba-140	162.66	182.	20.	0.011	98.01	3.813E+00	P
CE-139	165.85	202.	-16.	-0.009	119.23	-2.422E-01	P
U-235	185.72	128.	56.	0.031	40.36	1.301E+00	
TH-229	193.51	160.	-25.	-0.014	77.46	-7.494E+00	P
U-235	205.33	128.	-11.	-0.006	203.62	-2.958E+00	
TH-229	210.85	112.	13.	0.007	161.78	5.961E+00	
TH-227	235.97	476.	17.	0.009	184.67	2.025E+00	
EU-152	244.69	511.	-11.	-0.006	283.73	-2.264E+00	
TH-227	256.24	80.	-11.	-0.006	162.03	-2.454E+00	
BI-210M	265.83	97.	-6.	-0.004	434.29	-2.057E-01	P
Hg-203	279.20	97.	13.	0.007	113.52	2.577E-01	
I-131	284.30	52.	13.	0.007	114.80	3.469E+00	P
TL-210	296.00	496.	11.	0.006	279.24	2.473E-01	
Ir-192	316.49	301.	14.	0.008	174.93	2.941E-01	
CR-51	320.08	79.	14.	0.008	96.44	2.492E+00	P
La-140	328.76	334.	-18.	-0.010	144.97	-1.649E+00	
Cf-249	333.44	316.	-18.	-0.010	140.63	-2.187E+00	
Cs-136	340.57	298.	-18.	-0.010	135.96	-7.378E-01	
EU-152	344.29	280.	-18.	-0.010	131.52	-1.319E+00	
HF-181	345.83	229.	17.	0.009	131.34	2.114E+00	
BA-133	356.00	412.	-13.	-0.007	215.83	-4.230E-01	
I-131	364.48	56.	-7.	-0.004	212.69	-1.706E-01	
BA-133	383.84	108.	12.	0.007	127.65	2.733E+00	
SN-113	391.69	97.	14.	0.008	105.09	4.495E-01	
SB-125	427.88	56.	-6.	-0.004	245.15	-4.772E-01	
AG-108M	433.94	53.	-7.	-0.004	296.95	-1.772E-01	P
PM-146	453.88	22.	7.	0.004	134.72	2.625E-01	
SB-125	463.37	50.	12.	0.006	91.62	2.613E+00	P

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ir-192	468.06	80.	-7.	-0.004	180.59	-3.295E-01	
BE-7	477.60	45.	9.	0.005	105.36	2.172E+00	P
HF-181	482.00	55.	9.	0.005	118.37	2.783E-01	P
La-140	487.02	114.	-15.	-0.008	106.59	-7.860E-01	
RU-103	497.05	22.	4.	0.002	237.21	1.123E-01	P
RH-106	511.86	70.	78.	0.043	18.93	9.901E+00	
Nd-147	531.00	26.	9.	0.005	120.36	1.805E+00	
Ba-140	537.26	35.	7.	0.004	174.33	7.633E-01	P
CS-134	563.24	24.	10.	0.006	103.87	3.383E+00	P
CS-134	569.32	28.	7.	0.004	113.39	1.249E+00	
BI-207	569.70	45.	-9.	-0.005	128.63	-2.454E-01	P
SB-125	600.50	354.	-15.	-0.008	85.58	-2.362E+00	P
SB-124	602.73	340.	-15.	-0.008	178.73	-4.295E-01	
CS-134	604.71	325.	-3.	-0.002	889.07	-8.448E-02	
RH-106	621.92	33.	-5.	-0.003	383.80	-1.420E+00	P
SB-125	635.89	28.	-4.	-0.002	193.65	-1.054E+00	
I-131	636.97	20.	9.	0.005	76.26	3.828E+00	
AG-110M	657.76	60.	-2.	-0.001	552.27	-6.458E-02	
CS-137	661.66	97.	-19.	-0.011	75.67	-6.965E-01	
PM-144	696.54	62.	2.	0.001	517.73	6.983E-02	
NB-94	702.63	46.	12.	0.007	82.67	4.033E-01	
ZR-95	724.20	77.	-7.	-0.004	191.61	-4.924E-01	
BI-212	727.17	75.	8.	0.004	160.21	3.420E+00	
PM-146	747.16	38.	-14.	-0.008	134.58	-1.360E+00	P
ZR-95	756.73	30.	-4.	-0.002	305.16	-2.495E-01	
AG-110M	763.94	54.	-17.	-0.009	65.77	-2.611E+00	
NB-95	765.79	42.	11.	0.006	86.32	3.900E-01	
PA-234M	766.41	19.	8.	0.004	84.47	9.367E+01	
EU-152	778.92	25.	-8.	-0.004	141.88	-2.147E+00	
BI-212	785.42	65.	2.	0.001	549.39	5.710E+00	P
CS-134	795.87	45.	13.	0.007	78.77	5.315E-01	
CS-134	801.95	58.	2.	0.001	543.14	8.172E-01	
CO-58	810.78	20.	8.	0.005	84.64	2.953E-01	
La-140	815.77	28.	8.	0.004	102.76	1.205E+00	
MN-54	834.85	15.	10.	0.006	89.71	3.716E-01	P
Co-56	846.77	30.	-13.	-0.007	68.03	-4.995E-01	P
NB-94	871.10	19.	4.	0.002	162.02	1.515E-01	
PA-234	880.53	43.	-7.	-0.004	143.87	-4.239E+00	
Sc-46	889.28	28.	9.	0.005	94.94	3.270E-01	
Y-88	898.04	25.	-8.	-0.005	98.63	-3.456E-01	P
AG-110M	937.49	5.	18.	0.010	36.66	2.073E+00	P
PA-234	946.02	10.	6.	0.003	122.85	1.806E+00	
EU-152	964.11	78.	-10.	-0.006	125.06	-2.896E+00	
Co-56	1037.84	27.	-3.	-0.001	444.41	-8.184E-01	
Ga-68	1077.40	27.	-7.	-0.004	180.28	-1.060E+01	
EU-152	1112.07	100.	-13.	-0.007	110.95	-4.424E+00	
Sc-46	1120.55	58.	13.	0.007	86.24	6.092E-01	
Ta-182	1121.30	44.	11.	0.006	87.32	1.513E+00	

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Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
Ta-182	1189.05	23.	-4.	-0.002	308.96	-1.093E+00		
Ta-182	1221.41	28.	-8.	-0.005	153.75	-1.523E+00		
Co-56	1238.28	12.	9.	0.005	93.62	6.882E-01		P
NA-22	1274.53	28.	-10.	-0.006	79.21	-5.278E-01		
EU-152	1408.00	11.	4.	0.002	221.56	9.655E-01		
La-140	1596.21	6.	2.	0.001	311.43	1.256E-01		P
SB-124	1690.98	13.	-4.	-0.002	152.82	-5.419E-01		P

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
BE-7	#A	2.1717E+00	2.1717E+00	1.054E+02%	7.79E+00
NA-22	#A	-5.2779E-01	-5.2779E-01	7.921E+01%	1.41E+00
K-40		6.8958E+01	6.8958E+01	9.347E+00%	8.44E+00
Sc-46	#A	4.6812E-01	4.6812E-01	6.413E+01%	1.06E+00
CR-51	#A	2.4920E+00	2.4921E+00	9.644E+01%	8.09E+00
MN-54	#A	3.7160E-01	3.7160E-01	8.971E+01%	7.61E-01
FE-59	#A	-5.3541E-02	-5.3542E-02	1.120E+03%	1.44E+00
Co-56	#A	-4.9946E-01	-4.9946E-01	6.803E+01%	1.05E+00
CO-57	#A	0.0000E+00	0.0000E+00	7.071E+02%	7.68E-01
CO-58	#A	2.9530E-01	2.9531E-01	8.464E+01%	8.48E-01
CO-60	#	3.9534E-01	3.9534E-01	3.921E+01%	3.90E-01
ZN-65	#A	-1.3893E-02	-1.3893E-02	8.625E+03%	4.19E+00
NB-94	#A	4.0330E-01	4.0330E-01	8.267E+01%	1.12E+00
ZR-95	#A	-2.4951E-01	-2.4952E-01	3.052E+02%	1.76E+00
NB-95	#A	3.8995E-01	3.8995E-01	8.632E+01%	1.13E+00
RU-103	#A	1.1234E-01	1.1235E-01	2.372E+02%	6.70E-01
RH-106	#A	-1.4205E+00	-1.4205E+00	3.838E+02%	8.68E+00
AG-108M	#A	-1.7724E-01	-1.7724E-01	2.969E+02%	9.13E-01
AG-110M	#A	6.6546E-01	6.6546E-01	3.666E+01%	1.87E+00
SN-113	#A	4.4953E-01	4.4953E-01	1.051E+02%	1.59E+00
SB-124	#A	-4.2949E-01	-4.2949E-01	1.787E+02%	2.58E+00
SB-125	#A	3.3016E-01	3.3016E-01	9.162E+01%	2.84E+00
I-131	#A	3.6632E-01	3.6634E-01	7.626E+01%	9.16E-01
Gd-153	#A	0.0000E+00	0.0000E+00	7.071E+02%	4.57E+00
Ga-68	#A	-1.0479E+01	-1.0605E+01	1.803E+02%	4.26E+01
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.37E+00
BA-133	#A	-4.2299E-01	-4.2299E-01	2.158E+02%	3.07E+00
CS-134	#A	8.4803E-01	8.4803E-01	7.877E+01%	1.40E+00
CS-137	#A	-6.9646E-01	-6.9646E-01	7.567E+01%	1.75E+00
CE-139	#A	-2.4221E-01	-2.4221E-01	1.192E+02%	1.01E+00
Ba-140	#A	1.3830E+00	1.3830E+00	9.801E+01%	3.26E+00
La-140	#A	3.3735E-01	3.3737E-01	1.028E+02%	9.10E-01
CE-141	#A	-5.5901E-01	-5.5902E-01	1.376E+02%	2.57E+00

CE-144 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.05E+01
PM-144 #A	6.9826E-02	6.9826E-02	5.177E+02%		1.27E+00
EU-152 #A	4.1528E-01	4.1528E-01	1.580E+02%		2.22E+00
EU-154 #C	1.6144E+00	1.6144E+00	2.864E+01%		1.56E+00
EU-155 #A	-3.0647E-02	-3.0647E-02	3.080E+03%		6.37E+00
HF-181 #A	5.6770E-01	5.6771E-01	8.841E+01%		1.12E+00
Ta-182 #A	1.5128E+00	1.5128E+00	8.732E+01%		4.45E+00
Hg-203 #A	2.5772E-01	2.5772E-01	1.135E+02%		9.89E-01
TL-208	4.0200E+00	4.0200E+00	1.034E+01%		4.96E-01
PM-146 #A	2.6251E-01	2.6251E-01	1.347E+02%		8.73E-01
Y-88 #A	3.9952E-02	3.9952E-02	1.096E+03%		1.01E+00
Cd-113m#A	3.8921E+03	3.8921E+03	7.814E+01%		1.02E+04
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%		3.79E+01
Cf-251 #A	-8.3819E-01	-8.3819E-01	1.651E+02%		3.59E+00
Cf-249 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.69E+00
Sn-126 A	-3.2054E+00	-3.2054E+00	1.135E+02%		1.22E+01
PB-210 #A	8.0632E+00	8.0632E+00	1.108E+02%		3.00E+01
PB-212 #	8.4004E+00	8.4004E+00	1.141E+01%		2.70E+00
PB-214	1.7480E+01	1.7480E+01	6.228E+00%		1.36E+00
BI-207 #A	-3.9564E-02	-3.9564E-02	1.120E+03%		1.06E+00
BI-212 #A	3.4196E+00	3.4196E+00	1.602E+02%		1.88E+01
U-235 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.09E+01
BI-214	1.2891E+01	1.2891E+01	8.952E+00%		1.75E+00
BI-210M#A	-2.0567E-01	-2.0567E-01	4.343E+02%		1.56E+00
AC-228	9.7223E+00	9.7223E+00	1.230E+01%		1.46E+00
TH-227 #A	1.1329E+00	1.1329E+00	9.508E+01%		9.90E+00
TH-229 #A	-7.4942E+00	-7.4942E+00	7.746E+01%		1.82E+01
TH-234 #A	2.1672E+00	2.1672E+00	1.484E+02%		2.49E+01
PA-231 #A	0.0000E+00	0.0000E+00	7.071E+02%		6.54E+01
PA-233 #A	-5.1515E-03	-5.1515E-03	1.519E+04%		5.34E+00
PA-234 #A	2.9591E-01	2.9591E-01	1.229E+02%		6.35E+00
PA-234M#A	2.4350E+01	2.4350E+01	8.447E+01%		1.51E+02
AM-241 #A	-9.2764E-01	-9.2764E-01	1.170E+02%		3.63E+00
Np-237 #A	-1.9290E+00	-1.9290E+00	1.765E+02%		1.14E+01
Ir-192 #A	2.9411E-01	2.9411E-01	1.749E+02%		1.73E+00
Cs-136 #A	0.0000E+00	0.0000E+00	1.000E+03%		1.11E+00
Np-239 #A	1.2261E-01	1.2264E-01	1.449E+03%		5.98E+00
Nd-147 #A	1.1688E+00	1.1688E+00	1.027E+02%		5.31E+00
TL-210 #A	1.1222E-01	1.1222E-01	2.792E+02%		1.37E+00
Kr-85 #A	0.0000E+00	0.0000E+00	1.000E+03%		3.52E+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 (   25.1 to  1999.3 keV)     1.215E+02  Bq/Sample
Total Decayed Activity (   25.1 to  1999.3 keV) 1.2147208E+02  Bq/Sample
```

486236_Gamma_180-111757-A-1-C. 9_Gamma_20202019.spc.

Test America St. Louis Spectrum ID: 15_Gamma_20201166

Sample Description: 486236_Gamma_180-111757-A-1-D DU
Detector: Detector #15
Batch ID: 486236
Work Order Number: Gamma
Lot Number: 180-111757-A-1-D DU

Decay to Time: 11/12/2020 13:58 Live Time: 1800 sec
Acquisition Time: 11/12/2020 13:58:18 Real Time: 1801 sec
Analysis Time: 11/12/2020 14:28 Dead Time: 0.08 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 15_Soil_TunaCan.Clb
Efficiency Cal Desc: 15_TunaCan_90099_032212
Efficiency Cal Date: 3/22/2012 13:03
Energy Cal Date: 7/23/2020 16:17
Library: Client_Long_Rev15.lib
Bkgd Correction File: 15_2020-11-07_1044.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	2.989E+00	101.5	3.033E+00	3.037E+00	1.035E+01
NA-22	-1.417E+00	54.9	7.779E-01	7.812E-01	2.525E+00
K-40	8.220E+01	10.4	8.569E+00	9.546E+00	6.585E+00
Sc-46	-1.029E-02	7553.7	7.776E-01	7.776E-01	2.728E+00
CR-51	3.524E+00	194.8	6.864E+00	6.867E+00	2.312E+01
MN-54	-2.748E-01	197.8	5.436E-01	5.438E-01	1.541E+00
FE-59	1.243E-01	85.8	1.066E-01	1.068E-01	2.838E+00
Co-56	5.565E-01	51.1	2.841E-01	2.856E-01	1.230E+00
CO-57	0.000E+00	1.#INF	1.285E-01	1.285E-01	1.002E+00
CO-58	4.743E-01	85.2	4.042E-01	4.049E-01	1.371E+00
CO-60	3.281E-01	161.0	5.283E-01	5.285E-01	1.263E+00
ZN-65	-1.110E+00	169.4	1.880E+00	1.881E+00	6.452E+00
NB-94	2.114E-01	70.1	1.481E-01	1.485E-01	1.542E+00
ZR-95	1.644E-01	598.9	9.843E-01	9.844E-01	2.346E+00
NB-95	-6.566E-01	116.8	7.669E-01	7.676E-01	2.596E+00
RU-103	2.915E-01	94.9	2.766E-01	2.770E-01	6.947E-01
RH-106	-7.019E+00	82.0	5.754E+00	5.766E+00	1.926E+01
AG-108M	-3.256E-03	220.0	7.161E-03	7.163E-03	1.258E+00
AG-110M	9.370E-01	31.6	2.963E-01	3.002E-01	3.755E+00
SN-113	3.835E-01	140.5	5.389E-01	5.393E-01	1.849E+00
SB-124	-7.107E-02	51.7	3.673E-02	3.691E-02	3.522E+00
SB-125	1.814E+00	85.5	1.552E+00	1.554E+00	3.039E+00
I-131	2.110E-02	1944.4	4.103E-01	4.103E-01	1.033E+00
Gd-153	1.239E+00	123.5	1.530E+00	1.532E+00	5.107E+00
Ga-68	-5.145E+00	460.1	2.367E+01	2.367E+01	5.492E+01
Tc-99m	3.662E-01	141.2	5.170E-01	5.174E-01	1.730E+00
BA-133	-8.854E-01	136.2	1.206E+00	1.207E+00	4.044E+00
CS-134	2.636E-01	68.7	1.810E-01	1.815E-01	2.015E+00
CS-137	1.316E-01	496.0	6.529E-01	6.529E-01	2.285E+00
CE-139	3.490E-01	103.0	3.594E-01	3.609E-01	1.206E+00
Ba-140	1.174E-01	168.7	1.979E-01	1.980E-01	4.209E+00
La-140	-1.020E-01	98.4	1.004E-01	1.005E-01	2.050E+00
CE-141	6.721E-01	132.4	8.895E-01	8.902E-01	2.978E+00

CE-144	-3.049E+00	138.6	4.226E+00	4.229E+00	1.413E+01
PM-144	5.024E-01	66.1	3.321E-01	3.331E-01	1.159E+00
EU-152	8.128E-01	264.6	2.150E+00	2.151E+00	2.994E+00
EU-154	3.375E+00	19.2	6.496E-01	6.733E-01	1.658E+00
EU-155	-1.852E+00	68.0	1.259E+00	1.263E+00	4.547E+00
HF-181	4.024E-01	110.0	4.425E-01	4.430E-01	1.512E+00
Ta-182	-2.414E+00	118.0	2.848E+00	2.851E+00	9.663E+00
Hg-203	3.778E-01	125.9	4.757E-01	4.762E-01	1.609E+00
TL-208	2.885E+00	16.4	4.737E-01	4.968E-01	7.940E-01
PM-146	7.089E-01	47.3	3.355E-01	3.374E-01	1.640E+00
Y-88	-9.450E-01	110.4	1.043E+00	1.045E+00	2.227E+00
Cd-113m	-6.880E+03	83.2	5.722E+03	5.739E+03	1.912E+04
Cd-109	0.000E+00	1.#INF	1.577E+01	1.577E+01	5.272E+01
Cf-251	-2.333E+00	95.0	2.217E+00	2.226E+00	5.422E+00
Cf-249	4.742E-01	145.6	6.904E-01	6.909E-01	2.229E+00
Sn-126	1.382E+00	326.9	4.518E+00	4.519E+00	1.531E+01
PB-210	1.596E+01	65.1	1.039E+01	1.043E+01	3.403E+01
PB-212	8.066E+00	11.0	8.897E-01	1.031E+00	2.185E+00
PB-214	1.404E+01	8.5	1.188E+00	1.394E+00	2.317E+00
BI-207	-5.159E-01	201.6	1.040E+00	1.040E+00	2.344E+00
BI-212	0.000E+00	1.#INF	2.759E+00	2.759E+00	1.323E+01
U-235	3.835E+00	92.0	3.527E+00	3.532E+00	1.354E+01
BI-214	1.552E+01	8.5	1.321E+00	1.547E+00	1.447E+00
BI-210M	8.430E-01	87.4	7.369E-01	7.386E-01	2.022E+00
AC-228	9.706E+00	15.3	1.480E+00	1.561E+00	1.602E+00
TH-227	1.247E+00	182.6	2.277E+00	2.278E+00	1.366E+01
TH-229	3.503E+00	187.9	6.580E+00	6.586E+00	1.850E+01
TH-234	8.494E+00	51.4	4.367E+00	4.393E+00	1.615E+01
PA-231	0.000E+00	1.#INF	2.523E+00	2.523E+00	8.086E+01
PA-233	8.882E-01	193.9	1.722E+00	1.723E+00	5.809E+00
PA-234	-4.333E-01	89.0	3.858E-01	3.864E-01	8.252E+00
PA-234M	-4.761E+00	931.1	4.433E+01	4.433E+01	2.221E+02
AM-241	-1.375E+00	108.6	1.493E+00	1.495E+00	4.987E+00
Np-237	0.000E+00	1.#INF	4.980E+00	4.980E+00	1.660E+01
Ir-192	4.383E-01	167.8	7.357E-01	7.361E-01	2.515E+00
Cs-136	2.926E-01	25.8	7.554E-02	7.738E-02	2.071E+00
Np-239	-1.586E+00	88.9	1.410E+00	1.413E+00	4.698E+00
Nd-147	5.146E+00	46.0	2.365E+00	2.383E+00	5.233E+00
TL-210	0.000E+00	1.#INF	2.133E-01	2.133E-01	1.855E+00
Kr-85	5.758E+01	212.8	1.225E+02	1.226E+02	4.213E+02
Total	2.536E+02				

Analyst: Amanda Kraus

Sample description
486236_Gamma_180-111757-A-1-D DU

Spectrum Filename: C:\User\SPC\Det15\15_Gamma_20201166.An1

Acquisition information
Start time: 11/12/2020 1:58:18 PM
Live time: 1800
Real time: 1801
Dead time: 0.08 %
Detector ID: 15

Detector system
Ge15 SN/11012216

Calibration
Filename: 15_Soil_TunaCan.Clb
15_TunaCan_90099_032212

Energy Calibration
Created: 7/23/2020 4:17:28 PM
Zero offset: 0.089 keV
Gain: 0.250 keV/channel
Quadratic: -3.102E-08 keV/channel^2

Efficiency Calibration
Created: 3/22/2012 1:03:01 PM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.00 %
Log(Eff): -6.894897E-01 + (-3.290613E-01*Log(E)) + (-3.875629E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.13 %
Log(Eff): -2.362677E+01 + (8.666669E+00*Log(E)) + (-9.214638E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev15.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 100 (25.11keV)
Stop channel: 8000 (1999.58keV)
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	11/12/2020 1:58:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	15_2020-11-07_1044.PBC 11/7/2020 10:44:35 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 21 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.2154

***** 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	24.	65.12	1.11	1.957E-02	46.54	4.250	PBC<MDA	PB210
63.38	24.	62.83	1.12	2.924E-02	63.29	3.810	PBC<MDA	TH234
64.37	7.	326.94	1.12	2.970E-02	64.28	9.700	PBC<MDA	Sn126
87.53	17.	93.23	1.14	3.698E-02	87.57	37.500	PBC<MDA	Sn126
					88.04	3.790	6.900E+00	Cd109
92.54	23.	81.40	1.15	3.776E-02	92.59	5.584	PBC<MDA	TH234
93.30	26.	155.53	1.15	3.785E-02	93.35	5.561	PBC<MDA	AC228
97.50	26.	123.47	1.15	3.829E-02	97.50	30.000	PBC<MDA	Gd153
123.10	18.	78.91	1.17	3.840E-02	123.10	40.790	PBC<MDA	EU154
140.51	21.	141.19	1.19	3.678E-02	140.51	89.300	PBC<MDA	Tc99m
143.79	19.	153.13	1.19	3.639E-02	143.79	10.960	PBC<MDA	U235
145.44	21.	132.36	1.19	3.618E-02	145.44	48.200	PBC<MDA	CE141
162.66	8.	214.85	1.20	3.378E-02	162.66	6.220	PBC<MDA	Ba140
165.85	17.	102.97	1.21	3.392E-02	165.85	79.900	PBC<MDA	CE139
185.72	54.	39.40	1.22	3.123E-02	185.72	54.000	1.779E+00	U235
193.59	6.	294.71	1.23	3.030E-02	193.51	4.400	PBC<MDA	TH229
205.33	17.	101.90	1.24	2.900E-02	205.33	5.010	PBC<MDA	U235
210.85	8.	233.09	1.24	2.844E-02	210.85	2.990	PBC<MDA	TH229
227.00	11.	141.13	1.26	2.691E-02	227.00	6.300	PBC<MDA	Cf251
235.97	15.	182.56	1.26	2.614E-02	235.97	12.300	PBC<MDA	TH227
238.60	163.	11.03	1.26	2.592E-02	238.63	43.300	8.066E+00	PB212
241.97	59.	21.20	1.27	2.565E-02	242.00	7.430	1.732E+01	PB214

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
244.69	9.	319.51	1.27	2.543E-02	244.69	7.580	PBC<MDA	EU152
265.83	15.	87.41	1.29	2.388E-02	265.83	50.000	PBC<MDA	BI210M
272.72	30.	31.39	0.46	2.342E-02				
277.19	13.	119.68	1.30	2.313E-02	277.28	6.310	PBC<MDA	TL208
279.20	13.	125.92	1.30	2.301E-02	279.20	81.460	PBC<MDA	Hg203
295.06	100.	13.49	1.31	2.205E-02	295.09	19.300	1.306E+01	PB214
300.00	27.	28.54	1.31	2.177E-02	300.03	3.280	2.099E+01	PB212
					300.07	2.460	2.799E+01	PA231
					300.18	6.200	PBC<MDA	PA233
304.90	12.	185.97	1.32	2.150E-02	304.85	4.290	7.290E+00	Ba140
					304.90	28.000	1.117E+00	BI210M
308.44	12.	189.98	1.32	2.131E-02	308.44	31.750	PBC<MDA	Ir192
312.01	12.	193.88	1.32	2.112E-02	312.01	36.000	PBC<MDA	PA233
316.49	13.	187.47	1.33	2.089E-02	316.49	87.040	PBC<MDA	Ir192
320.08	13.	194.78	1.33	2.070E-02	320.08	9.940	PBC<MDA	CR51
328.76	14.	143.93	1.33	2.028E-02	328.76	20.300	PBC<MDA	La140
333.44	14.	145.60	1.34	2.006E-02	333.44	15.510	PBC<MDA	Cf249
338.79	42.	26.80	0.83	1.983E-02	338.32	12.010	9.849E+00	AC228
340.57	10.	216.94	1.34	1.973E-02	340.57	46.900	PBC<MDA	Cs136
351.75	189.	10.22	1.63	1.924E-02	351.93	37.600	1.455E+01	PB214
391.69	8.	140.53	1.38	1.767E-02	391.69	64.000	PBC<MDA	SN113
427.88	5.	235.00	1.41	1.647E-02	427.88	29.600	PBC<MDA	SB125
463.37	11.	85.52	1.44	1.545E-02	463.37	10.470	PBC<MDA	SB125
468.06	2.	426.98	1.44	1.533E-02	468.06	51.750	PBC<MDA	Ir192
477.60	9.	101.47	1.45	1.508E-02	477.60	10.520	PBC<MDA	BE7
482.00	9.	109.97	1.45	1.497E-02	482.00	80.500	PBC<MDA	HF181
497.05	7.	94.90	1.46	1.460E-02	497.05	90.900	PBC<MDA	RU103
511.86	73.	14.69	2.72	1.426E-02	511.86	20.000	1.422E+01	RH106
513.98	6.	212.82	1.47	1.421E-02	513.98	0.430	PBC<MDA	Kr85
531.00	17.	45.96	1.49	1.384E-02	531.00	13.000	PBC<MDA	Nd147
563.24	6.	138.44	1.51	1.319E-02	563.24	8.350	PBC<MDA	CS134
569.32	7.	68.68	1.51	1.307E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	3.857E+00	PA234
					569.70	97.740	3.237E-01	BI207
569.47	5.	119.13	1.51	1.307E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.709E+00	PA234
					569.70	97.740	2.274E-01	BI207
583.33	53.	16.42	1.89	1.282E-02	583.02	84.500	2.743E+00	TL208
609.21	151.	8.51	1.60	1.236E-02	609.31	46.090	1.475E+01	BI214
618.06	13.	100.97	1.55	1.222E-02	618.06	99.100	PBC<MDA	PM144
635.89	8.	91.43	1.56	1.193E-02	635.89	11.310	PBC<MDA	SB125
661.66	2.	495.99	1.58	1.155E-02	661.66	85.210	PBC<MDA	CS137
696.54	8.	85.32	1.60	1.106E-02	696.54	99.000	PBC<MDA	PM144
722.79	10.	78.53	1.62	1.072E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	5.568E-01	AG108M
					723.36	20.220	2.503E+00	EU154
722.94	3.	308.31	1.62	1.072E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	1.562E-01	AG108M

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					723.36	20.220	7.020E-01	EU154
735.72	13.	47.32	1.63	1.056E-02	735.72	22.500	PBC<MDA	PM146
756.73	2.	598.87	1.64	1.032E-02	756.73	54.460	PBC<MDA	ZR95
778.92	3.	264.58	1.66	1.007E-02	778.92	12.940	PBC<MDA	EU152
785.42	3.	268.44	1.66	9.998E-03	785.42	1.280	PBC<MDA	BI212
810.78	8.	85.22	1.68	9.733E-03	810.78	99.460	PBC<MDA	CO58
815.77	2.	374.12	1.68	9.682E-03	815.77	23.280	PBC<MDA	La140
860.23	8.	95.00	1.71	9.252E-03	860.56	12.420	PBC<MDA	TL208
871.10	8.	70.05	1.72	9.156E-03	871.10	99.890	PBC<MDA	NB94
873.23	1.	752.37	1.72	9.137E-03	873.23	12.270	PBC<MDA	EU154
898.04	6.	93.05	1.74	8.921E-03	898.04	93.700	PBC<MDA	Y88
910.64	44.	15.25	1.72	8.811E-03	911.07	29.000	9.646E+00	AC228
964.11	2.	338.64	1.78	8.393E-03	964.11	14.605	PBC<MDA	EU152
969.12	6.	96.13	1.78	8.357E-03	968.97	17.460	PBC<MDA	AC228
996.33	27.	19.25	1.80	8.158E-03	996.33	10.600	1.735E+01	EU154
1001.00	-1.	931.07	1.80	8.125E-03	1001.00	0.837	PBC<MDA	PA234M
1037.84	4.	153.25	1.83	7.875E-03	1037.84	14.130	PBC<MDA	Co56
1048.07	15.	25.82	1.83	7.808E-03	1048.07	80.000	1.334E+00	Cs136
1120.20	44.	19.64	0.30	7.368E-03	1120.29	15.100	2.174E+01	BI214
1221.41	1.	914.69	1.94	6.830E-03	1221.41	27.000	PBC<MDA	Ta182
1238.28	13.	51.05	1.95	6.748E-03	1238.28	66.070	PBC<MDA	Co56
1291.60	5.	113.28	1.98	6.502E-03	1291.60	43.200	PBC<MDA	FE59
1332.50	4.	161.01	2.00	6.325E-03	1332.50	99.980	PBC<MDA	CO60
1384.30	10.	31.62	2.03	6.114E-03	1384.30	24.290	3.741E+00	AG110M
1408.00	2.	248.05	2.04	6.023E-03	1408.00	21.005	PBC<MDA	EU152
1461.19	92.	10.43	1.30	5.828E-03	1460.83	10.670	8.220E+01	K40
1690.98	7.	38.62	2.19	5.109E-03	1690.98	47.790	PBC<MDA	SB124
1764.59	24.	22.46	2.22	4.916E-03	1764.49	15.400	1.784E+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
1089.50	272.72	15.	20.	8.680E+02	34.67	1.291	- 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_Rev15.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	185.67	46.54	107.	24.	0.013	65.12	1.110s
TH-227	200.06	50.14	182.	-12.	-0.007	161.59	1.113s
AM-241	237.62	59.54	337.	-24.	-0.014	108.60	1.121s
TH-234	252.62	63.29	103.	24.	0.014	62.83	1.124D
Sn-126	256.58	64.28	271.	7.	0.004	326.94	1.125s
BA-133	323.37	80.99	212.	-29.	-0.016	53.03	1.138
Np-237	345.36	86.49	919.	0.	0.000	163.98	1.143A
EU-155	345.57	86.54	893.	-26.	-0.015	161.62	1.143s
Sn-126	349.68	87.57	804.	17.	0.010	93.23	1.144D
Cd-109	351.56	88.04	785.	0.	0.000	197.45	1.144A
TH-234	369.75	92.59	158.	23.	0.013	81.40	1.148D
AC-228	372.78	93.35	834.	26.	0.015	155.53	1.149s
Gd-153	389.37	97.50	488.	26.	0.014	123.47	1.152s
Np-239	397.37	99.50	791.	-26.	-0.015	153.01	1.153
EU-155	420.61	105.31	192.	-27.	-0.015	67.98	1.158s
Np-239	423.87	106.13	237.	-25.	-0.014	88.90	1.159
CO-57	487.56	122.06	148.	0.	0.000	1000.00	1.172s
EU-154	491.71	123.10	89.	18.	0.010	78.91	1.173s
PA-234	524.47	131.29	444.	-23.	-0.013	132.35	1.179s
HF-181	531.38	133.02	467.	-23.	-0.013	135.46	1.181
CE-144	533.44	133.54	490.	-23.	-0.013	138.61	1.181
CO-57	545.17	136.47	515.	0.	0.000	1000.00	1.183s
Tc-99m	561.31	140.51	430.	21.	0.012	141.19	1.187s
U-235	574.40	143.79	411.	19.	0.011	153.13	1.189s
CE-141	581.02	145.44	379.	21.	0.012	132.36	1.191s
Ba-140	649.86	162.66	162.	8.	0.005	214.85	1.205s
CE-139	662.62	165.85	145.	17.	0.009	102.97	1.207s
Cf-251	705.58	176.60	120.	-23.	-0.013	95.00	1.216s
U-235	742.04	185.72	104.	54.	0.030	39.40	1.223s
TH-229	773.18	193.51	80.	6.	0.003	294.71	1.229s
U-235	820.45	205.33	73.	17.	0.009	101.90	1.238s
TH-229	842.51	210.85	80.	8.	0.004	233.09	1.243
Cf-251	907.07	227.00	60.	11.	0.006	141.13	1.256
TH-227	942.94	235.97	346.	15.	0.008	182.56	1.263s
PB-212	953.58	238.63	79.	163.	0.091	11.03	1.265D
PB-214	967.03	242.00	50.	59.	0.033	21.20	1.267D
EU-152	977.81	244.69	420.	9.	0.005	319.51	1.270s
TH-227	1023.98	256.24	72.	-3.	-0.002	593.34	1.279s
Cd-113m	1053.80	263.70	101.	-18.	-0.010	83.17	1.285s
BI-210M	1062.33	265.83	77.	15.	0.008	87.41	1.286s
TL-208	1108.11	277.28	110.	13.	0.007	119.68	1.295s
Hg-203	1115.77	279.20	122.	13.	0.007	125.92	1.297s
I-131	1136.16	284.30	167.	-15.	-0.008	124.57	1.301s
PB-214	1179.30	295.09	41.	100.	0.056	13.49	1.309D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
TL-210	1182.94	296.00	386.	-16.	-0.009	178.05	1.310s
PB-212	1199.05	300.03	16.	27.	0.015	28.54	1.313D
PA-231	1199.21	300.07	370.	-14.	-0.008	192.13	1.313s
PA-233	1199.65	300.18	356.	0.	0.000	1000.00	1.313s
PA-231	1209.53	302.65	356.	0.	0.000	1000.00	1.315s
BA-133	1210.34	302.85	356.	0.	0.000	1000.00	1.315s
Ba-140	1218.32	304.85	356.	0.	0.000	1000.00	1.316s
BI-210M	1218.51	304.90	247.	12.	0.007	185.97	1.317s
Ir-192	1232.68	308.44	259.	12.	0.007	189.98	1.319s
PA-233	1246.96	312.01	272.	12.	0.007	193.88	1.322s
Ir-192	1264.87	316.49	292.	13.	0.007	187.47	1.325s
CR-51	1279.24	320.08	317.	13.	0.007	194.78	1.328s
La-140	1313.93	328.76	186.	14.	0.008	143.93	1.335s
Cf-249	1332.64	333.44	199.	14.	0.008	145.60	1.339s
AC-228	1354.05	338.79	22.	42.	0.023	26.80	0.834s
Cs-136	1361.15	340.57	213.	10.	0.005	216.94	1.344s
EU-152	1376.00	344.29	242.	-16.	-0.009	143.94	1.347s
HF-181	1382.17	345.83	269.	-17.	-0.010	65.21	1.348s
PB-214	1405.84	351.75	35.	189.	0.105	10.22	1.633s
BA-133	1422.84	356.00	320.	-19.	-0.010	136.20	1.356s
Cf-249	1550.59	387.95	91.	0.	0.000	1000.00	1.380s
SN-113	1565.55	391.69	56.	8.	0.004	140.53	1.383s
SB-125	1710.24	427.88	26.	5.	0.003	235.00	1.410
AG-108M	1734.48	433.94	43.	-4.	-0.002	313.79	1.414s
PM-146	1814.23	453.88	35.	-2.	-0.001	725.26	1.429s
SB-125	1852.17	463.37	39.	11.	0.006	85.52	1.436s
Ir-192	1870.93	468.06	49.	2.	0.001	426.98	1.440s
BE-7	1909.06	477.60	33.	9.	0.005	101.47	1.447s
HF-181	1926.67	482.00	42.	9.	0.005	109.97	1.450s
La-140	1946.75	487.02	82.	-13.	-0.007	67.55	1.454s
RU-103	1986.88	497.05	9.	7.	0.004	94.90	1.461s
RH-106	2046.11	511.86	21.	73.	0.041	14.69	2.722s
Kr-85	2054.57	513.98	88.	6.	0.004	212.82	1.474
Nd-147	2122.63	531.00	9.	17.	0.009	45.96	1.486s
Ba-140	2147.67	537.26	24.	-3.	-0.001	260.05	1.490s
CS-134	2251.55	563.24	14.	6.	0.003	138.44	1.509s
CS-134	2275.88	569.32	9.	7.	0.004	68.68	1.513s
PA-234	2276.48	569.47	17.	5.	0.003	119.13	1.513s
BI-207	2277.41	569.70	42.	-13.	-0.007	76.11	1.514s
TL-208	2331.91	583.33	8.	53.	0.030	16.42	1.889s
SB-125	2400.58	600.50	272.	-13.	-0.007	180.49	1.536s
SB-124	2409.51	602.73	259.	-13.	-0.007	67.20	1.537s
CS-134	2417.42	604.71	246.	-13.	-0.007	171.49	1.539s
BI-214	2435.43	609.21	7.	151.	0.084	8.51	1.599s
RU-103	2439.77	610.30	233.	-9.	-0.005	249.39	1.543s
PM-144	2470.82	618.06	82.	13.	0.007	100.97	1.548s
RH-106	2486.24	621.92	71.	-15.	-0.008	81.98	1.551s
SB-125	2542.12	635.89	24.	8.	0.005	91.43	1.561s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
I-131	2546.46	636.97	51.	-15.	-0.009	70.76	1.561s
AG-110M	2629.60	657.76	45.	-15.	-0.009	66.49	1.576s
CS-137	2645.19	661.66	66.	2.	0.001	495.99	1.579s
PM-144	2784.72	696.54	19.	8.	0.004	85.32	1.603s
NB-94	2809.06	702.63	34.	-2.	-0.001	443.54	1.607s
SB-124	2889.69	722.79	24.	10.	0.005	78.53	1.621s
AG-108M	2890.29	722.94	34.	3.	0.002	308.31	1.621s
EU-154	2891.98	723.36	37.	0.	0.000	1000.00	1.621s
ZR-95	2895.34	724.20	37.	0.	0.000	1000.00	1.622s
BI-212	2907.22	727.17	12.	0.	0.000	1000.00	1.624
PM-146	2941.42	735.72	5.	13.	0.007	47.32	1.630s
ZR-95	3025.46	756.73	20.	2.	0.001	598.87	1.644s
AG-110M	3054.31	763.94	89.	-22.	-0.012	45.39	1.649s
NB-95	3061.70	765.79	93.	-12.	-0.007	116.78	1.651s
EU-152	3114.22	778.92	30.	3.	0.002	264.58	1.659s
BI-212	3140.22	785.42	41.	3.	0.002	268.44	1.664s
CS-134	3182.03	795.87	36.	-5.	-0.003	175.50	1.671s
TL-210	3196.95	799.60	41.	0.	0.000	1000.00	1.673s
CS-134	3206.35	801.95	41.	0.	0.000	1000.00	1.675s
CO-58	3241.65	810.78	21.	8.	0.005	85.22	1.681s
La-140	3261.63	815.77	29.	2.	0.001	374.12	1.684s
Cs-136	3272.55	818.50	51.	-12.	-0.007	90.97	1.686s
MN-54	3337.95	834.85	26.	-5.	-0.003	197.85	1.697
Co-56	3385.64	846.77	15.	-6.	-0.003	147.67	1.705s
TL-208	3440.82	860.56	10.	8.	0.004	95.00	1.714s
NB-94	3482.96	871.10	13.	8.	0.005	70.05	1.721s
EU-154	3491.49	873.23	21.	1.	0.000	752.37	1.722s
PA-234	3520.70	880.53	55.	-13.	-0.007	82.75	1.727s
PA-234	3531.54	883.24	68.	-12.	-0.006	105.26	1.729s
AG-110M	3537.31	884.68	80.	0.	0.000	1000.00	1.729s
Y-88	3590.75	898.04	5.	6.	0.003	93.05	1.738s
AC-228	3641.16	910.64	1.	44.	0.025	15.25	1.719
AG-110M	3748.58	937.49	30.	-8.	-0.004	154.62	1.764s
PA-234	3782.70	946.02	15.	-8.	-0.004	112.15	1.769s
EU-152	3855.08	964.11	26.	2.	0.001	338.64	1.781s
AC-228	3874.52	968.97	11.	6.	0.003	96.13	1.784
EU-154	3983.98	996.33	0.	27.	0.015	19.25	1.801s
PA-234M	4002.66	1001.00	28.	-1.	0.000	931.07	1.804
EU-154	4017.77	1004.77	27.	0.	0.000	1000.00	1.806s
Co-56	4150.07	1037.84	5.	4.	0.002	153.25	1.827s
Cs-136	4191.00	1048.07	0.	15.	0.008	25.82	1.833s
BI-207	4253.38	1063.66	21.	-5.	-0.003	201.56	1.843s
Ga-68	4308.36	1077.40	16.	-2.	-0.001	460.07	1.851s
FE-59	4395.79	1099.25	16.	-4.	-0.002	128.84	1.865s
EU-152	4447.11	1112.07	90.	-13.	-0.007	106.40	1.872s
ZN-65	4461.00	1115.55	76.	-7.	-0.004	169.42	1.875s
BI-214	4479.63	1120.20	5.	44.	0.024	19.64	0.302s
Ta-182	4484.02	1121.30	81.	-11.	-0.006	117.96	1.878

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-60	4691.85	1173.24	16.	-4.	-0.002	203.18	1.909s
Ta-182	4755.13	1189.05	16.	-2.	-0.001	460.07	1.918
Ta-182	4884.63	1221.41	16.	1.	0.001	914.69	1.937
Co-56	4952.14	1238.28	7.	13.	0.007	51.05	1.947s
NA-22	5097.22	1274.53	34.	-17.	-0.009	54.91	1.968s
EU-154	5097.26	1274.54	51.	-7.	-0.004	144.20	1.968s
FE-59	5165.51	1291.60	6.	5.	0.003	113.28	1.978s
TL-210	5251.18	1313.00	17.	-8.	-0.004	125.93	1.990s
CO-60	5329.23	1332.50	6.	4.	0.002	161.01	2.001s
AG-110M	5536.54	1384.30	0.	10.	0.006	31.62	2.029s
EU-152	5631.42	1408.00	6.	2.	0.001	248.05	2.042s
K-40	5844.34	1461.19	0.	92.	0.051	10.43	1.299s
La-140	6384.82	1596.21	12.	-6.	-0.003	98.43	2.141s
SB-124	6764.25	1690.98	0.	7.	0.004	38.62	2.188s
BI-214	7058.56	1764.49	3.	24.	0.014	22.46	2.223
Co-56	7086.03	1771.35	27.	0.	0.000	1000.00	2.227s
Y-88	7345.14	1836.06	12.	-8.	-0.004	110.40	2.256s

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

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	2.9891E+00				5.31E+01	
			477.60	2.989E+00	?(P	1.035E+01 1.01E+02 1.05E+01	G
NA-22	C	-1.4168E+00				9.50E+02	
			1274.53	-1.417E+00	?(	2.525E+00 5.49E+01 9.99E+01	G
K-40	N	8.2195E+01				4.66E+11	
			1460.83	8.220E+01	(	6.585E+00 1.04E+01 1.07E+01	G
Sc-46	F	-1.0295E-02				8.38E+01	
			889.28	-1.029E-02	%(	2.728E+00 7.55E+03 1.00E+02	G
			1120.55	-1.439E-07	%	3.124E+00 6.16E+08 1.00E+02	G
CR-51	F	3.5239E+00				2.77E+01	
			320.08	3.524E+00	&(	2.312E+01 1.95E+02 9.94E+00	G
MN-54	C	-2.7479E-01				3.12E+02	
			834.85	-2.748E-01	?(P	1.541E+00 1.98E+02 1.00E+02	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
FE-59	F	1.2429E-01					4.45E+01	
			1099.25	-5.872E-01	?(P	2.838E+00	1.29E+02	5.65E+01 G
			1291.60	1.055E+00	?(	2.730E+00	1.13E+02	4.32E+01 G
Co-56	C	5.5653E-01					7.73E+01	
			846.77	-3.556E-01	?(	1.230E+00	1.48E+02	9.99E+01 G
			1238.28	1.665E+00	?(P	1.833E+00	5.11E+01	6.61E+01 G
			1037.84	1.823E+00	?(P	6.733E+00	1.53E+02	1.41E+01 G
			1771.35	0.000E+00	-	1.973E+01	1.00E+03	1.55E+01 A
CO-58	C	4.7429E-01					7.09E+01	
			810.78	4.743E-01	?(	1.371E+00	8.52E+01	9.95E+01 G
CO-60	F	3.2810E-01					1.93E+03	
			1332.50	3.281E-01	?(P	1.263E+00	1.61E+02	1.00E+02 G
			1173.24	-3.320E-01	+ P	1.688E+00	2.03E+02	9.99E+01 G
ZN-65	F	-1.1099E+00					2.44E+02	
			1115.55	-1.110E+00	?(	6.452E+00	1.69E+02	5.06E+01 G
NB-94	I	2.1141E-01					7.41E+06	
			702.63	-9.724E-02	?(	1.542E+00	4.44E+02	9.79E+01 G
			871.10	5.139E-01	?(	1.198E+00	7.01E+01	9.99E+01 G
ZR-95	I	1.6437E-01					6.40E+01	
			756.73	1.644E-01	?(P	2.346E+00	5.99E+02	5.45E+01 G
			724.20	0.000E+00	-	3.650E+00	1.00E+03	4.42E+01 G
NB-95	I	-6.5664E-01					6.40E+01	
			765.79	-6.566E-01	?(	2.596E+00	1.17E+02	9.98E+01 G
RU-103	I	2.9145E-01					3.93E+01	
			497.05	2.915E-01	&(P	6.947E-01	9.49E+01	9.09E+01 G
			610.30	-6.834E+00	+	5.776E+01	2.49E+02	5.75E+00 GA
RH-106	I	-7.0187E+00					3.74E+02	
			621.92	-7.019E+00	?(	1.926E+01	8.20E+01	9.93E+00 G
			1050.36	-1.409E+00	% P	9.570E+01	1.84E+03	1.56E+00 G
			511.86	1.422E+01	?	4.688E+00	1.47E+01	2.00E+01 GA
AG-108M	C	-3.2556E-03					1.53E+05	
			433.94	-1.633E-01	?(	1.258E+00	3.14E+02	9.05E+01 G
			722.94	1.562E-01	?(	1.711E+00	3.08E+02	9.08E+01 G
			614.28	-3.842E-07	%	3.648E+00	2.77E+08	8.98E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AG-110M	F	9.3701E-01					2.50E+02	
			884.68	0.000E+00	?(	3.755E+00	1.00E+03	7.27E+01 G
			657.76	-7.841E-01	+	1.725E+00	6.65E+01	9.46E+01 G
			937.49	-1.504E+00	+	5.310E+00	1.55E+02	3.44E+01 G
			1384.30	3.741E+00	&(	2.757E+00	3.16E+01	2.43E+01 G
			763.94	-5.383E+00	+ P	1.139E+01	4.54E+01	2.23E+01 G
SN-113	F	3.8347E-01					1.15E+02	
			391.69	3.835E-01	?(P	1.849E+00	1.41E+02	6.40E+01 G
SB-124	F	-7.1067E-02					6.02E+01	
			602.73	-5.936E-01	?(P	3.522E+00	6.72E+01	9.83E+01 G
			1690.98	1.573E+00	+ P	1.677E+00	3.86E+01	4.78E+01 G
			722.79	4.679E+00	?(	1.235E+01	7.85E+01	1.08E+01 G
SB-125	I	1.8144E+00					1.01E+03	
			427.88	5.175E-01	&(P	3.039E+00	2.35E+02	2.96E+01 G
			600.50	-3.251E+00	+	1.978E+01	1.80E+02	1.79E+01 G
			635.89	3.367E+00	?(P	1.048E+01	9.14E+01	1.13E+01 G
			463.37	3.804E+00	?(P	1.095E+01	8.55E+01	1.05E+01 G
I-131	I	2.1099E-02					8.02E+00	
			364.48	2.110E-02	%(P	1.033E+00	1.94E+03	8.17E+01 G
			284.30	-5.978E+00	+	2.508E+01	1.25E+02	6.14E+00 G
			636.97	-9.983E+00	+	2.347E+01	7.08E+01	7.17E+00 G
Gd-153	F	1.2391E+00					2.42E+02	
			97.50	1.239E+00	?(	5.107E+00	1.23E+02	3.00E+01 G
			103.20	-1.257E-07	%	8.887E+00	2.10E+09	2.18E+01 G
Ga-68	C	-5.1451E+00					4.71E-02	
			1077.40	-5.145E+00	?(	5.492E+01	4.60E+02	3.30E+00 G
Tc-99m	I	3.6616E-01					2.51E-01	
			140.51	3.662E-01	?(	1.730E+00	1.41E+02	8.93E+01 G
BA-133	F	-8.8544E-01					3.85E+03	
			356.00	-8.854E-01	?(	4.044E+00	1.36E+02	6.20E+01 G
			302.85	0.000E+00	+	1.271E+01	1.00E+03	1.83E+01 G
			383.84	3.460E-01	%	1.623E+01	1.35E+03	8.94E+00 GA
			80.99	-1.324E+00	& P	3.236E+00	5.30E+01	3.41E+01 GA
CS-134	I	2.6356E-01					7.54E+02	
			795.87	-3.285E-01	&(	2.015E+00	1.75E+02	8.55E+01 G
			604.71	-5.994E-01	+	3.467E+00	1.71E+02	9.76E+01 G
			569.32	2.056E+00	?(	4.683E+00	6.87E+01	1.54E+01 G
			801.95	0.000E+00	-	2.118E+01	1.00E+03	8.69E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
			563.24	3.027E+00	?(	1.016E+01	1.38E+02	8.35E+00 G
CS-137	I	1.3163E-01					1.10E+04	
			661.66	1.316E-01	?(	2.285E+00	4.96E+02	8.52E+01 G
CE-139	F	3.4899E-01					1.38E+02	
			165.85	3.490E-01	?(P	1.206E+00	1.03E+02	7.99E+01 G
Ba-140	I	1.1735E-01					1.28E+01	
			537.26	-4.259E-01	?(P	4.209E+00	2.60E+02	2.44E+01 G
			162.66	2.248E+00	?(	1.643E+01	2.15E+02	6.22E+00 G
			304.85	0.000E+00	-	5.459E+01	1.00E+03	4.29E+00 G
La-140	I	-1.0197E-01					1.28E+01	
			1596.21	-6.647E-01	?(P	2.050E+00	9.84E+01	9.54E+01 G
			487.02	-1.065E+00	+ P	3.694E+00	6.75E+01	4.55E+01 G
			328.76	1.841E+00	&(P	8.937E+00	1.44E+02	2.03E+01 G
			815.77	5.100E-01	?(	6.846E+00	3.74E+02	2.33E+01 G
CE-141	I	6.7208E-01					3.25E+01	
			145.44	6.721E-01	?(	2.978E+00	1.32E+02	4.82E+01 G
CE-144	I	-3.0490E+00					2.85E+02	
			133.54	-3.049E+00	(	1.413E+01	1.39E+02	1.11E+01 G
PM-144	C	5.0244E-01					3.63E+02	
			696.54	3.999E-01	?(	1.159E+00	8.53E+01	9.90E+01 G
			618.06	6.049E-01	?(	2.061E+00	1.01E+02	9.91E+01 G
EU-152	F	8.1275E-01					4.94E+03	
			121.78	3.368E-02	%(	2.994E+00	2.58E+03	2.86E+01 G
			344.29	-1.664E+00	+	8.057E+00	1.44E+02	2.65E+01 G
			1112.07	-7.151E+00	+	2.569E+01	1.06E+02	1.36E+01 G
			778.92	1.279E+00	?(	1.204E+01	2.65E+02	1.29E+01 G
			964.11	9.820E-01	?(	1.196E+01	3.39E+02	1.46E+01 G
			244.69	2.628E+00	(	2.830E+01	3.20E+02	7.58E+00 G
			1408.00	1.025E+00	?	6.062E+00	2.48E+02	2.10E+01 GA
EU-154	I	3.3752E+00					3.14E+03	
			123.10	6.300E-01	&(	1.658E+00	7.89E+01	4.08E+01 G
			1274.54	-1.736E+00	+	8.618E+00	1.44E+02	3.52E+01 G
			723.36	0.000E+00	-	7.962E+00	1.00E+03	2.02E+01 G
			873.23	4.325E-01	&(	1.196E+01	7.52E+02	1.23E+01 G
			1004.77	0.000E+00	-	1.025E+01	1.00E+03	1.80E+01 G
			996.33	1.735E+01	?(	4.735E+00	1.92E+01	1.06E+01 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
EU-155	I	-1.8519E+00						1.81E+03	
			105.31	-1.852E+00	?(P	4.547E+00	6.80E+01	2.12E+01	G
			86.54	-1.296E+00	&	6.983E+00	1.62E+02	3.07E+01	G
HF-181	F	4.0240E-01						4.24E+01	
			482.00	4.024E-01	&(	1.512E+00	1.10E+02	8.05E+01	G
			133.02	-7.796E-01	&	3.531E+00	1.35E+02	4.33E+01	G
			345.83	-3.303E+00	+ P	1.497E+01	6.52E+01	1.51E+01	G
			136.30	-4.683E-01	%	2.759E+01	1.75E+03	5.85E+00	G
Ta-182	F	-2.4144E+00						1.14E+02	
			1121.30	-2.414E+00	(	9.663E+00	1.18E+02	3.49E+01	G
			1221.41	3.012E-01	+	6.431E+00	9.15E+02	2.70E+01	G
			1189.05	-9.807E-01	+	1.047E+01	4.60E+02	1.62E+01	G
Hg-203	F	3.7780E-01						4.66E+01	
			279.20	3.778E-01	?(	1.609E+00	1.26E+02	8.15E+01	G
TL-208	N	2.8854E+00						6.98E+02	
			583.02	2.743E+00	(P	7.940E-01	1.64E+01	8.45E+01	G
			277.28	4.846E+00	+	1.961E+01	1.20E+02	6.31E+00	G
			860.56	3.854E+00	?(P	8.596E+00	9.50E+01	1.24E+01	G
PM-146	C	7.0889E-01						2.02E+03	
			453.88	-9.065E-02	?(	1.640E+00	7.25E+02	6.50E+01	G
			747.16	1.567E-01	%	4.075E+00	1.10E+03	3.40E+01	G
			735.72	3.019E+00	?(P	3.089E+00	4.73E+01	2.25E+01	G
Y-88	F	-9.4500E-01						1.07E+02	
			1836.06	-9.450E-01	?(	2.227E+00	1.10E+02	9.92E+01	G
			898.04	3.941E-01	+ P	8.806E-01	9.30E+01	9.37E+01	G
Cd-113m		-6.8795E+03						5.33E+03	
			263.70	-6.880E+03	?(	1.912E+04	8.32E+01	6.00E-03	K
Cf-251	T	-2.3335E+00						3.28E+05	
			176.60	-2.333E+00	&(	5.422E+00	9.50E+01	1.70E+01	G
			227.00	3.605E+00		1.272E+01	1.41E+02	6.30E+00	GA
Cf-249	T	4.7421E-01						1.28E+05	
			387.95	0.000E+00	?(	2.229E+00	1.00E+03	6.60E+01	G
			333.44	2.492E+00	?(	1.224E+01	1.46E+02	1.55E+01	G
Sn-126		1.3819E+00						3.65E+07	
			87.57	6.990E-01	}	5.403E+00	9.32E+01	3.75E+01	GA
			64.28	1.382E+00	?(	1.531E+01	3.27E+02	9.70E+00	G
			86.94	1.996E-01	}	2.297E+01	1.40E+03	9.04E+00	GA

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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

PB-210   N   1.5960E+01                                      8.14E+03
                          46.54 1.596E+01  (P 3.403E+01 6.51E+01 4.25E+00 G

PB-212   N   8.0662E+00                                      6.98E+02
                         238.63 8.066E+00  (P 2.185E+00 1.10E+01 4.33E+01 G
                         300.03 2.099E+01 + P 1.662E+01 2.85E+01 3.28E+00 GA

PB-214   N   1.4042E+01                                      5.84E+05
                         351.93 1.455E+01 @(  2.317E+00 1.02E+01 3.76E+01 G
                         295.09 1.306E+01  (  4.249E+00 1.35E+01 1.93E+01 G
                         242.00 1.732E+01     1.036E+01 2.12E+01 7.43E+00 GA

BI-207   C  -5.1593E-01                                      1.18E+04
                        1063.66-5.159E-01 ?(  2.344E+00 2.02E+02 7.45E+01 G
                         569.70-5.607E-01 +   1.426E+00 7.61E+01 9.77E+01 G

U-235    N   3.8346E+00                                      2.57E+11
                         143.79 2.639E+00 *(P 1.354E+01 1.53E+02 1.10E+01 G
                         205.33 6.450E+00 &(P 1.627E+01 1.02E+02 5.01E+00 G
                         163.38-5.669E-01 % P 2.077E+01 1.67E+03 5.08E+00 G
                         185.72 1.779E+00     1.655E+00 3.94E+01 5.40E+01 GA

BI-214   N   1.5521E+01                                      5.84E+05
                         609.31 1.475E+01 *(P 1.447E+00 8.51E+00 4.61E+01 G
                        1120.29 2.174E+01 + P 6.789E+00 1.96E+01 1.51E+01 G
                        1764.49 1.784E+01 ?(P 7.595E+00 2.25E+01 1.54E+01 G

BI-210M  T   8.4304E-01                                      1.10E+09
                         265.83 6.896E-01 &(  2.022E+00 8.74E+01 5.00E+01 G
                         304.90 1.117E+00 ?(  7.014E+00 1.86E+02 2.80E+01 G

AC-228   N   9.7058E+00                                      2.10E+03
                         911.07 9.646E+00  (P 1.602E+00 1.53E+01 2.90E+01 G
                         968.97 2.097E+00 - P 6.969E+00 9.61E+01 1.75E+01 G
                         338.32 9.849E+00  (P 5.705E+00 2.68E+01 1.20E+01 G
                          93.35 6.986E+00 -   3.623E+01 1.56E+02 5.56E+00 XA

TH-227   N   1.2472E+00                                      7.95E+03
                         256.24-9.800E-01 &(P 1.366E+01 5.93E+02 7.00E+00 G
                         235.97 2.515E+00 ?(  1.544E+01 1.83E+02 1.23E+01 G
                          50.14-3.802E+00 +   2.078E+01 1.62E+02 8.00E+00 G

TH-229   N   3.5027E+00                                      2.68E+06
                         193.51 2.500E+00 ?(  1.850E+01 2.95E+02 4.40E+00 G
                         210.85 4.978E+00  (P 2.907E+01 2.33E+02 2.99E+00 G
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 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

TH-234   N   8.4942E+00                                      1.63E+12
                          92.59 6.014E+00  (P 1.615E+01 8.14E+01 5.58E+00 G
                          63.29 1.213E+01  (P 2.492E+01 6.28E+01 3.81E+00 G

PA-233   C   8.8815E-01                                      7.82E+08
                         312.01 8.882E-01 ?(  5.809E+00 1.94E+02 3.60E+01 G
                         300.18 0.000E+00 -   3.732E+01 1.00E+03 6.20E+00 G

PA-234   N  -4.3326E-01                                      1.63E+12
                         131.29-1.865E+00 ?(  8.252E+00 1.32E+02 1.80E+01 G
                         946.02-3.888E+00 +   1.009E+01 1.12E+02 1.34E+01 G
                         569.47 2.709E+00 ?(  1.130E+01 1.19E+02 8.20E+00 G
                         883.24-7.403E+00 +   2.639E+01 1.05E+02 9.60E+00 G
                         880.53-1.370E+01 +   3.804E+01 8.28E+01 6.00E+00 GA

PA-234M  N  -4.7607E+00                                      1.63E+12
                        1001.00-4.761E+00 &(P 2.221E+02 9.31E+02 8.37E-01 G
                         766.41-1.543E+01 %   9.419E+02 1.76E+03 2.94E-01 G

AM-241   T  -1.3749E+00                                      1.58E+05
                          59.54-1.375E+00 &(  4.987E+00 1.09E+02 3.59E+01 G

Ir-192   F   4.3831E-01                                      7.40E+01
                         316.49 3.981E-01 ?(  2.515E+00 1.87E+02 8.70E+01 G
                         468.06 1.637E-01 ?(  2.466E+00 4.27E+02 5.18E+01 G
                         308.44 9.961E-01 ?(  6.386E+00 1.90E+02 3.18E+01 G

Cs-136   F   2.9256E-01                                      1.30E+01
                         818.50-6.746E-01 ?(  2.071E+00 9.10E+01 1.00E+02 G
                        1048.07 1.334E+00 ?(  6.555E-01 2.58E+01 8.00E+01 G
                         340.57 5.782E-01 ?(  4.250E+00 2.17E+02 4.69E+01 G

Np-239   T  -1.5858E+00                                      2.36E+00
                         103.70 9.698E-02 &   8.076E+00 2.48E+03 2.40E+01 X
                         106.13-1.586E+00 ?(  4.698E+00 8.89E+01 2.27E+01 G
                          99.50-2.525E+00 +   1.289E+01 1.53E+02 1.50E+01 X

Nd-147       5.1465E+00                                      1.11E+01
                         531.00 5.146E+00 ?(  5.233E+00 4.60E+01 1.30E+01 G
                          91.10 9.972E-08 &   7.051E+00 2.10E+09 2.83E+01 G

Kr-85    I   5.7576E+01                                      3.92E+03
                         513.98 5.758E+01 ?(  4.213E+02 2.13E+02 4.30E-01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
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! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
PB-210	46.54	107.	24.	0.013	65.12	1.596E+01	P
TH-227	50.14	182.	-12.	-0.007	161.59	-3.802E+00	
AM-241	59.54	337.	-24.	-0.014	108.60	-1.375E+00	
BA-133	80.99	212.	-29.	-0.016	53.03	-1.324E+00	P
EU-155	86.54	893.	-26.	-0.015	161.62	-1.296E+00	
Gd-153	97.50	488.	26.	0.014	123.47	1.239E+00	
Np-239	99.50	791.	-26.	-0.015	153.01	-2.525E+00	
EU-155	105.31	192.	-27.	-0.015	67.98	-1.852E+00	P
Np-239	106.13	237.	-25.	-0.014	88.90	-1.586E+00	
PA-234	131.29	444.	-23.	-0.013	132.35	-1.865E+00	
HF-181	133.02	467.	-23.	-0.013	135.46	-7.796E-01	
CE-144	133.54	490.	-23.	-0.013	138.61	-3.049E+00	
Tc-99m	140.51	430.	21.	0.012	141.19	3.662E-01	
U-235	143.79	411.	19.	0.011	153.13	2.639E+00	P
CE-141	145.44	379.	21.	0.012	132.36	6.721E-01	
Ba-140	162.66	162.	8.	0.005	214.85	2.248E+00	
CE-139	165.85	145.	17.	0.009	102.97	3.490E-01	P
U-235	185.72	104.	54.	0.030	39.40	1.779E+00	
U-235	205.33	73.	17.	0.009	101.90	6.450E+00	P
TH-227	235.97	346.	15.	0.008	182.56	2.515E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
EU-152	244.69	420.	9.	0.005	319.51	2.628E+00		
TH-227	256.24	72.	-3.	-0.002	593.34	-9.800E-01		P
Cd-113m	263.70	101.	-18.	-0.010	83.17	-6.880E+03		
BI-210M	265.83	77.	15.	0.008	87.41	6.896E-01		
Hg-203	279.20	122.	13.	0.007	125.92	3.778E-01		
I-131	284.30	167.	-15.	-0.008	124.57	-5.978E+00		
TL-210	296.00	386.	-16.	-0.009	178.05	-5.040E-01		
PA-231	300.07	370.	-14.	-0.008	192.13	-1.484E+01		
BI-210M	304.90	247.	12.	0.007	185.97	1.117E+00		
Ir-192	308.44	259.	12.	0.007	189.98	9.961E-01		
PA-233	312.01	272.	12.	0.007	193.88	8.882E-01		
Ir-192	316.49	292.	13.	0.007	187.47	3.981E-01		
CR-51	320.08	317.	13.	0.007	194.78	3.524E+00		
La-140	328.76	186.	14.	0.008	143.93	1.841E+00		P
Cf-249	333.44	199.	14.	0.008	145.60	2.492E+00		
Cs-136	340.57	213.	10.	0.005	216.94	5.782E-01		
EU-152	344.29	242.	-16.	-0.009	143.94	-1.664E+00		
HF-181	345.83	269.	-17.	-0.010	65.21	-3.303E+00		P
BA-133	356.00	320.	-19.	-0.010	136.20	-8.854E-01		
SN-113	391.69	56.	8.	0.004	140.53	3.835E-01		P
SB-125	427.88	26.	5.	0.003	235.00	5.175E-01		P
AG-108M	433.94	43.	-4.	-0.002	313.79	-1.633E-01		
PM-146	453.88	35.	-2.	-0.001	725.26	-9.065E-02		
SB-125	463.37	39.	11.	0.006	85.52	3.804E+00		P
Ir-192	468.06	49.	2.	0.001	426.98	1.637E-01		
BE-7	477.60	33.	9.	0.005	101.47	2.989E+00		P
HF-181	482.00	42.	9.	0.005	109.97	4.024E-01		
La-140	487.02	82.	-13.	-0.007	67.55	-1.065E+00		P
RU-103	497.05	9.	7.	0.004	94.90	2.915E-01		P
RH-106	511.86	21.	73.	0.041	14.69	1.422E+01		
Kr-85	513.98	88.	6.	0.004	212.82	5.758E+01		
Nd-147	531.00	9.	17.	0.009	45.96	5.146E+00		
Ba-140	537.26	24.	-3.	-0.001	260.05	-4.259E-01		P
CS-134	563.24	14.	6.	0.003	138.44	3.027E+00		
CS-134	569.32	9.	7.	0.004	68.68	2.056E+00		
PA-234	569.47	17.	5.	0.003	119.13	2.709E+00		
BI-207	569.70	42.	-13.	-0.007	76.11	-5.607E-01		
SB-125	600.50	272.	-13.	-0.007	180.49	-3.251E+00		
SB-124	602.73	259.	-13.	-0.007	67.20	-5.936E-01		P
CS-134	604.71	246.	-13.	-0.007	171.49	-5.994E-01		
RU-103	610.30	233.	-9.	-0.005	249.39	-6.834E+00		
PM-144	618.06	82.	13.	0.007	100.97	6.049E-01		
RH-106	621.92	71.	-15.	-0.008	81.98	-7.019E+00		
SB-125	635.89	24.	8.	0.005	91.43	3.367E+00		P
I-131	636.97	51.	-15.	-0.009	70.76	-9.983E+00		
AG-110M	657.76	45.	-15.	-0.009	66.49	-7.841E-01		
CS-137	661.66	66.	2.	0.001	495.99	1.316E-01		
PM-144	696.54	19.	8.	0.004	85.32	3.999E-01		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
NB-94	702.63	34.	-2.	-0.001	443.54	-9.724E-02		
SB-124	722.79	24.	10.	0.005	78.53	4.679E+00		
AG-108M	722.94	34.	3.	0.002	308.31	1.562E-01		
PM-146	735.72	5.	13.	0.007	47.32	3.019E+00		P
ZR-95	756.73	20.	2.	0.001	598.87	1.644E-01		P
AG-110M	763.94	89.	-22.	-0.012	45.39	-5.383E+00		P
NB-95	765.79	93.	-12.	-0.007	116.78	-6.566E-01		
EU-152	778.92	30.	3.	0.002	264.58	1.279E+00		
BI-212	785.42	41.	3.	0.002	268.44	1.488E+01		P
CS-134	795.87	36.	-5.	-0.003	175.50	-3.285E-01		
CO-58	810.78	21.	8.	0.005	85.22	4.743E-01		
La-140	815.77	29.	2.	0.001	374.12	5.100E-01		
Cs-136	818.50	51.	-12.	-0.007	90.97	-6.746E-01		
MN-54	834.85	26.	-5.	-0.003	197.85	-2.748E-01		P
Co-56	846.77	15.	-6.	-0.003	147.67	-3.556E-01		
NB-94	871.10	13.	8.	0.005	70.05	5.139E-01		
PA-234	880.53	55.	-13.	-0.007	82.75	-1.370E+01		
PA-234	883.24	68.	-12.	-0.006	105.26	-7.403E+00		
Y-88	898.04	5.	6.	0.003	93.05	3.941E-01		P
AG-110M	937.49	30.	-8.	-0.004	154.62	-1.504E+00		
PA-234	946.02	15.	-8.	-0.004	112.15	-3.888E+00		
EU-152	964.11	26.	2.	0.001	338.64	9.820E-01		
PA-234M	1001.00	28.	-1.	0.000	931.07	-4.761E+00		P
Co-56	1037.84	5.	4.	0.002	153.25	1.823E+00		P
Cs-136	1048.07	0.	15.	0.008	25.82	1.334E+00		
BI-207	1063.66	21.	-5.	-0.003	201.56	-5.159E-01		
Ga-68	1077.40	16.	-2.	-0.001	460.07	-5.145E+00		
FE-59	1099.25	16.	-4.	-0.002	128.84	-5.872E-01		P
EU-152	1112.07	90.	-13.	-0.007	106.40	-7.151E+00		
ZN-65	1115.55	76.	-7.	-0.004	169.42	-1.110E+00		
Ta-182	1121.30	81.	-11.	-0.006	117.96	-2.414E+00		
CO-60	1173.24	16.	-4.	-0.002	203.18	-3.320E-01		P
Ta-182	1189.05	16.	-2.	-0.001	460.07	-9.807E-01		
Ta-182	1221.41	16.	1.	0.001	914.69	3.012E-01		
Co-56	1238.28	7.	13.	0.007	51.05	1.665E+00		P
NA-22	1274.53	34.	-17.	-0.009	54.91	-1.417E+00		
FE-59	1291.60	6.	5.	0.003	113.28	1.055E+00		
TL-210	1313.00	17.	-8.	-0.004	125.93	-3.303E+00		
CO-60	1332.50	6.	4.	0.002	161.01	3.281E-01		P
AG-110M	1384.30	0.	10.	0.006	31.62	3.741E+00		
EU-152	1408.00	6.	2.	0.001	248.05	1.025E+00		
La-140	1596.21	12.	-6.	-0.003	98.43	-6.647E-01		P
SB-124	1690.98	0.	7.	0.004	38.62	1.573E+00		P
Y-88	1836.06	12.	-8.	-0.004	110.40	-9.450E-01		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	2.9891E+00	2.9891E+00	1.015E+02%	1.03E+01
NA-22	#A	-1.4168E+00	-1.4168E+00	5.491E+01%	2.52E+00
K-40		8.2195E+01	8.2195E+01	1.043E+01%	6.58E+00
Sc-46	#A	-1.0295E-02	-1.0295E-02	7.554E+03%	2.73E+00
CR-51	#A	3.5239E+00	3.5239E+00	1.948E+02%	2.31E+01
MN-54	#A	-2.7479E-01	-2.7479E-01	1.978E+02%	1.54E+00
FE-59	#A	1.2429E-01	1.2429E-01	8.578E+01%	2.84E+00
Co-56	#A	5.5653E-01	5.5653E-01	5.105E+01%	1.23E+00
CO-57	#A	0.0000E+00	0.0000E+00	7.071E+02%	1.00E+00
CO-58	#A	4.7429E-01	4.7429E-01	8.522E+01%	1.37E+00
CO-60	#A	3.2810E-01	3.2810E-01	1.610E+02%	1.26E+00
ZN-65	#A	-1.1099E+00	-1.1099E+00	1.694E+02%	6.45E+00
NB-94	#A	2.1141E-01	2.1141E-01	7.005E+01%	1.54E+00
ZR-95	#A	1.6437E-01	1.6437E-01	5.989E+02%	2.35E+00
NB-95	#A	-6.5664E-01	-6.5664E-01	1.168E+02%	2.60E+00
RU-103	#A	2.9145E-01	2.9145E-01	9.490E+01%	6.95E-01
RH-106	#A	-7.0187E+00	-7.0187E+00	8.198E+01%	1.93E+01
AG-108M	#A	-3.2556E-03	-3.2556E-03	2.200E+02%	1.26E+00
AG-110M	#A	9.3701E-01	9.3701E-01	3.162E+01%	3.76E+00
SN-113	#A	3.8347E-01	3.8347E-01	1.405E+02%	1.85E+00
SB-124	#A	-7.1067E-02	-7.1067E-02	5.168E+01%	3.52E+00
SB-125	#A	1.8144E+00	1.8144E+00	8.552E+01%	3.04E+00
I-131	#A	2.1099E-02	2.1099E-02	1.944E+03%	1.03E+00
Gd-153	#A	1.2391E+00	1.2391E+00	1.235E+02%	5.11E+00
Ga-68	#A	-5.1293E+00	-5.1451E+00	4.601E+02%	5.49E+01
Tc-99m	#A	3.6595E-01	3.6616E-01	1.412E+02%	1.73E+00
BA-133	#A	-8.8544E-01	-8.8544E-01	1.362E+02%	4.04E+00
CS-134	#A	2.6356E-01	2.6356E-01	6.868E+01%	2.01E+00
CS-137	#A	1.3163E-01	1.3163E-01	4.960E+02%	2.29E+00
CE-139	#A	3.4899E-01	3.4899E-01	1.030E+02%	1.21E+00
Ba-140	#A	1.1735E-01	1.1735E-01	1.687E+02%	4.21E+00
La-140	#A	-1.0197E-01	-1.0197E-01	9.843E+01%	2.05E+00
CE-141	#A	6.7207E-01	6.7208E-01	1.324E+02%	2.98E+00
CE-144	#A	-3.0490E+00	-3.0490E+00	1.386E+02%	1.41E+01
PM-144	#A	5.0244E-01	5.0244E-01	6.610E+01%	1.16E+00
EU-152	#A	8.1275E-01	8.1275E-01	2.646E+02%	2.99E+00
EU-154	#C	3.3752E+00	3.3752E+00	1.925E+01%	1.66E+00
EU-155	#A	-1.8519E+00	-1.8519E+00	6.798E+01%	4.55E+00
HF-181	#A	4.0240E-01	4.0240E-01	1.100E+02%	1.51E+00
Ta-182	#A	-2.4144E+00	-2.4144E+00	1.180E+02%	9.66E+00
Hg-203	#A	3.7780E-01	3.7780E-01	1.259E+02%	1.61E+00
TL-208	#	2.8854E+00	2.8854E+00	1.642E+01%	7.94E-01
PM-146	#A	7.0889E-01	7.0889E-01	4.732E+01%	1.64E+00

Y-88	#A	-9.4500E-01	-9.4500E-01	1.104E+02%	2.23E+00
Cd-113m	#A	-6.8795E+03	-6.8795E+03	8.317E+01%	1.91E+04
Cd-109	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.27E+01
Cf-251	A	-2.3335E+00	-2.3335E+00	9.500E+01%	5.42E+00
Cf-249	#A	4.7421E-01	4.7421E-01	1.456E+02%	2.23E+00
Sn-126	#A	1.3819E+00	1.3819E+00	3.269E+02%	1.53E+01
PB-210	#A	1.5960E+01	1.5960E+01	6.512E+01%	3.40E+01
PB-212	#	8.0662E+00	8.0662E+00	1.103E+01%	2.19E+00
PB-214		1.4042E+01	1.4042E+01	8.462E+00%	2.32E+00
BI-207	#A	-5.1593E-01	-5.1593E-01	2.016E+02%	2.34E+00
BI-212	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.32E+01
U-235	#A	3.8346E+00	3.8346E+00	9.197E+01%	1.35E+01
BI-214		1.5521E+01	1.5521E+01	8.509E+00%	1.45E+00
BI-210M	#A	8.4304E-01	8.4304E-01	8.741E+01%	2.02E+00
AC-228		9.7058E+00	9.7058E+00	1.525E+01%	1.60E+00
TH-227	#A	1.2472E+00	1.2472E+00	1.826E+02%	1.37E+01
TH-229	A	3.5027E+00	3.5027E+00	1.879E+02%	1.85E+01
TH-234	A	8.4942E+00	8.4942E+00	5.141E+01%	1.62E+01
PA-231	#A	0.0000E+00	0.0000E+00	1.000E+03%	8.09E+01
PA-233	#A	8.8815E-01	8.8815E-01	1.939E+02%	5.81E+00
PA-234	#A	-4.3326E-01	-4.3326E-01	8.904E+01%	8.25E+00
PA-234M	#A	-4.7607E+00	-4.7607E+00	9.311E+02%	2.22E+02
AM-241	#A	-1.3749E+00	-1.3749E+00	1.086E+02%	4.99E+00
Np-237	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.66E+01
Ir-192	#A	4.3831E-01	4.3831E-01	1.678E+02%	2.52E+00
Cs-136	#A	2.9256E-01	2.9256E-01	2.582E+01%	2.07E+00
Np-239	#A	-1.5857E+00	-1.5858E+00	8.890E+01%	4.70E+00
Nd-147	#A	5.1464E+00	5.1465E+00	4.596E+01%	5.23E+00
TL-210	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.86E+00
Kr-85	#A	5.7576E+01	5.7576E+01	2.128E+02%	4.21E+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 (25.1 to 1999.6 keV) 1.324E+02 Bq/Sample
Total Decayed Activity (25.1 to 1999.6 keV) 1.3241591E+02 Bq/Sample

486236_Gamma_180-111757-A-1-D DU. 15_Gamma_20201166.spc.

Daily Checks

Test America
St. Louis
Quality Control Check

Spectrum: 9_20201112001_QCAsLeft
Description: Quality control Check (QC Source 'E') Post Stabilization
Acquired: 11/12/2020 7:46:09 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	237.70	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.54	59.79	60.04	PASS
FWHM	1.08	0.00	0.00	0.93	2.18	2.28	PASS
ActivityDiff	649.44	-5.00	-4.00	0.10	4.00	5.00	PASS
QA-662							
FWHM	1.62	0.00	0.00	1.52	3.32	3.42	PASS
ActivityDiff	607.56	-5.00	-4.00	-0.35	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	1332.32	1333.01	1333.26	PASS
FWHM	2.12	0.00	0.00	1.96	4.32	4.42	PASS
ActivityDiff	1191.31	-5.00	-4.00	-0.91	4.00	5.00	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

Test America
St. Louis
Background Check

Spectrum: 9_20201112002_BG
Description: Background Contamination Check
Acquired: 11/12/2020 8:29:04 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	1.80	2.14	2.26	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

Test America
St. Louis
Quality Control Check

Spectrum: 12_20201112001_QCAsLeft
Description: Quality control Check (QC Source 'H') Post Stabilization
Acquired: 11/12/2020 7:47:13 AM
Detector: Detector #12
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.00	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.64	59.79	60.04	PASS
FWHM	0.90	0.00	0.00	0.84	2.00	2.10	PASS
ActivityDiff	691.00	-5.00	-4.00	0.72	4.00	5.00	PASS
QA-662							
FWHM	1.48	0.00	0.00	1.45	3.18	3.28	PASS
ActivityDiff	659.00	-5.00	-4.00	0.26	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.30	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.82	1333.01	1333.26	PASS
FWHM	2.00	0.00	0.00	1.88	4.20	4.30	PASS
ActivityDiff	1274.00	-5.00	-4.00	-0.13	4.00	5.00	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

Test America
St. Louis
Background Check

Spectrum: 12_20201112002_BG
Description: Background Contamination Check
Acquired: 11/12/2020 8:29:35 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	1.97	1.85	1.89	2.00	2.05	2.09	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

Test America
St. Louis
Quality Control Check

Spectrum: 13_20201112001_QCAsLeft
Description: Quality control Check (QC Source 'I') Post Stabilization
Acquired: 11/12/2020 7:48:34 AM
Detector: Detector #13
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.55	59.79	60.04	PASS
FWHM	1.02	0.00	0.00	0.84	2.12	2.22	PASS
ActivityDiff	638.00	-5.00	-4.00	2.10	4.00	5.00	PASS
QA-662							
FWHM	1.57	0.00	0.00	1.45	3.27	3.37	PASS
ActivityDiff	609.00	-5.00	-4.00	3.01	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	1332.46	1333.01	1333.26	PASS
FWHM	2.08	0.00	0.00	2.04	4.28	4.38	PASS
ActivityDiff	1176.00	-5.00	-4.00	-0.70	4.00	5.00	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

Test America
St. Louis
Background Check

Spectrum: 13_20201112002_BG
Description: Background Contamination Check
Acquired: 11/12/2020 8:31:28 AM
Detector: Detector #13
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.91	1.71	1.77	1.91	2.04	2.10	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

Test America
St. Louis
Background Check

Spectrum: 15_20201112002_BG
Description: Background Contamination Check
Acquired: 11/12/2020 10:24:12 AM
Detector: Detector #15
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.68	1.59	1.62	1.73	1.74	1.77	PASS

Analyst: Jacob Boyd Reviewer: Kellene Robbs

Test America
St. Louis
Background Check

Spectrum: 15_20201112002_BG
Description: Background Contamination Check
Acquired: 11/12/2020 10:24:12 AM
Detector: Detector #15
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.68	1.59	1.62	1.73	1.74	1.77	PASS

Analyst: Jacob Boyd Reviewer: Jacob Boyd

Test America
St. Louis
Quality Control Check

Spectrum: 15_20201112003_QCAsLeft
Description: Quality control Check (QC Source 'F') Post Stabilization
Acquired: 11/12/2020 11:26:18 AM
Detector: Detector #15
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.00	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.64	59.79	60.04	PASS
FWHM	0.95	0.00	0.00	1.50	2.05	2.15	PASS
ActivityDiff	670.56	-5.00	-4.00	0.39	4.00	5.00	PASS
QA-662							
FWHM	1.51	0.00	0.00	1.95	3.21	3.31	PASS
ActivityDiff	668.76	-5.00	-4.00	0.01	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.40	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.57	1333.01	1333.26	PASS
FWHM	1.99	0.00	0.00	2.28	4.19	4.29	PASS
ActivityDiff	1277.79	-5.00	-4.00	1.87	4.00	5.00	PASS

Analyst: Jacob Boyd Reviewer: Kellene Robbs

Test America
St. Louis
Quality Control Check

Spectrum: 15_20201112003_QCAsLeft
Description: Quality control Check (QC Source 'F') Post Stabilization
Acquired: 11/12/2020 11:26:18 AM
Detector: Detector #15
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.00	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.64	59.79	60.04	PASS
FWHM	0.95	0.00	0.00	1.50	2.05	2.15	PASS
ActivityDiff	670.56	-5.00	-4.00	0.39	4.00	5.00	PASS
QA-662							
FWHM	1.51	0.00	0.00	1.95	3.21	3.31	PASS
ActivityDiff	668.76	-5.00	-4.00	0.01	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.40	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.57	1333.01	1333.26	PASS
FWHM	1.99	0.00	0.00	2.28	4.19	4.29	PASS
ActivityDiff	1277.79	-5.00	-4.00	1.87	4.00	5.00	PASS

Analyst: Jacob Boyd Reviewer: Jacob Boyd

Test America
St. Louis
Background Check

Spectrum: 17_20201112001_BG
Description: Background Contamination Check
Acquired: 11/12/2020 7:26:53 AM
Detector: Detector #17
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.38	2.03	2.15	2.33	22.61	2.72	PASS

Analyst: Kellene Robbs Reviewer: Jacob Boyd

Test America
St. Louis
Background Check

Spectrum: 17_20201112001_BG
Description: Background Contamination Check
Acquired: 11/12/2020 7:26:53 AM
Detector: Detector #17
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.38	2.03	2.15	2.33	22.61	2.72	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

Test America
St. Louis
Quality Control Check

Spectrum: 17_20201112002_QCAsLeft
Description: Quality control Check (QC Source 'H') Post Stabilization
Acquired: 11/12/2020 8:52:19 AM
Detector: Detector #17
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.69	59.79	60.04	PASS
FWHM	0.77	0.00	0.00	0.76	1.87	1.97	PASS
ActivityDiff	691.00	-5.00	-4.00	1.56	4.00	5.00	PASS
QA-662							
FWHM	1.37	0.00	0.00	1.31	3.07	3.17	PASS
ActivityDiff	659.00	-5.00	-4.00	1.45	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	1.88	0.00	0.00	1.89	4.08	4.18	PASS
ActivityDiff	1274.00	-5.00	-4.00	-0.80	4.00	5.00	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

Test America
St. Louis
Background Check

Spectrum: 18_20201112001_BG
Description: Background Contamination Check
Acquired: 11/12/2020 7:27:17 AM
Detector: Detector #18
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	2.34	2.15	2.23	2.34	2.44	2.50	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

Test America
St. Louis
Quality Control Check

Spectrum: 18_20201112002_QCAsLeft
Description: Quality control Check (QC Source 'E') Post Stabilization
Acquired: 11/12/2020 8:52:12 AM
Detector: Detector #18
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.80	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.60	59.79	60.04	PASS
FWHM	0.94	0.00	0.00	0.96	2.04	2.14	PASS
ActivityDiff	651.00	-5.00	-4.00	-2.94	4.00	5.00	PASS
QA-662							
FWHM	1.54	0.00	0.00	1.58	3.24	3.34	PASS
ActivityDiff	610.00	-5.00	-4.00	-3.21	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5328.40	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.30	1333.01	1333.26	PASS
FWHM	2.03	0.00	0.00	2.04	4.23	4.33	PASS
ActivityDiff	1190.00	-5.00	-4.00	-1.82	4.00	5.00	PASS

Analyst: Kellene Robbs Reviewer: Kellene Robbs

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	Peak 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: **Tuna Can**
Reference date: **1/1/2018**
Calibration Standard: **108513**
Standard volume g / vial: **1550**
Standard volume transferred in g / geometry: **342.2**
lab ID# of cal standard: **#1402359 / Tuna Can_2018_00001**

Isotope	Certified Activity - Bq	Geometry Activity - Bq	Count Results	%recovery
Pb-210	72410	15986	16000	100.1
Am-241	5770	1274	1261	99.0
Cd-109	79700	17596	18250	103.7
Co-57	1809	399	393.1	98.4
Ce-139	2723	601	585.9	97.5
Hg-203	5868	1296	1312	101.3
Sn-113	4658	1028	1059	103.0
Cs-137	2283	504	509.8	101.1
Y-88	7810	1724	1705	98.9
Co-60	3574	789	776.5	98.4
Co-60	3574	789	765.4	97.0
Y-88	7810	1724	1769	102.6

Reviewed By: Jody Watson

Date: 4/23/2018

Calibration Data from file: 12_Soil_TunaCan.Clb
Energy Calibration Date: 4/20/2018 Time: 11:53:01 AM
Efficiency Calibration Date: 4/20/2018 Time: 11:53:09 AM

Calibration Description:
12_TunaCan_108513

Energy Calibration Fit
Energy = 0.0591 +0.250183*Channel -3.73476e-008*Channel**2
FWHM (ch) = 3.2115 +0.001032*Channel -1.75096e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.95	46.54	46.58	-0.09%	0.84	0.85	-1.23%
237.82	59.54	59.56	-0.03%	0.86	0.86	-0.65%
351.66	88.03	88.03	-0.01%	0.89	0.89	-0.96%
487.75	122.06	122.08	-0.01%	0.92	0.93	-0.62%
662.97	165.85	165.91	-0.03%	0.97	0.97	0.22%
1115.42	279.17	279.07	0.04%	1.11	1.09	2.13%
1565.35	391.69	391.59	0.02%	1.20	1.20	0.60%
2645.53	661.66	661.66	-0.00%	1.49	1.45	2.30%
3591.22	898.02	898.04	-0.00%	1.66	1.67	-0.91%
4692.62	1173.24	1173.25	-0.00%	1.85	1.92	-3.60%
5330.40	1332.50	1332.57	-0.01%	2.09	2.05	1.92%
7346.34	1836.01	1835.97	0.00%	2.46	2.46	0.18%

Efficiency Calibration Fit
Polynomial Uncertainty = 1.0201 %
Coefficients:
-0.363508 -4.707999 0.462125 -0.051256 0.002384 -0.000043

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	1.8052E-002	1.7999E-002	0.29%
59.54	2.7878E-002	2.8172E-002	-1.06%
88.03	3.7143E-002	3.5814E-002	3.58%
122.06	3.6658E-002	3.7240E-002	-1.59%
165.85	3.3189E-002	3.4052E-002	-2.60%
279.17	2.4853E-002	2.4494E-002	1.45%
391.69	1.9499E-002	1.8934E-002	2.90%
661.66	1.2936E-002	1.2789E-002	1.13%
898.02	1.0139E-002	1.0253E-002	-1.13%
1173.24	8.2922E-003	8.4265E-003	-1.62%
1332.50	7.4182E-003	7.6470E-003	-3.08%
1836.01	6.0193E-003	5.8663E-003	2.54%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.50	4.25	8.11E+003	15986.00	679.41	4.20%	1/1/2018 11:00:00 AM
Am-241	59.50	35.70	1.58E+005	1273.90	454.78	3.60%	1/1/2018 11:00:00 AM
Cd-109	88.00	3.61	4.61E+002	17596.00	635.22	4.10%	1/1/2018 11:00:00 AM
Co-57	122.10	85.60	2.72E+002	399.38	341.87	3.40%	1/1/2018 11:00:00 AM
Ce-139	165.90	79.90	1.38E+002	601.20	480.36	3.60%	1/1/2018 11:00:00 AM
Hg-203	279.20	81.50	4.66E+001	1295.50	1055.83	3.50%	1/1/2018 11:00:00 AM
Sn-113	391.70	64.00	1.15E+002	1028.40	658.18	3.90%	1/1/2018 11:00:00 AM
Cs-137	661.70	85.21	1.10E+004	504.03	429.48	4.10%	1/1/2018 11:00:00 AM
Y-88	898.00	93.70	1.07E+002	1724.30	1615.67	3.70%	1/1/2018 11:00:00 AM
Co-60	1173.20	99.90	1.93E+003	789.05	788.26	3.90%	1/1/2018 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	789.05	788.89	3.90%	1/1/2018 11:00:00 AM
Y-88	1836.10	99.20	1.07E+002	1724.30	1710.51	3.70%	1/1/2018 11:00:00 AM

Test America St. Louis Spectrum ID: 12_TunaCan_20180005

Sample Description: 12_TunaCan_108513
Detector: Detector #12
Batch ID: 12
Work Order Number: TunaCan
Lot Number: 108513

Decay to Time: 1/1/2018 11:00 Live Time: 3600 sec
Acquisition Time: 4/18/2018 13:54:19 Real Time: 3652 sec
Analysis Time: 4/20/2018 11:55 Dead Time: 1.41 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 12_Soil_TunaCan.Clb
Efficiency Cal Desc: 12_TunaCan_108513
Efficiency Cal Date: 4/20/2018 11:53
Energy Cal Date: 4/20/2018 11:13
Library: DET_EnergyStandardMix & Pb.lib
Bkgd Correction File: 12_2017-05-07_0806.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
Pb-210	1.600E+04	0.6	9.485E+01	1.031E+03	1.853E+02
AM-241	1.261E+03	0.7	9.223E+00	8.039E+01	1.659E+01
CD-109	1.825E+04	0.4	7.598E+01	1.135E+03	1.134E+02
CO-57	3.931E+02	0.8	3.042E+00	2.279E+01	5.110E+00
Ce-139	5.859E+02	0.7	4.357E+00	3.335E+01	6.791E+00
Hg-203	1.312E+03	1.1	1.414E+01	7.659E+01	2.206E+01
SN-113	1.059E+03	0.9	9.013E+00	6.310E+01	1.205E+01
CS-137	5.098E+02	0.9	4.734E+00	2.665E+01	6.233E+00
Y-898	1.705E+03	0.8	1.331E+01	8.765E+01	1.505E+01
Co-1173	7.765E+02	0.9	6.740E+00	3.922E+01	6.891E+00
Co-1332	7.654E+02	0.8	6.419E+00	3.866E+01	6.071E+00
Y-1836	1.769E+03	0.8	1.413E+01	1.018E+02	8.211E+00
Total	4.438E+04				

Analyst: Jody Watson

Sample description
12_TunaCan_108513

Spectrum Filename: C:\User\SPC\Det12\12_TunaCan_20180005.An1

Acquisition information

Start time:	4/18/2018 1:54:19 PM
Live time:	3600
Real time:	3652
Dead time:	1.41 %
Detector ID:	12

Detector system
Ge12 S/N10034336

Calibration

Filename:	12_Soil_TunaCan.Clb

12_TunaCan_108513

Energy Calibration

Created:	4/20/2018 11:13:27 AM
Zero offset:	0.059 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration

Created:	4/20/2018 11:53:09 AM
Type:	Polynomial
Uncertainty:	1.020 %
Coefficients:	-0.363508 -4.707999 0.462125
	-0.051256 0.002384 -0.000043

Library Files

Main analysis library:	DET_EnergyStandardMix & Pb.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	100 (25.08keV)
Stop channel:	8000 (1999.13keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2018 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2017-05-07_0806.PBC 5/7/2017 8:06:54 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0332

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
27.87	601.	9.86	0.70	3.939E-03				
33.44	3191.	3.58	0.84	8.062E-03				
36.78	534.	21.42	0.84	1.059E-02				
38.00	764.	15.14	0.84	1.151E-02				
46.62	43669.	0.59	0.85	1.805E-02	46.54	4.250	1.600E+04	Pb210
49.75	200.	71.91	0.85	2.153E-02				
59.56	45621.	0.73	0.86	2.818E-02	59.54	35.700	1.261E+03	AM241
70.78	903.	16.81	0.88	3.227E-02				
72.97	1715.	8.94	0.88	3.286E-02				
74.88	161.	95.77	0.88	3.334E-02				
77.23	29.	497.10	0.88	3.389E-02				
82.47	1429.	10.54	0.89	3.493E-02				
84.79	2014.	7.84	0.89	3.532E-02				
88.06	72330.	0.42	0.89	3.581E-02	88.03	3.610	1.825E+04	CD109
90.37	144.	87.05	0.90	3.612E-02				
122.08	34326.	0.77	0.92	3.724E-02	122.06	85.600	3.931E+02	CO57
136.51	4200.	4.35	0.96	3.651E-02				
165.91	33460.	0.74	0.97	3.405E-02	165.85	79.900	5.859E+02	Ce139
206.00	117.	63.94	0.45	3.024E-02				
238.46	443.	25.54	0.90	2.744E-02				
255.00	1168.	12.03	0.88	2.617E-02				
279.07	19187.	1.08	1.11	2.450E-02	279.17	81.500	1.312E+03	Hg203
286.67	107.	74.95	0.64	2.401E-02				
351.85	322.	30.50	1.33	2.056E-02				
391.59	24235.	0.85	1.20	1.894E-02	391.69	64.000	1.059E+03	SN113
500.18	113.	56.68	0.53	1.573E-02				
583.01	248.	32.33	0.89	1.403E-02				

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
601.08	176.	44.64	0.64	1.372E-02				
643.04	164.	48.09	0.69	1.306E-02				
661.66	19866.	0.93	1.49	1.279E-02	661.66	85.210	5.098E+02	CS137
695.58	154.	52.24	0.30	1.233E-02				
712.59	169.	39.74	0.69	1.212E-02				
814.18	641.	15.80	1.86	1.101E-02				
890.80	44.	76.23	0.45	1.031E-02				
898.03	29383.	0.78	1.66	1.025E-02	898.02	93.700	1.705E+03	Y898
924.59	170.	51.69	2.08	1.004E-02				
1059.91	148.	40.90	0.51	9.087E-03				
1173.24	22640.	0.87	1.85	8.426E-03	1173.24	99.900	7.765E+02	Co1173
1217.40	45.	61.22	0.33	8.195E-03				
1271.51	36.	60.60	1.04	7.928E-03				
1301.67	34.	60.56	0.43	7.787E-03				
1332.57	20270.	0.84	2.09	7.647E-03	1332.50	99.982	7.654E+02	Co1332
1491.52	180.	28.09	0.33	6.994E-03				
1835.92	18468.	0.80	2.47	5.867E-03	1836.01	99.200	1.769E+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	
111.16	27.87	1248.	601.	1.526E+05	9.86	0.703	-	s
133.41	33.32	4927.	3191.	3.959E+05	3.58	0.838	-	sD
146.77	36.66	6263.	534.	5.040E+04	21.42	0.841	-	sD
151.64	37.88	6317.	764.	6.642E+04	15.14	0.842	-	sD
198.79	49.71	10292.	213.	9.912E+03	67.59	0.855	-	sc
282.69	70.80	11078.	903.	2.799E+04	16.81	0.876	-	D
291.44	72.99	10900.	1715.	5.219E+04	8.94	0.878	-	D
299.07	74.90	11841.	161.	4.837E+03	95.77	0.880	-	c
308.48	77.26	10683.	29.	8.685E+02	497.10	0.883	-	c
329.43	82.44	10620.	1431.	4.097E+04	10.52	0.888	-	D
338.70	84.76	11438.	2016.	5.707E+04	7.83	0.890	-	sD
361.04	90.35	7839.	145.	4.014E+03	86.78	0.896	-	sc
545.45	136.51	7622.	4200.	1.150E+05	4.35	0.964	-	
823.26	206.00	2348.	117.	3.869E+03	63.94	0.454	-	s
953.03	238.46	3718.	443.	1.615E+04	25.54	0.897	-	s
1019.19	255.00	4459.	1168.	4.464E+04	12.03	0.878	-	
1145.82	286.67	2108.	107.	4.456E+03	74.95	0.636	-	s
1406.43	351.85	2440.	322.	1.569E+04	30.50	1.334	-	
1999.63	500.18	1252.	113.	7.164E+03	56.68	0.530	-	s
2330.90	583.01	1545.	248.	1.767E+04	32.33	0.894	-	s
2403.19	601.08	1564.	176.	1.283E+04	44.64	0.638	-	s
2571.03	643.04	1587.	164.	1.258E+04	48.09	0.694	-	s
2781.20	695.58	1652.	154.	1.250E+04	52.24	0.304	-	s
2849.27	712.59	1184.	169.	1.395E+04	39.74	0.695	-	s

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected	
3255.67	814.18	1648.	641.	5.823E+04	15.80	1.859	-	s
3562.26	890.80	503.	44.	4.283E+03	76.23	0.452	-	sc
3697.47	924.59	1556.	170.	1.690E+04	51.69	2.082	-	s
4239.01	1059.91	879.	148.	1.629E+04	40.90	0.508	-	s
4869.35	1217.40	238.	45.	5.491E+03	61.22	0.330	-	s
5085.97	1271.51	165.	36.	4.541E+03	60.60	1.043	-	s
5206.71	1301.67	156.	34.	4.366E+03	60.56	0.434	-	s
5966.81	1491.52	462.	180.	2.581E+04	28.09	0.329	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.79	46.54	11653.	43669.	12.130	0.59	0.851D
AM-241	237.82	59.56	16449.	45621.	12.672	0.73	0.859
CD-109	351.65	88.03	9195.	72330.	20.092	0.42	0.894D
CO-57	487.75	122.08	9060.	34326.	9.535	0.77	0.923
Ce-139	662.97	165.91	6830.	33460.	9.295	0.74	0.975
Hg-203	1115.42	279.07	4712.	19187.	5.330	1.08	1.109
SN-113	1565.35	391.59	3432.	24235.	6.732	0.85	1.204
CS-137	2645.53	661.66	2656.	19866.	5.518	0.93	1.489
Y-898	3591.19	898.03	3033.	29383.	8.162	0.78	1.658
Co-1173	4692.59	1173.24	1810.	22640.	6.289	0.87	1.852
Co-1332	5330.41	1332.57	1150.	20270.	5.631	0.84	2.092
Y-1836	7346.14	1835.92	317.	18468.	5.130	0.80	2.475

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

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Peak Code	Peak MDA Value Bq/Sample	COMMENTS
Pb-210	N	1.6003E+04				8.15E+03	
			46.54	1.600E+04	(P	1.853E+02 5.93E-01 4.25E+00 G	

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AM-241	1.2606E+03					1.58E+05	
		59.54	1.261E+03	(	1.659E+01	7.32E-01	3.57E+01 G
CD-109	1.8246E+04					4.63E+02	
		88.03	1.825E+04	(	1.134E+02	4.16E-01	3.61E+00 G
CO-57	3.9307E+02					2.72E+02	
		122.06	3.931E+02	(	5.110E+00	7.74E-01	8.56E+01 G
Ce-139	5.8589E+02					1.38E+02	
		165.85	5.859E+02	(	6.791E+00	7.44E-01	7.99E+01 G
Hg-203	1.3123E+03					4.66E+01	
		279.17	1.312E+03	(	2.206E+01	1.08E+00	8.15E+01 G
SN-113	1.0590E+03					1.15E+02	
		391.69	1.059E+03	(	1.205E+01	8.51E-01	6.40E+01 G
CS-137	5.0981E+02					1.10E+04	
		661.66	5.098E+02	(	6.233E+00	9.29E-01	8.52E+01 G
Y-898	1.7049E+03					1.07E+02	
		898.02	1.705E+03	(	1.505E+01	7.81E-01	9.37E+01 G
Co-1173	7.7646E+02					1.93E+03	
		1173.24	7.765E+02	(	6.891E+00	8.68E-01	9.99E+01 G
Co-1332	7.6541E+02					1.93E+03	
		1332.50	7.654E+02	(	6.071E+00	8.39E-01	1.00E+02 G
Y-1836	1.7690E+03					1.07E+02	
		1836.01	1.769E+03	(	8.211E+00	7.99E-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

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
Pb-210	1.5857E+04	1.6003E+04	5.927E-01%	1.85E+02
AM-241	1.2600E+03	1.2606E+03	7.317E-01%	1.66E+01
CD-109	1.5540E+04	1.8246E+04	4.164E-01%	1.13E+02
CO-57	2.9911E+02	3.9307E+02	7.739E-01%	5.11E+00
Ce-139	3.4161E+02	5.8589E+02	7.437E-01%	6.79E+00
Hg-203	2.6699E+02	1.3123E+03	1.078E+00%	2.21E+01
SN-113	5.5555E+02	1.0590E+03	8.510E-01%	1.20E+01
CS-137	5.0637E+02	5.0981E+02	9.286E-01%	6.23E+00
Y-898	8.4955E+02	1.7049E+03	7.808E-01%	1.50E+01
Co-1173	7.4709E+02	7.7646E+02	8.681E-01%	6.89E+00
Co-1332	7.3646E+02	7.6541E+02	8.386E-01%	6.07E+00
Y-1836	8.8152E+02	1.7690E+03	7.985E-01%	8.21E+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 (25.1 to 1999.1 keV) 3.784E+04 Bq/Sample
Total Decayed Activity (25.1 to 1999.1 keV) 4.4384840E+04 Bq/Sample

Gamma Verification per Geometry

Detector:	Ge13
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14299	95.8
Am-241	2037	418	0.3590	1163	1236	106.2
Cd-109	2881	591	0.0361	16363	16083	98.3
Co-57	1511	310	0.8560	362	346.19	95.7
Ce-139	2139	439	0.7990	549	539.42	98.3
Hg-203	4651	954	0.8146	1171	1201.9	102.7
Sn-113	3015	618	0.6400	966	968.01	100.2
Cs-137	1938	397	0.8510	467	474.76	101.7
Y-88	7264	1489	0.9370	1589	1545.1	97.2
Co-60	3580	734	0.9997	734	719.78	98.0
Co-60	3581	734	0.9999	734	727.89	99.1
Y-88	7690	1577	0.9920	1589	1632.3	102.7

Reviewed By: Jody Watson

Date: 3/29/2012

Calibration Data from file: 13_Soil_TunaCan.Clb
Energy Calibration Date: 3/29/2012 Time: 7:50:00 AM
Efficiency Calibration Date: 3/29/2012 Time: 7:50:26 AM

Calibration Description:
13_Soil_TunaCan_90099_032712

Energy Calibration Fit
Energy = 0.0722 +0.250086*Channel -2.12895e-008*Channel**2
FWHM (ch) = 3.9604 +0.000908*Channel -1.76283e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.95	46.54	46.58	-0.08%	1.03	1.03	-0.55%
237.92	59.54	59.57	-0.05%	1.03	1.04	-1.74%
351.94	88.03	88.09	-0.06%	1.05	1.07	-1.59%
488.07	122.06	122.13	-0.05%	1.10	1.10	0.25%
663.06	165.85	165.88	-0.02%	1.17	1.14	2.38%
1115.49	279.17	279.01	0.06%	1.24	1.24	0.44%
1565.36	391.69	391.49	0.05%	1.36	1.33	1.77%
2646.08	661.66	661.67	-0.00%	1.55	1.56	-0.89%
3591.99	898.02	898.10	-0.01%	1.75	1.75	-0.09%
4693.06	1173.24	1173.27	-0.00%	1.96	1.96	-0.07%
5330.52	1332.50	1332.56	-0.00%	2.06	2.07	-0.45%
7345.62	1836.01	1835.96	0.00%	2.42	2.42	0.26%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.9134 %
Ln(Eff) = -0.5308 -0.305775*Ln(Eng) -0.0343757*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.5969 %
Ln(Eff) = -22.9222 +8.455931*Ln(Eng) -0.892406*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.5932E-002	2.7053E-002	-4.32%
59.54	4.0139E-002	3.8023E-002	5.27%
88.03	5.1336E-002	5.2255E-002	-1.79%
122.06	5.2852E-002	5.5285E-002	-4.60%
165.85	==========	Knee	==========
165.85	4.9293E-002	5.0203E-002	-1.85%
279.17	3.6281E-002	3.5323E-002	2.64%
391.69	2.7897E-002	2.7825E-002	0.26%
661.66	1.9294E-002	1.8934E-002	1.86%
898.02	1.4585E-002	1.4999E-002	-2.84%
1173.24	1.1920E-002	1.2168E-002	-2.08%
1332.50	1.0902E-002	1.0995E-002	-0.86%
1836.01	8.7053E-003	8.4769E-003	2.62%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

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     ORTEC g v - i (1087) Env32  G53W4.25  3/29/2012 12:11:47 PM   Page  1
TestAmerica, Inc                Spectrum name: 13_TunaCan_20120186.An1

Sample description
     13_TunaCan_90099_032712


Spectrum Filename: C:\User\Cal\Spectra\Det13\13_TunaCan_20120186.An1

Acquisition information
       Start time:                 3/27/2012 3:23:25 PM
       Live time:               3600
       Real time:               3670
       Dead time:                  1.92 %
       Detector ID:                   13

Detector system
     Ge13 SN/10064006


Calibration
       Filename:                   13_Soil_TunaCan.Clb
     13_Soil_TunaCan_90099_032712


       Energy Calibration
            Created:               3/29/2012 7:50:00 AM
            Zero offset:           0.072 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -2.129E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/29/2012 7:50:26 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.91 %
            Log(Eff):             -5.308398E-01 + (-3.057754E-01*Log(E) ) +
                                   ( -3.437570E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.60 %
            Log(Eff):             -2.292218E+01 + ( 8.455931E+00*Log(E) ) +
                                   ( -8.924057E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.58keV )
       Stop channel:            8000 (  1999.40keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (1087) Env32  G53W4.25  3/29/2012 12:11:47 PM   Page  2
TestAmerica, Inc                Spectrum name: 13_TunaCan_20120186.An1
                                      Page 1
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```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                          Status          Comments
       Decay correct to date:         YES       1/1/2012 11:00:00 AM
       Decay during acquisition:      NO
       Decay during collection:       NO
       True coincidence correction:   NO
       Peaked background correction:  NO
       Absorption (Internal):         NO
       Geometry correction:           NO
       Random summing:                NO


total peaks alloc.   12 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0495
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.58	58754.	0.66	1.03	2.709E-02	46.54	4.250	1.430E+04	Pb210
59.57	60379.	0.66	1.03	3.805E-02	59.54	35.700	1.236E+03	AM241
70.81	1954.	9.69	1.05	4.529E-02				
72.99	3363.	5.52	1.06	4.644E-02				
88.09	95988.	0.44	1.05	5.227E-02	88.03	3.610	1.608E+04	CD109
122.13	47342.	0.70	1.10	5.528E-02	122.06	85.600	3.462E+02	CO57
136.50	6079.	3.90	1.17	5.395E-02				
165.88	50468.	0.66	1.17	5.020E-02	165.85	79.900	5.394E+02	Ce139
254.99	1887.	8.59	1.10	3.760E-02				
279.01	34595.	0.73	1.24	3.534E-02	279.17	81.500	1.202E+03	Hg203
391.49	36929.	0.70	1.36	2.783E-02	391.69	64.000	9.680E+02	SN113
661.67	27425.	0.90	1.55	1.893E-02	661.66	85.210	4.748E+02	CS137
898.10	44634.	0.61	1.75	1.500E-02	898.02	93.700	1.545E+03	Y898
1173.26	30535.	0.69	1.96	1.217E-02	1173.24	99.900	7.198E+02	Co1173
1332.55	27926.	0.70	2.06	1.099E-02	1332.50	99.982	7.279E+02	Co1332
1835.94	28215.	0.64	2.43	8.477E-03	1836.01	99.200	1.632E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
282.85	70.83	16957.	1954.	4.315E+04	9.69	1.054	-	D
291.58	73.01	15573.	3363.	7.242E+04	5.52	1.056	-	D
545.57	136.50	11563.	6079.	1.127E+05	3.90	1.173	-	
1019.41	254.99	5852.	1887.	5.018E+04	8.59	1.098	-	

s - Peak fails shape tests.

D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.95	46.58	20947.	58754.	16.321	0.66	1.027
AM-241	237.92	59.57	22064.	60379.	16.772	0.66	1.026
CD-109	351.94	88.09	20029.	95988.	26.663	0.44	1.053
CO-57	488.07	122.13	14046.	47342.	13.151	0.70	1.103
Ce-139	663.06	165.88	11600.	50468.	14.019	0.66	1.167
Hg-203	1115.49	279.01	5938.	34595.	9.610	0.73	1.243
SN-113	1565.36	391.49	4998.	36929.	10.258	0.70	1.359
CS-137	2646.08	661.67	4975.	27425.	7.618	0.90	1.546
Y-898	3591.97	898.10	3847.	44634.	12.398	0.61	1.747
Co-1173	4693.01	1173.26	1833.	30535.	8.482	0.69	1.958
Co-1332	5330.51	1332.55	1457.	27926.	7.757	0.70	2.064
Y-1836	7345.55	1835.94	482.	28215.	7.838	0.64	2.427

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

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Activity Bq	Code	MDA Value Bq	COMMENTS
Pb-210	N	1.4299E+04				8.15E+03	
			46.54	1.430E+04	(	1.648E+02 6.58E-01 4.25E+00	G
AM-241		1.2360E+03				1.58E+05	
			59.54	1.236E+03	(	1.423E+01 6.62E-01 3.57E+01	G
CD-109		1.6083E+04				4.63E+02	
			88.03	1.608E+04	(	1.110E+02 4.41E-01 3.61E+00	G
CO-57		3.4619E+02				2.72E+02	
			122.06	3.462E+02	(	4.058E+00 7.02E-01 8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 3/29/2012 12:11:47 PM Page 4
TestAmerica, Inc Spectrum name: 13_TunaCan_20120186.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ce-139	5.3942E+02				1.38E+02	
		165.85	5.394E+02	(	5.393E+00 6.58E-01 7.99E+01	G
Hg-203	1.2019E+03				4.66E+01	
		279.17	1.202E+03	(	1.257E+01 7.27E-01 8.15E+01	G
SN-113	9.6801E+02				1.15E+02	
		391.69	9.680E+02	(	8.706E+00 6.96E-01 6.40E+01	G

```
CS-137       4.7476E+02                                      1.10E+04
                          661.66 4.748E+02  (  5.737E+00 8.98E-01 8.52E+01 G

Y-898        1.5451E+03                                      1.07E+02
                          898.02 1.545E+03  (  1.010E+01 6.13E-01 9.37E+01 G

Co-1173      7.1978E+02                                      1.93E+03
                         1173.24 7.198E+02  (  4.767E+00 6.89E-01 9.99E+01 G

Co-1332      7.2789E+02                                      1.93E+03
                         1332.50 7.279E+02  (  4.706E+00 7.04E-01 1.00E+02 G

Y-1836       1.6323E+03                                      1.07E+02
                         1836.01 1.632E+03  (  6.075E+00 6.40E-01 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
```

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      ORTEC g v - i (1087) Env32  G53W4.25  3/29/2012 12:11:47 PM   Page  5
 TestAmerica, Inc                Spectrum name: 13_TunaCan_20120186.An1

   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  1 Sigma %
 ____________________________________________________________________________
   P - Peakbackground subtraction

 *****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
         Time of Count  Time Corrected  Uncertainty  1 Sigma
 Nuclide     Activity       Activity       Counting                   MDA
                Bq             Bq
```

Pb-210	1.4195E+04	1.4299E+04	6.581E-01%	1.65E+02
AM-241	1.2356E+03	1.2360E+03	6.618E-01%	1.42E+01
CD-109	1.4134E+04	1.6083E+04	4.413E-01%	1.11E+02
CO-57	2.7789E+02	3.4619E+02	7.023E-01%	4.06E+00
Ce-139	3.4949E+02	5.3942E+02	6.584E-01%	5.39E+00
Hg-203	3.3381E+02	1.2019E+03	7.272E-01%	1.26E+01
SN-113	5.7605E+02	9.6801E+02	6.961E-01%	8.71E+00
CS-137	4.7218E+02	4.7476E+02	8.976E-01%	5.74E+00
Y-898	8.8221E+02	1.5451E+03	6.126E-01%	1.01E+01
Co-1173	6.9779E+02	7.1978E+02	6.892E-01%	4.77E+00
Co-1332	7.0565E+02	7.2789E+02	7.036E-01%	4.71E+00
Y-1836	9.3203E+02	1.6323E+03	6.402E-01%	6.07E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (82.3 to 1999.4 keV) 3.479E+04 Bq
Total Decayed Activity (82.3 to 1999.4 keV) 3.9773562E+04 Bq

Gamma Verification per Geometry

Detector:	Ge15
Geometry:	Tunacan
Reference date	1/1/2012
Calibration Standard:	90099
Standard volume g / vial	1550
Standard volume transferred in g / geometry	317.8
lab ID# of cal standard	6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14410	96.5
Am-241	2037	418	0.3590	1163	1206.9	103.7
Cd-109	2881	591	0.0361	16363	16069	98.2
Co-57	1511	310	0.8560	362	356.06	98.4
Ce-139	2139	439	0.7990	549	538.81	98.2
Hg-203	4651	954	0.8146	1171	1202.4	102.7
Sn-113	3015	618	0.6400	966	974.62	100.9
Cs-137	1938	397	0.8510	467	465.43	99.7
Y-88	7264	1489	0.9370	1589	1573.7	99.0
Co-60	3580	734	0.9997	734	716.44	97.6
Co-60	3581	734	0.9999	734	726.55	98.9
Y-88	7690	1577	0.9920	1589	1633.2	102.8

Reviewed By: Jody Watson

Date: 3/22/2012

Calibration Data from file: 15_Soil_TunaCan.Clb
Energy Calibration Date: 3/22/2012 Time: 1:02:46 PM
Efficiency Calibration Date: 3/22/2012 Time: 1:03:01 PM

Calibration Description:
15_TunaCan_90099_032212

Energy Calibration Fit
Energy = 0.0042 +0.250192*Channel -3.10425e-008*Channel**2
FWHM (ch) = 3.5032 +0.001000*Channel -3.73783e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.91	46.54	46.52	0.05%	0.90	0.92	-2.54%
237.99	59.54	59.55	-0.01%	0.91	0.94	-2.43%
352.01	88.03	88.07	-0.05%	0.95	0.96	-1.92%
487.92	122.06	122.07	-0.01%	1.00	1.00	0.30%
663.08	165.85	165.89	-0.02%	1.05	1.04	1.34%
1115.99	279.17	279.18	-0.00%	1.18	1.14	3.23%
1565.41	391.69	391.58	0.03%	1.26	1.24	1.14%
2645.35	661.66	661.63	0.00%	1.50	1.47	2.11%
3590.98	898.02	898.04	-0.00%	1.67	1.65	0.79%
4692.06	1173.24	1173.24	-0.00%	1.80	1.84	-2.06%
5329.66	1332.50	1332.56	-0.00%	1.90	1.94	-2.28%
7344.95	1836.01	1835.98	0.00%	2.23	2.21	1.30%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.9975 %
Ln(Eff) = -0.6895 -0.329061*Ln(Eng) -0.0387563*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.1273 %
Ln(Eff) = -23.6268 +8.666669*Ln(Eng) -0.921464*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	1.8904E-002	1.9569E-002	-3.52%
59.54	2.8630E-002	2.7372E-002	4.39%
88.03	3.6378E-002	3.7061E-002	-1.88%
122.06	3.7201E-002	3.8461E-002	-3.39%
165.85	========== Knee ==========		
165.85	3.3266E-002	3.3919E-002	-1.96%
279.17	2.3641E-002	2.3007E-002	2.68%
391.69	1.7841E-002	1.7674E-002	0.94%
661.66	1.1534E-002	1.1545E-002	-0.10%
898.02	8.8355E-003	8.9209E-003	-0.97%
1173.24	6.9001E-003	7.0763E-003	-2.55%
1332.50	6.2597E-003	6.3249E-003	-1.04%
1836.01	4.8716E-003	4.7412E-003	2.68%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

```
     ORTEC g v - i (1087) Env32  G53W4.25  3/22/2012 1:04:51 PM    Page  1
TestAmerica, Inc.               Spectrum name: 15_TunaCan_20120283.An1

Sample description
     15_TunaCan_90099_032212


Spectrum Filename: C:\User\SPC\Det15\15_TunaCan_20120283.An1

Acquisition information
       Start time:                 3/22/2012 11:06:02 AM
       Live time:               3600
       Real time:               3653
       Dead time:                  1.44 %
       Detector ID:                   15

Detector system
     Ge15 SN/1102216


Calibration
       Filename:                   15_TunaCan.Clb
     15_TunaCan_90099_032212


       Energy Calibration
            Created:               3/22/2012 1:02:46 PM
            Zero offset:           0.004 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.104E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/22/2012 1:03:01 PM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.00 %
            Log(Eff):             -6.894897E-01 + (-3.290613E-01*Log(E) ) +
                                   ( -3.875629E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.13 %
            Log(Eff):             -2.362677E+01 + ( 8.666669E+00*Log(E) ) +
                                   ( -9.214638E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.53keV )
       Stop channel:            8000 (  1999.56keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (1087) Env32  G53W4.25  3/22/2012 1:04:51 PM    Page  2
TestAmerica, Inc.               Spectrum name: 15_TunaCan_20120283.An1
                                      Page 1
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```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                          Status          Comments
       Decay correct to date:         YES       1/1/2012 11:00:00 AM
       Decay during acquisition:      NO
       Decay during collection:       NO
       True coincidence correction:   NO
       Peaked background correction:  NO
       Absorption (Internal):         NO
       Geometry correction:           NO
       Random summing:                NO


total peaks alloc.   12 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0249
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.52	42849.	0.75	0.90	1.955E-02	46.54	4.250	1.441E+04	Pb210
59.55	42443.	0.72	0.91	2.738E-02	59.54	35.700	1.207E+03	AM241
72.95	2606.	6.34	0.95	3.318E-02				
88.07	68550.	0.54	0.95	3.707E-02	88.03	3.610	1.607E+04	CD109
122.10	33756.	0.64	1.00	3.846E-02	122.06	85.600	3.502E+02	CO57
136.52	4295.	2.96	1.01	3.724E-02				
165.89	34959.	0.78	1.05	3.391E-02	165.85	79.900	5.388E+02	Ce139
279.18	24347.	0.88	1.18	2.301E-02	279.17	81.500	1.202E+03	Hg203
391.58	24366.	0.82	1.26	1.768E-02	391.69	64.000	9.746E+02	SN113
661.63	16400.	1.16	1.50	1.155E-02	661.66	85.210	4.654E+02	CS137
898.03	27965.	0.74	1.67	8.921E-03	898.02	93.700	1.574E+03	Y898
1173.23	17709.	0.94	1.81	7.076E-03	1173.24	99.900	7.164E+02	Co1173
1332.55	16065.	0.98	1.90	6.325E-03	1332.50	99.982	7.266E+02	Co1332
1835.95	16330.	0.85	2.24	4.741E-03	1836.01	99.200	1.633E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
291.58	72.93	12341.	2606.	7.854E+04	6.34	0.949	- D
545.42	136.45	8010.	4524.	1.215E+05	4.23	1.054	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.91	46.52	15447.	42849.	11.903	0.75	0.900
AM-241	237.99	59.55	14029.	42443.	11.790	0.72	0.913
CD-109	352.01	88.07	16260.	68550.	19.042	0.54	0.945
CO-57	487.92	122.07	9130.	34324.	9.535	0.78	0.999
Ce-139	663.08	165.89	8215.	34959.	9.711	0.78	1.052
Hg-203	1115.99	279.18	4252.	24347.	6.763	0.88	1.182
SN-113	1565.41	391.58	3012.	24366.	6.768	0.82	1.259
CS-137	2645.35	661.63	3077.	16400.	4.555	1.16	1.503
Y-898	3590.94	898.03	2252.	27965.	7.768	0.74	1.667
Co-1173	4692.02	1173.23	1355.	17709.	4.919	0.94	1.807
Co-1332	5329.60	1332.55	1160.	16065.	4.463	0.98	1.900
Y-1836	7344.81	1835.95	345.	16330.	4.536	0.85	2.240

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

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq	COMMENTS
Pb-210	N	1.4410E+04				8.15E+03	
			46.54	1.441E+04	(	1.957E+02 7.55E-01 4.25E+00	G
AM-241		1.2069E+03				1.58E+05	
			59.54	1.207E+03	(	1.577E+01 7.22E-01 3.57E+01	G
CD-109		1.6069E+04				4.63E+02	
			88.03	1.607E+04	(	1.399E+02 5.44E-01 3.61E+00	G
CO-57		3.5606E+02				2.72E+02	
			122.06	3.561E+02	(	4.647E+00 7.84E-01 8.56E+01	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ce-139	5.3881E+02				1.38E+02	
		165.85	5.388E+02	(	6.551E+00 7.82E-01 7.99E+01	G
Hg-203	1.2024E+03				4.66E+01	
		279.17	1.202E+03	(	1.514E+01 8.77E-01 8.15E+01	G
SN-113	9.7462E+02				1.15E+02	
		391.69	9.746E+02	(	1.034E+01 8.20E-01 6.40E+01	G
CS-137	4.6543E+02				1.10E+04	
		661.66	4.654E+02	(	7.413E+00 1.16E+00 8.52E+01	G
Y-898	1.5737E+03				1.07E+02	

```
                          898.02 1.574E+03  (  1.260E+01 7.45E-01 9.37E+01 G

Co-1173      7.1644E+02                                        1.93E+03
                         1173.24 7.164E+02  (  7.050E+00 9.39E-01 9.99E+01 G

Co-1332      7.2655E+02                                        1.93E+03
                         1332.50 7.266E+02  (  7.301E+00 9.83E-01 1.00E+02 G

Y-1836       1.6332E+03                                        1.07E+02
                         1836.01 1.633E+03  (  8.923E+00 8.49E-01 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
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   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  1 Sigma %
 ____________________________________________________________________________
   P - Peakbackground subtraction

 *****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
         Time of Count  Time Corrected  Uncertainty  1 Sigma
 Nuclide     Activity       Activity       Counting                   MDA
               Bq             Bq

 ____________________________________________________________________________
 Pb-210       1.4311E+04    1.4410E+04    7.549E-01%                1.96E+02
 AM-241       1.2065E+03    1.2069E+03    7.219E-01%                1.58E+01
 CD-109       1.4233E+04    1.6069E+04    5.439E-01%                1.40E+02
```

CO-57	2.8961E+02	3.5606E+02	7.837E-01%	4.65E+00
Ce-139	3.5832E+02	5.3881E+02	7.816E-01%	6.55E+00
Hg-203	3.6068E+02	1.2024E+03	8.771E-01%	1.51E+01
SN-113	5.9836E+02	9.7462E+02	8.201E-01%	1.03E+01
CS-137	4.6306E+02	4.6543E+02	1.155E+00%	7.41E+00
Y-898	9.2933E+02	1.5737E+03	7.445E-01%	1.26E+01
Co-1173	6.9585E+02	7.1644E+02	9.390E-01%	7.05E+00
Co-1332	7.0567E+02	7.2655E+02	9.834E-01%	7.30E+00
Y-1836	9.6449E+02	1.6332E+03	8.486E-01%	8.92E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (82.3 to 1999.6 keV) 3.512E+04 Bq
Total Decayed Activity (82.3 to 1999.6 keV) 3.9873703E+04 Bq

15_1L Marn_1893022-115244

Calibration Data from file: 15_TCC-1L Marn.Clb
Energy Calibration Date: 5/6/2020 Time: 2:13:32 PM
Efficiency Calibration Date: 5/6/2020 Time: 2:13:32 PM
Peak-To-Total Calibration Date: 5/6/2020 Time: 2:13:33 PM

Calibration Description:
15_1L Marn_1893022-115244

Energy Calibration Fit
Energy = 0.0891 +0.250185*Channel -3.10248e-008*Channel**2
FWHM (ch) = 4.2827 +0.000836*Channel -2.57983e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.47	46.54	46.49	0.11%	1.10	1.11	-0.73%
237.60	59.54	59.53	0.02%	1.12	1.12	0.34%
351.74	88.03	88.08	-0.06%	1.14	1.14	-0.59%
487.70	122.06	122.10	-0.03%	1.18	1.17	0.48%
662.88	165.85	165.92	-0.04%	1.21	1.21	0.02%
1115.68	279.17	279.18	-0.00%	1.30	1.30	0.08%
1565.21	391.69	391.60	0.02%	1.38	1.38	-0.28%
2054.10	513.99	513.86	0.03%	1.49	1.47	0.85%
2417.36	604.72	604.69	0.00%	1.55	1.54	0.68%
2645.27	661.66	661.68	-0.00%	1.58	1.58	-0.18%
3182.16	795.86	795.90	-0.00%	1.67	1.67	0.01%
3338.11	834.85	834.89	-0.00%	1.70	1.70	0.15%
3590.87	898.02	898.07	-0.01%	1.72	1.74	-0.94%
4461.04	1115.55	1115.56	-0.00%	1.87	1.87	-0.07%
7344.90	1836.01	1835.99	0.00%	2.26	2.26	0.10%

Efficiency Calibration Fit
Tcc Polynomial Uncertainty = 75.3820 %
Coefficients:
-0.481974 -4.786458 -0.774695 7.208170 0.000000 0.000000

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	3.1268E-002	3.2673E-002	-4.49%
59.54	3.6601E-002	3.7085E-002	-1.32%
88.03	4.0834E-002	4.0211E-002	1.53%
122.06	3.8123E-002	3.8424E-002	-0.79%
165.85	3.2623E-002	3.3531E-002	-2.78%
279.17	2.3803E-002	2.2718E-002	4.56%
391.69	1.8302E-002	1.7359E-002	5.15%
513.99	1.3631E-002	1.4002E-002	-2.72%
604.72	1.0900E-002	1.2326E-002	-13.08%
661.66	1.1221E-002	1.1490E-002	-2.40%
834.85	9.6475E-003	9.5927E-003	0.57%
898.02	8.3931E-003	9.0662E-003	-8.02%
1115.55	7.7758E-003	7.6632E-003	1.45%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	59840.00	2543.20	4.20%	2/1/2020 11:00:00 AM
AM-241	59.54	35.70	1.58E+005	7034.00	2511.14	3.60%	2/1/2020 11:00:00 AM
CD-109	88.03	3.61	4.63E+002	64040.00	2311.84	4.60%	2/1/2020 11:00:00 AM
CO-57	122.06	85.60	2.72E+002	1629.00	1394.42	3.50%	2/1/2020 11:00:00 AM

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Ce-139	165.85	79.90	1.38E+002	2257.00	1803.34	3.60%	2/1/2020	11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	5295.00	4315.43	3.50%	2/1/2020	11:00:00 AM
SN-113	391.69	64.00	1.15E+002	3614.00	2312.96	3.50%	2/1/2020	11:00:00 AM
Sr-85	513.99	99.28	6.47E+001	7206.00	7154.12	3.50%	2/1/2020	11:00:00 AM
Cs-134	604.72	97.62	7.54E+002	7857.00	7670.00	3.50%	2/1/2020	11:00:00 AM
CS-137	661.66	85.21	1.10E+004	1887.00	1607.91	3.40%	2/1/2020	11:00:00 AM
Mn-54	834.85	99.98	3.12E+002	4454.00	4453.11	3.30%	2/1/2020	11:00:00 AM
Y-88	898.02	93.70	1.07E+002	8215.00	7697.46	3.30%	2/1/2020	11:00:00 AM
Zn-65	1115.55	50.60	2.44E+002	11850.00	5996.10	3.50%	2/1/2020	11:00:00 AM

Peak-To-Total Calibration Table

Ptt = Exp(8.5670E-001 - 4.2452E-001 * Ln(Energy))

LS Energy Table

Intercept: 1.0981E+000 Slope: 7.1346E-001 Quad: 3.2248E-001

Gamma - TCC-1L Marn-LD

Detector: 15
Reagent ID: 1L Marn LD_00001
Container: 1893022
Reference date 2/1/2020
Calibration Standard: SRS 115244
Standard volume: 1 g/Jar
Standard volume transferred: 1 g/geometry

Isotope	Standard Activity (Bq)	Standard (Bq/g)	Geometry Mass (g)	Geometry (Bq/sample)	Measured (Bq/sample)	Percent Recovery (Bq/sample)	Recovery Within 8%
Pb-210	5.984E+04	59840.00	1.0	5.984E+04	6.016E+04	100.5%	PASS
Am-241	7.034E+03	7034.00	1.0	7.034E+03	6.946E+03	98.7%	PASS
Cd-109	6.404E+04	64040.00	1.0	6.404E+04	6.474E+04	101.1%	PASS
Co-57	1.629E+03	1629.00	1.0	1.629E+03	1.620E+03	99.4%	PASS
Ce-139	2.257E+03	2257.00	1.0	2.257E+03	2.288E+03	101.4%	PASS
Hg-203	5.295E+03	5295.00	1.0	5.295E+03	5.544E+03	104.7%	PASS
Sn-113	3.614E+03	3614.00	1.0	3.614E+03	3.796E+03	105.0%	PASS
Sr-85	7.206E+03	7206.00	1.0	7.206E+03	6.993E+03	97.0%	PASS
Cs-134	7.857E+03	7857.00	1.0	7.857E+03	7.784E+03	99.1%	PASS
Cs-137	1.887E+03	1887.00	1.0	1.887E+03	1.842E+03	97.6%	PASS
Mn-54	4.454E+03	4454.00	1.0	4.454E+03	4.478E+03	100.5%	PASS
Y-88	8.215E+03	8215.00	1.0	8.215E+03	8.292E+03	100.9%	PASS
Zn-65	1.185E+04	11850.00	1.0	1.185E+04	1.198E+04	101.1%	PASS

1st Reviewer: Audra DeMariano

Date: 5/7/2020

2nd Reviewer: [illegible]

Date: 5/12/20

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 115244
Source Description: 1.0 Liter Solid in 130G GA-MA Beaker
Product Code: 8703-EG-SD
Customer: Test America Laboratories- St. Louis
P.O. Number: 3060005, Item 2

This standard radionuclide source was prepared gravimetrically from a master radionuclide solution. The master radionuclide solution was prepared gravimetrically by addition of radionuclides calibrated by an ionization chamber, a liquid scintillation counter, or a germanium gamma-ray spectrometer system. Calibration and purity were checked using germanium gamma-ray spectrometry. 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 (NIST) 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."

Density of solid matrix: 1.17 g/cm³ ± 3 %.

Reference Date: 01-February-2020 12:00 PM EST

TCC Mixture

Isotope	Gamma-Ray Energy, keV	Half-Life, d	Activity, Bq	Flux, s^{-1}	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
Am-241	59.5	1.580E+05	7.034E+03	2.525E+03	0.1	1.8	3.7	4π LS
Co-57	122.1	2.717E+02	1.629E+03	1.394E+03	0.1	1.8	3.7	IC
Hg-203	279.2	4.669E+01	5.295E+03	4.319E+03	0.1	1.8	3.7	IC
Sr-85	514.0	6.485E+01	7.206E+03	7.098E+03	0.1	1.8	3.7	IC
Cs-134	795.9	———	———	6.714E+03	0.1	1.8	3.7	———
Mn-54	834.8	3.121E+02	4.454E+03	4.453E+03	0.1	1.7	3.5	IC
Y-88	1836.1	———	———	8.149E+03	0.1	1.7	3.5	———

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

(Certificate continued on reverse side)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318

SRS Number: 115244

Expiration Date: 16-March-2021

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____
K. Eardley, **Radiochemist**

QC Approved by: _____ **Date:** 05-MAR-20
J. Lahr, **Spectroscopist**

Test America St. Louis Spectrum ID: 15_1LMarn_20200345

Sample Description: 15_1LMarn_1893022-115244
Detector: Detector #15
Batch ID: 15
Work Order Number: 1LMarn
Lot Number: 1893022-115244

Decay to Time: 2/1/2020 11:00 Live Time: 7200 sec
Acquisition Time: 3/20/2020 15:08:58 Real Time: 8589 sec
Analysis Time: 5/6/2020 14:15 Dead Time: 16.18 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 15_TCC-1L Marn.Clb
Efficiency Cal Desc: 15_1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 14:13
Energy Cal Date: 5/1/2020 18:15
Library: DET_EnergyStandardMix TCC.lib
Bkgd Correction File: 15_2020-03-07_0845.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
Cs-134	7.784E+03	0.1	9.773E+00	4.972E+02	1.865E+01
Sr-85	6.993E+03	0.2	1.246E+01	4.467E+02	2.037E+01
Pb-210	6.016E+04	0.2	1.176E+02	3.650E+03	2.855E+02
AM-241	6.946E+03	0.2	1.618E+01	4.438E+02	2.968E+01
CD-109	6.474E+04	0.2	1.038E+02	4.188E+03	2.116E+02
CO-57	1.620E+03	0.2	3.923E+00	1.035E+02	9.115E+00
Ce-139	2.288E+03	0.3	7.862E+00	1.446E+02	1.440E+01
Hg-203	5.544E+03	0.3	1.535E+01	3.544E+02	2.603E+01
SN-113	3.796E+03	0.4	1.537E+01	2.518E+02	2.618E+01
CS-137	1.842E+03	0.5	9.428E+00	1.093E+02	1.554E+01
Mn-54	4.478E+03	0.3	1.190E+01	2.634E+02	1.438E+01
Y-88	8.292E+03	0.2	1.371E+01	4.880E+02	2.154E+01
Zn-65	1.198E+04	0.2	2.639E+01	7.042E+02	2.331E+01
Total	1.865E+05				

Analyst: Jody Watson

Sample description
15_1LMarn_1893022-115244

Spectrum Filename: C:\User\SPC\Det15\15_1LMarn_20200345.An1

Acquisition information
Start time: 3/20/2020 3:08:58 PM
Live time: 7200
Real time: 8589
Dead time: 16.18 %
Detector ID: 15

Detector system
Ge15 SN/11012216

Calibration
Filename: 15_TCC-1L Marn.Clb
15_1L Marn_1893022-115244

Energy Calibration
Created: 5/1/2020 6:15:32 PM
Zero offset: 0.089 keV
Gain: 0.250 keV/channel
Quadratic: -3.144E-08 keV/channel^2

Efficiency Calibration
Created: 5/6/2020 2:13:32 PM
Type: TCC Polynomial
Coefficients: -0.481974 -4.786458 -0.774695
7.208170 0.000000 0.000000

Library Files
Main analysis library: DET_EnergyStandardMix TCC.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.62keV)
Stop channel: 8000 (1999.58keV)
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	2/1/2020 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	15_2020-03-07_0845.PBC 3/7/2020 8:45:50 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0323

***** 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
40.98	19439.	6.54	2.04	2.991E-02				
46.55	570792.	0.20	1.11	3.265E-02	46.54	4.050	6.016E+04	Pb210
50.15	4190.	18.74	1.11	3.414E-02				
59.53	661608.	0.23	1.12	3.708E-02	59.54	35.683	6.946E+03	AM241
70.92	25776.	2.62	1.13	3.915E-02				
72.94	43600.	1.61	1.13	3.939E-02				
82.54	22377.	3.01	1.14	4.008E-02				
84.99	24469.	2.79	1.14	4.016E-02				
88.10	629504.	0.16	1.14	4.021E-02	88.03	3.610	6.474E+04	CD109
122.12	338161.	0.24	1.17	3.842E-02	122.06	85.327	1.620E+03	CO57
126.76	1639.	30.44	1.17	3.797E-02				
136.52	41037.	2.27	1.23	3.695E-02				
165.92	332255.	0.34	1.21	3.352E-02	165.85	76.670	2.288E+03	Ce139
199.09	8120.	10.00	1.49	2.961E-02				
211.41	1545.	48.52	0.52	2.827E-02				
237.18	589.	75.36	1.27	2.584E-02				
242.48	460.	71.34	0.33	2.539E-02				
255.16	10964.	4.31	1.28	2.439E-02				
260.10	718.	65.29	1.28	2.403E-02				
262.33	890.	50.74	1.28	2.387E-02				
271.41	1096.	51.64	0.27	2.323E-02				
279.18	361146.	0.28	1.30	2.272E-02	279.17	81.500	5.544E+03	Hg203
286.01	1046.	51.25	0.66	2.229E-02				
298.44	332.	75.89	0.48	2.155E-02				
332.47	1219.	39.78	2.19	1.977E-02				
354.40	519.	55.76	0.48	1.880E-02				
380.60	1278.	45.83	0.34	1.776E-02				
391.61	227970.	0.40	1.38	1.736E-02	391.69	64.226	3.796E+03	SN113

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
416.58	650.	54.33	1.21	1.653E-02				
475.28	10728.	5.46	1.31	1.489E-02				
501.18	310.	73.60	0.49	1.428E-02				
510.64	41678.	2.37	2.72	1.407E-02				
513.96	417376.	0.18	1.47	1.400E-02	513.99	99.198	6.991E+03	Sr85
548.79	745.	34.91	1.49	1.330E-02				
554.75	552.	57.45	1.50	1.319E-02				
558.17	439.	72.51	1.50	1.312E-02				
563.24	48711.	0.80	1.51	1.303E-02				
569.30	90371.	0.93	1.47	1.292E-02				
604.70	575851.	0.19	1.55	1.233E-02	604.72	87.269	7.772E+03	Cs134
613.99	1145.	32.73	3.07	1.218E-02				
626.84	1155.	44.04	0.54	1.198E-02				
661.68	129505.	0.51	1.58	1.149E-02	661.66	85.235	1.842E+03	CS137
730.67	429.	68.86	0.53	1.064E-02				
748.03	279.	62.53	0.42	1.044E-02				
762.69	847.	37.57	1.05	1.029E-02				
795.95	399038.	0.17	1.67	9.954E-03	795.86	74.625	7.798E+03	Cs134
802.08	38707.	0.74	1.67	9.895E-03				
813.95	5767.	5.92	1.49	9.783E-03				
834.89	277926.	0.27	1.70	9.592E-03	834.85	100.000	4.478E+03	Mn54
898.07	339956.	0.22	1.72	9.066E-03	898.02	85.135	8.367E+03	Y88
1017.66	528.	44.83	1.99	8.230E-03				
1038.66	4344.	5.91	1.91	8.100E-03				
1115.56	292771.	0.22	1.87	7.663E-03	1115.55	50.796	1.198E+04	Zn65
1168.05	7478.	1.89	1.90	7.394E-03				
1174.19	2000.	5.92	1.91	7.364E-03				
1187.91	76.	72.38	0.51	7.297E-03				
1297.15	264.	37.47	0.57	6.811E-03				
1325.09	8005.	3.52	2.74	6.698E-03				
1354.65	315.	40.75	2.33	6.582E-03				
1365.22	11887.	2.47	2.05	6.542E-03				
1400.53	8723.	3.03	1.99	6.411E-03				
1458.51	212.	70.31	0.38	6.207E-03				
1493.80	165.	78.11	2.09	6.091E-03				
1497.66	127.	101.61	2.09	6.078E-03				
1549.70	833.	32.41	1.59	5.912E-03				
1569.74	253.	72.52	0.53	5.851E-03				
1651.67	402.	38.05	0.34	5.615E-03				
1684.70	250.	46.91	0.48	5.525E-03				
1711.18	499.	28.54	0.87	5.455E-03				
1720.51	162.	52.96	0.44	5.430E-03				
1835.96	202495.	0.24	2.27	5.146E-03	1836.01	90.939	8.221E+03	Y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
163.43	40.98	416905.	19439.	6.499E+05	6.54	2.040	-	s
199.91	50.09	306022.	4245.	1.244E+05	18.49	1.113	-	sD
283.12	70.88	214888.	25776.	6.583E+05	2.62	1.129	-	sD
291.21	72.91	224797.	43600.	1.107E+06	1.61	1.131	-	D
329.80	82.53	216189.	22524.	5.619E+05	2.99	1.139	-	D
339.57	84.97	219871.	24586.	6.122E+05	2.77	1.141	-	sD
506.49	126.74	123706.	1622.	4.270E+04	30.78	1.174	-	sD
545.37	136.52	198202.	41037.	1.111E+06	2.27	1.229	-	
795.49	199.09	162846.	8120.	2.742E+05	10.00	1.485	-	s
844.76	211.41	146274.	1545.	5.467E+04	48.52	0.517	-	s
947.78	237.18	73737.	589.	2.281E+04	75.36	1.269	-	sc
968.94	242.48	49388.	460.	1.810E+04	71.34	0.333	-	sc
1019.66	255.14	106012.	10964.	4.494E+05	4.31	1.276	-	D
1039.41	260.08	109359.	718.	2.986E+04	65.29	1.279	-	c
1048.30	262.30	101604.	890.	3.731E+04	50.74	1.281	-	sD
1084.62	271.41	91225.	1096.	4.718E+04	51.64	0.267	-	s
1143.00	286.01	81872.	1046.	4.696E+04	51.25	0.662	-	s
1192.71	298.44	31574.	332.	1.541E+04	75.89	0.479	-	sc
1328.75	332.47	70229.	1219.	6.166E+04	39.78	2.187	-	s
1416.44	354.40	35664.	519.	2.761E+04	55.76	0.479	-	s
1521.20	380.60	81956.	1278.	7.193E+04	45.83	0.340	-	s
1665.07	416.58	43720.	650.	3.929E+04	54.33	1.208	-	s
1899.78	475.28	68647.	10728.	7.203E+05	5.46	1.310	-	
2003.38	501.18	22129.	310.	2.168E+04	73.60	0.493	-	c
2040.98	510.62	467298.	41268.	2.932E+06	2.39	2.717	-	sD
2193.77	548.74	33459.	745.	5.602E+04	34.91	1.495	-	sD
2217.60	554.70	50006.	552.	4.185E+04	57.45	1.499	-	sD
2231.27	558.12	50377.	439.	3.342E+04	72.51	1.502	-	sc
2251.54	563.19	51863.	48711.	3.738E+06	0.80	1.505	-	D
2275.78	569.30	91817.	90371.	6.994E+06	0.93	1.473	-	
2454.50	613.99	37984.	1145.	9.401E+04	32.73	3.071	-	s
2505.92	626.84	53291.	1155.	9.637E+04	44.04	0.541	-	s
2921.20	730.67	21711.	429.	4.033E+04	68.86	0.529	-	s
2990.64	748.03	11310.	279.	2.671E+04	62.53	0.419	-	s
3049.28	762.69	22316.	847.	8.232E+04	37.57	1.053	-	s
3207.02	802.03	21552.	38620.	3.903E+06	0.74	1.671	-	D
3254.35	813.95	22931.	5767.	5.895E+05	5.92	1.494	-	
4069.33	1017.66	9781.	528.	6.412E+04	44.83	1.990	-	s
4153.35	1038.66	9982.	4344.	5.363E+05	5.91	1.912	-	
4671.08	1167.97	6233.	7478.	1.011E+06	1.89	1.902	-	D
4695.66	1174.11	6011.	2000.	2.716E+05	5.92	1.906	-	D
4750.56	1187.91	1475.	76.	1.042E+04	72.38	0.507	-	c
5187.75	1297.15	2856.	264.	3.876E+04	37.47	0.574	-	s

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected	
5299.56	1324.90	9129.	8005.	1.195E+06	3.52	2.745	-	s
5417.86	1354.65	4041.	315.	4.786E+04	40.75	2.329	-	
5460.18	1365.22	9733.	11887.	1.817E+06	2.47	2.052	-	
5601.50	1400.53	8913.	8723.	1.361E+06	3.03	1.991	-	
5833.60	1458.51	5282.	212.	3.416E+04	70.31	0.376	-	s
5974.86	1493.44	8205.	165.	2.706E+04	78.11	2.087	-	sc
5990.31	1497.30	8273.	127.	2.091E+04	101.61	2.089	-	sc
6198.64	1549.70	11376.	833.	1.409E+05	32.41	1.589	-	s
6278.87	1569.74	7710.	253.	4.324E+04	72.52	0.526	-	s
6606.85	1651.67	4928.	402.	7.160E+04	38.05	0.336	-	s
6739.12	1684.70	3246.	250.	4.528E+04	46.91	0.477	-	s
6845.13	1711.18	3388.	499.	9.145E+04	28.54	0.866	-	s
6882.47	1720.51	1800.	162.	2.983E+04	52.96	0.439	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix TCC.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	185.67	46.54	337309.	570792.	79.277	0.20	1.110D
AM-241	237.60	59.53	367301.	661608.	91.890	0.23	1.125
CD-109	351.52	88.03	194539.	629504.	87.431	0.16	1.143D
CO-57	487.55	122.06	166286.	338161.	46.967	0.24	1.171D
Ce-139	662.88	165.92	201001.	332255.	46.147	0.34	1.207
Hg-203	1115.68	279.18	132032.	361146.	50.159	0.28	1.298
SN-113	1565.21	391.61	113414.	227970.	31.663	0.40	1.379
Sr-85	2054.60	513.99	67832.	417498.	57.986	0.18	1.470D
Cs-134	2417.36	604.70	87582.	575851.	79.979	0.19	1.550
CS-137	2645.27	661.68	54670.	129505.	17.987	0.51	1.576
Cs-134	3181.99	795.86	27517.	399038.	55.422	0.17	1.666D
Mn-54	3338.11	834.89	36468.	277926.	38.601	0.27	1.699
Y-88	3590.86	898.07	35053.	339956.	47.216	0.22	1.722
Zn-65	4461.03	1115.56	14806.	292771.	40.663	0.22	1.874
Y-88	7344.77	1835.96	4300.	202495.	28.124	0.24	2.266

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
Cs-134	R	7.7842E+03				7.54E+02	
			604.72	7.772E+03	(1.865E+01	1.86E-01	8.73E+01 G
			795.86	7.798E+03	(1.516E+01	1.69E-01	7.46E+01 G
Sr-85		6.9927E+03				6.47E+01	
			513.99	6.993E+03	(2.037E+01	1.78E-01	9.92E+01 G
Pb-210	R	6.0157E+04				8.15E+03	
			46.54	6.016E+04	(P 2.855E+02	1.96E-01	4.05E+00 G
AM-241		6.9455E+03				1.58E+05	
			59.54	6.946E+03	(2.968E+01	2.33E-01	3.57E+01 G
CD-109		6.4737E+04				4.63E+02	
			88.03	6.474E+04	(2.116E+02	1.60E-01	3.61E+00 G
CO-57		1.6198E+03				2.72E+02	
			122.06	1.620E+03	(9.115E+00	2.42E-01	8.53E+01 G
Ce-139	R	2.2878E+03				1.38E+02	
			165.85	2.288E+03	(1.440E+01	3.44E-01	7.67E+01 G
Hg-203		5.5439E+03				4.66E+01	
			279.17	5.544E+03	(2.603E+01	2.77E-01	8.15E+01 G
SN-113		3.7959E+03				1.15E+02	
			391.69	3.796E+03	(2.618E+01	4.05E-01	6.42E+01 G
CS-137		1.8422E+03				1.10E+04	
			661.66	1.842E+03	(1.554E+01	5.12E-01	8.52E+01 G
Mn-54		4.4781E+03				3.12E+02	
			834.85	4.478E+03	(P 1.438E+01	2.66E-01	1.00E+02 G
Y-88	R	8.2916E+03				1.07E+02	
			898.02	8.367E+03	(P 2.154E+01	2.24E-01	8.51E+01 G
			1836.01	8.221E+03	(P 1.252E+01	2.43E-01	9.09E+01 G
Zn-65	F	1.1976E+04				2.44E+02	
			1115.55	1.198E+04	(2.331E+01	2.20E-01	5.08E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

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

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
Cs-134	7.4470E+03	7.7842E+03	1.255E-01%	1.86E+01
Sr-85	4.1747E+03	6.9927E+03	1.781E-01%	2.04E+01
Pb-210	5.9911E+04	6.0157E+04	1.955E-01%	2.86E+02
AM-241	6.9441E+03	6.9455E+03	2.330E-01%	2.97E+01
CD-109	6.0229E+04	6.4737E+04	1.603E-01%	2.12E+02
CO-57	1.4325E+03	1.6198E+03	2.422E-01%	9.12E+00
Ce-139	1.7950E+03	2.2878E+03	3.437E-01%	1.44E+01
Hg-203	2.7091E+03	5.5439E+03	2.768E-01%	2.60E+01
SN-113	2.8399E+03	3.7959E+03	4.048E-01%	2.62E+01
CS-137	1.8366E+03	1.8422E+03	5.118E-01%	1.55E+01

Mn-54	4.0240E+03	4.4781E+03	2.657E-01%	1.44E+01
Y-88	6.0618E+03	8.2916E+03	1.653E-01%	2.15E+01
Zn-65	1.0446E+04	1.1976E+04	2.203E-01%	2.33E+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 (37.6 to 1999.6 keV) 1.699E+05 Bq/Sample
Total Decayed Activity (37.6 to 1999.6 keV) 1.8645134E+05 Bq/Sample

1L Marn TCC

Calibration Data from file: 17_TCC-1L Marn.Clb
Energy Calibration Date: 5/6/2020 Time: 2:27:38 PM
Efficiency Calibration Date: 5/6/2020 Time: 2:27:38 PM
Peak-To-Total Calibration Date: 5/6/2020 Time: 2:27:38 PM

Calibration Description:
17_1L Marn_1893022-115244

Energy Calibration Fit
Energy = 0.1678 +0.250126*Channel -2.40152e-008*Channel**2
FWHM (ch) = 3.3016 +0.000965*Channel -3.54846e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.69	46.54	46.61	-0.15%	0.85	0.87	-2.57%
237.62	59.54	59.60	-0.10%	0.86	0.88	-2.20%
351.52	88.03	88.09	-0.07%	0.92	0.91	1.25%
487.23	122.06	122.03	0.02%	0.96	0.94	1.64%
662.04	165.85	165.75	0.06%	0.97	0.98	-0.75%
1115.23	279.17	279.08	0.03%	1.11	1.08	1.98%
1565.41	391.69	391.66	0.01%	1.20	1.18	1.50%
2054.59	513.99	513.97	0.00%	1.27	1.28	-1.00%
2417.46	604.72	604.70	0.00%	1.36	1.36	0.20%
2645.31	661.66	661.66	0.00%	1.41	1.40	0.53%
3182.22	795.86	795.88	-0.00%	1.51	1.50	0.37%
3338.21	834.85	834.87	-0.00%	1.53	1.53	-0.08%
3591.05	898.02	898.07	-0.01%	1.56	1.58	-0.90%
4461.31	1115.55	1115.58	-0.00%	1.71	1.72	-0.71%
7344.77	1836.01	1835.99	0.00%	2.12	2.12	0.26%

Efficiency Calibration Fit
Tcc Polynomial Uncertainty = 43.9342 %
Coefficients:
-0.423753 -4.300989 -0.683475 6.999694 0.000000 0.000000

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	4.0529E-002	4.1866E-002	-3.30%
59.54	4.6062E-002	4.7300E-002	-2.69%
88.03	5.3026E-002	5.1658E-002	2.58%
122.06	5.1010E-002	5.0345E-002	1.30%
165.85	4.4007E-002	4.5261E-002	-2.85%
279.17	3.3938E-002	3.2685E-002	3.69%
391.69	2.7258E-002	2.5846E-002	5.18%
513.99	2.0850E-002	2.1391E-002	-2.60%
604.72	1.6161E-002	1.9118E-002	-18.30%
661.66	1.7605E-002	1.7972E-002	-2.08%
834.85	1.5396E-002	1.5331E-002	0.42%
898.02	1.3073E-002	1.4588E-002	-11.58%
1115.55	1.2712E-002	1.2576E-002	1.07%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	59840.00	2543.20	4.20%	2/1/2020 11:00:00 AM
AM-241	59.54	35.70	1.58E+005	7034.00	2511.14	3.60%	2/1/2020 11:00:00 AM
CD-109	88.03	3.61	4.63E+002	64040.00	2311.84	4.60%	2/1/2020 11:00:00 AM
CO-57	122.06	85.60	2.72E+002	1629.00	1394.42	3.50%	2/1/2020 11:00:00 AM

Page 1

1L Marn TCC

Ce-139	165.85	79.90	1.38E+002	2257.00	1803.34	3.60%	2/1/2020	11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	5295.00	4315.43	3.50%	2/1/2020	11:00:00 AM
SN-113	391.69	64.00	1.15E+002	3614.00	2312.96	3.50%	2/1/2020	11:00:00 AM
Sr-85	513.99	99.28	6.47E+001	7206.00	7154.12	3.50%	2/1/2020	11:00:00 AM
Cs-134	604.72	97.62	7.54E+002	7857.00	7670.00	3.50%	2/1/2020	11:00:00 AM
CS-137	661.66	85.21	1.10E+004	1887.00	1607.91	3.40%	2/1/2020	11:00:00 AM
Mn-54	834.85	99.98	3.12E+002	4454.00	4453.11	3.30%	2/1/2020	11:00:00 AM
Y-88	898.02	93.70	1.07E+002	8215.00	7697.46	3.30%	2/1/2020	11:00:00 AM
Zn-65	1115.55	50.60	2.44E+002	11850.00	5996.10	3.50%	2/1/2020	11:00:00 AM

Peak-To-Total Calibration Table

Ptt = Exp(1.0495E+000 - 4.2520E-001 * Ln(Energy))

LS Energy Table

Intercept: 1.0997E+000 Slope: 6.9377E-001 Quad: 3.4764E-001

Gamma - TCC-1L Marn-LD

Detector: 17
Reagent ID: 1L Marn LD_00001
Container: 1893022
Reference date 2/1/2020
Calibration Standard: SRS 115244
Standard volume: 1 g/Jar
Standard volume transferred: 1 g/geometry

Isotope	Standard Activity (Bq)	Standard (Bq/g)	Geometry Mass (g)	Geometry (Bq/sample)	Measured (Bq/sample)	Percent Recovery (Bq/sample)	Recovery Within 8%
Pb-210	5.984E+04	59840.00	1.0	5.984E+04	6.070E+04	101.4%	PASS
Am-241	7.034E+03	7034.00	1.0	7.034E+03	6.853E+03	97.4%	PASS
Cd-109	6.404E+04	64040.00	1.0	6.404E+04	6.548E+04	102.2%	PASS
Co-57	1.629E+03	1629.00	1.0	1.629E+03	1.656E+03	101.7%	PASS
Ce-139	2.257E+03	2257.00	1.0	2.257E+03	2.292E+03	101.6%	PASS
Hg-203	5.295E+03	5295.00	1.0	5.295E+03	5.496E+03	103.8%	PASS
Sn-113	3.614E+03	3614.00	1.0	3.614E+03	3.797E+03	105.1%	PASS
Sr-85	7.206E+03	7206.00	1.0	7.206E+03	7.019E+03	97.4%	PASS
Cs-134	7.857E+03	7857.00	1.0	7.857E+03	7.780E+03	99.0%	PASS
Cs-137	1.887E+03	1887.00	1.0	1.887E+03	1.848E+03	97.9%	PASS
Mn-54	4.454E+03	4454.00	1.0	4.454E+03	4.472E+03	100.4%	PASS
Y-88	8.215E+03	8215.00	1.0	8.215E+03	8.250E+03	100.4%	PASS
Zn-65	1.185E+04	11850.00	1.0	1.185E+04	1.193E+04	100.7%	PASS

1st Reviewer: Audra DeMariano 2nd Reviewer: [signature]

Date: 5/13/2020 Date: 5-14-20

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 115244
Source Description: 1.0 Liter Solid in 130G GA-MA Beaker
Product Code: 8703-EG-SD
Customer: Test America Laboratories- St. Louis
P.O. Number: 3060005, Item 2

This standard radionuclide source was prepared gravimetrically from a master radionuclide solution. The master radionuclide solution was prepared gravimetrically by addition of radionuclides calibrated by an ionization chamber, a liquid scintillation counter, or a germanium gamma-ray spectrometer system. Calibration and purity were checked using germanium gamma-ray spectrometry. 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 (NIST) 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."

Density of solid matrix: 1.17 g/cm³ ± 3 %.

Reference Date: 01-February-2020 12:00 PM EST

TCC Mixture

Isotope	Gamma-Ray Energy, keV	Half-Life, d	Activity, Bq	Flux, s^{-1}	Uncertainty u_A, %	u_B, %	U, %*	Calibration Method**
Am-241	59.5	1.580E+05	7.034E+03	2.525E+03	0.1	1.8	3.7	4π LS
Co-57	122.1	2.717E+02	1.629E+03	1.394E+03	0.1	1.8	3.7	IC
Hg-203	279.2	4.659E+01	5.295E+03	4.319E+03	0.1	1.8	3.7	IC
Sr-85	514.0	6.485E+01	7.206E+03	7.098E+03	0.1	1.8	3.7	IC
Cs-134	795.9	———	———	6.714E+03	0.1	1.8	3.7	———
Mn-54	834.8	3.121E+02	4.454E+03	4.453E+03	0.1	1.7	3.5	IC
Y-88	1836.1	———	———	8.149E+03	0.1	1.7	3.5	———

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

(Certificate continued on reverse side)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318

SRS Number: 115244

Expiration Date: 16-March-2021

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____
K. Eardley, Radiochemist

QC Approved by: _____ **Date:** 05-MAR-20
J. Lahr, Spectroscopist

Test America St. Louis Spectrum ID: 17_1L Marn_20200687

Sample Description: 17_1L Marn_1893022-115244
Detector: Detector #17
Batch ID: 17
Work Order Number: 1L Marn
Lot Number: 1893022-115244

Decay to Time: 2/1/2020 11:00 Live Time: 3600 sec
Acquisition Time: 5/4/2020 10:11:57 Real Time: 4375 sec
Analysis Time: 5/6/2020 14:40 Dead Time: 17.72 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 17_TCC-1L Marn.Clb
Efficiency Cal Desc: 17_1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 14:27
Energy Cal Date: 5/6/2020 14:27
Library: DET_EnergyStandardMix TCC.lib
Bkgd Correction File: 17_2020-05-02_0909.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
Cs-134	7.780E+03	0.1	1.165E+01	4.969E+02	1.942E+01
Sr-85	7.019E+03	0.3	1.832E+01	4.486E+02	3.079E+01
Pb-210	6.070E+04	0.2	1.387E+02	3.684E+03	3.169E+02
AM-241	6.853E+03	0.3	1.809E+01	4.380E+02	3.282E+01
CD-109	6.548E+04	0.2	1.261E+02	4.236E+03	2.263E+02
CO-57	1.656E+03	0.4	6.535E+00	1.060E+02	1.234E+01
Ce-139	2.292E+03	0.4	9.345E+00	1.449E+02	1.742E+01
Hg-203	5.496E+03	0.5	2.800E+01	3.521E+02	5.096E+01
SN-113	3.797E+03	0.5	1.858E+01	2.521E+02	3.250E+01
CS-137	1.848E+03	0.5	1.004E+01	1.097E+02	1.563E+01
Mn-54	4.472E+03	0.3	1.226E+01	2.631E+02	1.362E+01
Y-88	8.250E+03	0.2	1.566E+01	4.857E+02	2.185E+01
Zn-65	1.193E+04	0.2	2.877E+01	7.017E+02	2.191E+01
Total	1.876E+05				

Analyst: Jody Watson

Sample description
17_1L Marn_1893022-115244

Spectrum Filename: C:\User\SPC\Det17\17_1L Marn_20200687.An1

Acquisition information
Start time: 5/4/2020 10:11:57 AM
Live time: 3600
Real time: 4375
Dead time: 17.72 %
Detector ID: 17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_TCC-1L Marn.Clb
17_1L Marn_1893022-115244

Energy Calibration
Created: 5/6/2020 2:27:38 PM
Zero offset: 0.168 keV
Gain: 0.250 keV/channel
Quadratic: -2.402E-08 keV/channel^2

Efficiency Calibration
Created: 5/6/2020 2:27:38 PM
Type: TCC Polynomial
Coefficients: -0.423753 -4.300989 -0.683475
6.999694 0.000000 0.000000

Library Files
Main analysis library: DET_EnergyStandardMix TCC.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.69keV)
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	2/1/2020 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	17_2020-05-02_0909.PBC 5/2/2020 9:09:55 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0380

***** 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
40.89	13906.	6.15	2.18	3.844E-02				
46.67	367576.	0.23	0.87	4.190E-02	46.54	4.050	6.070E+04	Pb210
49.70	1865.	29.51	0.87	4.344E-02				
59.60	416234.	0.26	0.86	4.732E-02	59.54	35.683	6.853E+03	AM241
66.47	394.	106.19	0.61	4.910E-02				
70.90	8416.	5.45	0.89	4.999E-02				
72.98	14731.	3.10	0.90	5.032E-02				
75.28	1727.	23.82	0.90	5.065E-02				
82.65	7044.	6.19	0.90	5.138E-02				
84.91	9826.	4.48	0.91	5.152E-02				
88.12	382451.	0.19	0.91	5.166E-02	88.03	3.610	6.548E+04	CD109
111.99	589.	55.80	0.73	5.113E-02				
122.03	202004.	0.39	0.96	5.035E-02	122.06	85.300	1.656E+03	CO57
136.42	25212.	2.26	0.91	4.889E-02				
165.75	178861.	0.41	0.97	4.527E-02	165.85	76.487	2.292E+03	Ce139
172.49	956.	49.76	1.75	4.439E-02				
198.87	5487.	10.32	1.37	4.091E-02				
214.62	1186.	40.99	0.39	3.897E-02				
255.06	6635.	6.57	1.27	3.475E-02				
279.08	132336.	0.51	1.11	3.269E-02	279.17	81.500	5.496E+03	Hg203
289.18	822.	39.84	1.39	3.190E-02				
315.70	928.	34.17	0.42	3.003E-02				
323.72	437.	52.37	0.68	2.951E-02				
355.22	216.	80.83	0.32	2.767E-02				
391.66	129636.	0.49	1.20	2.585E-02	391.69	64.226	3.797E+03	SN113
475.29	7092.	5.40	1.19	2.259E-02				
511.06	25987.	2.76	2.53	2.148E-02				
513.99	198065.	0.26	1.28	2.139E-02	513.99	99.173	7.018E+03	Sr85

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
563.21	34467.	1.32	1.32	2.008E-02				
569.29	62473.	0.87	1.35	1.993E-02				
604.70	409695.	0.21	1.36	1.912E-02	604.72	84.286	7.692E+03	Cs134
661.66	101310.	0.54	1.41	1.797E-02	661.66	85.235	1.848E+03	CS137
795.88	296764.	0.22	1.51	1.584E-02	795.86	71.916	7.882E+03	Cs134
801.98	28189.	1.10	1.47	1.576E-02				
813.96	2611.	8.51	1.46	1.560E-02				
822.52	264.	99.00	0.35	1.549E-02				
834.87	200789.	0.27	1.53	1.533E-02	834.85	100.000	4.472E+03	Mn54
860.54	451.	44.11	0.62	1.502E-02				
887.19	393.	51.62	0.35	1.471E-02				
898.10	197893.	0.24	1.58	1.459E-02	898.02	82.381	8.372E+03	Y88
903.98	276.	54.44	1.58	1.452E-02				
937.18	410.	37.38	1.93	1.417E-02				
1009.30	84.	78.26	0.29	1.347E-02				
1018.98	258.	41.30	1.83	1.338E-02				
1038.52	3400.	6.20	1.83	1.321E-02				
1115.58	210768.	0.24	1.71	1.258E-02	1115.55	50.796	1.193E+04	Zn65
1134.03	177.	53.80	1.25	1.244E-02				
1168.07	6197.	1.84	1.76	1.219E-02				
1173.56	1928.	4.93	1.76	1.215E-02				
1177.41	159.	45.00	1.76	1.212E-02				
1211.34	110.	68.98	1.39	1.188E-02				
1221.94	88.	50.62	0.55	1.181E-02				
1238.44	248.	49.82	0.76	1.170E-02				
1324.94	4298.	4.49	3.17	1.116E-02				
1347.27	362.	36.87	0.42	1.103E-02				
1365.21	10244.	1.92	1.83	1.093E-02				
1400.52	10408.	1.96	1.82	1.074E-02				
1570.27	618.	35.10	2.30	9.891E-03				
1636.32	59.	75.81	0.60	9.603E-03				
1664.95	184.	60.28	0.68	9.483E-03				
1686.50	306.	39.35	0.71	9.394E-03				
1835.98	124784.	0.30	2.12	8.821E-03	1836.01	88.406	8.136E+03	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
162.81	40.86	205068.	13906.	3.617E+05	6.15	2.182	- s
198.33	49.64	137316.	2211.	5.090E+04	23.79	0.873	- sD
265.07	66.34	69682.	394.	8.014E+03	106.19	0.611	- sc
282.81	70.88	101011.	8416.	1.684E+05	5.45	0.893	- D
291.10	72.96	96788.	14731.	2.927E+05	3.10	0.895	- D
300.30	75.26	83748.	1727.	3.410E+04	23.82	0.897	- sD
329.99	82.62	91490.	7106.	1.383E+05	6.14	0.904	- D

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected	
339.05	84.88	91816.	9966.	1.934E+05	4.42	0.907	-	sD
447.07	111.99	45981.	589.	1.151E+04	55.80	0.730	-	s
544.75	136.42	81723.	25212.	5.157E+05	2.26	0.914	-	
689.00	172.49	64448.	956.	2.155E+04	49.76	1.747	-	s
794.49	199.03	82215.	5487.	1.341E+05	10.32	1.373	-	s
857.43	214.62	67138.	1186.	3.042E+04	40.99	0.391	-	s
1019.17	255.06	52370.	6635.	1.909E+05	6.57	1.267	-	s
1155.58	289.18	35478.	822.	2.576E+04	39.84	1.392	-	s
1261.67	315.70	33208.	928.	3.090E+04	34.17	0.424	-	s
1293.73	323.72	22229.	437.	1.480E+04	52.37	0.683	-	s
1419.69	355.22	15132.	216.	7.807E+03	80.83	0.320	-	sc
1899.87	475.29	33472.	7092.	3.140E+05	5.40	1.189	-	
2042.88	511.05	243439.	25977.	1.210E+06	2.76	2.531	-	sD
2251.54	563.21	35807.	34467.	1.717E+06	1.32	1.321	-	
2275.85	569.29	42534.	62473.	3.134E+06	0.87	1.349	-	
3206.61	801.98	13969.	28189.	1.789E+06	1.10	1.468	-	
3254.53	813.96	11216.	2611.	1.674E+05	8.51	1.458	-	s
3288.78	822.52	13608.	264.	1.705E+04	99.00	0.347	-	sc
3440.89	860.54	9781.	451.	3.003E+04	44.11	0.619	-	s
3547.49	887.19	10191.	393.	2.672E+04	51.62	0.353	-	s
3614.88	903.95	11163.	268.	1.845E+04	56.11	1.582	-	sD
3747.50	937.18	6015.	410.	2.892E+04	37.38	1.932	-	s
4036.05	1009.30	1816.	84.	6.236E+03	78.26	0.291	-	sc
4074.78	1018.98	3182.	258.	1.932E+04	41.30	1.832	-	
4152.98	1038.52	6485.	3400.	2.574E+05	6.20	1.831	-	
4535.16	1134.03	2540.	177.	1.423E+04	53.80	1.252	-	s
4671.36	1167.95	3426.	6197.	5.085E+05	1.84	1.758	-	D
4693.31	1173.43	3542.	1928.	1.587E+05	4.93	1.762	-	sD
4708.74	1177.29	2476.	159.	1.311E+04	45.00	1.764	-	sD
4844.51	1211.34	1772.	110.	9.230E+03	68.98	1.389	-	s
4886.92	1221.94	886.	88.	7.494E+03	50.62	0.549	-	s
4952.95	1238.44	3009.	248.	2.121E+04	49.82	0.761	-	s
5299.11	1324.94	4606.	4298.	3.851E+05	4.49	3.175	-	s
5388.47	1347.27	3164.	362.	3.277E+04	36.87	0.423	-	s
5460.30	1365.21	4182.	10244.	9.371E+05	1.92	1.830	-	
5601.59	1400.52	4538.	10408.	9.694E+05	1.96	1.822	-	
6281.05	1570.96	6808.	618.	6.253E+04	35.10	2.302	-	s
6545.43	1636.32	896.	59.	6.144E+03	75.81	0.595	-	sc
6660.04	1664.95	2507.	184.	1.940E+04	60.28	0.680	-	s
6746.31	1686.50	2511.	306.	3.261E+04	39.35	0.711	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix TCC.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	185.40	46.54	169110.	367574.	102.104	0.23	0.870D
AM-241	237.62	59.60	182467.	416234.	115.621	0.26	0.864
CD-109	351.28	88.03	80129.	382451.	106.237	0.19	0.910D
CO-57	487.23	122.03	103996.	202004.	56.112	0.39	0.957
Ce-139	662.04	165.75	84715.	178861.	49.684	0.41	0.974
Hg-203	1115.23	279.08	69040.	132336.	36.760	0.51	1.106
SN-113	1565.41	391.66	56408.	129636.	36.010	0.49	1.200
Sr-85	2054.66	513.99	34565.	198096.	55.027	0.26	1.284D
Cs-134	2417.46	604.70	48990.	409695.	113.804	0.21	1.360
CS-137	2645.31	661.66	33620.	101310.	28.142	0.54	1.409
Cs-134	3182.22	795.88	19402.	296764.	82.434	0.22	1.509
Mn-54	3338.21	834.87	17065.	200789.	55.775	0.27	1.531
Y-88	3590.85	898.02	12154.	197893.	54.970	0.24	1.577D
Zn-65	4461.30	1115.58	6804.	210768.	58.547	0.24	1.713
Y-88	7344.74	1835.98	1450.	124784.	34.662	0.30	2.124

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
Cs-134	R	7.7797E+03				7.54E+02	
			604.72	7.692E+03	(	1.942E+01 2.06E-01 8.43E+01	G
			795.86	7.882E+03	(P	1.731E+01 2.17E-01 7.19E+01	G
Sr-85		7.0188E+03				6.47E+01	
			513.99	7.019E+03	(	3.079E+01 2.61E-01 9.92E+01	G
Pb-210	R	6.0697E+04				8.15E+03	
			46.54	6.070E+04	(P	3.169E+02 2.29E-01 4.05E+00	G
AM-241		6.8531E+03				1.58E+05	
			59.54	6.853E+03	(	3.282E+01 2.64E-01 3.57E+01	G
CD-109		6.5480E+04				4.63E+02	
			88.03	6.548E+04	(	2.263E+02 1.93E-01 3.61E+00	G
CO-57		1.6562E+03				2.72E+02	
			122.06	1.656E+03	(	1.234E+01 3.95E-01 8.53E+01	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ce-139	R	2.2921E+03					1.38E+02	
			165.85	2.292E+03	(	1.742E+01	4.08E-01	7.65E+01 G
Hg-203		5.4959E+03					4.66E+01	
			279.17	5.496E+03	(	5.096E+01	5.09E-01	8.15E+01 G
SN-113		3.7974E+03					1.15E+02	
			391.69	3.797E+03	(	3.250E+01	4.89E-01	6.42E+01 G
CS-137		1.8479E+03					1.10E+04	
			661.66	1.848E+03	(	1.563E+01	5.43E-01	8.52E+01 G
Mn-54		4.4717E+03					3.12E+02	
			834.85	4.472E+03	(	1.362E+01	2.74E-01	1.00E+02 G
Y-88	R	8.2500E+03					1.07E+02	
			898.02	8.372E+03	(	2.185E+01	2.38E-01	8.24E+01 G
			1836.01	8.136E+03	(P	1.174E+01	2.96E-01	8.84E+01 G
Zn-65	F	1.1931E+04					2.44E+02	
			1115.55	1.193E+04	(	2.191E+01	2.41E-01	5.08E+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
R - Coincidence Corrected
H - Halflife limit exceeded
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/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
Cs-134	7.1426E+03	7.7797E+03	1.497E-01%	1.94E+01
Sr-85	2.5938E+03	7.0188E+03	2.610E-01%	3.08E+01
Pb-210	6.0218E+04	6.0697E+04	2.286E-01%	3.17E+02
AM-241	6.8503E+03	6.8531E+03	2.639E-01%	3.28E+01
CD-109	5.6966E+04	6.5480E+04	1.926E-01%	2.26E+02
CO-57	1.3066E+03	1.6562E+03	3.946E-01%	1.23E+01
Ce-139	1.4352E+03	2.2921E+03	4.077E-01%	1.74E+01
Hg-203	1.3800E+03	5.4959E+03	5.094E-01%	5.10E+01
SN-113	2.1693E+03	3.7974E+03	4.893E-01%	3.25E+01
CS-137	1.8371E+03	1.8479E+03	5.434E-01%	1.56E+01
Mn-54	3.6379E+03	4.4717E+03	2.742E-01%	1.36E+01
Y-88	4.5074E+03	8.2500E+03	1.898E-01%	2.19E+01
Zn-65	9.1645E+03	1.1931E+04	2.412E-01%	2.19E+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 (37.7 to 1999.6 keV) 1.592E+05 Bq/Sample
Total Decayed Activity (37.7 to 1999.6 keV) 1.8757030E+05 Bq/Sample

18_TCC-1L Marn

Calibration Data from file: 18_TCC-1L Marn.Clb
Energy Calibration Date: 5/6/2020 Time: 12:27:45 PM
Efficiency Calibration Date: 5/6/2020 Time: 12:27:45 PM
Peak-To-Total Calibration Date: 5/6/2020 Time: 12:27:46 PM

Calibration Description:
18_TCC-1L Marn_1893022-115244

Energy Calibration Fit
Energy = 0.0929 +0.250171*Channel -2.88355e-008*Channel**2
FWHM (ch) = 3.8071 +0.000960*Channel -2.97276e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.58	46.54	46.52	0.05%	0.98	1.00	-1.72%
237.59	59.54	59.53	0.02%	1.00	1.01	-1.40%
351.53	88.03	88.03	-0.00%	1.04	1.04	0.65%
487.65	122.06	122.08	-0.02%	1.08	1.07	0.89%
662.95	165.85	165.93	-0.05%	1.11	1.11	0.09%
1115.62	279.17	279.15	0.01%	1.22	1.21	0.79%
1565.32	391.69	391.62	0.02%	1.33	1.31	1.66%
2054.47	513.99	513.94	0.01%	1.40	1.41	-0.90%
2417.51	604.72	604.72	0.00%	1.49	1.49	-0.16%
2645.33	661.66	661.68	-0.00%	1.55	1.53	0.69%
3182.17	795.86	795.89	-0.00%	1.63	1.64	-0.52%
3338.11	834.85	834.87	-0.00%	1.68	1.67	0.77%
3590.78	898.02	898.03	-0.00%	1.70	1.72	-0.74%
4461.06	1115.55	1115.55	0.00%	1.86	1.87	-0.55%
7344.83	1836.01	1836.00	0.00%	2.32	2.31	0.19%

Efficiency Calibration Fit
Tcc Polynomial Uncertainty = 149.3390 %
Coefficients:
-0.479130 -4.387026 -0.707377 7.231555 0.000000 0.000000

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	3.8974E-002	4.0263E-002	-3.31%
59.54	4.5550E-002	4.6314E-002	-1.68%
88.03	5.2117E-002	5.1331E-002	1.51%
122.06	4.9842E-002	4.9991E-002	-0.30%
165.85	4.2785E-002	4.4433E-002	-3.85%
279.17	3.2667E-002	3.1106E-002	4.78%
391.69	2.6009E-002	2.4306E-002	6.55%
513.99	1.9457E-002	1.9965E-002	-2.61%
604.72	1.5342E-002	1.7767E-002	-15.81%
661.66	1.6614E-002	1.6662E-002	-0.29%
834.85	1.4458E-002	1.4130E-002	2.27%
898.02	1.2295E-002	1.3420E-002	-9.16%
1115.55	1.1831E-002	1.1510E-002	2.71%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	59840.00	2543.20	4.20%	2/1/2020 11:00:00 AM
AM-241	59.54	35.70	1.58E+005	7034.00	2511.14	3.60%	2/1/2020 11:00:00 AM
CD-109	88.03	3.61	4.63E+002	64040.00	2311.84	4.60%	2/1/2020 11:00:00 AM
CO-57	122.06	85.60	2.72E+002	1629.00	1394.42	3.50%	2/1/2020 11:00:00 AM

Page 1

18_TCC-1L Marn

Ce-139	165.85	79.90	1.38E+002	2257.00	1803.34	3.60%	2/1/2020	11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	5295.00	4315.43	3.50%	2/1/2020	11:00:00 AM
SN-113	391.69	64.00	1.15E+002	3614.00	2312.96	3.50%	2/1/2020	11:00:00 AM
Sr-85	513.99	99.28	6.47E+001	7206.00	7154.12	3.50%	2/1/2020	11:00:00 AM
Cs-134	604.72	97.62	7.54E+002	7857.00	7670.00	3.50%	2/1/2020	11:00:00 AM
CS-137	661.66	85.21	1.10E+004	1887.00	1607.91	3.40%	2/1/2020	11:00:00 AM
Mn-54	834.85	99.98	3.12E+002	4454.00	4453.11	3.30%	2/1/2020	11:00:00 AM
Y-88	898.02	93.70	1.07E+002	8215.00	7697.46	3.30%	2/1/2020	11:00:00 AM
Zn-65	1115.55	50.60	2.44E+002	11850.00	5996.10	3.50%	2/1/2020	11:00:00 AM

Peak-To-Total Calibration Table

Ptt = Exp(8.5737E-001 - 4.0028E-001 * Ln(Energy))

LS Energy Table

Intercept: 7.6271E-001 Slope: 5.2658E-001 Quad: 4.1642E-002

Gamma - TCC-1L Marn-LD

Detector: 18
Reagent ID: 1L Marn LD_00001
Container: 1893022
Reference date 2/1/2020
Calibration Standard: SRS 115244
Standard volume: 1 g/Jar
Standard volume transferred: 1 g/geometry

Isotope	Standard Activity (Bq)	Standard (Bq/g)	Geometry Mass (g)	Geometry (Bq/sample)	Measured (Bq/sample)	Percent Recovery (Bq/sample)	Recovery Within 8%
Pb-210	5.984E+04	59840.00	1.0	5.984E+04	6.070E+04	101.4%	PASS
Am-241	7.034E+03	7034.00	1.0	7.034E+03	6.921E+03	98.4%	PASS
Cd-109	6.404E+04	64040.00	1.0	6.404E+04	6.483E+04	101.2%	PASS
Co-57	1.629E+03	1629.00	1.0	1.629E+03	1.629E+03	100.0%	PASS
Ce-139	2.257E+03	2257.00	1.0	2.257E+03	2.266E+03	100.4%	PASS
Hg-203	5.295E+03	5295.00	1.0	5.295E+03	5.557E+03	104.9%	PASS
Sn-113	3.614E+03	3614.00	1.0	3.614E+03	3.852E+03	106.6%	PASS
Sr-85	7.206E+03	7206.00	1.0	7.206E+03	7.016E+03	97.4%	PASS
Cs-134	7.857E+03	7857.00	1.0	7.857E+03	7.756E+03	98.7%	PASS
Cs-137	1.887E+03	1887.00	1.0	1.887E+03	1.881E+03	99.7%	PASS
Mn-54	4.454E+03	4454.00	1.0	4.454E+03	4.556E+03	102.3%	PASS
Y-88	8.215E+03	8215.00	1.0	8.215E+03	8.300E+03	101.0%	PASS
Zn-65	1.185E+04	11850.00	1.0	1.185E+04	1.213E+04	102.4%	PASS

1st Reviewer: Audra DeMariano 2nd Reviewer: [signature]

Date: 5/6/2020 Date: 5-19-20

Eckert & Ziegler
Analytics

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

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 115244
Source Description: 1.0 Liter Solid in 130G GA-MA Beaker
Product Code: 8703-EG-SD
Customer: Test America Laboratories- St. Louis
P.O. Number: 3060005, Item 2

This standard radionuclide source was prepared gravimetrically from a master radionuclide solution. The master radionuclide solution was prepared gravimetrically by addition of radionuclides calibrated by an ionization chamber, a liquid scintillation counter, or a germanium gamma-ray spectrometer system. Calibration and purity were checked using germanium gamma-ray spectrometry. 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 (NIST) 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."

Density of solid matrix: 1.17 g/cm³ ± 3 %.

Reference Date: 01-February-2020 12:00 PM EST

TCC Mixture

Isotope	Gamma-Ray Energy, keV	Half-Life, d	Activity, Bq	Flux, s^{-1}	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
Pb-210	46.5	8.109E+03	5.984E+04	2.543E+03	0.1	2.2	4.5	4π LS
Am-241	59.5	1.580E+05	7.034E+03	2.525E+03	0.1	1.8	3.7	4π LS
Cd-109	88.0	4.614E+02	6.404E+04	2.370E+03	0.1	1.9	3.9	IC
Co-57	122.1	2.717E+02	1.629E+03	1.394E+03	0.1	1.8	3.7	IC
Ce-139	165.9	1.376E+02	2.257E+03	1.806E+03	0.1	1.9	3.8	IC
Hg-203	279.2	4.659E+01	5.295E+03	4.319E+03	0.1	1.8	3.7	IC
Sn-113	391.7	1.151E+02	3.614E+03	2.348E+03	0.1	1.8	3.7	IC
Sr-85	514.0	6.485E+01	7.206E+03	7.098E+03	0.1	1.8	3.7	IC
Cs-134	604.7	7.543E+02	7.857E+03	7.670E+03	0.1	1.8	3.7	IC
Cs-134	795.9	———	———	6.714E+03	0.1	1.8	3.7	———
Cs-137	661.7	1.099E+04	1.887E+03	1.806E+03	0.1	1.8	3.7	IC
Mn-54	834.8	3.121E+02	4.454E+03	4.453E+03	0.1	1.7	3.5	IC
Y-88	898.0	1.066E+02	8.215E+03	7.697E+03	0.1	1.7	3.5	IC
Y-88	1836.1	———	———	8.149E+03	0.1	1.7	3.5	———
Zn-65	1115.5	2.439E+02	1.185E+04	5.929E+03	0.1	1.8	3.7	IC

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

(Certificate continued on reverse side)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318

SDS Number: 118244

Expiration Date: 16-March-2021

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____
K. Eardley, Radiochemist

QC Approved by: _____ **Date:** 05-MAR-20
J. Lahr, Spectroscopist

Test America St. Louis Spectrum ID: 18_1L Marn_20200017

Sample Description: 18_1L Marn_1893022-115244_031920
Detector: Detector #18
Batch ID: 18
Work Order Number: 1L Marn
Lot Number: 1893022-115244_031920

Decay to Time: 2/1/2020 11:00 Live Time: 7200 sec
Acquisition Time: 3/19/2020 11:08:26 Real Time: 8951 sec
Analysis Time: 5/6/2020 12:31 Dead Time: 19.56 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 18_TCC-1L Marn.Clb
Efficiency Cal Desc: 18_TCC-1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 12:27
Energy Cal Date: 5/6/2020 12:27
Library: DET_EnergyStandardMix TCC.lib
Bkgd Correction File: 18_2020-03-07_0846.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
Cs-134	7.756E+03	0.1	8.047E+00	4.954E+02	1.488E+01
Sr-85	7.016E+03	0.1	1.031E+01	4.481E+02	1.650E+01
Pb-210	6.070E+04	0.2	1.039E+02	3.683E+03	2.469E+02
AM-241	6.921E+03	0.2	1.401E+01	4.422E+02	2.585E+01
CD-109	6.483E+04	0.1	8.914E+01	4.193E+03	1.725E+02
CO-57	1.629E+03	0.3	4.980E+00	1.041E+02	9.369E+00
Ce-139	2.266E+03	0.3	6.516E+00	1.432E+02	1.197E+01
Hg-203	5.557E+03	0.2	1.381E+01	3.551E+02	2.300E+01
SN-113	3.852E+03	0.4	1.366E+01	2.554E+02	2.264E+01
CS-137	1.881E+03	0.5	9.128E+00	1.116E+02	1.421E+01
Mn-54	4.556E+03	0.2	9.376E+00	2.679E+02	1.118E+01
Y-88	8.300E+03	0.1	1.181E+01	4.885E+02	1.933E+01
Zn-65	1.213E+04	0.2	2.163E+01	7.132E+02	1.948E+01
Total	1.874E+05				

Analyst: Jody Watson

Sample description
18_1L Marn_1893022-115244_031920

Spectrum Filename: C:\User\SPC\Det18\18_1L Marn_20200017.An1

Acquisition information

Start time:	3/19/2020 11:08:26 AM
Live time:	7200
Real time:	8951
Dead time:	19.56 %
Detector ID:	18

Detector system
Ge18 SN/11164036

Calibration

Filename:	18_TCC-1L Marn.Clb

18_TCC-1L Marn_1893022-115244

Energy Calibration

Created:	5/6/2020 12:27:45 PM
Zero offset:	0.093 keV
Gain:	0.250 keV/channel
Quadratic:	-2.884E-08 keV/channel^2

Efficiency Calibration

Created:	5/6/2020 12:27:45 PM
Type:	TCC Polynomial
Coefficients:	-0.479130 -4.387026 -0.707377
	7.231555 0.000000 0.000000

Library Files

Main analysis library:	DET_EnergyStandardMix TCC.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.62keV)
Stop channel:	8000 (1999.62keV)
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	2/1/2020 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	18_2020-03-07_0846.PBC 3/7/2020 8:46:41 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0209

***** 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
40.36	860.	85.00	0.73	3.616E-02				
46.57	709878.	0.17	1.00	4.025E-02	46.54	4.050	6.070E+04	Pb210
49.87	1254.	66.40	1.00	4.210E-02				
59.53	823385.	0.20	1.00	4.631E-02	59.54	35.683	6.921E+03	AM241
66.59	16491.	4.22	1.02	4.842E-02				
70.86	46626.	1.58	1.02	4.937E-02				
72.89	63619.	1.22	1.02	4.975E-02				
75.02	4540.	15.43	1.02	5.010E-02				
82.50	27405.	2.56	1.03	5.098E-02				
84.89	29860.	2.46	1.03	5.116E-02				
88.05	806157.	0.14	1.04	5.133E-02	88.03	3.610	6.483E+04	CD109
122.08	443818.	0.31	1.08	4.999E-02	122.06	85.341	1.629E+03	CO57
129.35	630.	84.82	0.67	4.923E-02				
136.52	55095.	1.73	1.10	4.839E-02				
165.93	438309.	0.29	1.11	4.442E-02	165.85	76.603	2.266E+03	Ce139
185.39	352.	104.69	0.31	4.163E-02				
199.14	10469.	5.76	1.14	3.968E-02				
203.85	3013.	18.90	1.14	3.903E-02				
255.07	14764.	5.39	1.20	3.321E-02				
269.23	682.	89.79	0.67	3.194E-02				
279.15	504291.	0.25	1.22	3.111E-02	279.17	81.500	5.557E+03	Hg203
301.19	1139.	50.05	1.27	2.943E-02				
391.62	326234.	0.35	1.33	2.431E-02	391.69	64.226	3.852E+03	SN113
446.07	273.	83.53	0.36	2.212E-02				
468.57	1134.	41.01	0.94	2.134E-02				
475.31	13922.	4.16	1.32	2.112E-02				
503.68	112.	270.09	1.41	2.027E-02				
510.61	65020.	1.81	2.66	2.006E-02				

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
514.02	604532.	0.15	1.41	1.997E-02	513.99	99.178	7.015E+03	Sr85
563.24	66766.	1.17	1.43	1.869E-02				
569.34	122959.	0.72	1.47	1.855E-02				
579.25	676.	50.02	0.46	1.832E-02				
604.71	811362.	0.15	1.49	1.777E-02	604.72	85.014	7.790E+03	Cs134
626.67	2151.	29.63	0.67	1.732E-02				
646.04	480.	56.10	1.52	1.695E-02				
647.88	1014.	32.78	1.52	1.692E-02				
661.68	191768.	0.49	1.55	1.666E-02	661.66	85.235	1.881E+03	CS137
795.97	564555.	0.14	1.64	1.462E-02	795.86	72.594	7.716E+03	Cs134
802.08	53374.	0.63	1.65	1.454E-02				
813.92	6305.	6.70	1.72	1.439E-02				
834.86	417586.	0.21	1.68	1.413E-02	834.85	100.000	4.556E+03	Mn54
898.03	501767.	0.20	1.71	1.342E-02	898.02	83.439	8.449E+03	Y88
1038.61	6057.	4.27	1.90	1.211E-02				
1084.30	403.	51.68	1.72	1.174E-02				
1115.54	446923.	0.18	1.87	1.151E-02	1115.55	50.796	1.213E+04	Zn65
1145.80	279.	43.65	1.89	1.129E-02				
1151.35	205.	57.56	1.90	1.125E-02				
1168.08	11530.	1.51	1.91	1.114E-02				
1174.17	4169.	3.50	1.91	1.110E-02				
1209.67	190.	62.08	1.94	1.086E-02				
1211.38	134.	88.45	1.94	1.085E-02				
1252.82	243.	51.41	1.97	1.059E-02				
1258.47	235.	52.42	1.97	1.056E-02				
1325.05	7815.	2.18	2.01	1.018E-02				
1332.33	144.	79.59	2.02	1.014E-02				
1365.17	18998.	1.74	2.05	9.961E-03				
1400.52	18658.	1.57	2.08	9.778E-03				
1469.20	142.	88.81	0.26	9.443E-03				
1535.08	141.	60.62	0.39	9.144E-03				
1543.81	136.	63.32	0.62	9.106E-03				
1565.87	146.	61.50	0.73	9.011E-03				
1720.23	158.	82.63	0.60	8.400E-03				
1763.45	69.	55.10	0.63	8.244E-03				
1811.55	108.	51.62	0.55	8.077E-03				
1821.79	88.	68.79	0.56	8.043E-03				
1835.94	308729.	0.21	2.33	7.995E-03	1836.01	89.213	8.161E+03	Y88
1857.56	243.	45.01	0.56	7.924E-03				

********** 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	
160.98	40.36	228656.	860.	2.378E+04	85.00	0.727	-	c
198.90	49.82	345897.	1175.	2.790E+04	70.87	1.000	-	c

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
265.80	66.59	234105.	16491.	3.406E+05	4.22	1.016	- sD
282.89	70.87	246852.	46626.	9.444E+05	1.58	1.020	- D
290.98	72.90	268307.	63619.	1.279E+06	1.22	1.022	- D
299.51	75.03	242912.	4540.	9.061E+04	15.43	1.024	- sD
329.44	82.48	232845.	27415.	5.378E+05	2.56	1.031	- D
338.97	84.87	255436.	29871.	5.839E+05	2.46	1.033	- D
516.71	129.35	113967.	630.	1.280E+04	84.82	0.675	- c
545.38	136.52	221266.	55095.	1.139E+06	1.73	1.098	-
740.73	185.39	67719.	352.	8.455E+03	104.69	0.310	- c
795.71	199.10	176535.	10469.	2.638E+05	5.76	1.139	- D
814.54	203.81	160667.	3013.	7.720E+04	18.90	1.143	- sD
1019.32	255.07	154740.	14764.	4.445E+05	5.39	1.196	-
1075.93	269.23	112294.	682.	2.135E+04	89.79	0.672	- c
1203.71	301.19	97106.	1139.	3.869E+04	50.05	1.270	- s
1783.05	446.07	25863.	273.	1.234E+04	83.53	0.358	- sc
1873.04	468.57	61522.	1134.	5.316E+04	41.01	0.937	- s
1899.97	475.31	77282.	13922.	6.591E+05	4.16	1.318	-
2013.39	503.30	45666.	114.	5.645E+03	264.29	1.405	- c
2041.05	510.55	660029.	64501.	3.215E+06	1.82	2.661	- sD
2251.63	563.24	98451.	66766.	3.572E+06	1.17	1.427	-
2276.01	569.34	109315.	122959.	6.628E+06	0.72	1.471	-
2315.66	579.25	40178.	676.	3.692E+04	50.02	0.458	- s
2505.33	626.67	78225.	2151.	1.242E+05	29.63	0.668	- s
2582.79	645.88	35995.	480.	2.831E+04	56.10	1.522	- sD
2590.15	647.72	54767.	1014.	5.996E+04	32.78	1.524	- sD
3207.02	801.99	30224.	53324.	3.668E+06	0.63	1.645	- D
3254.31	813.92	34436.	6305.	4.383E+05	6.70	1.725	- s
4153.21	1038.61	12196.	6057.	5.002E+05	4.27	1.896	-
4336.04	1084.30	9548.	403.	3.431E+04	51.68	1.721	- s
4582.12	1146.09	7254.	279.	2.468E+04	43.65	1.895	- sD
4604.31	1151.64	6863.	205.	1.822E+04	57.56	1.899	- sD
4671.27	1167.92	9419.	11530.	1.035E+06	1.51	1.910	- sD
4695.64	1174.01	8567.	4169.	3.756E+05	3.50	1.914	- D
4837.68	1209.79	6893.	190.	1.753E+04	62.08	1.938	- c
4844.53	1211.50	6937.	134.	1.233E+04	88.45	1.939	- c
5010.39	1252.99	7704.	243.	2.297E+04	51.41	1.967	- sD
5032.98	1258.63	7469.	235.	2.225E+04	52.42	1.971	- sD
5299.42	1324.93	10658.	7815.	7.678E+05	2.18	2.014	- sD
5328.57	1332.22	6495.	144.	1.420E+04	79.59	2.019	- sc
5460.02	1365.17	12654.	18998.	1.907E+06	1.74	2.052	-
5601.48	1400.52	10881.	18658.	1.908E+06	1.57	2.085	-
5876.37	1469.20	5001.	142.	1.507E+04	88.81	0.260	- c
6140.07	1535.08	3323.	141.	1.546E+04	60.62	0.389	- s
6175.02	1543.81	3360.	136.	1.494E+04	63.32	0.616	- s
6263.34	1565.87	3678.	146.	1.626E+04	61.50	0.730	- s
6881.31	1720.23	3634.	158.	1.885E+04	82.63	0.604	- s
7054.32	1763.45	642.	69.	8.410E+03	55.10	0.626	- s
7246.94	1811.55	1000.	108.	1.337E+04	51.62	0.549	- s

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
7287.91	1821.79	1192.	88.	1.094E+04	68.79	0.562	- s
7431.17	1857.56	1845.	243.	3.063E+04	45.01	0.558	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix TCC.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	185.67	46.54	383094.	709878.	98.594	0.17	0.997D
AM-241	237.59	59.53	434665.	823385.	114.359	0.20	0.995
CD-109	351.52	88.03	211249.	806157.	111.966	0.14	1.036D
CO-57	487.65	122.08	299457.	443818.	61.641	0.31	1.077
Ce-139	662.95	165.93	246389.	438309.	60.876	0.29	1.109
Hg-203	1115.60	279.15	200157.	504291.	70.040	0.25	1.221
SN-113	1565.31	391.62	168741.	326234.	45.310	0.35	1.333
Sr-85	2054.67	513.99	92715.	604617.	83.975	0.15	1.414D
Cs-134	2417.50	604.71	110205.	811362.	112.689	0.15	1.487
CS-137	2645.33	661.68	96331.	191768.	26.634	0.49	1.547
Cs-134	3182.07	795.86	47381.	564555.	78.410	0.14	1.640D
Mn-54	3338.08	834.86	48133.	417586.	57.998	0.21	1.684
Y-88	3590.76	898.03	60388.	501767.	69.690	0.20	1.706
Zn-65	4461.02	1115.54	23527.	446923.	62.073	0.18	1.866
Y-88	7344.57	1835.94	9558.	308729.	42.879	0.21	2.328s

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
Cs-134	R	7.7561E+03				7.54E+02	
			604.72	7.790E+03	(	1.488E+01 1.50E-01 8.50E+01	G
			795.86	7.716E+03	(P	1.390E+01 1.44E-01 7.26E+01	G
Sr-85		7.0156E+03				6.47E+01	
			513.99	7.016E+03	(	1.650E+01 1.47E-01 9.92E+01	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Pb-210	R	6.0705E+04					8.15E+03	
			46.54	6.070E+04	(P	2.469E+02	1.71E-01	4.05E+00 G
AM-241		6.9212E+03					1.58E+05	
			59.54	6.921E+03	(	2.585E+01	2.02E-01	3.57E+01 G
CD-109		6.4830E+04					4.63E+02	
			88.03	6.483E+04	(	1.725E+02	1.37E-01	3.61E+00 G
CO-57		1.6289E+03					2.72E+02	
			122.06	1.629E+03	(	9.369E+00	3.06E-01	8.53E+01 G
Ce-139	R	2.2662E+03					1.38E+02	
			165.85	2.266E+03	(	1.197E+01	2.88E-01	7.66E+01 G
Hg-203		5.5565E+03					4.66E+01	
			279.17	5.557E+03	(	2.300E+01	2.49E-01	8.15E+01 G
SN-113		3.8523E+03					1.15E+02	
			391.69	3.852E+03	(P	2.264E+01	3.55E-01	6.42E+01 G
CS-137		1.8810E+03					1.10E+04	
			661.66	1.881E+03	(P	1.421E+01	4.85E-01	8.52E+01 G
Mn-54		4.5560E+03					3.12E+02	
			834.85	4.556E+03	(	1.118E+01	2.06E-01	1.00E+02 G
Y-88	R	8.3000E+03					1.07E+02	
			898.02	8.449E+03	(P	1.933E+01	1.97E-01	8.34E+01 G
			1836.01	8.161E+03	@(P	1.212E+01	2.06E-01	8.92E+01 G
Zn-65	F	1.2131E+04					2.44E+02	
			1115.55	1.213E+04	(	1.948E+01	1.78E-01	5.08E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.

& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

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

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting 1 Sigma	MDA Bq/Sample
Cs-134	7.4282E+03	7.7561E+03	1.037E-01%	1.49E+01
Sr-85	4.2411E+03	7.0156E+03	1.470E-01%	1.65E+01
Pb-210	6.0463E+04	6.0705E+04	1.712E-01%	2.47E+02
AM-241	6.9198E+03	6.9212E+03	2.025E-01%	2.58E+01
CD-109	6.0421E+04	6.4830E+04	1.375E-01%	1.72E+02
CO-57	1.4448E+03	1.6289E+03	3.057E-01%	9.37E+00
Ce-139	1.7885E+03	2.2662E+03	2.875E-01%	1.20E+01
Hg-203	2.7628E+03	5.5565E+03	2.486E-01%	2.30E+01
SN-113	2.9025E+03	3.8523E+03	3.547E-01%	2.26E+01
CS-137	1.8754E+03	1.8810E+03	4.853E-01%	1.42E+01
Mn-54	4.1046E+03	4.5560E+03	2.058E-01%	1.12E+01
Y-88	6.1142E+03	8.3000E+03	1.423E-01%	1.93E+01
Zn-65	1.0617E+04	1.2131E+04	1.783E-01%	1.95E+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 (37.6 to 1999.6 keV) 1.711E+05 Bq/Sample
Total Decayed Activity (37.6 to 1999.6 keV) 1.8739970E+05 Bq/Sample

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: **10/1/2006**
Calibration Standard: **74139-334**
Standard volume g / vial: **1550**
Standard volume transferred in g / geometry: **341.9**
lab ID# of cal standard: **1282974**

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	449	0.359	1250	1288	103.1
Cs-137	1926	425	0.851	499	509.9	102.1
Co-60	3612	797	0.999856	797	833.8	104.6

Reviewed By: Jody Watson

Date: 4/24/2018

Test America St. Louis Spectrum ID: 12_TunaCan_20180012

Sample Description: 12_TunaCan_ICV
Detector: Detector #12
Batch ID: 12
Work Order Number: TunaCan
Lot Number: ICV

Decay to Time: 10/1/2006 11:00 Live Time: 5000 sec
Acquisition Time: 4/24/2018 09:26:18 Real Time: 5018 sec
Analysis Time: 4/24/2018 10:50 Dead Time: 0.36 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 12_Soil_TunaCan.Clb
Efficiency Cal Desc: 12_TunaCan_108513
Efficiency Cal Date: 4/20/2018 11:53
Energy Cal Date: 4/20/2018 11:13
Library: DET_EnergyStandardMix & Pb.lib
Bkgd Correction File: 12_2017-05-07_0806.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
Pb-210	1.634E+04	0.6	9.464E+01	1.053E+03	1.764E+02
AM-241	1.288E+03	0.4	5.772E+00	8.177E+01	8.914E+00
CD-109	2.726E+04	25.0	6.823E+03	7.030E+03	1.764E+04
CO-57	1.000E+100	153.6	5.398E-01	5.402E-01	1.425E+00
Ce-139	1.000E+100	106.9	5.267E-01	5.274E-01	1.390E+00
Hg-203	1.000E+100	297.5	6.855E-01	6.856E-01	1.730E+00
SN-113	1.000E+100	692.4	1.143E+00	1.143E+00	2.762E+00
CS-137	5.099E+02	0.8	3.904E+00	2.652E+01	3.285E+00
Y-898	1.000E+100	140.9	1.086E+00	1.086E+00	2.342E+00
Co-1173	8.106E+02	1.3	1.069E+01	4.173E+01	9.187E+00
Co-1332	8.338E+02	1.3	1.078E+01	4.290E+01	6.803E+00
Y-1836	1.000E+100	127.2	4.662E-01	4.667E-01	9.202E-01
Total	6.000E+100				

Analyst: Jody Watson

(Page 1 of 7)

Sample description
12_TunaCan_ICV

Spectrum Filename: C:\User\SPC\Det12\12_TunaCan_20180012.An1

Acquisition information

Start time:	4/24/2018 9:26:18 AM
Live time:	5000
Real time:	5018
Dead time:	0.36 %
Detector ID:	12

Detector system
Ge12 S/N10034336

Calibration

Filename:	12_Soil_TunaCan.Clb

12_TunaCan_108513

Energy Calibration

Created:	4/20/2018 11:13:27 AM
Zero offset:	0.059 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration

Created:	4/20/2018 11:53:09 AM
Type:	Polynomial
Uncertainty:	1.020 %
Coefficients:	-0.363508 -4.707999 0.462125
	-0.051256 0.002384 -0.000043

Library Files

Main analysis library:	DET_EnergyStandardMix & Pb.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	100 (25.08keV)
Stop channel:	8000 (1999.13keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	10/1/2006 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2017-05-07_0806.PBC 5/7/2017 8:06:54 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 7 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 25.3541

***** 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
28.13	58.	46.71	0.75	4.137E-03				
32.13	394.	18.65	0.81	7.163E-03				
36.69	330.	25.31	0.84	1.059E-02				
46.66	43625.	0.58	0.85	1.811E-02	46.54	4.250	1.634E+04	Pb210
49.83	321.	44.33	0.85	2.160E-02				
59.65	63562.	0.45	0.86	2.820E-02	59.54	35.700	1.288E+03	AM241
70.53	127.	49.58	1.39	3.219E-02				
74.86	220.	28.10	0.88	3.333E-02				
77.21	369.	16.72	0.88	3.387E-02				
87.68	350.	23.71	0.81	3.578E-02	88.03	3.610	3.034E+04	CD109
93.18	213.	27.98	1.16	3.644E-02				
165.85	67.	106.94	0.97	3.405E-02	165.85	79.900	HL>Cutoff	Ce139
238.54	388.	19.10	0.88	2.744E-02				
279.17	23.	297.48	1.09	2.449E-02	279.17	81.500	HL>Cutoff	Hg203
307.48	44.	92.73	0.49	2.278E-02				
312.92	63.	62.15	0.30	2.248E-02				
320.20	50.	55.24	0.61	2.209E-02				
355.42	79.	51.62	0.51	2.040E-02				
384.05	22.	98.42	0.50	1.922E-02				
428.92	42.	63.02	0.59	1.766E-02				
454.01	126.	41.89	2.09	1.692E-02				
493.21	76.	56.00	0.64	1.589E-02				
583.05	231.	19.93	1.19	1.403E-02				
609.57	255.	15.76	1.66	1.358E-02				
661.72	21282.	0.77	1.42	1.279E-02	661.66	85.210	5.099E+02	CS137
898.02	37.	140.94	1.67	1.025E-02	898.02	93.700	HL>Cutoff	Y898
1173.31	7459.	1.32	1.92	8.426E-03	1173.24	99.900	8.106E+02	Co1173

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
1332.58	6951.	1.30	1.98	7.647E-03	1332.50	99.982	8.318E+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	
112.21	28.13	314.	58.	1.406E+04	46.71	0.750	-	s
128.21	32.13	1577.	394.	5.496E+04	18.65	0.810	-	
146.44	36.67	3332.	330.	3.120E+04	25.31	0.841	-	sD
199.29	49.79	9113.	333.	1.539E+04	40.96	0.855	-	sD
281.70	70.53	1447.	127.	3.956E+03	49.58	1.387	-	s
299.02	74.84	1784.	220.	6.587E+03	28.10	0.880	-	D
308.40	77.19	1706.	369.	1.088E+04	16.72	0.883	-	sD
372.24	93.18	1248.	213.	5.837E+03	27.98	1.163	-	sM
953.35	238.54	1339.	388.	1.414E+04	19.10	0.882	-	s
1229.01	307.48	572.	44.	1.931E+03	92.73	0.491	-	sc
1250.75	312.92	513.	63.	2.788E+03	62.15	0.295	-	s
1279.88	320.20	329.	50.	2.263E+03	55.24	0.611	-	s
1420.71	355.42	528.	79.	3.873E+03	51.62	0.511	-	s
1535.20	384.00	232.	22.	1.118E+03	98.42	0.497	-	sc
1714.62	428.92	312.	42.	2.406E+03	63.02	0.590	-	s
1814.96	454.01	760.	126.	7.448E+03	41.89	2.094	-	s
1971.76	493.21	502.	76.	4.813E+03	56.00	0.640	-	s
2331.07	583.05	403.	231.	1.644E+04	19.93	1.194	-	
2437.14	609.57	326.	255.	1.877E+04	15.76	1.660	-	

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	185.79	46.54	10103.	43625.	8.725	0.58	0.851D
AM-241	237.76	59.54	8808.	63562.	12.712	0.45	0.865D
CD-109	350.62	87.77	1861.	315.	0.063	25.03	0.760s
CO-57	487.68	122.06	2320.	-56.	-0.011	153.64	0.928
Ce-139	662.74	165.85	1600.	67.	0.013	106.94	0.973s
Hg-203	1115.81	279.17	1331.	23.	0.005	297.48	1.086s
SN-113	1565.74	391.69	1248.	-10.	-0.002	692.39	1.196s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CS-137	2645.75	661.72	832.	21282.	4.256	0.77	1.422
Y-898	3591.15	898.02	555.	37.	0.007	140.94	1.672s
Co-1173	4692.85	1173.31	308.	7459.	1.492	1.32	1.921
Co-1332	5330.42	1332.58	135.	6968.	1.394	1.29	1.978
Y-1836	7346.49	1836.01	27.	-11.	-0.002	127.17	2.459s

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	1.6338E+04				8.15E+03	
			46.54	1.634E+04	(P	1.764E+02 5.79E-01 4.25E+00	G
AM-241		1.2876E+03				1.58E+05	
			59.54	1.288E+03	(	8.914E+00 4.48E-01 3.57E+01	G
CD-109		2.7262E+04				4.63E+02	
			88.03	2.726E+04	*(	1.764E+04 2.50E+01 3.61E+00	G
CO-57		-3.5134E-01				2.72E+02	
			122.06	-3.513E-01	(	1.425E+00 1.54E+02 8.56E+01	G
Ce-139		4.9250E-01				1.38E+02	
			165.85	4.925E-01	?(	1.390E+00 1.07E+02 7.99E+01	G
Hg-203		2.3043E-01				4.66E+01	
			279.17	2.304E-01	&(	1.730E+00 2.97E+02 8.15E+01	G
SN-113		-1.6505E-01				1.15E+02	
			391.69	-1.650E-01	&(	2.762E+00 6.92E+02 6.40E+01	G
CS-137		5.0987E+02				1.10E+04	
			661.66	5.099E+02	(	3.285E+00 7.66E-01 8.52E+01	G
Y-898		7.7025E-01				1.07E+02	
			898.02	7.703E-01	&(	2.342E+00 1.41E+02 9.37E+01	G
Co-1173		8.1058E+02				1.93E+03	
			1173.24	8.106E+02	(	9.187E+00 1.32E+00 9.99E+01	G
Co-1332		8.3376E+02				1.93E+03	
			1332.50	8.338E+02	(	6.803E+00 1.29E+00 1.00E+02	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Y-1836	-3.6659E-01					1.07E+02	
		1836.01	-3.666E-01	?(	9.202E-01	1.27E+02	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
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
CO-57	122.06	2320.	-56.	-0.011	153.64	0.000E+00
Ce-139	165.85	1600.	67.	0.013	106.94	0.000E+00
Hg-203	279.17	1331.	23.	0.005	297.48	0.000E+00
SN-113	391.69	1248.	-10.	-0.002	692.39	0.000E+00
Y-898	898.02	555.	37.	0.007	140.94	0.000E+00
Y-1836	1836.01	27.	-11.	-0.002	127.17	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 1 Sigma Counting	MDA Bq/Sample
Pb-210	1.1406E+04	1.6338E+04	5.793E-01%	1.76E+02
AM-241	1.2640E+03	1.2876E+03	4.483E-01%	8.91E+00
CD-109 #	4.8702E+01	2.7262E+04	2.503E+01%	1.76E+04
CO-57 #A	-3.5134E-01	>12 Halflives	1.536E+02%	1.43E+00
Ce-139 #A	4.9250E-01	>12 Halflives	1.069E+02%	1.39E+00
Hg-203 #A	2.3043E-01	>12 Halflives	2.975E+02%	1.73E+00
SN-113 #A	-1.6505E-01	>12 Halflives	6.924E+02%	2.76E+00
CS-137	3.9058E+02	5.0987E+02	7.657E-01%	3.29E+00
Y-898 #A	7.7025E-01	>12 Halflives	1.409E+02%	2.34E+00
Co-1173	1.7721E+02	8.1058E+02	1.318E+00%	9.19E+00
Co-1332	1.8227E+02	8.3376E+02	1.293E+00%	6.80E+00
Y-1836 #A	-3.6659E-01	>12 Halflives	1.272E+02%	9.20E-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 (25.1 to 1999.1 keV) 1.347E+04 Bq/Sample
Total Decayed Activity (25.1 to 1999.1 keV) 4.7041629E+04 Bq/Sample

(Page 7 of 7)

2nd Source Verification

Detector:	Ge13
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1139.6	97.9
Cs-137	1926	396	0.851	465	445.47	95.8
Co-60	3611	742	0.99974	742	679.75	91.6
Co-60	3612	742	0.999856	742	691.64	93.2

Reviewed By: Jody Watson

Date: 3/27/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  3/29/2012 7:52:27 AM
TestAmerica, Inc                Spectrum name: 13_TunaCan2nd_20120188.An1

Sample description
     13_TunaCan2nd_Rad10_32712


Spectrum Filename: C:\User\SPC\Det13\13_TunaCan2nd_20120188.An1

Acquisition information
       Start time:                 3/27/2012 6:51:58 PM
       Live time:               3600
       Real time:               3628
       Dead time:                  0.78 %
       Detector ID:                   13

Detector system
     Ge13 SN/10064006


Calibration
       Filename:                   13_Soil_TunaCan.Clb
     13_Soil_TunaCan_90099_032712


       Energy Calibration
            Created:               3/29/2012 7:50:00 AM
            Zero offset:           0.072 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -2.129E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/29/2012 7:50:26 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   0.91 %
            Log(Eff):             -5.308398E-01 + (-3.057754E-01*Log(E) ) +
                                   ( -3.437570E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.60 %
            Log(Eff):             -2.292218E+01 + ( 8.455931E+00*Log(E) ) +
                                   ( -8.924057E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.58keV )
       Stop channel:            8000 (  1999.40keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method
```

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 12:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	13_2012-02-26_0417.PBC 2/26/2012 4:17:38 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 28.2216

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.63	804.	13.85	1.08	1.752E-02				
40.21	60.	185.44	0.67	2.100E-02				
46.59	52644.	0.64	1.03	2.710E-02	46.54	4.250	1.363E+04	Pb210
59.58	55490.	0.64	1.04	3.805E-02	59.54	35.700	1.140E+03	AM241
88.11	30251.	0.82	1.05	5.228E-02	88.03	3.610	1.515E+04	CD109
122.15	7057.	2.19	1.12	5.528E-02	122.06	85.600	3.326E+02	CO57
136.58	848.	11.42	1.04	5.394E-02				
165.89	1296.	7.65	1.22	5.020E-02	165.85	79.900	5.488E+02	Ce139
172.07	64.	73.90	0.46	4.900E-02				
256.08	52.	107.49	0.43	3.749E-02				
391.55	506.	16.69	1.67	2.782E-02	391.69	64.000	1.081E+03	SN113
505.51	54.	53.76	0.71	2.313E-02				
606.29	68.	54.54	1.51	2.022E-02				
609.47	156.	25.34	1.52	2.014E-02				
661.70	24573.	0.73	1.57	1.893E-02	661.66	85.210	4.455E+02	CS137
712.45	48.	87.48	0.52	1.791E-02				
788.55	57.	45.24	0.72	1.658E-02				
865.90	201.	31.02	0.76	1.543E-02				
875.22	53.	53.16	0.57	1.530E-02				
892.03	70.	57.17	0.30	1.508E-02				
898.14	349.	18.02	1.75	1.500E-02	898.02	93.700	1.399E+03	Y898
936.66	183.	26.42	0.66	1.452E-02				
1000.19	143.	40.81	0.58	1.379E-02				
1173.33	22167.	0.77	1.99	1.217E-02	1173.24	99.900	6.798E+02	Co1173
1332.59	20398.	0.72	2.09	1.099E-02	1332.50	99.982	6.916E+02	Co1332
1836.09	255.	7.25	1.84	8.477E-03	1836.01	99.200	1.707E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
146.20	36.63	3474.	804.	4.587E+04	13.85	1.080	-	
160.50	40.21	4620.	60.	2.857E+03	185.44	0.671	-	c
545.87	136.58	2328.	848.	1.572E+04	11.42	1.036	-	s

687.79	172.07	921.	64.	1.299E+03	73.90	0.462	-	sc

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
1023.76	256.08	1106.	52.	1.400E+03	107.49	0.433	- sc
2021.40	505.51	369.	54.	2.349E+03	53.76	0.707	- s
2424.54	605.96	659.	68.	3.375E+03	54.54	1.514	- D
2437.27	609.15	707.	156.	7.762E+03	25.34	1.517	- D
2849.24	712.45	490.	48.	2.681E+03	87.48	0.517	- c
3153.66	788.55	257.	57.	3.419E+03	45.24	0.717	- s
3463.13	865.90	819.	201.	1.303E+04	31.02	0.758	- s
3500.42	875.22	313.	53.	3.442E+03	53.16	0.568	- s
3567.71	892.03	535.	70.	4.621E+03	57.17	0.300	- sM
3746.27	936.66	649.	183.	1.263E+04	26.42	0.655	- s
4000.44	1000.19	757.	143.	1.039E+04	40.81	0.580	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	186.01	46.59	14100.	52644.	14.623	0.64	1.035
AM-241	237.95	59.58	13492.	55490.	15.414	0.64	1.040
CD-109	352.05	88.11	6670.	30251.	8.403	0.82	1.051
CO-57	488.16	122.15	3586.	7057.	1.960	2.19	1.121
Ce-139	663.07	165.89	2133.	1296.	0.360	7.65	1.221
SN-113	1565.60	391.55	1530.	506.	0.141	16.69	1.674s
CS-137	2646.19	661.70	1216.	24573.	6.826	0.73	1.574
Y-898	3592.12	898.14	1808.	349.	0.097	18.02	1.748
Co-1173	4693.29	1173.33	884.	22167.	6.157	0.77	1.991
Co-1332	5330.68	1332.59	172.	20398.	5.666	0.72	2.087
Y-1836	7346.16	1836.09	9.	255.	0.071	7.25	1.837s

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

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample			COMMENTS
Pb-210	N	1.3634E+04						8.15E+03	
			46.54	1.363E+04	(	1.440E+02	6.41E-01	4.25E+00	G
AM-241		1.1396E+03						1.58E+05	
			59.54	1.140E+03	(	1.117E+01	6.38E-01	3.57E+01	G
CD-109		1.5147E+04						4.63E+02	
			88.03	1.515E+04	(	1.919E+02	8.19E-01	3.61E+00	G
CO-57		3.3255E+02						2.72E+02	
			122.06	3.326E+02	(	1.328E+01	2.19E+00	8.56E+01	G
Ce-139		5.4879E+02						1.38E+02	
			165.85	5.488E+02	(	9.228E+01	7.65E+00	7.99E+01	G
Hg-203		-4.5053E-03						4.66E+01	
			279.17	-4.505E-03	%(	2.170E+00	1.44E+04	8.15E+01	G
SN-113		1.0805E+03						1.15E+02	
			391.69	1.081E+03	(	3.950E+02	1.67E+01	6.40E+01	G
CS-137		4.4547E+02						1.10E+04	
			661.66	4.455E+02	(	2.995E+00	7.31E-01	8.52E+01	G
Y-898		1.3989E+03						1.07E+02	
			898.02	1.399E+03	?(	8.041E+02	1.80E+01	9.37E+01	G
Co-1173		6.7975E+02						1.93E+03	
			1173.24	6.798E+02	(	4.332E+00	7.66E-01	9.99E+01	G
Co-1332		6.9164E+02						1.93E+03	
			1332.50	6.916E+02	(	2.164E+00	7.24E-01	1.00E+02	G
Y-1836		1.7073E+03						1.07E+02	
			1836.01	1.707E+03	(	1.108E+02	7.25E+00	9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

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

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting	1 Sigma	MDA Bq/Sample
Pb-210	1.2719E+04	1.3634E+04	6.406E-01%		1.44E+02
AM-241	1.1355E+03	1.1396E+03	6.376E-01%		1.12E+01
CD-109	4.4546E+03	1.5147E+04	8.189E-01%		1.92E+02
CO-57	4.1423E+01	3.3255E+02	2.186E+00%		1.33E+01
Ce-139	8.9749E+00	5.4879E+02	7.649E+00%		9.23E+01
Hg-203 #A	-4.5053E-03	>12 Halflives	1.4441E+04%	2.1699E+00	
SN-113 #	7.8929E+00	1.0805E+03	1.669E+01%		3.95E+02
CS-137	4.2308E+02	4.4547E+02	7.311E-01%		2.99E+00
Y-898 #	6.9065E+00	1.3989E+03	1.802E+01%		8.04E+02
Co-1173	5.0656E+02	6.7975E+02	7.655E-01%		4.33E+00
Co-1332	5.1542E+02	6.9164E+02	7.239E-01%		2.16E+00
Y-1836	8.4289E+00	1.7073E+03	7.248E+00%		1.11E+02

ORTEC g v - i (3263) Env32 G53W4.25 3/29/2012 7:52:27 AM
TestAmerica, Inc Spectrum name: 13_TunaCan2nd_20120188.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (661.7 to 1999.4 keV) 1.983E+04 Bq/Sample
Total Decayed Activity (661.7 to 1999.4 keV) 3.6805410E+04 Bq/Sample

Analyzed by: _____
admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica, Inc

2nd Source Verification

Detector:	Ge 15
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1151	98.9
Cs-137	1926	396	0.851	465	435.18	93.6
Co-60	3611	742	0.99974	742	687.16	92.6
Co-60	3612	742	0.999856	742	696.46	93.8

Reviewed By: Jody Watson

Date: 3/23/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  7/5/2012 1:14:04 PM     Page  1
TestAmerica, Inc.               Spectrum name: 15_TunaCan2nd_20120288.An1

Sample description
     15_TunaCan2nd_rad10_032312


Spectrum Filename: C:\User\SPC\Det15\15_TunaCan2nd_20120288.An1

Acquisition information
       Start time:                 3/23/2012 6:10:28 AM
       Live time:               7200
       Real time:               7248
       Dead time:                  0.66 %
       Detector ID:                   15

Detector system
     Ge15 SN/1102216


Calibration
       Filename:                   15_Soil_TunaCan.Clb
     15_TunaCan_90099_032212


       Energy Calibration
            Created:               3/22/2012 1:02:46 PM
            Zero offset:           0.004 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.104E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/22/2012 1:03:01 PM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.00 %
            Log(Eff):             -6.894897E-01 + (-3.290613E-01*Log(E) ) +
                                   ( -3.875629E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.13 %
            Log(Eff):             -2.362677E+01 + ( 8.666669E+00*Log(E) ) +
                                   ( -9.214638E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.53keV )
       Stop channel:            8000 (  1999.56keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

     ORTEC g v - i (3263) Env32  G53W4.25  7/5/2012 1:14:04 PM     Page  2
TestAmerica, Inc.               Spectrum name: 15_TunaCan2nd_20120288.An1
                                      Page 1
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```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       1/1/2010 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   YES       15_2012-02-26_0425.PBC
                                                 2/26/2012 4:25:10 AM

       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.   12 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:      26.5953
```

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.48	1231.	11.17	1.20	1.258E-02				
46.44	76440.	0.51	0.91	1.950E-02	46.54	4.250	1.366E+04	Pb210
49.65	1514.	14.37	1.25	2.160E-02				
59.44	80694.	0.48	0.94	2.732E-02	59.54	35.700	1.151E+03	AM241
87.99	43578.	0.68	0.97	3.705E-02	88.03	3.610	1.527E+04	CD109
92.63	219.	44.56	0.42	3.776E-02				
122.00	10133.	1.58	1.01	3.846E-02	122.06	85.600	3.389E+02	CO57
136.33	1390.	8.77	1.13	3.725E-02				
165.85	1699.	7.29	1.05	3.392E-02	165.85	79.900	5.192E+02	Ce139
238.39	480.	20.10	1.42	2.594E-02				
260.67	81.	57.86	0.33	2.424E-02				
279.32	56.	141.32	1.14	2.301E-02	279.17	81.500	HL>Cutoff	Hg203
352.13	110.	54.66	0.68	1.922E-02				
368.26	125.	49.84	0.46	1.856E-02				
391.56	581.	13.59	1.28	1.768E-02	391.69	64.000	9.477E+02	SN113
400.57	73.	61.58	0.54	1.736E-02				
661.57	29285.	0.71	1.46	1.155E-02	661.66	85.210	4.352E+02	CS137
754.74	100.	52.53	0.39	1.034E-02				
898.10	516.	14.74	1.96	8.921E-03	898.02	93.700	1.681E+03	Y898
904.89	86.	54.53	0.36	8.863E-03				
1000.75	82.	43.22	0.58	8.127E-03				
1096.51	181.	26.16	0.80	7.507E-03				
1173.15	26111.	0.71	1.80	7.077E-03	1173.24	99.900	6.872E+02	Co1173
1226.66	98.	36.87	0.74	6.805E-03				
1332.45	23674.	0.68	1.95	6.325E-03	1332.50	99.982	6.965E+02	Co1332
1835.96	284.	9.76	1.20	4.741E-03	1836.01	99.200	1.642E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide

Page 2

145.78	36.48	5577.	1231.	9.786E+04	11.17	1.202	-	s
198.43	49.65	13746.	1514.	7.010E+04	14.37	1.248	-	sM
370.24	92.63	3274.	219.	5.791E+03	44.56	0.421	-	s

ORTEC g v - i (3263) Env32 G53W4.25 7/5/2012 1:14:04 PM Page 3
TestAmerica, Inc. Spectrum name: 15_TunaCan2nd_20120288.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected	
544.93	136.33	3516.	1390.	3.731E+04	8.77	1.130	-	s
952.92	238.39	2518.	480.	1.849E+04	20.10	1.422	-	sM
1042.01	260.67	968.	81.	3.328E+03	57.86	0.332	-	sM
1407.66	352.13	1248.	110.	5.749E+03	54.66	0.679	-	s
1472.16	368.26	1252.	125.	6.736E+03	49.84	0.459	-	s
1601.36	400.57	843.	73.	4.224E+03	61.58	0.543	-	s
3017.75	754.74	768.	100.	9.719E+03	52.53	0.393	-	s
3618.39	904.89	752.	86.	9.741E+03	54.53	0.363	-	s
4001.87	1000.75	476.	82.	1.015E+04	43.22	0.582	-	s
4385.05	1096.51	621.	181.	2.415E+04	26.16	0.796	-	s
4905.82	1226.66	215.	98.	1.445E+04	36.87	0.740	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.62	46.44	19930.	76355.	10.605	0.51	0.907
AM-241	237.58	59.44	16824.	80694.	11.208	0.48	0.935
CD-109	351.67	87.99	9695.	43578.	6.052	0.68	0.972
CO-57	487.63	122.00	4069.	10133.	1.407	1.58	1.014
Ce-139	662.95	165.85	3411.	1699.	0.236	7.29	1.054
Hg-203	1116.56	279.32	3139.	56.	0.008	141.32	1.144
SN-113	1565.32	391.56	1615.	581.	0.081	13.59	1.282
CS-137	2645.11	661.57	2071.	29285.	4.067	0.71	1.459
Y-898	3591.24	898.10	1317.	516.	0.072	14.74	1.959
Co-1173	4691.69	1173.15	1159.	26111.	3.627	0.71	1.803
Co-1332	5329.20	1332.45	323.	23674.	3.288	0.68	1.945
Y-1836	7345.58	1836.14	48.	260.	0.036	8.96	1.181s

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

ORTEC g v - i (3263) Env32 G53W4.25 7/5/2012 1:14:04 PM Page 4
TestAmerica, Inc. Spectrum name: 15_TunaCan2nd_20120288.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS

```
Pb-210    N   1.3663E+04                                        8.15E+03
                              46.54 1.366E+04  (P 1.182E+02 5.11E-01 4.25E+00 G

AM-241        1.1510E+03                                        1.58E+05
                              59.54 1.151E+03  (  8.660E+00 4.81E-01 3.57E+01 G

CD-109        1.5268E+04                                        4.63E+02
                              88.03 1.527E+04  (  1.617E+02 6.78E-01 3.61E+00 G

CO-57         3.3887E+02                                        2.72E+02
                             122.06 3.389E+02  (  1.003E+01 1.58E+00 8.56E+01 G

Ce-139        5.1921E+02                                        1.38E+02
                             165.85 5.192E+02  (  8.400E+01 7.29E+00 7.99E+01 G

Hg-203        4.1717E-01                                        4.66E+01
                             279.17 4.172E-01  (  1.954E+00 1.41E+02 8.15E+01 G

SN-113        9.4771E+02                                        1.15E+02
                             391.69 9.477E+02  (  3.099E+02 1.36E+01 6.40E+01 G

CS-137        4.3518E+02                                        1.10E+04
                             661.66 4.352E+02  (  3.191E+00 7.12E-01 8.52E+01 G

Y-898         1.6812E+03                                        1.07E+02
                             898.02 1.681E+03  (  5.598E+02 1.47E+01 9.37E+01 G

Co-1173       6.8716E+02                                        1.93E+03
                            1173.24 6.872E+02  (  4.246E+00 7.12E-01 9.99E+01 G

Co-1332       6.9646E+02                                        1.93E+03
                            1332.50 6.965E+02  (  2.544E+00 6.82E-01 1.00E+02 G

Y-1836        1.5036E+03                                        1.07E+02
                            1836.01 1.504E+03  (  2.033E+02 8.96E+00 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
```



```
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
                                       Page 4
```

```
  F - Fast Neutron Activation          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  Time Corrected  Uncertainty  1 Sigma
 Nuclide     Activity       Activity       Counting                    MDA
               Bq/Sample     Bq/Sample                                 Bq/Sample

 ____________________________________________________________________________
 Pb-210       1.2751E+04    1.3663E+04    5.115E-01%                 1.18E+02
 AM-241       1.1469E+03    1.1510E+03    4.812E-01%                 8.66E+00
 CD-109       4.5239E+03    1.5268E+04    6.776E-01%                 1.62E+02
 CO-57        4.2749E+01    3.3887E+02    1.583E+00%                 1.00E+01
 Ce-139       8.7071E+00    5.1921E+02    7.291E+00%                 8.40E+01
 Hg-203  A    4.1717E-01 >12 Halflives   1.4132E+02%   1.9540E+00
 SN-113       7.1340E+00    9.4771E+02    1.359E+01%                 3.10E+02
 CS-137       4.1344E+02    4.3518E+02    7.117E-01%                 3.19E+00
 Y-898        8.5738E+00    1.6812E+03    1.474E+01%                 5.60E+02
 Co-1173      5.1301E+02    6.8716E+02    7.125E-01%                 4.25E+00
 Co-1332      5.1995E+02    6.9646E+02    6.817E-01%                 2.54E+00
 Y-1836       7.6681E+00    1.5036E+03    8.962E+00%                 2.03E+02
```



```
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded
 ----------------------------   S U M M A R Y   ---------------------------
 Total Activity (   37.5 to  1999.6 keV)     1.994E+04  Bq/Sample
 Total Decayed Activity (   37.5 to  1999.6 keV) 3.6891324E+04  Bq/Sample
```

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

83924-334

1.0 Liter Solid in 130G GA-MA Beaker

Customer: Test America St. Louis
P.O. No.: 2401509, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.015372

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. Density of solid matrix 1.15 g/cc.

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	———	1.830E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	2.609E+03	0.8	2.3	4.9	HPGe
Co-57	122.1	2.718E+02	8.711E+04	1.339E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	1.917E+03	0.5	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	4.232E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	2.719E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	1.705E+03	0.7	1.9	4.0	HPGe
Mn-54	834.9	3.121E+02	———	3.083E+03	0.1	1.7	3.3	IC
Y-88	898.0	1.066E+02	4.224E+05	6.493E+03	0.5	1.9	3.9	HPGe
Zn-65	1115.6	2.441E+02	———	3.181E+03	0.1	1.7	3.5	IC
Co-60	1173.2	1.925E+03	2.142E+05	3.293E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	3.294E+03	0.6	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	6.874E+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)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

6675
ID: 1L Marn_00002
Exp: 03/02/16 Prpd: JW Open: 03/02/11
Mixed Gamma 1L Marn 2011

91608
ID: 1L Marn_00004
Exp:02/15/14 Prpd:JW Opn:03/
Mixed Gamma 1L Marn

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

This standard will expire one year after the reference date.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 2/23/4
J. D. McCorvey, QA Manager Alternate

Test America St. Louis Spectrum ID: 15_Gamma_20200666

Sample Description: 467872_Gamma_LCS 160-467872~2-A
Detector: Detector #15
Batch ID: 467872
Work Order Number: Gamma
Lot Number: LCS 160-467872~2-A

Decay to Time: 1/1/2011 11:00 Live Time: 7200 sec
Acquisition Time: 5/18/2020 14:28:45 Real Time: 7298 sec
Analysis Time: 11/18/2020 08:47 Dead Time: 1.34 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 15_TCC-1L Marn.Clb
Efficiency Cal Desc: 15_1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 14:13
Energy Cal Date: 2/28/2012 16:29
Library: DET_EnergyStandardMix & Mn, Zn.l
Bkgd Correction File: 15_2020-05-02_0857.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
AM-241	5.058E+03	0.2	9.936E+00	3.232E+02	1.422E+01
CD-109	7.025E+04	4.8	3.382E+03	5.663E+03	7.370E+03
CO-57	1.000E+100	82.0	6.832E-01	6.853E-01	2.254E+00
Ce-139	1.000E+100	177.8	1.012E+00	1.013E+00	2.532E+00
Hg-203	1.000E+100	525.3	1.379E+00	1.379E+00	3.301E+00
SN-113	1.000E+100	139.1	2.066E+00	2.068E+00	4.940E+00
CS-137	2.025E+03	0.3	6.567E+00	1.199E+02	5.046E+00
Mn-54	6.692E+03	41.7	2.788E+03	2.815E+03	6.240E+03
Y-898	1.000E+100	68.4	1.573E+00	1.579E+00	6.394E+00
Zn-65	1.000E+100	562.9	4.553E+00	4.553E+00	9.423E+00
Co-1173	3.153E+03	0.5	1.624E+01	1.860E+02	1.318E+01
Co-1332	3.132E+03	0.5	1.568E+01	1.847E+02	7.998E+00
Y-1836	1.000E+100	134.7	5.701E-01	5.706E-01	1.160E+00
Total	7.000E+100				

Analyst: Jody Watson

TestAmerica Inc Spectrum name: 15_Gamma_20200666.An1

Sample description
467872_Gamma_LCS 160-467872~2-A

Spectrum Filename: C:\User\SPC\Det15\15_Gamma_20200666.An1

Acquisition information

Start time:	5/18/2020 2:28:45 PM
Live time:	7200
Real time:	7298
Dead time:	1.34 %
Detector ID:	15

Detector system
Ge15 SN/11012216

Calibration

Filename:	15_TCC-1L Marn.Clb

15_1L Marn_1893022-115244

Energy Calibration

Created:	2/28/2012 4:29:17 PM
Zero offset:	0.044 keV
Gain:	0.250 keV/channel
Quadratic:	-3.267E-08 keV/channel^2

Efficiency Calibration

Created:	5/6/2020 2:13:32 PM
Type:	TCC Polynomial
Coefficients:	-0.481974 -4.786458 -0.774695
	7.208170 0.000000 0.000000

Library Files

Main analysis library:	DET_EnergyStandardMix & Mn, Zn.l
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.57keV)
Stop channel:	8000 (1999.52keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000

Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2011 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	15_2020-05-02_0857.PBC 5/2/2020 8:57:21 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 9 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 239.8552

***** 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
42.56	472.	57.41	0.78	3.076E-02				
49.73	19689.	3.17	1.82	3.400E-02				
59.55	474720.	0.20	1.21	3.709E-02	59.54	35.683	5.058E+03	AM241
88.04	4335.	4.81	1.22	4.021E-02	88.03	3.610	7.025E+04	CD109
98.83	330.	37.11	1.14	4.004E-02				
122.72	1000.	17.94	1.65	3.836E-02	122.06	85.327	HL>Cutoff	CO57
174.67	228.	51.81	0.28	3.248E-02				
223.82	210.	50.55	0.45	2.704E-02				
326.99	283.	42.27	0.61	2.004E-02				
391.69	119.	139.07	1.25	1.736E-02	391.69	64.226	HL>Cutoff	SN113
661.69	115006.	0.32	1.64	1.149E-02	661.66	85.235	2.025E+03	CS137
754.86	264.	40.34	0.67	1.037E-02				
806.88	237.	30.40	2.67	9.849E-03				
834.77	231.	41.66	1.78	9.593E-03	834.85	100.000	6.692E+03	Mn54
893.21	110.	79.17	0.30	9.104E-03				
916.85	84.	49.23	0.33	8.922E-03				
940.80	82.	64.37	0.70	8.746E-03				
1094.96	202.	48.16	0.45	7.775E-03				
1173.27	48693.	0.52	1.97	7.368E-03	1173.24	99.900	3.153E+03	Co1173
1237.67	99.	31.33	0.48	7.067E-03				
1278.73	24.	53.36	0.39	6.888E-03				
1332.56	43797.	0.50	2.08	6.668E-03	1332.50	99.982	3.132E+03	Co1332
1836.01	16.	134.67	2.22	5.146E-03	1836.01	99.200	HL>Cutoff	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
169.95	42.56	29120.	472.	1.533E+04	57.41	0.777	- s
198.58	49.73	106010.	19689.	5.791E+05	3.17	1.815	- s
394.87	98.83	5166.	330.	8.234E+03	37.11	1.141	- M
490.36	122.76	8507.	1000.	2.608E+04	17.94	1.654	- sM
698.04	174.67	4838.	228.	7.016E+03	51.81	0.285	- sM
894.52	223.82	4444.	210.	7.785E+03	50.55	0.451	- sM
1306.99	326.99	4219.	283.	1.414E+04	42.27	0.610	- s
3018.08	754.86	2216.	264.	2.545E+04	40.34	0.672	- s
3226.17	806.88	1415.	237.	2.406E+04	30.40	2.669	- s
3571.54	893.21	2051.	110.	1.212E+04	79.17	0.296	- sM
3666.11	916.85	813.	84.	9.415E+03	49.23	0.333	- s
3761.93	940.80	1149.	82.	9.338E+03	64.37	0.703	- s
4378.74	1094.96	2068.	202.	2.604E+04	48.16	0.453	- s
4949.82	1237.67	227.	99.	1.406E+04	31.33	0.478	- s
5114.16	1278.73	70.	24.	3.484E+03	53.36	0.393	- 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 & Mn, Zn.l

********** 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	237.85	59.55	81727.	474720.	65.933	0.20	1.206s
CD-109	351.71	88.04	9411.	4335.	0.602	4.81	1.215s
CO-57	487.71	122.06	12907.	197.	0.027	82.00	1.016
Ce-139	662.76	165.85	9995.	-105.	-0.015	177.84	1.055
Hg-203	1115.79	279.17	8808.	-35.	-0.005	525.27	1.156
SN-113	1565.67	391.69	7143.	119.	0.017	139.07	1.253s
CS-137	2645.42	661.69	3712.	115006.	15.973	0.32	1.640
Mn-54	3337.75	834.77	2080.	231.	0.032	41.66	1.785s
Y-898	3590.78	898.02	6947.	-141.	-0.020	68.45	1.649
Zn-65	4461.13	1115.55	3147.	-23.	-0.003	562.92	1.800s
Co-1173	4692.11	1173.27	1856.	48693.	6.763	0.52	1.971
Co-1332	5329.59	1332.56	549.	43797.	6.083	0.50	2.081
Y-1836	7345.15	1836.01	73.	16.	0.002	134.67	2.216s

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

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
AM-241		5.0580E+03				1.58E+05	
			59.54	5.058E+03	*(	1.422E+01 1.96E-01 3.57E+01	G
CD-109		7.0246E+04				4.63E+02	
			88.03	7.025E+04	(	7.370E+03 4.81E+00 3.61E+00	G
CO-57		8.3321E-01				2.72E+02	
			122.06	8.332E-01	(	2.254E+00 8.20E+01 8.53E+01	G
Ce-139	R	-5.6906E-01				1.38E+02	
			165.85	-5.691E-01	?(	2.532E+00 1.78E+02 7.67E+01	G
Hg-203		-2.6255E-01				4.66E+01	
			279.17	-2.625E-01	(	3.301E+00 5.25E+02 8.15E+01	G
SN-113		1.4854E+00				1.15E+02	
			391.69	1.485E+00	?(P	4.940E+00 1.39E+02 6.42E+01	G
CS-137		2.0246E+03				1.10E+04	
			661.66	2.025E+03	(	5.046E+00 3.24E-01 8.52E+01	G
Mn-54		6.6922E+03				3.12E+02	
			834.85	6.692E+03	(P	6.240E+03 4.17E+01 1.00E+02	G
Y-898		-2.2978E+00				1.07E+02	
			898.02	-2.298E+00	(P	6.394E+00 6.84E+01 9.37E+01	G
Zn-65	F	-8.0873E-01				2.44E+02	
			1115.55	-8.087E-01	?(	9.423E+00 5.63E+02 5.08E+01	G
Co-1173		3.1534E+03				1.93E+03	
			1173.24	3.153E+03	(P	1.318E+01 5.15E-01 9.99E+01	G
Co-1332		3.1316E+03				1.93E+03	
			1332.50	3.132E+03	(P	7.998E+00 5.01E-01 1.00E+02	G
Y-1836		4.2331E-01				1.07E+02	
			1836.01	4.233E-01	?(P	1.160E+00 1.35E+02 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
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	
Ce-139	165.85	9995.	-105.	-0.015	177.84	0.000E+00	
Hg-203	279.17	8808.	-35.	-0.005	525.27	0.000E+00	
SN-113	391.69	7143.	119.	0.017	139.07	0.000E+00	P
Y-898	898.02	6947.	-141.	-0.020	68.45	0.000E+00	P
Zn-65	1115.55	3147.	-23.	-0.003	562.92	0.000E+00	
Y-1836	1836.01	73.	16.	0.002	134.67	0.000E+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 1 Sigma Counting	MDA Bq/Sample
AM-241 #	4.9825E+03	5.0580E+03	1.965E-01%	1.42E+01
CD-109 #	4.1473E+02	7.0246E+04	4.814E+00%	7.37E+03
CO-57 A	8.3321E-01	>12 Halflives	8.200E+01%	2.25E+00
Ce-139 #A	-5.6906E-01	>12 Halflives	1.778E+02%	2.53E+00
Hg-203 #A	-2.6255E-01	>12 Halflives	5.253E+02%	3.30E+00
SN-113 #A	1.4854E+00	>12 Halflives	1.391E+02%	4.94E+00

CS-137		1.6310E+03	2.0246E+03	3.243E-01%	5.05E+00
Mn-54	#	3.3421E+00	6.6922E+03	4.166E+01%	6.24E+03
Y-898	#A	-2.2978E+00	>12 Halflives	6.845E+01%	6.39E+00
Zn-65	#A	-8.0873E-01	>12 Halflives	5.629E+02%	9.42E+00
Co-1173		9.1879E+02	3.1534E+03	5.151E-01%	1.32E+01
Co-1332		9.1241E+02	3.1316E+03	5.007E-01%	8.00E+00
Y-1836	#A	4.2331E-01	>12 Halflives	1.347E+02%	1.16E+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) 8.863E+03 Bq/Sample
Total Decayed Activity (37.6 to 1999.5 keV) 9.0306250E+04 Bq/Sample

Gamma ICV - TCC-1L Marn-LD

Detetctor: 15
Reagent ID: 1L Marn LCS_00006
Container: 1801782
Reference date 1/1/2011
Calibration Standard: SRS: 83924-334
Standard volume: 1 g/Jar
Standard volume transferred: 1 g/geometry

Isotope	Standard (γps)	Standard (γps/g)	γ abundance	Geometry (dpm/g)	Geometry (Bq/sample)	Measured (Bq/sample)	Percent Recovery (Bq/sample)	Recovery Within 10%
Am-241	1830	1830.0	0.359	305849.58	5097.49	5.058E+03	100.8%	PASS
Cs-137	1705	1705.0	0.851	120211.52	2003.53	2.025E+03	98.9%	PASS
Co-60	3294	3294.0	0.999856	197668.46	3294.47	3.153E+03	104.5%	PASS

1st Reviewer: Jody Waston

Date: 11/18/2020

2nd Reviewer: Molly Olson

Date: 11/18/2020 MMO

Gamma ICV - TCC-1L Marn-LD

Detetctor: 17

Reagent ID: 1L Marn LCS_00006
Container: 1801782
Reference date 1/1/2011
Calibration Standard: SRS: 83924-334
Standard volume: 1 g/Jar
Standard volume transferred: 1 g/geometry

Isotope	Standard (γps)	Standard (γps/g)	γ abundance	Geometry (dpm/g)	Geometry (Bq/sample)	Measured (Bq/sample)	Percent Recovery (Bq/sample)	Recovery Within 10%
Am-241	1830	1830.0	0.359	305849.58	5097.49	5.107E+03	99.8%	PASS
Cs-137	1705	1705.0	0.851	120211.52	2003.53	2.004E+03	100.0%	PASS
Co-60	3294	3294.0	0.999856	197668.46	3294.47	3.009E+03	109.5%	PASS

1st Reviewer: Audra DeMariano

Date: 5/13/2020

2nd Reviewer: [illegible], (KS)

Date: 5-19-20

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

83924-334

1.0 Liter Solid in 130G GA-MA Beaker

Customer: Test America St. Louis
P.O. No.: 2401509, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.015372

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. Density of solid matrix 1.15 g/cc.

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	———	1.830E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	2.609E+03	0.8	2.3	4.9	HPGe
Co-57	122.1	2.718E+02	8.711E+04	1.339E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	1.917E+03	0.5	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	4.232E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	2.719E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	1.705E+03	0.7	1.9	4.0	HPGe
Mn-54	834.9	3.121E+02	———	3.083E+03	0.1	1.7	3.3	IC
Y-88	898.0	1.066E+02	4.224E+05	6.493E+03	0.5	1.9	3.9	HPGe
Zn-65	1115.6	2.441E+02	———	3.181E+03	0.1	1.7	3.5	IC
Co-60	1173.2	1.925E+03	2.142E+05	3.293E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	3.294E+03	0.6	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	6.874E+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)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

6675
ID: 1L Marn_00002
Exp: 03/02/16 Prpd: JW Open: 03/02/11
Mixed Gamma 1L Marn 2011

91608
ID: 1L Marn_00004
Exp:02/15/14 Prpd:JW Opn:03/
Mixed Gamma 1L Marn

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

This standard will expire one year after the reference date.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 2/23/4
J. D. McCorvey, QA Manager Alternate

Test America St. Louis Spectrum ID: 17_Gamma_20200703

Sample Description: 467872_Gamma_LCS 160-467872~2-A
Detector: Detector #17
Batch ID: 467872
Work Order Number: Gamma
Lot Number: LCS 160-467872~2-A

Decay to Time: 1/1/2011 11:00 Live Time: 3600 sec
Acquisition Time: 5/6/2020 10:10:14 Real Time: 3693 sec
Analysis Time: 5/13/2020 09:25 Dead Time: 2.52 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 17_TCC-1L Marn.Clb
Efficiency Cal Desc: 17_1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 14:27
Energy Cal Date: 2/29/2012 10:33
Library: DET_EnergyStandardMix & Mn, Zn.l
Bkgd Correction File: 17_2020-05-02_0909.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
AM-241	5.107E+03	0.2	1.169E+01	3.263E+02	1.639E+01
CD-109	7.157E+04	5.2	3.727E+03	5.942E+03	8.352E+03
CO-57	1.000E+100	112.8	7.809E-01	7.822E-01	2.581E+00
Ce-139	1.000E+100	155.6	1.090E+00	1.091E+00	2.870E+00
Hg-203	1.000E+100	241.9	1.404E+00	1.405E+00	3.521E+00
SN-113	1.000E+100	129.1	2.067E+00	2.069E+00	5.177E+00
CS-137	2.004E+03	0.4	7.176E+00	1.187E+02	4.944E+00
Mn-54	2.896E+03	121.8	3.526E+03	3.530E+03	7.810E+03
Y-898	1.000E+100	250.5	2.172E+00	2.173E+00	4.818E+00
Zn-65	1.000E+100	1998.6	4.345E+00	4.345E+00	9.326E+00
Co-1173	3.001E+03	0.6	1.697E+01	1.771E+02	1.292E+01
Co-1332	3.009E+03	0.6	1.676E+01	1.776E+02	8.157E+00
Y-1836	1.000E+100	87.4	6.705E-01	6.720E-01	1.349E+00
Total	7.000E+100				

Analyst: Jody Watson

Sample description
467872_Gamma_LCS 160-467872~2-A

Spectrum Filename: C:\User\SPC\Det17\17_Gamma_20200703.An1

Acquisition information
Start time: 5/6/2020 10:10:14 AM
Live time: 3600
Real time: 3693
Dead time: 2.52 %
Detector ID: 17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_TCC-1L Marn.Clb
17_1L Marn_1893022-115244

Energy Calibration
Created: 2/29/2012 10:33:23 AM
Zero offset: 0.108 keV
Gain: 0.250 keV/channel
Quadratic: -2.584E-08 keV/channel^2

Efficiency Calibration
Created: 5/6/2020 2:27:38 PM
Type: TCC Polynomial
Coefficients: -0.423753 -4.300989 -0.683475
6.999694 0.000000 0.000000

Library Files
Main analysis library: DET_EnergyStandardMix & Mn, Zn.l
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.63keV)
Stop channel: 8000 (1999.54keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method
Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000

Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2011 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	17_2020-05-02_0909.PBC 5/2/2020 9:09:55 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 6 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 41.7391

***** 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
42.93	169.	113.79	0.30	3.977E-02				
49.60	9975.	4.39	1.68	4.342E-02				
59.59	305705.	0.23	0.99	4.731E-02	59.54	35.683	5.107E+03	AM241
74.92	119.	63.56	0.30	5.060E-02				
88.01	2976.	5.05	1.00	5.166E-02	88.03	3.610	7.372E+04	CD109
99.06	391.	25.97	1.50	5.172E-02				
122.69	630.	18.70	0.83	5.029E-02	122.06	85.300	HL>Cutoff	CO57
202.41	213.	46.70	0.28	4.047E-02				
240.59	220.	39.90	0.70	3.615E-02				
279.17	56.	241.93	0.99	3.268E-02	279.17	81.500	HL>Cutoff	Hg203
310.62	83.	75.06	0.46	3.037E-02				
391.69	96.	129.09	1.09	2.585E-02	391.69	64.226	HL>Cutoff	SN113
406.99	206.	35.52	0.66	2.516E-02				
505.05	100.	55.58	0.38	2.165E-02				
550.72	61.	69.31	0.30	2.039E-02				
661.67	89118.	0.36	1.48	1.797E-02	661.66	85.235	2.004E+03	CS137
721.38	82.	68.58	0.32	1.694E-02				
778.56	226.	34.55	0.53	1.607E-02				
834.85	82.	121.79	1.48	1.533E-02	834.85	100.000	PBC<MDA	Mn54
847.59	43.	74.04	0.38	1.517E-02				
898.02	43.	250.51	1.53	1.459E-02	898.02	93.700	HL>Cutoff	Y898
1058.61	171.	46.88	1.17	1.304E-02				
1088.55	43.	66.15	0.65	1.279E-02				
1105.18	82.	59.94	0.52	1.266E-02				
1173.29	38361.	0.57	1.80	1.215E-02	1173.24	99.900	3.001E+03	Co1173
1332.54	35242.	0.56	1.91	1.112E-02	1332.50	99.982	3.009E+03	Co1332
1836.01	24.	87.40	2.26	8.821E-03	1836.01	99.200	HL>Cutoff	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
171.19	42.93	15839.	169.	4.257E+03	113.79	0.298	- c
197.86	49.60	57313.	9975.	2.297E+05	4.39	1.683	- s
299.11	74.92	2390.	119.	2.348E+03	63.56	0.303	- s
395.61	99.06	3306.	391.	7.560E+03	25.97	1.499	- sM
490.09	122.69	4180.	630.	1.252E+04	18.70	0.835	- sM
808.85	202.41	3406.	213.	5.255E+03	46.70	0.283	- s
961.49	240.59	2798.	220.	6.077E+03	39.90	0.701	- s
1241.55	310.62	1628.	83.	2.733E+03	75.06	0.458	- sc
1626.92	406.99	1930.	206.	8.186E+03	35.52	0.660	- s
2019.10	505.05	1184.	100.	4.595E+03	55.58	0.385	- s
2201.73	550.72	740.	61.	2.991E+03	69.31	0.297	- sc
2884.38	721.38	880.	82.	4.841E+03	68.58	0.316	- s
3113.13	779.37	1298.	226.	1.403E+04	34.55	0.526	- s
3389.28	847.59	448.	43.	2.834E+03	74.04	0.384	- sc
4233.57	1058.61	1346.	171.	1.314E+04	46.88	1.174	- s
4353.36	1088.55	383.	43.	3.362E+03	66.15	0.648	- sc
4419.89	1105.18	778.	82.	6.478E+03	59.94	0.522	- 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 & Mn, Zn.l

********** 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	59.59	44074.	305705.	84.918	0.23	0.990s
CD-109	351.46	88.02	5151.	2889.	0.803	5.21	0.998s
CO-57	487.57	122.06	7234.	107.	0.030	112.83	0.846
Ce-139	662.65	165.85	5803.	-87.	-0.024	155.59	0.887
Hg-203	1115.77	279.17	5166.	56.	0.015	241.93	0.992s
SN-113	1565.72	391.69	4330.	96.	0.027	129.09	1.094s
CS-137	2645.55	661.67	2170.	89118.	24.755	0.36	1.477
Mn-54	3338.31	834.85	2198.	82.	0.023	121.79	1.481
Y-898	3591.03	898.02	2529.	43.	0.012	250.51	1.534s
Co-1173	4692.47	1173.29	1215.	38361.	10.656	0.57	1.802
Co-1332	5329.78	1332.54	397.	35242.	9.790	0.56	1.912
Y-1836	7345.19	1836.01	73.	24.	0.007	87.40	2.262s

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

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample			COMMENTS
AM-241		5.1071E+03				1.58E+05			
			59.54	5.107E+03	*(	1.639E+01	2.29E-01	3.57E+01	G
CD-109		7.1568E+04				4.63E+02			
			88.03	7.157E+04	*(	8.352E+03	5.21E+00	3.61E+00	G
CO-57		6.9211E-01				2.72E+02			
			122.06	6.921E-01	(	2.581E+00	1.13E+02	8.53E+01	G
Ce-139	R	-7.0076E-01				1.38E+02			
			165.85	-7.008E-01	?(	2.870E+00	1.56E+02	7.65E+01	G
Hg-203		5.8049E-01				4.66E+01			
			279.17	5.805E-01	?(	3.521E+00	2.42E+02	8.15E+01	G
SN-113		1.6009E+00				1.15E+02			
			391.69	1.601E+00	&(	5.177E+00	1.29E+02	6.42E+01	G
CS-137		2.0045E+03				1.10E+04			
			661.66	2.004E+03	(	4.944E+00	3.58E-01	8.52E+01	G
Mn-54		2.8956E+03				3.12E+02			
			834.85	2.896E+03	?(	7.810E+03	1.22E+02	1.00E+02	G
Y-898		8.6709E-01				1.07E+02			
			898.02	8.671E-01	@(	4.818E+00	2.51E+02	9.37E+01	G
Zn-65	F	2.1741E-01				2.44E+02			
			1115.55	2.174E-01	%(	9.326E+00	2.00E+03	5.08E+01	G
Co-1173		3.0007E+03				1.93E+03			
			1173.24	3.001E+03	(	1.292E+01	5.66E-01	9.99E+01	G
Co-1332		3.0093E+03				1.93E+03			
			1332.50	3.009E+03	(P	8.157E+00	5.57E-01	1.00E+02	G
Y-1836		7.6711E-01				1.07E+02			
			1836.01	7.671E-01	?(P	1.349E+00	8.74E+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	
Ce-139	165.85	5803.	-87.	-0.024	155.59	0.000E+00	
Hg-203	279.17	5166.	56.	0.015	241.93	0.000E+00	
SN-113	391.69	4330.	96.	0.027	129.09	0.000E+00	
Mn-54	834.85	2198.	82.	0.023	121.79	2.896E+03	
Y-898	898.02	2529.	43.	0.012	250.51	0.000E+00	
Y-1836	1836.01	73.	24.	0.007	87.40	0.000E+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 1 Sigma Counting	MDA Bq/Sample
AM-241 #	5.0312E+03	5.1071E+03	2.288E-01%	1.64E+01
CD-109 #	4.3031E+02	7.1568E+04	5.208E+00%	8.35E+03
CO-57 A	6.9211E-01	>12 Halflives	1.128E+02%	2.58E+00
Ce-139 #A	-7.0076E-01	>12 Halflives	1.556E+02%	2.87E+00

Hg-203 #A	5.8049E-01	>12 Halflives	2.419E+02%		3.52E+00
SN-113 #A	1.6009E+00	>12 Halflives	1.291E+02%		5.18E+00
CS-137	1.6160E+03	2.0045E+03	3.580E-01%		4.94E+00
Mn-54 #A	1.4857E+00	2.8956E+03	1.218E+02%		7.81E+03
Y-898 #A	8.6709E-01	>12 Halflives	2.505E+02%		4.82E+00
Zn-65 #A	2.1741E-01	>12 Halflives	1.999E+03%		9.33E+00
Co-1173	8.7811E+02	3.0007E+03	5.655E-01%		1.29E+01
Co-1332	8.8064E+02	3.0093E+03	5.571E-01%		8.16E+00
Y-1836 #A	7.6711E-01	>12 Halflives	8.740E+01%		1.35E+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) 8.836E+03 Bq/Sample
Total Decayed Activity (37.6 to 1999.5 keV) 8.4689734E+04 Bq/Sample

Gamma ICV - TCC-1L Marn-LD

Detetctor: 18
Reagent ID: 1L Marn LCS_00006
Container: 1801782
Reference date 1/1/2011
Calibration Standard: SRS: 83924-334
Standard volume: 1 g/Jar
Standard volume transferred: 1 g/geometry

Isotope	Standard (γps)	Standard (γps/g)	γ abundance	Geometry (dpm/g)	Geometry (Bq/sample)	Measured (Bq/sample)	Percent Recovery (Bq/sample)	Recovery Within 10%
Am-241	1830	1830.0	0.359	305849.58	5097.49	5.205E+03	97.9%	PASS
Cs-137	1705	1705.0	0.851	120211.52	2003.53	2.072E+03	96.7%	PASS
Co-60	3294	3294.0	0.999856	197668.46	3294.47	3.124E+03	105.5%	PASS

1st Reviewer: Audra DeMariano

Date: 5/6/2020

2nd Reviewer: (KS)

Date: 5-19-20

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

83924-334

1.0 Liter Solid in 130G GA-MA Beaker

Customer: Test America St. Louis
P.O. No.: 2401509, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.015372

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. Density of solid matrix 1.15 g/cc.

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	———	1.830E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	2.609E+03	0.8	2.3	4.9	HPGe
Co-57	122.1	2.718E+02	8.711E+04	1.339E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	1.917E+03	0.5	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	4.232E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	2.719E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	1.705E+03	0.7	1.9	4.0	HPGe
Mn-54	834.9	3.121E+02	———	3.083E+03	0.1	1.7	3.3	IC
Y-88	898.0	1.066E+02	4.224E+05	6.493E+03	0.5	1.9	3.9	HPGe
Zn-65	1115.6	2.441E+02	———	3.181E+03	0.1	1.7	3.5	IC
Co-60	1173.2	1.925E+03	2.142E+05	3.293E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	3.294E+03	0.6	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	6.874E+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)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

6675
ID: 1L Marn_00002
Exp: 03/02/16 Prpd: JW Open: 03/02/11
Mixed Gamma 1L Marn 2011

91608
ID: 1L Marn_00004
Exp:02/15/14 Prpd:JW Opn:03/
Mixed Gamma 1L Marn

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

ANA Form005 Rev. —

This standard will expire one year after the reference date.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 2/23/4
J. D. McCorvey, QA Manager Alternate

Test America St. Louis Spectrum ID: 18_Gamma_20200022

Sample Description: 467872_Gamma_LCS 160-467872~2-A
Detector: Detector #18
Batch ID: 467872
Work Order Number: Gamma
Lot Number: LCS 160-467872~2-A

Decay to Time: 1/1/2011 11:00 Live Time: 3600 sec
Acquisition Time: 4/21/2020 17:41:40 Real Time: 3671 sec
Analysis Time: 5/6/2020 12:46 Dead Time: 1.93 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 18_TCC-1L Marn.Clb
Efficiency Cal Desc: 18_TCC-1L Marn_1893022-115244
Efficiency Cal Date: 5/6/2020 12:27
Energy Cal Date: 1/14/2019 14:06
Library: DET_EnergyStandardMix & Mn, Zn.l
Bkgd Correction File: 18_2020-04-04_0851.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
AM-241	5.205E+03	0.2	1.273E+01	3.326E+02	1.819E+01
CD-109	7.507E+04	4.9	3.681E+03	6.093E+03	8.214E+03
CO-57	1.000E+100	206.5	8.471E-01	8.475E-01	2.804E+00
Ce-139	1.000E+100	84.6	1.156E+00	1.159E+00	3.815E+00
Hg-203	1.000E+100	101.4	1.678E+00	1.681E+00	4.010E+00
SN-113	1.000E+100	177.9	2.586E+00	2.588E+00	5.940E+00
CS-137	2.072E+03	0.4	7.748E+00	1.227E+02	5.943E+00
Mn-54	4.623E+03	83.6	3.864E+03	3.873E+03	8.243E+03
Y-898	1.000E+100	81.2	2.633E+00	2.640E+00	5.613E+00
Zn-65	1.000E+100	225.4	4.998E+00	5.000E+00	1.035E+01
Co-1173	3.099E+03	0.6	1.950E+01	1.832E+02	1.747E+01
Co-1332	3.124E+03	0.6	1.842E+01	1.845E+02	1.148E+01
Y-1836	1.000E+100	77.9	1.072E+00	1.076E+00	2.065E+00
Total	7.000E+100				

Analyst: Jody Watson

TestAmerica Inc Spectrum name: 18_Gamma_20200022.An1

Sample description
467872_Gamma_LCS 160-467872~2-A

Spectrum Filename: C:\User\SPC\Det18\18_Gamma_20200022.An1

Acquisition information
Start time: 4/21/2020 5:41:40 PM
Live time: 3600
Real time: 3671
Dead time: 1.93 %
Detector ID: 18

Detector system
Ge18 SN/11164036

Calibration
Filename: 18_TCC-1L Marn.Clb
18_TCC-1L Marn_1893022-115244

Energy Calibration
Created: 1/14/2019 2:06:32 PM
Zero offset: -0.046 keV
Gain: 0.250 keV/channel
Quadratic: -3.254E-08 keV/channel^2

Efficiency Calibration
Created: 5/6/2020 12:27:45 PM
Type: TCC Polynomial
Coefficients: -0.479130 -4.387026 -0.707377
7.231555 0.000000 0.000000

Library Files
Main analysis library: DET_EnergyStandardMix & Mn, Zn.l
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.49keV)
Stop channel: 8000 (1999.66keV)
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	1/1/2011 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	YES	
Peaked background correction:	YES	18_2020-04-04_0851.PBC 4/4/2020 8:51:51 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 8 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 179.1793

***** 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
42.64	82.	295.75	0.25	3.776E-02				
49.41	14309.	3.67	1.91	4.188E-02				
59.39	305062.	0.24	0.97	4.626E-02	59.54	35.683	5.205E+03	AM241
87.85	3078.	4.90	1.06	5.132E-02	88.03	3.610	7.507E+04	CD109
99.06	326.	26.71	1.08	5.145E-02				
102.52	219.	42.09	1.08	5.136E-02				
122.45	751.	20.65	1.70	4.995E-02	122.06	85.341	HL>Cutoff	CO57
127.14	94.	74.35	0.49	4.947E-02				
133.88	125.	77.84	0.45	4.871E-02				
162.38	134.	59.61	0.34	4.493E-02				
311.31	319.	38.16	0.59	2.873E-02				
391.69	82.	177.94	1.34	2.431E-02	391.69	64.226	HL>Cutoff	SN113
428.36	274.	45.54	2.17	2.278E-02				
438.58	210.	47.64	0.75	2.239E-02				
661.65	85484.	0.37	1.48	1.666E-02	661.66	85.235	2.072E+03	CS137
715.87	113.	40.02	1.91	1.576E-02				
834.41	125.	83.57	1.70	1.413E-02	834.85	100.000	PBC<MDA	Mn54
853.70	51.	67.16	0.41	1.391E-02				
1064.69	126.	34.90	1.76	1.190E-02				
1073.03	50.	55.57	0.61	1.183E-02				
1106.39	88.	51.80	0.70	1.158E-02				
1115.55	47.	225.45	1.91	1.151E-02	1115.55	50.796	HL>Cutoff	Zn65
1146.22	56.	53.35	0.61	1.129E-02				
1173.27	36415.	0.63	1.87	1.110E-02	1173.24	99.900	3.099E+03	Co1173
1332.55	33534.	0.59	2.02	1.014E-02	1332.50	99.982	3.124E+03	Co1332
1697.46	12.	45.92	0.67	8.485E-03				

********** 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
170.58	42.61	20476.	82.	2.159E+03	295.75	0.246	- c
197.64	49.41	68232.	14309.	3.417E+05	3.67	1.905	- s
396.10	98.87	3617.	326.	6.327E+03	26.71	1.080	- sD
409.93	102.34	4150.	219.	4.269E+03	42.09	1.083	- sD
489.57	122.45	5823.	751.	1.503E+04	20.65	1.699	- sM
508.32	127.14	2188.	94.	1.890E+03	74.35	0.487	- sc
535.28	133.88	3315.	125.	2.573E+03	77.84	0.455	- sc
649.19	162.38	2480.	134.	2.972E+03	59.61	0.339	- s
1244.50	311.31	3624.	319.	1.110E+04	38.16	0.588	- s
1712.49	428.36	3680.	274.	1.205E+04	45.54	2.166	- s
1753.34	438.58	2940.	210.	9.379E+03	47.64	0.746	- s
2862.17	715.87	644.	113.	7.172E+03	40.02	1.911	- s
3413.43	853.70	518.	51.	3.667E+03	67.16	0.415	- sc
4257.48	1064.69	642.	126.	1.062E+04	34.90	1.765	- sM
4290.84	1073.05	361.	50.	4.226E+03	55.57	0.608	- sM
4424.33	1106.39	708.	88.	7.630E+03	51.80	0.696	- sM
4583.68	1146.22	328.	56.	4.916E+03	53.35	0.614	- s
6789.95	1697.46	8.	12.	1.395E+03	45.92	0.674	- 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 & Mn, Zn.l

********** 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	237.55	59.39	52103.	305062.	84.740	0.24	0.969
CD-109	351.30	87.85	5140.	3078.	0.855	4.90	1.065
CO-57	488.02	122.06	8431.	63.	0.018	206.50	1.101
Ce-139	663.05	165.85	9946.	-167.	-0.047	84.56	1.141s
Hg-203	1116.03	279.17	6076.	-151.	-0.042	101.40	1.243
SN-113	1565.85	391.69	5048.	82.	0.023	177.94	1.342s
CS-137	2645.32	661.65	2707.	85484.	23.745	0.37	1.482
Mn-54	3338.04	834.85	2220.	125.	0.035	83.57	1.702s
Y-898	3590.73	898.02	2910.	-147.	-0.041	81.23	1.750s
Zn-65	4460.98	1115.55	2133.	47.	0.013	225.45	1.907
Co-1173	4691.94	1173.27	1890.	36415.	10.115	0.63	1.873

TestAmerica Inc Spectrum name: 18_Gamma_20200022.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Co-1332	5329.31	1332.55	669.	33534.	9.315	0.59	2.020
Y-1836	7344.66	1836.01	146.	-39.	-0.011	77.91	2.355s

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
AM-241		5.2045E+03						1.58E+05	
			59.54	5.205E+03	(	1.819E+01	2.45E-01	3.57E+01	G
CD-109		7.5074E+04						4.63E+02	
			88.03	7.507E+04	(	8.214E+03	4.90E+00	3.61E+00	G
CO-57		4.1019E-01						2.72E+02	
			122.06	4.102E-01	(	2.804E+00	2.07E+02	8.53E+01	G
Ce-139	R	-1.3669E+00						1.38E+02	
			165.85	-1.367E+00	?(	3.815E+00	8.46E+01	7.66E+01	G
Hg-203		-1.6545E+00						4.66E+01	
			279.17	-1.655E+00	&(	4.010E+00	1.01E+02	8.15E+01	G
SN-113		1.4532E+00						1.15E+02	
			391.69	1.453E+00	&(	5.940E+00	1.78E+02	6.42E+01	G
CS-137		2.0719E+03						1.10E+04	
			661.66	2.072E+03	(	5.943E+00	3.74E-01	8.52E+01	G
Mn-54		4.6233E+03						3.12E+02	
			834.85	4.623E+03	?(	8.243E+03	8.36E+01	1.00E+02	G
Y-898		-3.2419E+00						1.07E+02	
			898.02	-3.242E+00	&(	5.613E+00	8.12E+01	9.37E+01	G
Zn-65	F	2.2171E+00						2.44E+02	
			1115.55	2.217E+00	(	1.035E+01	2.25E+02	5.08E+01	G
Co-1173		3.0994E+03						1.93E+03	
			1173.24	3.099E+03	(	1.747E+01	6.29E-01	9.99E+01	G
Co-1332		3.1243E+03						1.93E+03	
			1332.50	3.124E+03	(P	1.148E+01	5.90E-01	1.00E+02	G

TestAmerica Inc Spectrum name: 18_Gamma_20200022.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Y-1836	-1.3765E+00					1.07E+02	
		1836.01	-1.376E+00	?(	2.065E+00	7.79E+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
Ce-139	165.85	9946.	-167.	-0.047	84.56	0.000E+00
Hg-203	279.17	6076.	-151.	-0.042	101.40	0.000E+00
SN-113	391.69	5048.	82.	0.023	177.94	0.000E+00
Y-898	898.02	2910.	-147.	-0.041	81.23	0.000E+00
Y-1836	1836.01	146.	-39.	-0.011	77.91	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 1 Sigma Counting	MDA Bq/Sample
AM-241	5.1275E+03	5.2045E+03	2.446E-01%	1.82E+01
CD-109	4.6144E+02	7.5074E+04	4.903E+00%	8.21E+03
CO-57 A	4.1019E-01	>12 Halflives	2.065E+02%	2.80E+00
Ce-139 #A	-1.3669E+00	>12 Halflives	8.456E+01%	3.81E+00
Hg-203 #A	-1.6545E+00	>12 Halflives	1.014E+02%	4.01E+00
SN-113 #A	1.4532E+00	>12 Halflives	1.779E+02%	5.94E+00
CS-137	1.6720E+03	2.0719E+03	3.739E-01%	5.94E+00
Mn-54 #A	2.4508E+00	4.6233E+03	8.357E+01%	8.24E+03
Y-898 #A	-3.2419E+00	>12 Halflives	8.123E+01%	5.61E+00
Zn-65 A	2.2171E+00	>12 Halflives	2.254E+02%	1.04E+01
Co-1173	9.1182E+02	3.0994E+03	6.291E-01%	1.75E+01
Co-1332	9.1914E+02	3.1243E+03	5.896E-01%	1.15E+01
Y-1836 #A	-1.3765E+00	>12 Halflives	7.791E+01%	2.06E+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 (37.5 to 1999.7 keV) 9.094E+03 Bq/Sample
Total Decayed Activity (37.5 to 1999.7 keV) 9.3197602E+04 Bq/Sample

Monthly Backgrounds

Test America
St. Louis
Background Check

Spectrum: 9_20201106013_BGLong
Description: Background Long PBC Count
Acquired: 11/6/2020 6:38:34 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	1.81	2.14	2.26	PASS

Analyst: Jacob Boyd Reviewer:

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Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det9\9_20201106013_BGLong.An1

Acquisition information
Start time: 11/6/2020 6:38:34 PM
Live time: 72000
Real time: 72082
Dead time: 0.11 %
Detector ID: 9

Detector system
Ge9 S/N09363993

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

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Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	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. 13 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0937

***** 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
198.06	257.	20.44	1.33	1.359E-01				
238.37	239.	20.91	1.83	1.228E-01	238.63	43.300	6.240E-02	PB212
295.01	250.	20.91	1.22	1.047E-01	295.09	19.300	1.722E-01	PB214
338.43	156.	28.38	2.63	9.078E-02	338.32	12.010	1.981E-01	AC228
351.68	358.	14.88	1.31	8.648E-02	351.93	37.600	1.528E-01	PB214
510.92	2356.	3.55	2.39	6.209E-02	511.86	20.000	2.640E+00	RH106
569.59	156.	27.37	1.61	5.641E-02	569.70	97.740	3.930E-02	BI207
					569.32	15.380	2.496E-01	CS134
					569.47	8.200	4.682E-01	PA234
609.42	393.	11.38	1.24	5.257E-02	609.31	46.090	2.252E-01	BI214
					610.30	5.750	1.809E+00	RU103
911.04	121.	20.02	1.18	3.085E-02	911.16	29.000	1.881E-01	AC228
1120.58	140.	21.82	0.99	2.761E-02	1120.29	15.100	4.663E-01	BI214
					1120.55	99.987	7.044E-02	Sc46
					1121.30	34.900	2.019E-01	Ta182
1460.76	316.	10.95	2.61	2.339E-02	1460.83	10.670	1.756E+00	K40
1623.64	50.	28.57	0.33	2.243E-02				
1765.02	173.	20.23	1.54	2.159E-02	1764.49	15.400	7.211E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
791.72	198.06	715.	257.	1.891E+03	20.44	1.328	- s
2043.04	510.92	618.	2356.	3.795E+04	3.55	2.391	-

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TestAmerica Inc Spectrum name: 9_20201106013_BGLong.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
6495.74	1623.64	33.	50.	2.229E+03	28.57	0.326	- 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-212	952.92	238.37	616.	239.	0.003	20.91	1.832s
PB-214	1179.43	295.01	598.	250.	0.003	20.91	1.222
AC-228	1353.11	338.43	468.	156.	0.002	28.38	2.626s
PB-214	1406.12	351.68	550.	358.	0.005	14.88	1.315s
BI-207	2277.71	569.59	345.	156.	0.002	27.37	1.606s
BI-214	2437.03	609.42	357.	393.	0.005	11.38	1.243
AC-228	3643.75	911.04	122.	121.	0.002	20.02	1.176s
BI-214	4482.22	1120.58	140.	140.	0.002	21.82	0.993s
K-40	5843.73	1460.76	108.	316.	0.004	10.95	2.610s
BI-214	7061.75	1765.02	114.	173.	0.002	20.23	1.544s

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	Peak MDA Value DPS	COMMENTS
K-40	N	1.7556E+00				4.66E+11	
			1460.83	1.756E+00	(	2.839E-01 1.09E+01 1.07E+01	G
PB-212	N	6.2403E-02				6.98E+02	
			238.63	6.240E-02	*(	3.091E-02 2.09E+01 4.33E+01	G
			300.03	0.000E+00	&	4.324E-01 0.00E+00 3.28E+00	GA
PB-214	N	1.5941E-01				5.84E+05	
			351.93	1.528E-01	@(	4.786E-02 1.49E+01 3.76E+01	G
			295.09	1.722E-01	(	8.023E-02 2.09E+01 1.93E+01	G
			242.00	0.000E+00	?	1.590E-01 0.00E+00 7.43E+00	GA

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

BI-207   C   3.9299E-02                                      1.18E+04
                          569.70 3.930E-02  (  2.249E-02 2.74E+01 9.77E+01 G
                         1063.66 0.000E+00 &   2.947E-02 1.00E+03 7.45E+01 G

BI-214   N   2.2523E-01                                      5.84E+05
                          609.31 2.252E-01  (  5.201E-02 1.14E+01 4.61E+01 G
                         1120.29 4.663E-01 +   1.927E-01 2.18E+01 1.51E+01 G
                         1764.49 7.211E-01 +   2.194E-01 2.02E+01 1.54E+01 G

AC-228   N   1.9104E-01                                      2.10E+03
                          911.16 1.881E-01  (  8.407E-02 2.00E+01 2.90E+01 G
                          968.97 0.000E+00 &   1.275E-01 8.86E+02 1.75E+01 G
                          338.32 1.981E-01 *(  1.318E-01 2.84E+01 1.20E+01 G
                           93.35 0.000E+00 %   1.216E-01 7.70E+02 5.56E+00 XA
   ( - 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

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	<	1.1832E-01		
NA-22	<	1.0797E-02		
K-40		1.7556E+00	1.0950E+01%	2.839E-01
Sc-46	<	2.2240E-02		
CR-51	<	1.0554E-01		
MN-54	<	1.9092E-02		
FE-59	<	3.8942E-02		
Co-56	<	1.9980E-02		
CO-57	<	1.1476E-02		
CO-58	<	1.9232E-02		
CO-60	<	1.5486E-02		
ZN-65	<	5.8318E-02		
NB-94	<	2.5935E-02		
ZR-95	<	2.8508E-02		
NB-95	<	1.8060E-02		
RU-103	<	1.3712E-02		
RH-106	<	1.4238E-01		
AG-108M	<	1.2463E-02		
AG-110M	<	4.9527E-02		
SN-113	<	2.0090E-02		
SB-124	<	1.7202E-02		
SB-125	<	4.3206E-02		
I-131	<	1.4690E-02		
BA-133	<	2.1479E-02		
CS-134	<	2.4352E-02		
CS-137	<	3.4760E-02		
CE-139	<	8.7820E-03		
Ba-140	<	5.4437E-02		
La-140	<	2.0380E-02		
CE-141	<	2.3877E-02		
CE-144	<	9.7456E-02		
PM-144	<	1.0888E-02		
EU-152	<	5.0302E-02		
EU-154	<	1.6948E-01		
EU-155	<	3.1720E-02		
HF-181	<	1.4304E-02		

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Ta-182	<	7.3634E-02		
Hg-203	<	1.4055E-02		
TL-208	<	1.7921E-02		
pm-146	<	4.0662E-02		
y-88	<	2.4572E-02		
PB-210	<	6.4559E-01		
PB-212	#	6.2403E-02	2.0911E+01%	3.091E-02
PB-214		1.5941E-01	1.2833E+01%	4.786E-02
BI-207	#	3.9299E-02	2.7373E+01%	2.249E-02
BI-212	<	3.4254E-01		
BI-214		2.2523E-01	1.1378E+01%	5.201E-02
BI-210M	<	1.7295E-02		
RA-224	<	2.8543E-01		
AC-228		1.9104E-01	1.7364E+01%	8.407E-02
TH-227	<	1.0456E-01		
TH-229	<	1.7413E-01		
TH-234	<	3.0436E-01		
PA-231	<	2.2586E-01		
PA-233	<	2.4382E-02		
PA-234	<	6.7127E-02		
PA-234M	<	2.2361E+00		
Ra-226	<	3.7360E-01		
U-235	<	9.6743E-02		
AM-241	<	4.8001E-02		
Np-237	<	7.3721E-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)     2.433E+00  DPS
```

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Test America
St. Louis
Background Check

Spectrum: 12_20201106012_BGLong
Description: Background Long PBC Count
Acquired: 11/6/2020 6:39:27 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	1.97	1.85	1.89	1.94	2.05	2.09	PASS

Analyst: Jacob Boyd Reviewer:

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Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det12\12_20201106012_BGLong.An1

Acquisition information

Start time:	11/6/2020 6:39:27 PM
Live time:	72000
Real time:	72040
Dead time:	0.06 %
Detector ID:	12

Detector system
Ge12 S/N10034336

Calibration

Filename:	12_QC.Clb

12_SourceCheck_H_2018

Energy Calibration

Created:	7/23/2020 4:01:50 PM
Zero offset:	0.081 keV
Gain:	0.250 keV/channel
Quadratic:	-3.747E-08 keV/channel^2

Efficiency Calibration

Created:	4/24/2018 2:08:25 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:	Null.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.61keV)
Stop channel:	8000 (1999.51keV)
Peak rejection level:	30.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3

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Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	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	

***** 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	1358.	5.27	0.84	5.838E-02				
63.30	847.	9.09	1.04	7.856E-02				
74.88	267.	17.55	0.94	9.246E-02				
77.31	206.	21.74	0.95	9.538E-02				
92.65	1192.	5.59	1.17	1.066E-01				
144.10	183.	28.16	0.83	9.246E-02				
185.67	752.	8.93	1.03	8.764E-02				
198.80	314.	18.10	1.49	8.612E-02				
238.59	358.	11.10	1.10	8.153E-02				
242.15	134.	27.16	1.11	8.112E-02				
295.22	296.	17.87	1.36	7.494E-02				
351.93	362.	12.44	1.03	6.837E-02				
511.03	2104.	5.19	2.48	4.991E-02				
583.52	189.	19.41	0.85	4.152E-02				
609.49	398.	9.41	1.66	3.851E-02				

********** 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	
185.88	46.59	1075.	1358.	2.326E+04	5.27	0.843	-	
252.67	63.30	1323.	847.	1.078E+04	9.09	1.041	-	
298.95	74.81	967.	267.	2.891E+03	17.55	0.944	-	D
308.64	77.23	896.	206.	2.155E+03	21.74	0.947	-	D
369.97	92.65	973.	1192.	1.118E+04	5.59	1.172	-	s
575.59	144.10	742.	183.	1.979E+03	28.16	0.831	-	s

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Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected	
741.75	185.67	902.	752.	8.586E+03	8.93	1.033	-	
794.26	198.80	759.	314.	3.642E+03	18.10	1.494	-	s
953.29	238.39	612.	358.	4.396E+03	11.10	1.104	-	sD
967.55	241.96	595.	134.	1.652E+03	27.16	1.108	-	sD
1179.67	295.22	602.	296.	3.954E+03	17.87	1.361	-	
1406.40	351.93	453.	362.	5.290E+03	12.44	1.034	-	
2042.56	511.15	981.	2104.	4.216E+04	5.19	2.479	-	
2332.44	583.52	279.	189.	4.560E+03	19.41	0.846	-	s
2436.31	609.49	275.	398.	1.034E+04	9.41	1.658	-	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Null.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

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

(- 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

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} - Peak is too close to another for the activity
to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

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

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity DPS	Uncertainty 1 Sigma Counting	MDA
DUMMY	No in-range peaks		

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 0.000E+00 DPS

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Test America
St. Louis
Background Check

Spectrum: 13_20201106012_BGLong
Description: Background Long PBC Count
Acquired: 11/6/2020 6:41:51 PM
Detector: Detector #13
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.91	1.71	1.77	1.84	2.04	2.10	PASS

Analyst: Jacob Boyd Reviewer:

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Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det13\13_20201106012_BGLong.An1

Acquisition information
Start time: 11/6/2020 6:41:51 PM
Live time: 72000
Real time: 72225
Dead time: 0.31 %
Detector ID: 13

Detector system
Ge13 S/N10064006

Calibration
Filename: 13_QC.Clb
13_QC-I_83725-334_060211

Energy Calibration
Created: 2/23/2012 9:31:24 AM
Zero offset: 0.036 keV
Gain: 0.250 keV/channel
Quadratic: -2.347E-08 keV/channel^2

Efficiency Calibration
Created: 6/5/2011 10:21:36 AM
Knee Energy: 0.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Null.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.55keV)
Stop channel: 8000 (1999.54keV)
Peak rejection level: 30.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method
Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3

(Page 2 of 5)

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	

***** 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
66.15	212.	24.83	0.80	1.216E-01				
74.92	142.	26.84	0.90	1.395E-01				
198.36	291.	23.04	1.04	1.467E-01				
238.42	180.	22.53	1.20	1.329E-01				
241.99	152.	24.83	1.20	1.317E-01				
295.00	226.	20.87	1.05	1.133E-01				
351.81	404.	15.07	1.29	9.374E-02				
511.05	2414.	3.49	2.53	6.760E-02				
583.47	150.	19.07	0.93	6.009E-02				
609.22	459.	13.84	1.53	5.742E-02				

********** 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	
264.32	66.15	728.	212.	1.739E+03	24.83	0.796	-	s
299.41	74.92	520.	142.	1.015E+03	26.84	0.901	-	s
792.96	198.36	970.	291.	1.984E+03	23.04	1.035	-	s
953.12	238.35	728.	180.	1.351E+03	22.53	1.197	-	sD
967.43	241.92	634.	152.	1.153E+03	24.83	1.200	-	sD
1179.41	295.00	547.	226.	1.997E+03	20.87	1.048	-	
1406.57	351.81	638.	404.	4.305E+03	15.07	1.288	-	
2043.41	511.05	565.	2414.	3.572E+04	3.49	2.535	-	
2333.07	583.47	181.	150.	2.491E+03	19.07	0.930	-	s
2436.05	609.22	550.	459.	7.994E+03	13.84	1.533	-	s

(Page 3 of 5)

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Null.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

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	Peak MDA Value DPS	COMMENTS

(- 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

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R - Coincidence Corrected C - Coincidence Peak
H - Halflife limit exceeded

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

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

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity DPS	Uncertainty 1 Sigma Counting	MDA

DUMMY No in-range peaks
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 0.000E+00 DPS

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Test America
St. Louis
Background Check

Spectrum: 15_20201106001_BGLong
Description: Background Long PBC Count
Acquired: 11/6/2020 2:42:15 PM
Detector: Detector #15
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.68	1.59	1.62	1.66	1.74	1.77	PASS

Analyst: Jacob Boyd Reviewer:

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Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det15\15_20201106001_BGLong.An1

Acquisition information
Start time: 11/6/2020 2:42:15 PM
Live time: 72000
Real time: 72048
Dead time: 0.07 %
Detector ID: 15

Detector system
Ge15 SN/11012216

Calibration
Filename: 15_QC.Clb
15_QC_83725-334_SOURCE F_2011

Energy Calibration
Created: 7/23/2020 4:17:28 PM
Zero offset: 0.089 keV
Gain: 0.250 keV/channel
Quadratic: -3.102E-08 keV/channel^2

Efficiency Calibration
Created: 8/2/2011 8:55:45 AM
Knee Energy: 0.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: DET_Long Background PBC.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.62keV)
Stop channel: 8000 (1999.58keV)
Peak rejection level: 30.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method
Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3

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```
       Half lives decay limit:    12.000
       Activity range factor:      2.000
       Min. step backg. energy     0.000
       Multiplet shift channel     2.000

Corrections                          Status          Comments
       Decay correct to date:         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.   13 cutoff: 5.00E+01 %
       Energy Calibration
            Normalized diff:       0.2393

*****   S U M M A R Y   O F   P E A K S   I N   R A N G E   *****
 Peak       Area   Uncert  FWHM    Corrctn   Nuclide  Brnch.     Act.   Nuc
 Energy                             Factor    Energy   Ratio    DPS
_____________________________________________________________________________
   46.77      804.   9.84   0.92  6.084E-02    46.54   4.250  4.341E+00 PB210
   63.70      762.  10.06   1.43  8.243E-02    63.29   3.810  3.389E+00 TH234
   75.10      189.  29.77   0.86  9.712E-02
   92.87     1078.   9.24   1.50  1.142E-01    92.59   5.584  2.350E+00 TH234
                                               93.35   5.561  2.358E+00 AC228
  185.92      459.  12.90   1.03  9.776E-02   185.72  54.000  1.206E-01 U235
                                              185.99   3.280  1.987E+00 Ra226
  238.41      239.  23.68   1.69  8.501E-02   238.63  43.300  9.018E-02 PB212
  583.57      167.  21.55   2.54  3.411E-02   583.02  84.500  8.056E-02 TL208
  609.50      271.  13.36   1.89  3.220E-02   609.31  46.090  2.536E-01 BI214
                                              610.30   5.750  2.037E+00 RU103
 1765.37      108.  14.02   1.87  1.107E-02  1764.49  15.400  8.761E-01 BI214


************ U N I D E N T I F I E D     P E A K    S U M M A R Y ************
  Peak Centroid  Background Net Area  Efficiency  Uncert   FWHM  Suspected
Channel   Energy   Counts     Counts   * Area    1 Sigma %  keV   Nuclide
_____________________________________________________________________________
  299.82    75.10       992.       189. 1.946E+03   29.77   0.861  -      s

  s - Peak fails shape tests.
  D - Peak area deconvoluted.
  L - Peak written from unknown list.
  C - Area < Critical level.

-------------------------------------------------------------
This section based on library: DET_Long Background PBC.lib
```

(Page 3 of 7)

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	186.57	46.77	1170.	804.	0.011	9.84	0.922s
TH-234	253.97	63.63	1209.	720.	0.010	10.35	1.421s
TH-234	370.86	92.87	1712.	1078.	0.015	9.24	1.495s
Ra-226	742.83	185.92	829.	459.	0.006	12.90	1.032
PB-212	952.68	238.41	741.	239.	0.003	23.68	1.694s
TL-208	2332.88	583.57	234.	167.	0.002	21.55	2.536s
BI-214	2436.56	609.50	240.	271.	0.004	13.36	1.886s
BI-214	7062.07	1765.37	18.	108.	0.001	14.02	1.873

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
TL-208	N	8.0556E-02					6.98E+02	
			583.02	8.056E-02	*(	3.564E-02	2.15E+01 8.45E+01	G
			277.28	0.000E+00	&	2.226E-01	1.00E+03 6.31E+00	G
			860.56	0.000E+00	%	2.204E-01	7.87E+01 1.24E+01	G
PB-210	N	4.3409E+00					8.14E+03	
			46.54	4.341E+00	*(	8.748E-01	9.84E+00 4.25E+00	G
PB-212	N	9.0177E-02					6.98E+02	
			238.63	9.018E-02	(	4.888E-02	2.37E+01 4.33E+01	G
			300.03	0.000E+00	%	4.077E-01	4.96E+01 3.28E+00	GA
BI-214	N	2.5362E-01					5.84E+05	
			609.31	2.536E-01	*(	7.010E-02	1.34E+01 4.61E+01	G
			1120.29	0.000E+00	&	2.204E-01	5.52E+01 1.51E+01	G
			1764.49	8.761E-01	+	1.810E-01	1.40E+01 1.54E+01	G
TH-234	N	3.2009E+00					1.63E+12	
			63.29	3.201E+00	(	7.324E-01	1.04E+01 3.81E+00	G
			92.59	2.350E+00	-	4.261E-01	9.24E+00 5.58E+00	G
Ra-226		1.9871E+00					5.84E+05	
			185.99	1.987E+00	(	5.931E-01	1.29E+01 3.28E+00	G

(- This peak used in the nuclide activity average.

```
  * - Peak is too wide, but only one peak in library.
  ! - Peak is part of a multiplet and this area went
      negative during deconvolution.
  ? - Peak is too narrow.
  @ - Peak is too wide at FW25M, but ok at FWHM.
  % - Peak fails sensitivity test.
  $ - Peak identified, but first peak of this nuclide
      failed one or more qualification tests.
  + - Peak activity higher than counting uncertainty range.
  - - Peak activity lower than counting uncertainty range.
  = - Peak outside analysis energy range.
  & - Calculated peak centroid is not close enough to the
      library energy centroid for positive identification.
  P - Peakbackground subtraction
  } - Peak is too close to another for the activity
      to be found directly.

  Nuclide Codes:                      Peak Codes:
  T - Thermal Neutron Activation      G - Gamma Ray
  F - Fast Neutron Activation         X - X-Ray
  I - Fission Product                 P - Positron Decay
  N - Naturally Occurring Isotope     S - Single-Escape
  P - Photon Reaction                 D - Double-Escape
  C - Charged Particle Reaction       K - Key Line
  M - No MDA Calculation              A - Not in Average
  R - Coincidence Corrected           C - Coincidence Peak
  H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


*************** D I S C A R D E D  I S O T O P E  P E A K S ***************
Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
          Energy   Counts     Counts     Cts/Sec  1 Sigma %
_____________________________________________________________________________
  P - Peakbackground subtraction

*****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
        Time of Count   Uncertainty  1 Sigma
Nuclide    Activity        Counting                  MDA
              DPS
_____________________________________________________________________________
BE-7    <    1.6527E-01
NA-22   <    3.8206E-02
K-40    <    3.0956E-01
Sc-46   <    2.9662E-02
CR-51   <    1.5654E-01
MN-54   <    2.4022E-02
FE-59   <    4.3628E-02
Co-56   <    2.8296E-02
CO-57   <    8.9317E-03
CO-58   <    2.0601E-02
CO-60   <    2.7345E-02
```

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ZN-65	<	6.0392E-02		
NB-94	<	3.7424E-02		
ZR-95	<	4.2733E-02		
NB-95	<	2.8502E-02		
RU-103	<	2.0085E-02		
RH-106	<	2.2202E-01		
AG-108M	<	2.0378E-02		
AG-110M	<	4.8583E-02		
SN-113	<	2.6047E-02		
SB-124	<	2.3694E-02		
SB-125	<	5.4327E-02		
I-131	<	2.0044E-02		
BA-133	<	2.2785E-02		
CS-134	<	3.5347E-02		
CS-137	<	3.0734E-02		
CE-139	<	1.3086E-02		
Ba-140	<	7.7568E-02		
La-140	<	3.5135E-02		
CE-141	<	3.0772E-02		
CE-144	<	9.7331E-02		
PM-144	<	3.2306E-02		
EU-152	<	5.7261E-02		
EU-154	<	2.2739E-01		
EU-155	<	4.7895E-02		
HF-181	<	2.2186E-02		
Ta-182	<	1.1979E-01		
Hg-203	<	2.4356E-02		
TL-208	#	8.0556E-02	2.1547E+01%	3.564E-02
pm-146	<	7.0108E-02		
y-88	<	2.9771E-02		
PB-210	#	4.3409E+00	9.8389E+00%	8.748E-01
PB-212	#	9.0177E-02	2.3680E+01%	4.888E-02
PB-214	<	6.1637E-02		
BI-207	<	3.6062E-02		
BI-212	<	5.0681E-01		
BI-214		2.5362E-01	1.3361E+01%	7.010E-02
BI-210M	<	2.7579E-02		
RA-224	<	4.6802E-01		
AC-228	<	1.1519E-01		
TH-227	<	8.3196E-02		
TH-229	<	2.4731E-01		
TH-234	#	3.2009E+00	1.0353E+01%	7.324E-01
PA-231	<	3.0240E-01		
PA-233	<	4.0711E-02		
PA-234	<	7.0774E-02		
PA-234M	<	3.7071E+00		
Ra-226		1.9871E+00	1.2898E+01%	5.931E-01
U-235	<	9.7410E-02		
AM-241	<	7.9272E-02		

Np-237 < 1.3709E-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) 9.953E+00 DPS

Test America
St. Louis
Background Check

Spectrum: 17_20201106010_BGLong
Description: Background Long PBC Count
Acquired: 11/6/2020 6:43:26 PM
Detector: Detector #17
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.38	2.03	2.15	2.29	22.61	2.72	PASS

Analyst: Jacob Boyd Reviewer:

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Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det17\17_20201106010_BGLong.An1

Acquisition information
Start time: 11/6/2020 6:43:26 PM
Live time: 72000
Real time: 72240
Dead time: 0.33 %
Detector ID: 17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_QC.Clb
17_QC_83725-334_SOURCE H_042211

Energy Calibration
Created: 7/23/2020 4:21:49 PM
Zero offset: 0.168 keV
Gain: 0.250 keV/channel
Quadratic: -2.402E-08 keV/channel^2

Efficiency Calibration
Created: 5/1/2011 11:17:56 AM
Knee Energy: 0.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: DET_Long Background PBC.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 150 (37.69keV)
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

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Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	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. 22 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1772

***** 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
46.71	1187.	6.80	0.78	5.962E-02	46.54	4.250	6.529E+00	PB210
63.35	1100.	6.67	0.81	8.044E-02	63.29	3.810	4.990E+00	TH234
75.00	420.	11.20	0.90	9.500E-02				
77.19	294.	16.48	0.90	9.774E-02				
89.85	153.	27.51	0.91	1.116E-01				
92.66	1557.	3.91	0.91	1.119E-01	92.59	5.584	3.461E+00	TH234
					93.35	5.561	3.472E+00	AC228
139.54	211.	26.63	1.48	1.105E-01				
185.67	781.	8.33	0.84	9.857E-02	185.72	54.000	2.038E-01	U235
					185.99	3.280	3.357E+00	Ra226
198.26	239.	25.05	0.92	9.571E-02				
238.51	364.	13.08	0.96	8.657E-02	238.63	43.300	1.349E-01	PB212
295.14	216.	26.25	0.81	7.370E-02	295.09	19.300	2.109E-01	PB214
351.84	371.	11.74	0.88	6.082E-02	351.93	37.600	2.252E-01	PB214
510.96	2252.	4.21	2.53	4.377E-02	511.86	20.000	3.582E+00	RH106
583.43	167.	26.47	0.99	3.884E-02	583.02	84.500	7.047E-02	TL208
609.63	346.	14.42	0.98	3.708E-02	609.31	46.090	2.813E-01	BI214
					610.30	5.750	2.259E+00	RU103
766.63	143.	26.72	4.39	2.923E-02	766.41	0.294	2.311E+01	PA234M
					765.79	99.790	6.803E-02	NB95
					763.94	22.280	3.039E-01	AG110M
911.38	187.	20.99	1.39	2.355E-02	911.16	29.000	3.803E-01	AC228
1001.55	116.	24.86	1.91	2.198E-02	1001.00	0.837	8.796E+00	PA234M
1120.39	136.	26.88	1.85	1.989E-02	1120.29	15.100	6.289E-01	BI214
					1120.55	99.987	9.500E-02	Sc46
					1121.30	34.900	2.723E-01	Ta182
1461.38	267.	11.75	1.62	1.608E-02	1460.83	10.670	2.161E+00	K40

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pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
1764.66	108.	23.14	1.75	1.381E-02	1764.49	15.400	7.065E-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
299.18	74.98	897.	420.	4.421E+03	11.20	0.897	- D
307.92	77.17	1028.	294.	3.009E+03	16.48	0.899	- D
358.90	89.87	807.	153.	1.370E+03	27.52	0.911	- D
557.25	139.54	927.	211.	1.906E+03	26.63	1.485	- sM
792.02	198.26	912.	239.	2.497E+03	25.05	0.916	- sM
2042.54	510.32	807.	2252.	5.145E+04	4.21	2.531	- 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_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	186.06	46.71	1633.	1206.	0.017	7.55	0.777
TH-234	252.60	63.35	1225.	1100.	0.015	6.67	0.806
TH-234	369.52	92.59	1075.	1557.	0.022	3.91	0.914D
Ra-226	741.67	185.67	985.	781.	0.011	8.33	0.838
PB-212	952.97	238.51	600.	364.	0.005	13.08	0.957
PB-214	1179.44	295.14	750.	216.	0.003	26.25	0.813s
PB-214	1406.17	351.84	457.	371.	0.005	11.74	0.875
TL-208	2332.41	583.43	381.	167.	0.002	26.47	0.992s
BI-214	2437.17	609.63	445.	346.	0.005	14.42	0.977s
PA-234M	3065.22	766.63	247.	143.	0.002	26.72	4.389s
AC-228	3644.30	911.38	232.	187.	0.003	20.99	1.393
PA-234M	4005.05	1001.55	150.	116.	0.002	24.86	1.909
BI-214	4480.58	1120.39	200.	136.	0.002	26.88	1.851
K-40	5845.18	1461.38	105.	267.	0.004	11.75	1.618s
BI-214	7059.19	1764.66	76.	108.	0.002	23.14	1.751

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	2.1607E+00				4.66E+11	
			1460.83	2.161E+00	*(	4.084E-01 1.18E+01 1.07E+01	G
TL-208	N	7.0474E-02				6.98E+02	
			583.02	7.047E-02	(	3.962E-02 2.65E+01 8.45E+01	G
			277.28	0.000E+00	%	2.102E-01 1.00E+03 6.31E+00	G
			860.56	0.000E+00	%	1.925E-01 4.76E+01 1.24E+01	G
PB-210	N	6.6325E+00				8.14E+03	
			46.54	6.633E+00	(	1.051E+00 7.55E+00 4.25E+00	G
PB-212	N	1.3485E-01				6.98E+02	
			238.63	1.349E-01	(	4.332E-02 1.31E+01 4.33E+01	G
			300.03	0.000E+00	%	4.113E-01 7.47E+01 3.28E+00	GA
PB-214	N	2.2033E-01				5.84E+05	
			351.93	2.252E-01	(	6.219E-02 1.17E+01 3.76E+01	G
			295.09	2.109E-01	?(	1.272E-01 2.63E+01 1.93E+01	G
			242.00	0.000E+00		2.829E-01 0.00E+00 7.43E+00	GA
BI-214	N	2.8132E-01				5.84E+05	
			609.31	2.813E-01	(	8.202E-02 1.44E+01 4.61E+01	G
			1120.29	6.289E-01	+	3.173E-01 2.69E+01 1.51E+01	G
			1764.49	7.065E-01	+	2.828E-01 2.31E+01 1.54E+01	G
AC-228	N	3.8031E-01				2.10E+03	
			911.16	3.803E-01	(	1.499E-01 2.10E+01 2.90E+01	G
			968.97	0.000E+00	%	1.539E-01 3.14E+01 1.75E+01	G
			338.32	0.000E+00	%	1.274E-01 3.22E+01 1.20E+01	G
			93.35	0.000E+00	?	5.129E-01 0.00E+00 5.56E+00	XA
TH-234	N	4.9897E+00				1.63E+12	
			63.29	4.990E+00	(	7.521E-01 6.67E+00 3.81E+00	G
			92.59	3.461E+00	-	3.457E-01 3.91E+00 5.58E+00	G
PA-234M	N	8.7961E+00				1.63E+12	
			1001.00	8.796E+00	(	4.507E+00 2.49E+01 8.37E-01	G
			766.41	2.311E+01	+	1.227E+01 2.67E+01 2.94E-01	G
Ra-226		3.3574E+00				5.84E+05	
			185.99	3.357E+00	(	6.404E-01 8.33E+00 3.28E+00	G

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```
  ( - 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    <    2.3643E-01
NA-22   <    3.9340E-02
K-40   #     2.1607E+00   1.1752E+01%               4.084E-01
Sc-46   <    4.0417E-02
CR-51   <    1.3307E-01
MN-54   <    2.4367E-02
FE-59   <    5.4648E-02
Co-56   <    2.6933E-02
CO-57   <    1.9601E-02
CO-58   <    2.4043E-02
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CO-60	<	2.9723E-02		
ZN-65	<	5.9918E-02		
NB-94	<	2.5647E-02		
ZR-95	<	4.2272E-02		
NB-95	<	4.4105E-02		
RU-103	<	2.1080E-02		
RH-106	<	2.4026E-01		
AG-108M	<	1.7360E-02		
AG-110M	<	2.4088E-02		
SN-113	<	2.6290E-02		
SB-124	<	2.7162E-02		
SB-125	<	5.3598E-02		
I-131	<	1.7996E-02		
BA-133	<	3.9097E-02		
CS-134	<	3.3854E-02		
CS-137	<	2.7800E-02		
CE-139	<	1.8787E-02		
Ba-140	<	8.1569E-02		
La-140	<	2.8480E-02		
CE-141	<	3.0677E-02		
CE-144	<	1.1095E-01		
PM-144	<	2.6818E-02		
EU-152	<	9.7690E-02		
EU-154	<	2.9924E-01		
EU-155	<	5.7423E-02		
HF-181	<	3.8025E-02		
Ta-182	<	1.3740E-01		
Hg-203	<	1.5924E-02		
TL-208		7.0474E-02	2.6470E+01%	3.962E-02
pm-146	<	7.0777E-02		
y-88	<	2.9400E-02		
PB-210		6.6325E+00	7.5488E+00%	1.051E+00
PB-212		1.3485E-01	1.3079E+01%	4.332E-02
PB-214		2.2033E-01	1.1744E+01%	6.219E-02
BI-207	<	2.8880E-02		
BI-212	<	4.7855E-01		
BI-214		2.8132E-01	1.4424E+01%	8.202E-02
BI-210M	<	2.4555E-02		
RA-224	<	5.5915E-01		
AC-228		3.8031E-01	2.0988E+01%	1.499E-01
TH-227	<	1.2886E-01		
TH-229	<	2.9818E-01		
TH-234		4.9897E+00	6.6727E+00%	7.521E-01
PA-231	<	7.7567E-01		
PA-233	<	3.7119E-02		
PA-234	<	6.5958E-02		
PA-234M		8.7961E+00	2.4864E+01%	4.507E+00
Ra-226		3.3574E+00	8.3261E+00%	6.404E-01
U-235	<	1.1184E-01		

AM-241 < 7.3178E-02
Np-237 < 1.2339E-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 (37.7 to 1999.6 keV) 2.702E+01 DPS

Test America
St. Louis
Background Check

Spectrum: 18_20201106007_BGLong
Description: Background Long PBC Count
Acquired: 11/6/2020 6:44:46 PM
Detector: Detector #18
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	2.34	2.15	2.23	2.34	2.44	2.50	PASS

Analyst: Jacob Boyd Reviewer:

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Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det18\18_20201106007_BGLong.An1

Acquisition information
Start time: 11/6/2020 6:44:46 PM
Live time: 72000
Real time: 72063
Dead time: 0.09 %
Detector ID: 18

Detector system
Ge18 SN/11164036

Calibration
Filename: 18_20201106007_BGLong.An1
Ge18_QA Source E

Energy Calibration
Created: 4/29/2020 11:57:11 AM
Zero offset: 0.093 keV
Gain: 0.250 keV/channel
Quadratic: -2.879E-08 keV/channel^2

Efficiency Calibration
Created: 4/29/2020 11:32:06 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 (37.62keV)
Stop channel: 8000 (1999.62keV)
Peak rejection level: 30.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method
Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3

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Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	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. 22 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0987

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
46.54	1219.	5.51	0.89	5.291E-02	46.54	4.250	7.531E+00	PB210
63.31	972.	7.60	1.06	7.701E-02	63.29	3.810	4.606E+00	TH234
75.00	345.	15.21	1.02	9.379E-02				
77.14	232.	23.45	1.03	9.687E-02				
89.99	175.	27.56	1.04	1.122E-01				
92.63	1239.	5.05	1.04	1.119E-01	92.59	5.584	2.755E+00	TH234
					93.35	5.561	2.769E+00	AC228
143.68	202.	25.26	1.56	1.046E-01	143.79	10.960	2.451E-01	U235
185.72	746.	11.02	1.14	9.869E-02	185.72	54.000	1.944E-01	U235
					185.99	3.280	3.202E+00	Ra226
238.64	333.	13.83	1.01	9.120E-02	238.63	43.300	1.171E-01	PB212
242.01	170.	24.43	1.18	9.073E-02	242.00	7.430	3.493E-01	PB214
295.24	203.	22.33	1.31	8.321E-02	295.09	19.300	1.758E-01	PB214
351.78	377.	17.10	1.36	7.519E-02	351.93	37.600	1.853E-01	PB214
510.94	2246.	4.96	2.55	5.266E-02	511.86	20.000	2.969E+00	RH106
570.30	162.	23.60	1.09	4.434E-02	569.70	97.740	5.191E-02	BI207
					569.32	15.380	3.295E-01	CS134
					569.47	8.200	6.183E-01	PA234
583.09	175.	26.48	1.27	4.245E-02	583.02	84.500	6.762E-02	TL208
609.49	239.	21.80	1.12	3.871E-02	609.31	46.090	1.862E-01	BI214
					610.30	5.750	1.498E+00	RU103
1000.65	124.	27.98	1.72	2.270E-02	1001.00	0.837	9.087E+00	PA234M
1121.04	128.	28.36	2.71	1.967E-02	1120.29	15.100	5.962E-01	BI214
					1120.55	99.987	9.006E-02	Sc46
					1121.30	34.900	2.583E-01	Ta182
1460.45	274.	11.71	1.55	1.495E-02	1460.83	10.670	2.386E+00	K40
1764.38	126.	16.18	1.73	1.138E-02	1764.49	15.400	9.950E-01	BI214

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pk energy area uncert fwhm corr nuclide brnch. act. nuc

********** 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
299.42	74.99	1208.	345.	3.683E+03	15.21	1.024	- sD
307.99	77.14	1362.	232.	2.393E+03	23.45	1.026	- sD
359.89	90.09	1196.	182.	1.621E+03	27.90	1.038	- D
2042.45	510.94	969.	2246.	4.265E+04	4.96	2.549	-

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	185.68	46.54	1038.	1219.	0.017	5.51	0.892
TH-234	252.71	63.31	1282.	972.	0.014	7.60	1.064s
TH-234	369.75	92.59	1343.	1239.	0.017	5.06	1.040D
U-235	574.00	143.68	851.	202.	0.003	25.26	1.558s
U-235	742.06	185.72	1426.	643.	0.009	7.93	1.127D
PB-212	953.61	238.63	600.	400.	0.006	10.01	1.175D
PB-214	967.06	242.00	772.	170.	0.002	24.43	1.178D
PB-214	1179.93	295.24	558.	203.	0.003	22.33	1.313
PB-214	1406.01	351.78	782.	377.	0.005	17.10	1.359
BI-207	2279.85	570.30	300.	162.	0.002	23.60	1.092s
TL-208	2331.00	583.09	406.	175.	0.002	26.48	1.269
BI-214	2436.61	609.49	514.	239.	0.003	21.80	1.125s
PA-234M	4001.35	1000.65	204.	124.	0.002	27.98	1.724
BI-214	4483.03	1121.04	182.	128.	0.002	28.36	2.710s
K-40	5841.35	1460.45	108.	274.	0.004	11.71	1.554s
BI-214	7058.05	1764.38	46.	126.	0.002	16.18	1.730s

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	2.3865E+00				4.66E+11	
			1460.83	2.386E+00	(	4.454E-01 1.17E+01 1.07E+01	G
TL-208	N	6.7616E-02				6.98E+02	
			583.02	6.762E-02	(	3.741E-02 2.65E+01 8.45E+01	G
			277.28	0.000E+00	%	1.831E-01 6.12E+01 6.31E+00	G
			860.56	0.000E+00	&	2.247E-01 2.03E+02 1.24E+01	G
PB-210	N	7.5306E+00				8.14E+03	
			46.54	7.531E+00	(	9.440E-01 5.51E+00 4.25E+00	G
PB-212	N	1.4051E-01				6.98E+02	
			238.63	1.405E-01	(	4.110E-02 1.00E+01 4.33E+01	G
			300.03	0.000E+00	%	5.932E-01 0.00E+00 3.28E+00	GA
PB-214	N	1.8207E-01				5.84E+05	
			351.93	1.853E-01	(	6.537E-02 1.71E+01 3.76E+01	G
			295.09	1.758E-01	(	9.751E-02 2.23E+01 1.93E+01	G
			242.00	3.493E-01	+	2.724E-01 2.44E+01 7.43E+00	GA
BI-207	C	5.1912E-02				1.18E+04	
			569.70	5.191E-02	*(	2.673E-02 2.36E+01 9.77E+01	G
			1063.66	0.000E+00	%	3.909E-02 1.08E+02 7.45E+01	G
BI-214	N	1.8618E-01				5.84E+05	
			609.31	1.862E-01	(	8.427E-02 2.18E+01 4.61E+01	G
			1120.29	5.962E-01	+	3.062E-01 2.84E+01 1.51E+01	G
			1764.49	9.950E-01	+	2.734E-01 1.62E+01 1.54E+01	G
TH-234	N	4.6057E+00				1.63E+12	
			63.29	4.606E+00	@(	8.032E-01 7.60E+00 3.81E+00	G
			92.59	2.755E+00	-	3.857E-01 5.06E+00 5.58E+00	G
PA-234M	N	9.0874E+00				1.63E+12	
			1001.00	9.087E+00	(	5.059E+00 2.80E+01 8.37E-01	G
			766.41	0.000E+00	&	7.912E+00 4.20E+01 2.94E-01	G
U-235	N	2.4506E-01				2.57E+11	
			185.72	1.675E-01	}	4.657E-02 7.93E+00 5.40E+01	GA
			143.79	2.451E-01	(	1.679E-01 2.53E+01 1.10E+01	G
			205.33	0.000E+00	&	2.568E-01 1.00E+03 5.01E+00	G
			163.38	0.000E+00	%	2.564E-01 1.00E+02 5.08E+00	G

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```
  ( - This peak used in the nuclide activity average.

  * - Peak is too wide, but only one peak in library.
  ! - Peak is part of a multiplet and this area went
      negative during deconvolution.
  ? - Peak is too narrow.
  @ - Peak is too wide at FW25M, but ok at FWHM.
  % - Peak fails sensitivity test.
  $ - Peak identified, but first peak of this nuclide
      failed one or more qualification tests.
  + - Peak activity higher than counting uncertainty range.
  - - Peak activity lower than counting uncertainty range.
  = - Peak outside analysis energy range.
  & - Calculated peak centroid is not close enough to the
      library energy centroid for positive identification.
  P - Peakbackground subtraction
  } - Peak is too close to another for the activity
      to be found directly.

  Nuclide Codes:                      Peak Codes:
  T - Thermal Neutron Activation      G - Gamma Ray
  F - Fast Neutron Activation         X - X-Ray
  I - Fission Product                 P - Positron Decay
  N - Naturally Occurring Isotope     S - Single-Escape
  P - Photon Reaction                 D - Double-Escape
  C - Charged Particle Reaction       K - Key Line
  M - No MDA Calculation              A - Not in Average
  R - Coincidence Corrected           C - Coincidence Peak
  H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


*************** D I S C A R D E D  I S O T O P E  P E A K S ***************
Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
          Energy   Counts     Counts     Cts/Sec  1 Sigma %
_____________________________________________________________________________
  P - Peakbackground subtraction

*****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
        Time of Count   Uncertainty  1 Sigma
Nuclide    Activity        Counting                    MDA
              DPS
_____________________________________________________________________________
BE-7    <    1.7337E-01
NA-22   <    5.2338E-02
K-40         2.3865E+00   1.1713E+01%               4.454E-01
Sc-46   <    4.2729E-02
CR-51   <    1.1911E-01
MN-54   <    2.9946E-02
FE-59   <    4.9874E-02
Co-56   <    2.5983E-02
CO-57   <    1.4301E-02
CO-58   <    2.7794E-02
```

CO-60	<	3.5673E-02		
ZN-65	<	9.1898E-02		
NB-94	<	2.8562E-02		
ZR-95	<	4.3564E-02		
NB-95	<	4.7548E-02		
RU-103	<	1.5657E-02		
RH-106	<	2.0732E-01		
AG-108M	<	1.5934E-02		
AG-110M	<	4.3081E-02		
SN-113	<	2.1506E-02		
SB-124	<	2.1504E-02		
SB-125	<	4.7323E-02		
I-131	<	1.6992E-02		
BA-133	<	2.8605E-02		
CS-134	<	4.2653E-02		
CS-137	<	2.8625E-02		
CE-139	<	1.5358E-02		
Ba-140	<	6.6778E-02		
La-140	<	3.5944E-02		
CE-141	<	3.8402E-02		
CE-144	<	1.8928E-01		
PM-144	<	2.9085E-02		
EU-152	<	7.3054E-02		
EU-154	<	2.2159E-01		
EU-155	<	6.1043E-02		
HF-181	<	2.6005E-02		
Ta-182	<	1.2440E-01		
Hg-203	<	1.0510E-02		
TL-208		6.7616E-02	2.6476E+01%	3.741E-02
pm-146	<	6.4052E-02		
y-88	<	3.0905E-02		
PB-210		7.5306E+00	5.5057E+00%	9.440E-01
PB-212		1.4051E-01	1.0011E+01%	4.110E-02
PB-214		1.8207E-01	1.4065E+01%	6.537E-02
BI-207	#	5.1912E-02	2.3603E+01%	2.673E-02
BI-212	<	5.3700E-01		
BI-214		1.8618E-01	2.1799E+01%	8.427E-02
BI-210M	<	2.3577E-02		
RA-224	<	5.4071E-01		
AC-228	<	1.2799E-01		
TH-227	<	1.1954E-01		
TH-229	<	2.8395E-01		
TH-234	#	4.6057E+00	7.5990E+00%	8.032E-01
PA-231	<	5.8847E-01		
PA-233	<	3.3911E-02		
PA-234	<	8.3283E-02		
PA-234M		9.0874E+00	2.7984E+01%	5.059E+00
U-235		2.4506E-01	2.5262E+01%	1.679E-01
AM-241	<	7.2075E-02		

Np-237 < 1.5802E-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) 2.448E+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
11/06/20 18:38		ICB 160-488503/1		488503			JLW
11/12/20 07:24		CCV 160-488942/1		488942			
11/12/20 07:46		CCV 160-488942/2		488942			JCB
11/12/20 08:29		CCB 160-488942/3		488942			JCB
11/12/20 09:52	30	ZZZZZ		488942			
11/12/20 10:30	30	ZZZZZ		488942			
11/12/20 11:03	30	ZZZZZ		488942			
11/12/20 12:02	30	ZZZZZ		488942			
11/12/20 12:41	30	ZZZZZ		488942			
11/12/20 13:17	30	180-111757-1	JOF-SES-01-20201001 ~ AOI1	488942	486236	901.1	JCB
11/12/20 13:57	30	ZZZZZ		488942			
11/12/20 15:22	30	ZZZZZ		488942			
11/12/20 16:04	30	ZZZZZ		488942			
11/12/20 17:00	30	ZZZZZ		488942			
11/12/20 18:05	30	ZZZZZ		488942			
11/12/20 19:22	30	ZZZZZ		488942			
11/12/20 19:59	30	ZZZZZ		488942			
11/12/20 21:04	30	ZZZZZ		488942			
11/12/20 22:00	30	ZZZZZ		488942			

Detector: GV12

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
04/18/18 13:54		IC 160-364854/1		364854			JLW
04/24/18 09:26		ICV 160-364854/2		364854			JLW
11/06/20 18:39		ICB 160-488504/1		488504			JLW
11/12/20 07:25		CCV 160-488940/1		488940			
11/12/20 07:47		CCV 160-488940/2		488940			JCB
11/12/20 08:29		CCB 160-488940/3		488940			JCB
11/12/20 09:53	30	ZZZZZ		488940			
11/12/20 10:31	30	ZZZZZ		488940			
11/12/20 11:03	30	ZZZZZ		488940			
11/12/20 12:01	30	ZZZZZ		488940			
11/12/20 12:42	30	ZZZZZ		488940			
11/12/20 13:18	30	MB 160-486236/1-A		488940	486236	901.1	JCB
11/12/20 13:58	30	ZZZZZ		488940			
11/12/20 15:13	120	ZZZZZ		488940			
11/12/20 18:06	30	ZZZZZ		488940			
11/12/20 19:21	30	ZZZZZ		488940			
11/12/20 19:58	30	ZZZZZ		488940			
11/12/20 21:03	30	ZZZZZ		488940			
11/12/20 21:58	30	ZZZZZ		488940			

Detector: GV13

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/12 15:23		IC 160-12348/1		12348			JLW
03/27/12 18:51		ICV 160-12348/2		12348			JLW
11/06/20 18:41		ICB 160-488505/1		488505			JLW

Gamma Spectroscopy Run Log

Detector: GV13 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
11/12/20 07:26		CCV 160-488941/1		488941			
11/12/20 07:48		CCV 160-488941/2		488941			JCB
11/12/20 08:31		CCB 160-488941/3		488941			JCB
11/12/20 09:55	30	ZZZZZ		488941			
11/12/20 10:32	30	ZZZZZ		488941			
11/12/20 11:05	30	ZZZZZ		488941			
11/12/20 12:03	30	ZZZZZ		488941			
11/12/20 12:43	30	ZZZZZ		488941			
11/12/20 13:19	30	LCS 160-486236/2-A		488941	486236	901.1	JCB
11/12/20 14:00	30	ZZZZZ		488941			
11/12/20 15:23	30	ZZZZZ		488941			
11/12/20 16:09	30	ZZZZZ		488941			
11/12/20 17:03	30	ZZZZZ		488941			
11/12/20 18:09	30	ZZZZZ		488941			
11/12/20 19:21	30	ZZZZZ		488941			
11/12/20 19:57	30	ZZZZZ		488941			
11/12/20 21:03	30	ZZZZZ		488941			
11/12/20 21:57	30	ZZZZZ		488941			

Detector: GV15

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/22/12 11:06		IC 160-12362/1		12362			JLW
03/23/12 06:10		ICV 160-12362/2		12362			JLW
03/20/20 15:08		IC 160-470885/1		470885			JLW
05/18/20 14:28		ICV 160-470885/2		470885			JLW
11/06/20 14:42		ICB 160-488497/1		488497			JLW
11/12/20 09:04		CCV 160-488953/4		488953			
11/12/20 10:24		CCB 160-488953/1		488953			JCB
11/12/20 11:05		CCV 160-488953/2		488953			
11/12/20 11:26		CCV 160-488953/3		488953			JCB
11/12/20 12:06	30	ZZZZZ		488953			
11/12/20 12:42	30	ZZZZZ		488953			
11/12/20 13:21	30	ZZZZZ		488953			
11/12/20 13:58	30	180-111757-1 DU	JOF-SES-01-20201001 ~ AOI1 DU	488953	486236	901.1	JCB
11/12/20 15:21	30	ZZZZZ		488953			
11/12/20 15:56	120	ZZZZZ		488953			
11/12/20 18:16	120	180-111757-2	JOF-SES-FB01-2020100 ~ AOI1	488953	486234	901.1	JCB
11/12/20 20:59	120	ZZZZZ		488953			

Detector: GV17

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/04/20 10:11		IC 160-470373/1		470373			JLW
05/06/20 10:10		ICV 160-470373/2		470373			JLW
11/06/20 18:43		ICB 160-488500/1		488500			JLW
11/12/20 07:26		CCB 160-488943/1		488943			JCB
11/12/20 08:32		CCV 160-488943/2		488943			
11/12/20 08:52		CCV 160-488943/3		488943			JCB
11/12/20 09:56	30	ZZZZZ		488943			

Gamma Spectroscopy Run Log

Detector: GV17 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
11/12/20 10:33	30	ZZZZZ		488943			
11/12/20 11:08	30	ZZZZZ		488943			
11/12/20 12:05	30	ZZZZZ		488943			
11/12/20 12:44	30	ZZZZZ		488943			
11/12/20 13:22	30	ZZZZZ		488943			
11/12/20 15:06	30	ZZZZZ		488943			
11/12/20 16:10	30	ZZZZZ		488943			
11/12/20 17:14	30	ZZZZZ		488943			
11/12/20 18:13	120	MB 160-486234/1-A		488943	486234	901.1	JCB
11/12/20 20:58	120	180-111757-3	JOF-SES-EB01-2020100 ~ AOI1	488943	486234	901.1	JCB

Detector: GV18

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/19/20 11:08		IC 160-470590/1		470590			JLW
04/21/20 17:41		ICV 160-470590/2		470590			JLW
11/06/20 18:44		ICB 160-488501/1		488501			JLW
11/12/20 07:27		CCB 160-488944/1		488944			SCB
11/12/20 08:31		CCV 160-488944/2		488944			
11/12/20 08:52		CCV 160-488944/3		488944			SCB
11/12/20 10:07	120	ZZZZZ		488944			
11/12/20 12:14	120	ZZZZZ		488944			
11/12/20 15:14	120	ZZZZZ		488944			
11/12/20 18:13	120	LCS 160-486234/2-A		488944	486234	901.1	SCB
11/12/20 20:57	120	180-111757-2 DU	JOF-SES-FB01-2020100 ~ AOI1 DU	488944	486234	901.1	SCB

Radiological
Pre-Preparation Data

Radiological
Pre-Preparation Data

Subcontract Data

Shipping and Receiving Documents

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	1	of	1
COC No:	JOF_SES_20201001_1B		
1 of 1 Pages			
Task Desc:	JOF_SES		

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:	
Lab Name:	TestAmerica Pittsburgh
Lab Address:	301 Alpha Drive Pittsburgh, PA 15238
Lab Manager Contact Information	
Lab PM:	Gail Lage
Phone/Fax:	615-301-5741
Lab Email:	Gail.Lage@eurofinset.com

Required Project Information:				
Site ID #:	Johnsonville Fossil Plant			
Project #:	175568286			
Site Address	535 Steam Plant Road			
City	New Johnsonville	State, Zip:	TN	37134
Site PM Name:	Roy Quinn			
Phone/Fax:	423-751-3753			
Site PM Email:	jrquinn@tva.gov			

Required Sampler Information			
Sampler:	Courtnae Ramser, Chris Knabel		
Sampling Company:	Stantec		
Address	601 Grassmere Park Rd, Ste 22		
City/State	Nashville, TN	Phone:	615-885-1144
Sampling Team Number:	1		
Send EDD/Hard Copy to:	tva_deliverables@envstd.com		

Analysis Turnaround Time

☐ CALENDAR DAYS ☑ WORKING DAYS

TAT if different from Below _____

☐ 24 Hours
☐ 3 Business Days
☐ 5 Business Days
☑ **10 Business Days**

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit	Sample Depth: Select Unit	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Filtered	Preserve: None	Preserve: HNO3	Analysis: SEEP_SOIL_RAD	Analysis: SEEP_SOIL_BLANKS_RAD
1	JOF-SeS-01-20201001	AOI1			4"	4"	SES	C	N	10/1/2020	1200	6	MS/MSD	☑	N			X	
2	JOF-SeS-FB01-20201001	AOI1			NA	NA	AQ	G	FB	10/1/2020	1030	3	None	☐	N				X
3	JOF-SeS-EB01-20201001	AOI1			NA	NA	AQ	G	EB	10/1/2020	1040	3	None	☐	N				X
4														☐					
5														☐					
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			

CR 10/1/20

CR 10/1/20

180-111757 Chain of Custody

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Courtnae Ramser / Stantec /	10/1/20	1600		10/2/20	900

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
FedEx	Courtnae Ramser

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☑ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Form TVA 30067A

180-111757 Waybill

eurofins | Environment Testing TestAmerica

Part # 1594TD-434 RIT2 EXP 06/21 ®

ORIGIN ID:PHDA (330) 966-9677
COURTNAE RAMSER
STANTEC
1216 W END STATION DRIVE

LEBANON, TN 37078
UNITED STATES US

SHIP DATE: 22SEP20
ACTWGT: 10.00 LB MAN
CAD: 0562065/CAFE3406

TO SAMPLE RECEIVING
TESTAMERICA PITTSBURGH
301 ALPHA DRIVE
RIDC PARK
PITTSBURGH PA 15238

(412) 963-7058
REF: S180-64217

RMA:

FedEx Express

FedEx.

TRK# 0221 9235 2418 7218

FRI - 02 OCT AA
PRIORITY OVERNIGHT

15238
PA-US
PIT

XH AGCA

Uncorrected temp 15 °C
Thermometer ID 14
CF 0 Initials B
PT-WI-SR-001 effective 11/8/18

FID: 3651983 010ct2020 MQYA 56DG2/A27E/05A2

Eurofins TestAmerica, Pittsburgh
301 Alpha Drive RIDC Park
Pittsburgh, PA 15238
Phone: 412-963-7058 Fax: 412-963-2468

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Rumble, Jennifer L	Carrier Tracking No(s):	COC No: 180-414058.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Jennifer.Rumble@Eurofinset.com	State of Origin: Tennessee	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-111757-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 10/14/2020			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: JOF_SES_20201001_1B	Project #: 18020000			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	901.1_Ra/Dry_Grind Positive Combined Radium-226/228	901.1_Ra/Fill_Geo_21 Positive Combined Radium-226/228	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
JOF-SES-01-20201001 ~ AOI1 (180-111757-1)	10/1/20	12:00 Central		Solid			X		3	TVA - Batch alone. Contact PM if insufficient volume for Tuna
JOF-SES-01-20201001 ~ AOI1 (180-111757-1DU)	10/1/20	12:00 Central	DU	Solid			X		3	TVA - Batch alone. Contact PM if insufficient volume for Tuna
JOF-SES-FB01-20201001 ~ AOI1 (180-111757-2)	10/1/20	10:30 Central		Water				X	3	TVA - Batch alone
JOF-SES-EB01-20201001 ~ AOI1 (180-111757-3)	10/1/20	10:40 Central		Water				X	3	TVA - Batch alone

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins TestAmerica.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	10/6/20 1500	Eurofins	FED EX		
Relinquished by: FED EX	Date/Time:	Company	Received by: Michael Kennington	Date/Time: OCT 07 2020 09:19	Company ETA SR
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: Environmental Standards Inc. Job Number: 180-111757-1

Login Number: 111757 **List Source: Eurofins TestAmerica, Pittsburgh**
List Number: 1
Creator: Say, Thomas C

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

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-111757-1

Login Number: 111757
List Number: 2
Creator: Korrinhizer, Micha L

List Source: Eurofins TestAmerica, St. Louis
List Creation: 10/08/20 07:15 PM

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

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-111757-1

Login Number: 111757
List Number: 3
Creator: Korrinhizer, Micha L

List Source: Eurofins TestAmerica, St. Louis
List Creation: 10/08/20 07:16 PM

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

TVA Environmental Investigations

Rev. 1 (CR 1/8/2021)

Rev 2 BJ 6/3/2021 BJ 6/9/2021 Rev 3

TVA Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.: | | of | |

COC No: JOF_SES_20201001_1B

1 of 1 Pages

Task Desc: JOF_SES

Required Ship to Lab:

Lab Name: TestAmerica Pittsburgh
Lab Address: 301 Alpha Drive, Pittsburgh, PA 15238

Lab Manager Contact Information

Lab PM: Gail Lage
Phone/Fax: 615-301-5741
Lab Email: Gail.Lage@eurofinset.com

Required Project Information:

Site ID #: Johnsonville Fossil Plant
Project #: 175568286
Site Address: 535 Steam Plant Road
City: New Johnsonville State, Zip: TN 37134
Site PM Name: Roy Quinn
Phone/Fax: 423-751-3753
Site PM Email: jrquinn@tva.gov

Required Sampler Information

Sampler: Courtnae Ramser, Chris Knabel
Sampling Company: Stantec
Address: 601 Grassmere Park Rd, Ste 22
City/State: Nashville, TN Phone: 615-885-1144
Sampling Team Number: 1
Send EDD/Hard Copy to: tva_deliverables@envstd.com

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below _____
☐ 24 Hours
☐ 3 Business Days
☐ 5 Business Days
☑ 10 Business Days

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit	Sample Depth: Select Unit	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Filtered N	Filtered N	Preserve None	Preserve HNO3	Analysis SEEP_SOIL_RAD	Analysis SEEP_SOIL_BLANKS_RAD
1	JOF-SeS-01-20201001	~~AOI1~~			~~4"~~	~~4"~~	SES	C	N	10/1/2020	1200	6	MS/MSD	☐					X	
2	JOF-SeS-FB01-20201001	~~AOI1~~			NA	NA	AQ	G	FB	10/1/2020	1030	23	None	☐						X
3	JOF-SeS-EB01-20201001	~~AOI1~~			NA	NA	AQ	G	EB	10/1/2020	1040	23	None	☐						X
4	AOI01 (CR 1/8/21)													☐						
5	AOI01 (CR 1/8/21)													☐						
6	AOI01 (CR 1/8/21)													☐						
7														☐						
8														☐						
9														☐						
10														☐						
11														☐						
12														☐						
13														☐						

~~0.34~~ BJ 6/3/2021

BJ 6/9/2021

180-111757 Chain of Custody

Additional Comments/Special Instructions:

Additional volume collected should be used for laboratory duplicate analysis.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Courtnae Ramser / Stantec /	10/1/20	1600		10/2/20	900

SHIPPING METHOD:	SAMPLER NAME AND SIGNATURE
FedEx	Courtnae Ramser

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

Form TVA 30067A