SAF-RC-189
100N Field Remediation – Soil Full Protocol
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

No Distribution Required KW 5/16/16
INITIAL/DATE

COMMENTS:

SDG XP0228 **SAF RC-189**

Rad only Chem only ☑ Rad & Chem

☑ Complete Partial

Sample Location: 100-N-83 Verification Sampling

WASHINGTON CLOSURE HANFORD

SAF: RC-189, SDG: XP0228

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #16-04147-OR

May 12, 2016

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN

TABLE OF CONTENTS

Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 16-04147

The checklist items listed below are to be initialed by appropriate staff upon completion/verification.

Date for Partial	Initials	Date	Initials	Checklist Items
		4/26/16	JEB	Sample Log-In
		5/5/16	KBS	Data Compilation
		5-5-16	MKT	First Technical Data Review
		5/5/16	M	Second Technical Data Review
		5/11/16		Data Entry/Electronic Deliverable
		5/11/16		Case Narrative
		5/11/16	KBS	Electronic Deliverable Proof
		5/11/16	MK	Samples Analyzed within Holding Time Yes? [X] No? [ ]
		5/11/16	MK	QA/QC Review
		05/05/16	Emt	Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

Technical/Clerical Corrections, Signatures Needed, Problems, Etc	Date/Initials

Date package approved by: _____ 5/12/16

Laboratory Manager Date

Copy No. _____

SECTION I

CHAIN OF CUSTODY

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-189-315

Collector MARCHAND, EG	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Project Designation 100N Field Remediation	**Sampling Location** 100-N-83 Verification Sampling		**SAF No.** RC-189
Ice Chest No. WCH-11-016	**Field Logbook No.** EL-1652-12	**COA** 000N832000	**Method of Shipment** Commercial Carrier
Shipped To Eberline Services Oak Ridge	**Offsite Property No.** A131456		**Bill of Lading/Air Bill No.** SEE OSPC

Price Code 8B

Data Turnaround 7 Day

Other Labs Shipped To
GEL Laboratories Charleston

POSSIBLE SAMPLE HAZARDS/REMARKS
N/A

Special Handling and/or Storage
Cool as required

16-04147

REC'D APR 28 2016

Preservation	None	None	None	None	None		
Type of Container	G/P	G/P	G/P	G/P	G		
No. of Container(s)	1	1	1	1	1		
Volume	1000mL	~~125mL 60mL~~	~~125mL 60mL~~ TRE 4-26-16	~~125mL 60mL~~	60mL		
Sample Analysis	See item (3) in Special Instructions	Isotopic Plutonium	Strontium-89,90 -- Total Sr	Nickel-63	Tritium - H3 Low Level Soil		

Sample No.	Matrix	Sample Date	Sample Time								
J1V8X3 4	SOIL	4-26-16	1025	✓	✓	✓	✓	✓			

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Ed Marchand Rf/Richland	26 Apr 16 1230	T.R. Edmundson T.R. Edmundson	4-26-16 1230
T.R. Edmundson T.R. Edmundson	4-26-16 1330	1060 Refer #3	4-26-16 1330
1060 Refer #3	4-27-16 1000	T.R. Edmundson T.R. Edmundson	4-27-16 1000
T.R. Edmundson T.R. Edmundson	WCH 4-27-16 1500	Fed Ex	4-27-16 —
Fedex		Aaron E Ellis	4/28/16 0930

Sign/Print Names

SPECIAL INSTRUCTIONS
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY KWpertek DATE 4-27-16

XP0228

FINAL SAMPLE DISPOSITION Disposal Method — Disposed By — Date/Time

WCH-EE-011

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	16-04147
Lab Deadline	5/4/2016
Analysis	PuISO - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	42	F1.4
	> 05 <	< NOT REQUESTED	<<<

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1200	Kmy Seej	4-28-16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 0715	Kmy Seej	4-29-16
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JRO Re 4/29/16 0715	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JRO Re 4/29/16 1015	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	4/29-16 1015	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	4/29/16 0818	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	5/4 0823	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	VB 5/4/16 1138	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	16-04147
Lab Deadline	5/4/2016
Analysis	SrTOT - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	42	F1.4
	> 05 <	< NOT REQUESTED	<<<

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1200	Kenj Saij	4-28-16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 0715	Kenj Saij	4-29-16
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MH	29APR16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MH	2MAY16 0830
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		02-05-2
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB 5/2/16	1411
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	16-04147
Lab Deadline	5/4/2016
Analysis	H0003 - Level 4
Sample Matrix	Soil/Solid

Comments
Run MS

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	42	F1.4
05	0	F1.4

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1100	4-28-16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	2140	5-3-16
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JCB	5/3/16 1443
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		5/4 0500
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	16-04147
Lab Deadline	5/4/2016
Analysis	Ni063 - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Run MS	04	42	F1.4
	05	0	F1.4

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1200	Kerry Sacksteder	4-28-16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 0715	Kerry Sacksteder	4-29-16
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 840	J Pachelle	5-2-16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1500 KC	5/4/16
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KC 5/4/16	1500
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KC	1500
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	16-04147
Lab Deadline	5/4/2016
Analysis	Gamma - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Report Am241, Cs137, Co60, Eu152/154/155, K40, Pa234m, Pb212/214, Ra226, Th234, Tl208, U235 and positives	04	42	F1.4
	> 05 <	< NOT REQUESTED	<<<

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1205	Kmg Sanj	4.28.16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 0715	Kmg Sanj	4-29-16
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1115		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		1178
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

SECTION II

SAMPLE ACKNOWLEDGEMENT

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
Washington Closure Hanford	S00W235A01	Environmental	04/28/2016	7	16-04147
Project Name	Client WO	Sample Disp	Lab Deadline	Internal Deadline	Client Deadline
S00W235A01	SAF: RC-189;SDG: XP0228	H	05/04/2016	05/05/2016	05/05/2016

Internal ID	Client ID	Sample Date	Matrix	Storage	Gamma	H0003	Ni063	PuISO	SrTOT																				Ttl
01	LCS	04/28/16	SO	F1.4	X	X	X	X	X																				5
02	BLANK	04/28/16	SO	F1.4	X	X	X	X	X																				5
03	DUP	04/28/16	SO	F1.4	X	X	X	X	X																				5
04	J1V8X3 SAF: RC-189	04/26/16 10:25	SO	F1.4	X	X	X	X	X																				5
05	J1V8X3 SAF: RC-189 MS	04/26/16 10:25	SO	F1.4		X	X																						2
																													0
																													0
																													0
																													0
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																													0
Totals Per Analysis (non QA samples)					1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

Sample Log In Report

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830

Voice: (865) 481-0683
Fax: (865) 483-4621

Invoice
Accounts Payable
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354
Voice
Fax

Contact
Joan Kessner
Voice 509-375-4688
Fax

Report Data
Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354
Voice 509-375-4688
Fax

Printed: 4/28/2016 11:16 AM

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 16-04147

SAMPLE MATRIX/MATRICES: (CIRCLE ONE OR BOTH)

AQUEOUS NON-AQUEOUS

(CIRCLE EITHER YES, NO, OR N/A)

WERE SAMPLES:

Received in good condition?	(Y)	N	
If aqueous, properly preserved	Y	N	(N/A)

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	(Y)	N
Unbroken on outside of package?	(Y)	N
Present on samples?	(Y)	N
Unbroken on samples?	(Y)	N
Was chain of custody present upon sample receipt?	(Y)	N

IF THE RESPONSE TO ANY OF THE ABOVE IS **NO**, A DISCREPANT SAMPLE RECEIPT REPORT (DSR) HAS BEEN ISSUED.

REMARKS: _____

SIGNATURE: James E Bailey DATE: 4/28/16

SECTION III

CASE NARRATIVE

EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-40706

May 12, 2016

Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354

CASE NARRATIVE
SAF: RC-189, SDG: XP0228
Work Order # 16-04147-OR

SAMPLE RECEIPT

This work order contains one soil sample received 04/28/2016. Sample was analyzed for Isotopic Plutonium, Total Strontium, Tritium, Nickel-63 and by Gamma Spectroscopy.

CLIENT ID	LAB ID
J1V8X3	16-04147-04
J1V8X3 MS	16-04147-05

ANALYTICAL METHODS

Isotopic Plutonium was analyzed using Method EML Pu-02 Modified. Total Strontium was analyzed using EIChroM Method SRW01 Modified. Tritium was performed using Method LANL ER-210 Modified. Nickel-63 was performed using Method ASTM 3500-Ni Modified. Gamma Spectroscopy was performed using Method LANL ER-130 Modified.

Laboratory qualifier is as follows:

U - Result is less than or equal to MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

Minimum Detectable Activity (MDA) values for data represented in this report are sample-specific. MDA measurements are determined based on factors and conditions including instrument settings, aliquot size and matrix type.

ANALYTICAL RESULTS CONTINUED

ISOTOPIC PLUTONIUM

Sample was prepared by removing a representative aliquot followed by mixed acid digestions as appropriate. Plutonium was selectively extracted by ion exchange. Plutonium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using energy specific regions of interest for Plutonium-238 and Plutonium-239. Chemical recovery was determined by the use of a Plutonium-242 tracer. Activity of the Plutonium-242 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Sample demonstrated acceptable results for all Plutonium analyses. Chemical recovery was slightly high for the laboratory control sample. Chemical recovery was acceptable for all other samples. The Plutonium-238 and Plutonium-239/240 method blank demonstrated acceptable results. Results for the Plutonium-238 and Plutonium-239/240 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-238 and Plutonium-239 laboratory control sample demonstrated an acceptable percent recovery.

TOTAL STRONTIUM

Sample was prepared by acid digestion as appropriate for the matrix. Chemical separations were conducted using EIChroM stabilized chemical resins. Strontium fractions of the sample were eluted onto steel planchets. Chemical recovery was determined by use of a stable Strontium carrier and subsequent mass measurements. Sample was counted by gas flow proportional counting and corrected for Yttrium-90 ingrowth.

Sample demonstrated acceptable results for all Total Strontium analyses. Chemical recovery was acceptable for all samples. The Total Strontium method blank demonstrated an acceptable result. Results for the Total Strontium duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Total Strontium laboratory control sample demonstrated an acceptable percent recovery.

TRITIUM

A representative aliquot of the sample was equilibrated with Tritium free water. Equilibrate was transferred into a round-bottomed distillation flask and attached to single stage stills. A portion of the middle distillation fraction was transferred to a liquid scintillation vial and cocktail was added. Sample was then counted by beta liquid scintillation.

Sample demonstrated acceptable results for all Tritium analyses. The Tritium method blank demonstrated an acceptable result. Results for the Tritium duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Tritium laboratory control sample demonstrated an acceptable percent recovery. Results for the Tritium matrix spike demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

NICKEL-63

A representative aliquot of sample was placed into an appropriately sized beaker. Stable elemental Nickel carrier was added to the sample prior to digestion. Sample was digested in concentrated Nitric acid. After digestion, sample pH was adjusted and Nickel-63 was precipitated selectively with Dimethylglyoxime. Precipitates were selectively separated, redissolved, and residual acid was effectively neutralized. Sample residuals were placed into scintillation vials, scintillation cocktail was added and Nickel-63 activity was determined by beta liquid scintillation.

Sample demonstrated acceptable results for all Nickel-63 analyses. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Nickel-63 laboratory control sample demonstrated an acceptable percent recovery. Results for the Nickel-63 matrix spike demonstrated an acceptable percent recovery.

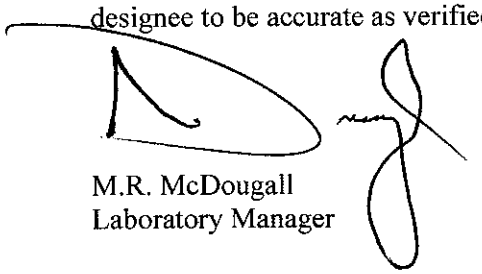
GAMMA SPECTROSCOPY

Sample for Gamma Spectroscopy analysis was prepared by transferring a known mass/aliquot of the prepared and homogenized sample to a standard geometry container. Sample was counted on a High Purity Germanium (HPGe) gamma ray detector.

Sample demonstrated acceptable results for all gamma-emitting radionuclides as reported. The method blank demonstrated acceptable results for all radionuclides as reported. Results for the Americium-241, Cobalt-60 and Cesium-137 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Cobalt-60 and Cesium-137 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.



M.R. McDougall
Laboratory Manager

Date: 5/12/2016

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit http://www.eberlineservices.com/client.htm to provide us with feedback on our services.

SECTION IV

ANALYTICAL RESULTS SUMMARY

Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354

SAF: RC-189
SDG: XP0228
Work Order: 16-04147
Date Received: 04/28/2016
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
NA	16-04147-01	LCS	4/29/2016	GAMMA_GS	10198-40-0	Cobalt-60	141.238	8.18	10.93	0.99		pCi/g
		LCS	4/29/2016	GAMMA_GS	10045-97-3	Cesium-137	90.405	8.00	9.25	1.19		pCi/g
		LCS	5/3/2016	TRITIUM_DIST_LSC	10028-17-8	Tritium	263.543	6.04	15.95	3.86		pCi/g
		LCS	5/4/2016	NI63_LSC	13981-37-8	Nickel-63	1458.508	9.20	86.25	2.41		pCi/g
		LCS	5/4/2016	PUISO_EIE_PRECIP_AEA	13981-16-3	Plutonium-238	4.544	0.70	0.82	0.11		pCi/g
		LCS	5/4/2016	PUISO_EIE_PRECIP_AEA	PU-239/240	Plutonium-239/240	7.455	1.03	1.26	0.05		pCi/g
		LCS	5/2/2016	SRTOT_SEP_PRECIP_GPC	SR-RAD	Total beta radiostrontium	38.661	1.16	13.50	0.65		pCi/g
NA	16-04147-02	BLK	4/29/2016	GAMMA_GS	14596-10-2	Americium-241	-0.004	0.03	0.03	0.04	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	14733-03-0	Bismuth-214	0.029	0.03	0.03	0.06	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	10198-40-0	Cobalt-60	0.020	0.01	0.01	0.03	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	10045-97-3	Cesium-137	0.011	0.02	0.02	0.03	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	14683-23-9	Europium-152	-0.016	0.07	0.07	0.05	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	15585-10-1	Europium-154	-0.001	0.05	0.05	0.02	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	14391-16-3	Europium-155	-0.002	0.03	0.03	0.04	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	13966-00-2	Potassium-40	0.142	0.13	0.13	0.21	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	15100-28-4	Protactinium-234m	0.742	1.74	1.74	3.02	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	15092-94-1	Lead-212	0.011	0.02	0.02	0.04	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	15067-28-4	Lead-214	0.008	0.03	0.03	0.05	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	13982-63-3	Radium-226	0.029	0.03	0.03	0.06	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	15065-10-8	Thorium-234	0.279	0.30	0.30	0.42	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	14913-50-9	Thallium-208	0.041	0.04	0.04	0.07	U	pCi/g
		BLK	4/29/2016	GAMMA_GS	15117-96-1	Uranium-235	0.049	0.06	0.07	0.11	U	pCi/g
		BLK	5/3/2016	TRITIUM_DIST_LSC	10028-17-8	Tritium	0.754	2.29	2.29	3.90	U	pCi/g
		BLK	5/4/2016	NI63_LSC	13981-37-8	Nickel-63	-1.589	1.37	1.38	2.40	U	pCi/g
		BLK	5/4/2016	PUISO_EIE_PRECIP_AEA	13981-16-3	Plutonium-238	-0.014	0.03	0.03	0.09	U	pCi/g
		BLK	5/4/2016	PUISO_EIE_PRECIP_AEA	PU-239/240	Plutonium-239/240	-0.005	0.03	0.03	0.07	U	pCi/g
		BLK	5/2/2016	SRTOT_SEP_PRECIP_GPC	SR-RAD	Total beta radiostrontium	0.285	0.32	0.34	0.66	U	pCi/g

Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354

SAF: RC-189
SDG: XP0228
Work Order: 16-04147
Date Received: 04/28/2016
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
J1V8X3	16-04147-03	DUP	4/29/2016	GAMMA_GS	14596-10-2	Americium-241	0.041	0.07	0.07	0.11	U	pCi/g
		DUP	4/29/2016	GAMMA_GS	14733-03-0	Bismuth-214	0.870	0.18	0.18	0.21		pCi/g
		DUP	4/29/2016	GAMMA_GS	10198-40-0	Cobalt-60	0.010	0.07	0.07	0.10	U	pCi/g
		DUP	4/29/2016	GAMMA_GS	10045-97-3	Cesium-137	0.067	0.06	0.06	0.10	U	pCi/g
		DUP	4/29/2016	GAMMA_GS	14683-23-9	Europium-152	0.064	0.13	0.13	0.24	U	pCi/g
		DUP	4/29/2016	GAMMA_GS	15585-10-1	Europium-154	0.048	0.21	0.21	0.12	U	pCi/g
		DUP	4/29/2016	GAMMA_GS	14391-16-3	Europium-155	0.064	0.15	0.15	0.17	U	pCi/g
		DUP	4/29/2016	GAMMA_GS	13966-00-2	Potassium-40	17.277	2.46	2.61	1.09		pCi/g
		DUP	4/29/2016	GAMMA_GS	15100-28-4	Protactinium-234m	-1.028	6.34	6.34	9.94	U	pCi/g
		DUP	4/29/2016	GAMMA_GS	15092-94-1	Lead-212	1.229	0.20	0.21	0.24		pCi/g
		DUP	4/29/2016	GAMMA_GS	15067-28-4	Lead-214	0.767	0.17	0.17	0.27		pCi/g
		DUP	4/29/2016	GAMMA_GS	13982-63-3	Radium-226	0.870	0.18	0.18	0.21		pCi/g
		DUP	4/29/2016	GAMMA_GS	15065-10-8	Thorium-234	0.427	0.74	0.74	1.13	U	pCi/g
		DUP	4/29/2016	GAMMA_GS	14913-50-9	Thallium-208	1.155	0.30	0.31	0.40		pCi/g
		DUP	4/29/2016	GAMMA_GS	15117-96-1	Uranium-235	0.266	0.34	0.34	0.52	U	pCi/g
		DUP	5/3/2016	TRITIUM_DIST_LSC	10028-17-8	Tritium	0.947	2.30	2.30	3.92	U	pCi/g
		DUP	5/4/2016	NI63_LSC	13981-37-8	Nickel-63	-0.884	1.39	1.39	2.40	U	pCi/g
		DUP	5/4/2016	PUISO_EIE_PRECIP_AEA	13981-16-3	Plutonium-238	0.061	0.07	0.07	0.10	U	pCi/g
		DUP	5/4/2016	PUISO_EIE_PRECIP_AEA	PU-239/240	Plutonium-239/240	-0.024	0.03	0.03	0.10	U	pCi/g
		DUP	5/2/2016	SRTOT_SEP_PRECIP_GPC	SR-RAD	Total beta radiostrontium	0.197	0.34	0.35	0.70	U	pCi/g
J1V8X3	16-04147-04		4/29/2016	GAMMA_GS	14596-10-2	Americium-241	0.073	0.07	0.07	0.11	U	pCi/g
			4/29/2016	GAMMA_GS	14733-03-0	Bismuth-214	0.892	0.18	0.18	0.24		pCi/g
			4/29/2016	GAMMA_GS	10198-40-0	Cobalt-60	0.028	0.07	0.07	0.10	U	pCi/g
			4/29/2016	GAMMA_GS	10045-97-3	Cesium-137	0.031	0.06	0.06	0.10	U	pCi/g
			4/29/2016	GAMMA_GS	14683-23-9	Europium-152	-1.659	0.36	0.37	0.23	U	pCi/g
			4/29/2016	GAMMA_GS	15585-10-1	Europium-154	-0.051	0.11	0.11	0.12	U	pCi/g
			4/29/2016	GAMMA_GS	14391-16-3	Europium-155	0.390	0.15	0.15	0.22		pCi/g
			4/29/2016	GAMMA_GS	13966-00-2	Potassium-40	16.996	2.49	2.64	1.45		pCi/g
			4/29/2016	GAMMA_GS	15100-28-4	Protactinium-234m	5.348	6.35	6.36	10.96	U	pCi/g
			4/29/2016	GAMMA_GS	15092-94-1	Lead-212	1.093	0.20	0.21	0.25		pCi/g
			4/29/2016	GAMMA_GS	15067-28-4	Lead-214	0.762	0.15	0.16	0.25		pCi/g
			4/29/2016	GAMMA_GS	13982-63-3	Radium-226	0.892	0.18	0.18	0.24		pCi/g
			4/29/2016	GAMMA_GS	15065-10-8	Thorium-234	0.651	0.73	0.73	1.13	U	pCi/g
			4/29/2016	GAMMA_GS	14913-50-9	Thallium-208	1.050	0.27	0.28	0.36		pCi/g
			4/29/2016	GAMMA_GS	15117-96-1	Uranium-235	0.084	0.33	0.33	0.51	U	pCi/g
			5/3/2016	TRITIUM_DIST_LSC	10028-17-8	Tritium	0.188	2.27	2.27	3.89	U	pCi/g
			5/4/2016	NI63_LSC	13981-37-8	Nickel-63	-0.770	1.35	1.35	2.33	U	pCi/g
			5/4/2016	PUISO_EIE_PRECIP_AEA	13981-16-3	Plutonium-238	0.101	0.08	0.08	0.10	U	pCi/g
			5/4/2016	PUISO_EIE_PRECIP_AEA	PU-239/240	Plutonium-239/240	0.011	0.04	0.04	0.09	U	pCi/g
			5/2/2016	SRTOT_SEP_PRECIP_GPC	SR-RAD	Total beta radiostrontium	0.432	0.35	0.38	0.71	U	pCi/g
J1V8X3	16-04147-05	MS	5/3/2016	TRITIUM_DIST_LSC	10028-17-8	Tritium	236.294	5.80	14.45	3.89		pCi/g
		MS	5/4/2016	NI63_LSC	13981-37-8	Nickel-63	1398.294	8.92	82.70	2.36		pCi/g

SECTION V

ANALYTICAL STANDARD

National Institute of Standards & Technology
Certificate

Standard Reference Material 4334H
Plutonium-242 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive plutonium-242 nitrate and nitric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of alpha-particle counting instruments and for the monitoring of radiochemical procedures.

Radiological Hazard: The SRM ampoule contains plutonium-242 with a total activity of approximately 150 Bq. Plutonium-242 decays by alpha-particle emission. None of the alpha particles escape from the SRM ampoule. During the decay process, X-rays and gamma rays with energies from 10 keV to 160 keV are also emitted. Most of these photons escape from the SRM ampoule but their intensities are so small that they do not represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard: The SRM ampoule contains nitric acid (HNO_3) with a concentration of 3 moles per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling: The SRM should be stored and used at a temperature between 5 °C and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least January 2015. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation: This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, M.P. Unterweger, Acting Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group. The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program.

Lisa R. Karam, Acting Chief
Ionizing Radiation Division

Gaithersburg, Maryland 20899
January 2005

Robert L. Watters, Jr., Chief
Measurement Services Division

*Notes and references are on pages 5 to 7.

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 11/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
(RECERTIFICATION)
MP 009

CURRENT DATE: 5/4/2015 0:00

SOLUTION REFERENCE #: NIST 4334H

SOLUTION #: Pu-20

Principal Radionuclide	Half Life, Years	Half Life, Days
^{242}Pu	3.733E+05	1.363E+08

Radionuclide: ^{242}Pu

Certified Activity: µCi

Certified Concentration: 7.111E-04 µCi per gram

Reference Date: 6/7/1994 0:00 EST

Ampoule /Solution Gross: 9.5668 Weight, Grams

Empty Ampoule: 4.0566 Weight, Grams

Solution Net: 5.5102 Weight, Grams

Total Activity in Ampoule: 3.9182E-03 µCi

Chemical Composition of Standard Solution

$^{242}Pu(NO_3)_4$ in 2N HNO_3

Dilution Instructions:

Dilution Solvent Used: 2N HNO_3

Dilute to a volume of: 1000.00 milliliters

Certified Total Activity of: 3.9182E-03 µCi

Which Equals: 8.698E+03 dpm at the date listed above

And after dilution the activity of this solution is: 8.698E+00 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: April 27, 2016

Recertified By: _____ Date: 05/04/15

QC Approval: _____ Date: 5-5-15

National Institute of Standards & Technology

Certificate

Standard Reference Material® 4323B

Plutonium-238 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive plutonium-238 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit consists of a solution, whose composition is specified in Table 1, contained in a flame-sealed 5 mL NIST borosilicate-glass ampoule (see Note 1)*.

The certified **Plutonium-238** massic activity value, at a **Reference Time of 1200 EST, 15 November 1999**, is:

$$(41.52 \pm 0.28)\ \mathrm{Bq \cdot g^{-1}}$$

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Table 1. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guide (see Note 2). Table 2 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4323B** is valid indefinitely provided the SRM is handled and stored properly and no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is indefinitely homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Use"). The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

This SRM may represent a radiological hazard and a chemical hazard. Consult the Material Safety Data Sheet (MSDS), enclosed with the SRM shipment, for details (see Note 1).

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, M.P. Unterweger, Group Leader. The overall technical direction and physical measurement leading to certification were provided by L. Lucas of the NIST Radioactivity Group.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Measurement Services Division.

INSTRUCTIONS FOR USE

Storage: SRM 4323B should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container should always be clearly marked as containing radioactive material.

Handling: If the ampoule is transported, it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of both the radioactivity and the strong base or acid. The ampoule should be opened only by persons qualified to handle both radioactive material and alkaline and/or acidic solutions. Appropriate shielding and/or distance should be used to minimize personnel exposure. Refer to MSDS for further information.

Lisa R. Karam, Chief
Ionizing Radiation Division

Robert L. Watters, Jr., Chief
Measurement Services Division

Gaithersburg, Maryland 20899
Certificate Issue Date: 30 July 2009
See Certificate Revision History on Last Page

* Notes and references may be found on page 4.

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 7/3/2015 0:00

SOLUTION REFERENCE #: NIST 4323B

SOLUTION #: Pu-21

Principal Radionuclide	Half Life, Years	Half Life, Days
^{238}Pu	8.769E+01	3.203E+04

Radionuclide: ^{239}Pu

Reference Date: 11/15/1999 0:00

Certified Activity: 5.611E-03 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross	9.4026	Weight, Grams
Empty Ampoule	4.4019	Weight, Grams
Solution Net	5.0007	Weight, Grams
Total Activity in Ampoule	0.0056	µCi

Chemical Composition of Standard Solution

$^{238}Pu(NO_3)_4$ in 2N HNO_3

Dilution Instructions:

Dilution Solvent Used: 4M HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.0056 µCi Which Equals 1.246E+04 dpm at the date listed above

And after dilution the activity of this solution is 1.246E+01 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: June 27, ~~2014~~ 2016 MLT

Verified & Approved By _____ Date: 7/3/15 ~~6/27/2013 0:00~~

QC Approval _____ Date: 7-6-15

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY-LAS VEGAS
P.O. BOX 93478
LAS VEGAS, NEVADA 89193-3478
702/798-2100

Calibration Certificate

Description

Principal Radionuclide	Pu-239
Total Mass of this Solution	Approx. 5 grams
Total Activity	Approx. 62 nanocuries
Half-life	24,110 ± 30 years
Activity Concentration	12.4 nanocuries/gram
Date and Time of Standardization	February 2, 1995 0400 hours PST
Solution Number	94002-1

Measurement

Method of Measurement:

The activity of the primary solution was measured by liquid scintillation counting. The activity of the dilution was also measured by liquid scintillation counting.

Activity of daughter radionuclide:

The principal activity was accompanied at the quoted time by :
[ ] of the daughter nuclide..... [ ]

Useful Life

We recommend that this solution should not be used after..... 2001

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.14; 10/10/12
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
RECERTIFICATION
MP 009

CURRENT DATE: 3/5/2016 0:00

SOLUTION REFERENCE #: EPA 94002-1 | SOLUTION #: Pu-22

Principal Radionuclide	Half Life, Years	Half Life, Days
^{239}Pu	2.400E+04	8.766E+06

Radionuclide: ^{239}Pu
Reference Date: 2/2/1995 1:00
Certified Activity: 7.019E-02 µCi
Certified Concentration: µCi per gram

Ampoule /Solution Gross	9.7960	Weight, Grams
Empty Ampoule	4.1357	Weight, Grams
Solution Net	5.6603	Weight, Grams
Total Activity in Ampoule	0.0702	µCi

Chemical Composition of Standard Solution

$^{239}Pu(NO_3)_4$ in 2N HNO_3

Dilution Instructions:

Dilution Solvent Used: 4M HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.0702 µCi Which Equals 1.558E+05 dpm at the date listed above

And after dilution the activity of this solution is **1.558E+02** dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: February 25, 2017

Verified & Approved By _____ Date: 3/5/2016 0:00

QC Approval _____ Date: 3/5/16

(H-5)

CERTIFICATE OF CALIBRATION
BETA STANDARD SOLUTION

QA/QC REVIEWED
Date 4/16/99 Initials

Radionuclide	H-3	Customer:	THERMO NUTECH
Half Life:	12.35 ± 0.1 years	P.O.No.:	5108
Catalog No.:	7003	Reference Date:	15 Apr 99 12:00 PST.
Source No.:	660-25	Contained Radioactivity:	99.61 μCi (3686 kBq)

Description of Solution

a. Mass of solution:	4.91974 grams in 5 mL flame sealed ampoule
b. Chemical form:	Tritiated water
c. Carrier content:	Not applicable
d. Density:	0.9982 gram/ml @ 20°C.

Radioimpurities

None detected

Radioactive Daughters

None

Radionuclide Concentration

20.25 μCi/gram

Method of Calibration

This source was prepared from a weighed aliquot of solution whose concentration in μCi/gram was determined by a liquid scintillation counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±3.0%
b. Random uncertainty in assay:	±1.9%
c. Random uncertainty in weighing(s):	±0.0%
d. Total uncertainty at the 99% confidence level:	±3.6%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

See reverse side for Leak Test(s) applied to this source.

Notes

1. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay(and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)

QUALITY CONTROL

2 Apr 99
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 N. KEYSTONE STREET
BURBANK, CALIFORNIA 91504
818·843·7000 FAX 818·843·6168

00028

Eberline Services

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

Rev.8, 11/01/05
Title: Radioactive Reference Standards Solutions & Records

Eberline Services - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION (RECERTIFICATION)
QCP 009-1

SOLUTION REFERENCE # IPL 660-25 **CURRENT DATE** 09/30/15
SOLUTION # H-5

Principal Radionuclide	Half Life, Years	Half Life, Days
^{3}H	1.235E+01	4.511E+03

Radionuclide ^{3}H
Reference Date 4/15/1999 0:00
Certified Activity 9.961E+01 µCi
Certified Concentration µCi per gram

Ampoule /Solution Gross Weight, Grams
Empty Ampoule Weight, Grams
Solution Net Weight, Grams
Total Activity in Ampoule 99.6100 µCi

Chemical Composition of Standard Solution
$^{3}H_2O$ in water

Dilution Instructions: **Dilution Solvent Used** Water

Dilute to a volume of 1000.00 **milliliters**

Certified Total Activity of 99.6100 µCi **Which Equals** 2.211E+08 **dpm**

And after dilution the activity of this solution is 2.211E+05 **dpm/ml**

Tthis standard was recertified by measurement of the activity of its daughter solution, H-5a.

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data **processing software.**

Expiration Date: 09/14/16

Verified & Approved By _____ Date: 09/30/15

QC Approval _____ Date: 10/1/15

Eberline Services

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

Title: Radioactive Reference Standards Solutions & Records

Eberline Services - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION (RECERTIFICATION)

	QCP-009-1-A	Date	9/30/15
Solution Reference #	IPL 660-25	Solution #	H-5a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{3}H	1.235E+01	4.511E+03

Radionuclide of Interest	^{3}H	Reference Date	4/15/1999 0:00
Parent Solution Conc.	2.21E+05 dpm/ml		

Chemical Composition of Standard Solution
$^{3}H_2O$ in water

Dilution Instructions: **Dilution Solvent Used** Water

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	65.0000 ml	Final Activity Concentration:	1.4372E+04 dpm/ml
Total Activity:	1.4372E+07 dpm		
Final Volume:	1000.00 ml		

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: 09/14/16

Recertified By: _____ Date: 09/30/15

QC Approval: _____ Date: 10/1/15

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

92791
Ni-63 5 mL Liquid in Flame Sealed Vial

Customer: Eberline Analytical Corporation
P.O. No.: 7873, Item 1 Product Code: 8063

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

			Uncertainty*, % Type			
Isotope	Half-Life, Days	Activity (Bq)	u_A	u_B	U	Reference Date (12:00 PM EST)
Ni-63	3.656E+04	3.733E+05	0.2	1.5	3.0	02/06/2013

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

Comments:
Impurities: γ-impurities<0.1%.
5.01669 g 0.1M HCl solution with approximately 30 µg/g Ni carrier.

Source Prepared by: R. Ormsby
R. Ormsby, Radiochemist

QA Approved: J.D. McCorvey
J.D. McCorvey, Counting Room Manager

Date: 29JAN13

ACCREDITED SOURCE CALIBRATION LABORATORY — HEALTH PHYSICS SOCIETY — FOUNDED 1955

ANA Form005 Rev —

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.4; 10/10/12
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
RECERTIFICATION

CURRENT DATE: 1/25/16

SOLUTION REFERENCE #: Analytics 92791

SOLUTION #: Ni-3

Principal Radionuclide	Half Life, Years	Half Life, Days
^{63}Ni	1.001E+02	3.656E+04

Radionuclide: ^{63}Ni

Reference Date: 2/6/2013 0:00

Certified Activity: 1.009E+01 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross	9.2445	Weight, Grams	
Empty Ampoule	4.2269	Weight, Grams	
Solution Net	5.0176	Weight, Grams	Mass checks certificate
Total Activity in Ampoule	10.0892	µCi	

Chemical Composition of Standard Solution

$NiCl_2$ in 0.1 N HCl

Dilution Instructions:

Dilution Solvent Used: 0.1 N HCl

Dilute to a volume of 1000.00 milliliters or grams

Certified Total Activity of 10.0892 µCi Which Equals 2.240E+07 dpm at the date listed above

And after dilution the activity of this solution is 2.240E+04 dpm/g

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: January 25, 2017

Verified & Approved By _____ Date: 3/5/16

QC Approval _____ Date: 3/11/16

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

GAS-1402

98503
Sand in 16 Ounce PP Taral Jar Filled to Capacity

Customer: Eberline Analytical Corporation
P.O. No.: OR-1405030, Item 6 Product Code: 8401-EG-SAN
Reference Date: 01-Oct-2014 12:00 PM EST **Grams of Master Source:** 0.017608

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*
Am-241	59.5	1.580E+05	———	2.030E+03	0.1	1.8	3.6	4π LS
Cd-109	88.0	4.614E+02	1.663E+05	2.929E+03	0.5	2.0	4.1	HPGe
Co-57	122.1	2.717E+02	8.913E+04	1.569E+03	0.4	1.7	3.5	HPGe
Ce-139	165.9	1.376E+02	1.241E+05	2.185E+03	0.4	1.7	3.5	HPGe
Hg-203	279.2	4.659E+01	2.675E+05	4.710E+03	0.3	1.7	3.5	HPGe
Sn-113	391.7	1.151E+02	1.796E+05	3.163E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.099E+04	1.111E+05	1.956E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.223E+05	7.435E+03	0.7	1.7	3.7	HPGe
Co-60	1173.2	1.925E+03	2.091E+05	3.683E+03	0.7	1.8	3.9	HPGe
Co-60	1332.5	1.925E+03	2.094E+05	3.687E+03	0.7	1.8	3.9	HPGe
Y-88	1836.1	1.066E+02	4.471E+05	7.872E+03	0.7	1.7	3.7	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

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	PuISO	1	pCi	g	Washington Closure Hanford

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
PU-238		100.87%	18.11%	100.00%	0.68%	4.50E+00	3.06E-02	4.54E+00	8.23E-01	Pu-21	1.09E+01	6.80E-01	9.14E-01
PU-239		101.23%	16.88%	100.00%	3.20%	7.37E+00	2.36E-01	7.46E+00	1.26E+00	Pu-22	1.56E+02	3.20E+00	1.05E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

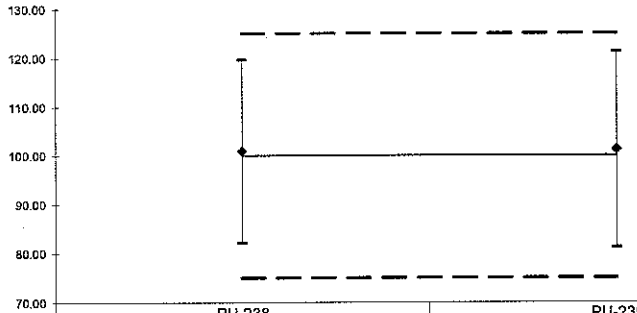
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
PU-238	0.73	50.38	1.01E-01	8.44E-02	6.06E-02	6.99E-02
PU-239	1.35	554.15	1.13E-02	4.05E-02	-2.40E-02	3.16E-02

QC Summary

LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.01	OK				NA	OK
1.01	OK				NA	OK

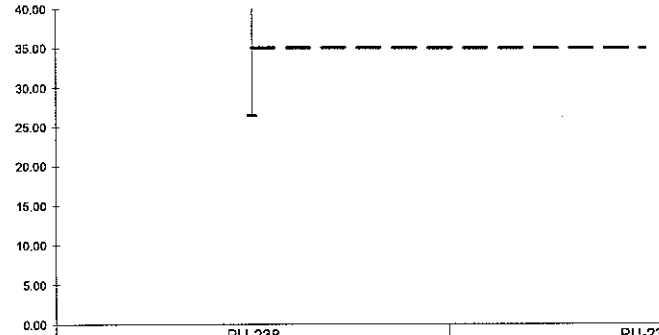
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	PuISO	1	pCi	g	Washington Closure Hanford

LCS % Recovery



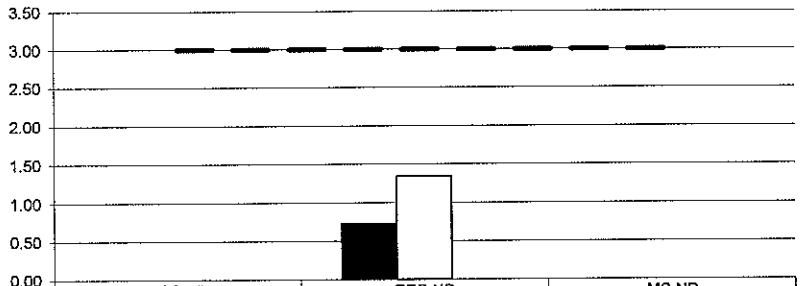
	PU-238	PU-239
Lower Error	82.08	81.15
Upper Error	119.67	121.30
%R	100.87	101.23
LCL	75	75
Mean	100	100
UCL	125	125

Replicate Sample RPD



	PU-238	PU-239
Lower Error	74.37	-1015.95
Upper Error	26.39	2124.25
RPD	50.38	554.15
CL	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
PU-238	0.00	0.73	0.00
PU-239	0.00	1.35	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	SrTOT	1	pCi	g	Washington Closure Hanford

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
TOTAL SR		75.00%	34.92%	100.00%	0.56%	5.16E+01	2.89E-01	3.87E+01	1.35E+01	Sr-13a	1.61E+03	5.60E-01	7.09E-02

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

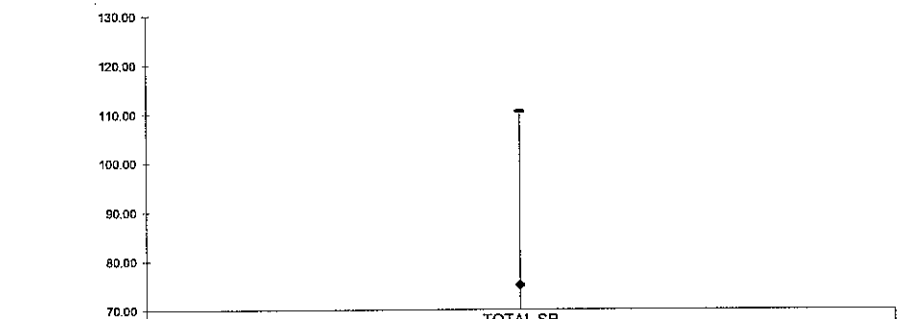
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
TOTAL SR	0.89	74.87	4.32E-01	3.85E-01	1.97E-01	3.45E-01

QC Summary

LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
0.75	INV				NA	OK

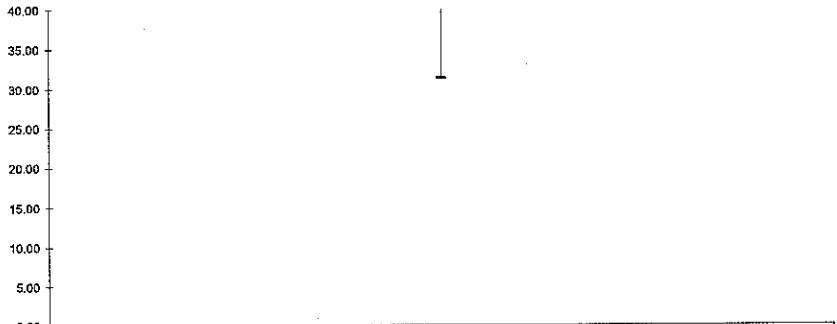
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	SrTOT	1	pCi	g	Washington Closure Hanford

LCS % Recovery



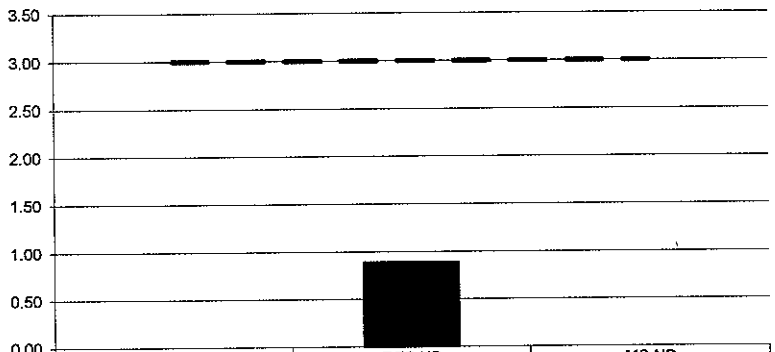
	TOTAL SR
Lower Error	39.51
Upper Error	110.48
%R	75.00
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



	TOTAL SR
Lower Error	118.37
Upper Error	31.36
RPD	74.87
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
TOTAL SR	0.00	0.89	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	H0003	1	pCi	g	Washington Closure Hanford

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
H-3		101.20%	6.05%	100.00%	3.60%	2.60E+02	9.37E+00	2.64E+02	1.59E+01	H-5a	5.49E+03	3.60E+00	1.05E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*
H-3	1.62	94.78%	2.49E+02	8.97E+00	2.36E+02	1.44E+01	1.88E-01	2.27E+00	1.00E+00	H-5a	5.49E+03	3.60	1.01E-01

Replicate Sample

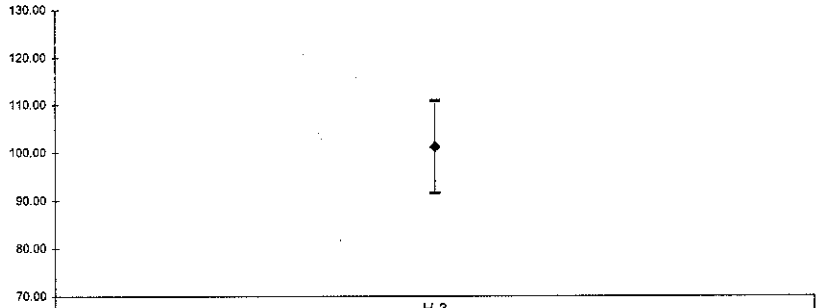
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
H-3	0.46	133.63	1.88E-01	2.27E+00	9.47E-01	2.30E+00

QC Summary

LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.01	OK			OK	INV	OK

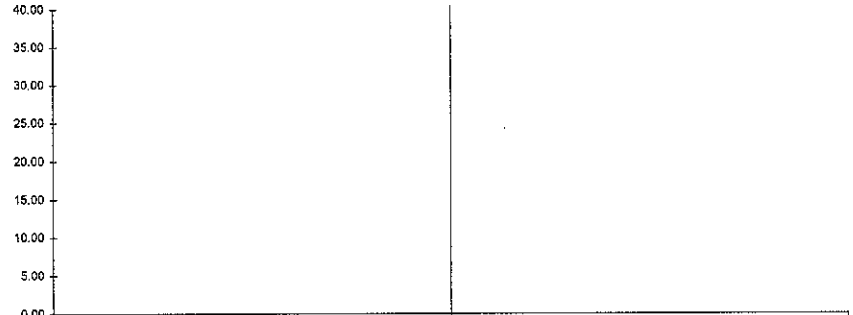
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	H0003	1	pCi	g	Washington Closure Hanford

LCS % Recovery



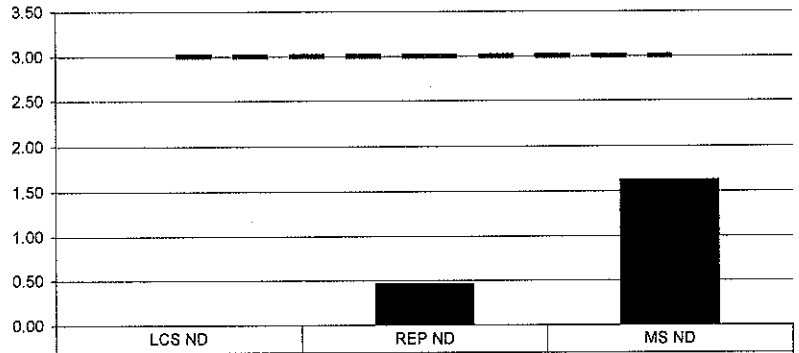
	H-3
Lower Error	91.55
Upper Error	110.86
%R	101.20
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



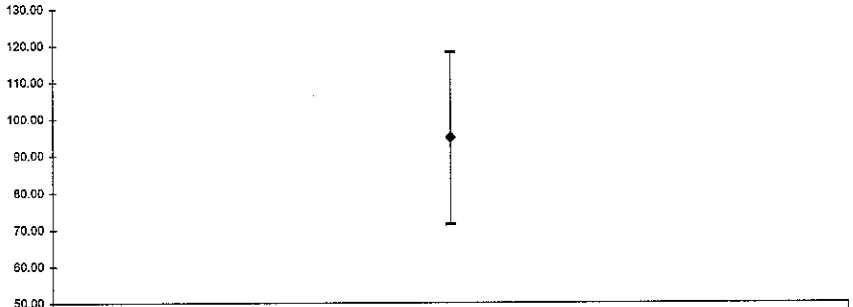
	H-3
Lower Error	402.87
Upper Error	-135.61
RPD	133.63
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
H-3	0.00	0.46	1.62
UCL	3	3	3

Matrix Spike % Recovery



	H-3
Lower Error	71.37
Upper Error	118.20
%R	94.78
LCL	65
Mean	100
UCL	135

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	Ni063	1	pCi	g	Washington Closure Hanford

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
Ni-63		97.78%	5.91%	100.00%	3.00%	1.49E+03	4.47E+01	1.46E+03	8.63E+01	Ni-3	2.19E+04	3.00E+00	1.51E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*
Ni-63	2.38	92.91%	1.51E+03	4.52E+01	1.40E+03	8.27E+01	-7.70E-01	1.35E+00	1.02E+00	Ni-3	2.19E+04	3.00	1.56E-01

Replicate Sample

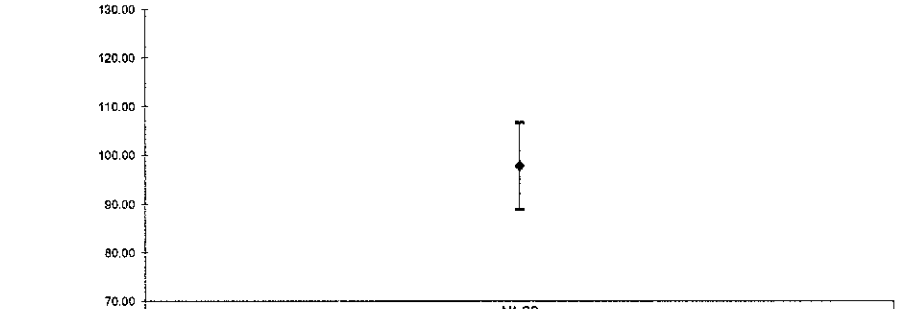
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
Ni-63	0.12	13.78	-7.70E-01	1.35E+00	-8.84E-01	1.39E+00

QC Summary

LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
0.98	OK			OK	OK	OK

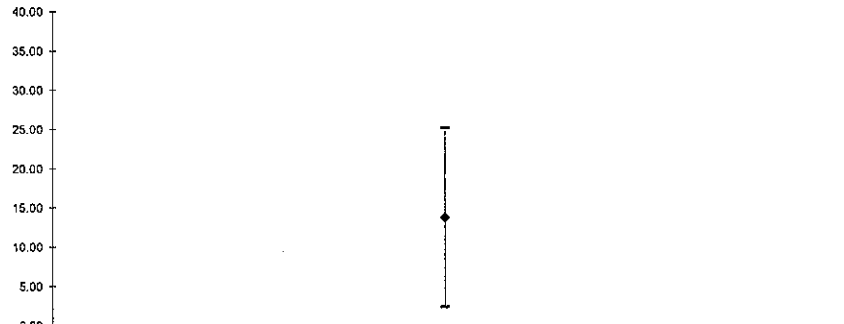
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	Ni063	1	pCi	g	Washington Closure Hanford

LCS % Recovery



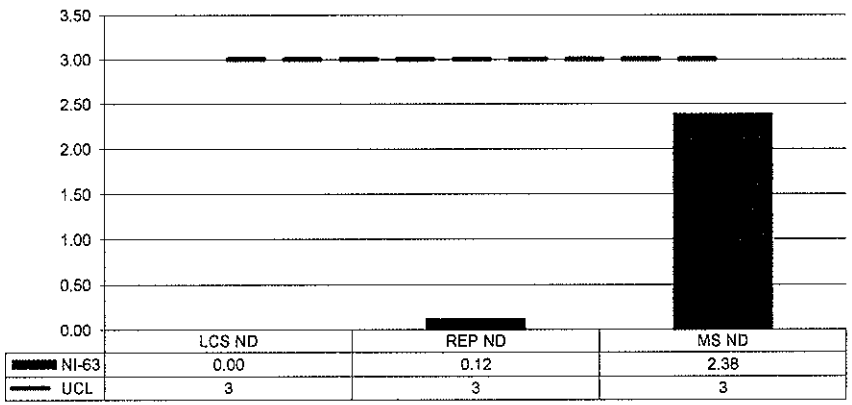
	Ni-63
Lower Error	88.87
Upper Error	106.70
%R	97.78
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



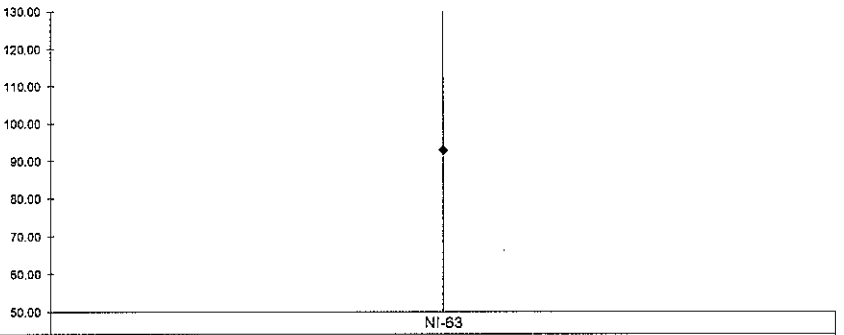
	Ni-63
Lower Error	2.37
Upper Error	25.18
RPD	13.78
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
NI-63	0.00	0.12	2.38
UCL	3	3	3

Matrix Spike % Recovery



	Ni-63
Lower Error	-34.97
Upper Error	220.79
%R	92.91
LCL	65
Mean	100
UCL	135

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	Gamma	1	pCi	g	Washington Closure Hanford

Laboratory Control Sample

Analyte		LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
CO-60		103.06%	7.74%	100.00%	4.00%	1.37E+02	5.48E+00	1.41E+02	1.09E+01	GAS-1302	1.37E+02	5.48E+00	7.36E+02
CS-137		104.00%	10.23%	100.00%	4.00%	8.69E+01	3.48E+00	9.04E+01	9.25E+00	GAS-1302	8.69E+01	3.48E+00	7.36E+02

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

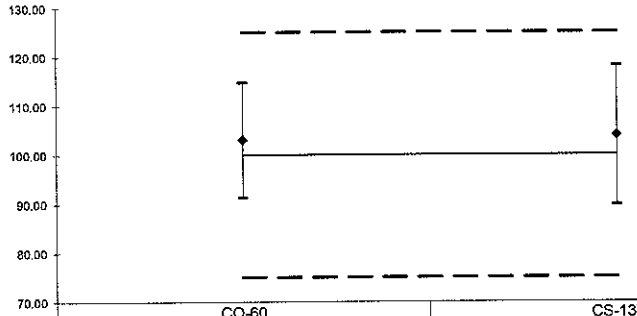
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
AM-241	0.60	55.70	7.29E-02	7.26E-02	4.11E-02	7.38E-02
CO-60	0.34	94.99	2.78E-02	7.41E-02	9.90E-03	7.03E-02
CS-137	0.81	72.00	3.15E-02	5.91E-02	6.69E-02	6.18E-02

QC Summary

LCS Relative Bias	*LCS % R*		*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.03	OK		<CS-137	AM-241>	NA	
1.04	OK		<CO-60	CO-60>	NA	OK
				CS-137>	NA	OK

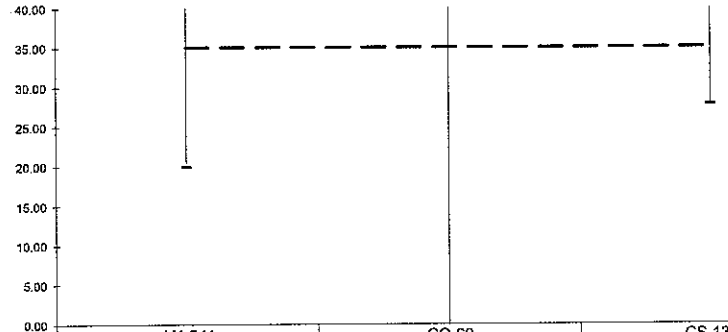
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-04147	Gamma	1	pCi	g	Washington Closure Hanford

LCS % Recovery



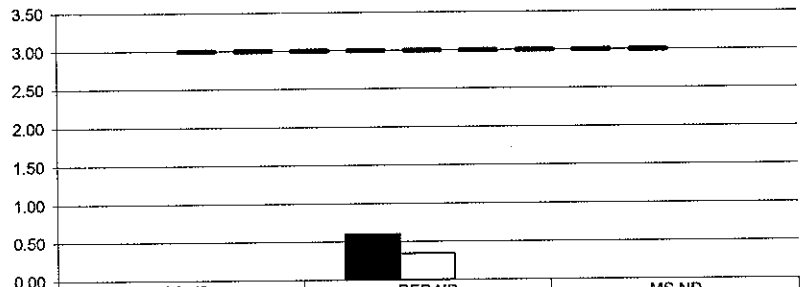
	CO-60	CS-137
Lower Error	91.33	89.77
Upper Error	114.80	118.23
%R	103.06	104.00
LCL	75	75
Mean	100	100
UCL	125	125

Replicate Sample RPD



	AM-241	CO-60	CS-137
Lower Error	91.48	276.86	116.25
Upper Error	19.93	-86.88	27.75
RPD	55.70	94.99	72.00
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
CO-60	0.00	0.60	0.00
CS-137	0.00	0.34	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

SECTION VII

LABORATORY TECHNICIAN'S NOTES

ISO-PU NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	16-04147
Analysis Code	PuISO
Run Number	1

#	Date	Dept	User	Notes
1	04/29/16 09:08	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- SUBMITTED SAMPLES TO SEPARATIONS

JWolfe
4/29/16

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	16-04147
Analysis Code	PuISO
Run Number	1

#	Date	Dept	User	Notes
1	04/29/16 09:08	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- SUBMITTED SAMPLES TO SEPARATIONS
2	05/03/16 10:58	CHEM	TSMITH	Followed steps 12.3.1 to 12.3.7 in AP-005 . (Column separation for Plutonium by Eichrom Anion resin)
3	05/04/16 05:11	CHEM	TSMITH	Followed steps 12.3.7 to 12.4.5 in AP-005 . (Preciptiated and filtered samples for Plutonium)

5/4/16
JM

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-04147	
Analysis Code	Run
PuISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
017047P	Hydrofluoric Acid	Reagent Grade	JWOLFE	4/29/2016
017152P	Nitric Acid	Reagent Grade	JWOLFE	4/29/2016
017361P	Perchloric Acid	Reagent Grade	JWOLFE	4/29/2016
016679P	Sulfuric Acid	Reagent Grade	JWOLFE	4/29/2016
017344P	Anion Exchange Resin	Reagent Grade	TSMITH	5/3/2016
017548S	Nitric Acid	8N	TSMITH	5/3/2016
017555S	Hydrochloric Acid	8N	TSMITH	5/3/2016
017562S	HCl - NH4I	8N - 0.1M	TSMITH	5/3/2016
017518P	Hydrochloric Acid	Reagent Grade	TSMITH	5/3/2016
017047P	Hydrofluoric Acid	Reagent Grade	TSMITH	5/4/2016
016973S	Neodymium Carrier	1 mg/ml	TSMITH	5/4/2016
017408P	Reagent Alcohol	Reagent Grade	TSMITH	5/4/2016
016606P	Titanous Chloride	Reagent Grade	TSMITH	5/4/2016
017506S	Carbon substrate	Solution	TSMITH	5/4/2016

Alpha #1

Date	Sample	Client	Read Time	Clear Time	Analyst	Fee
5/4	1604147A(1-4)	Washington	0832	1452	Pat 50	—
5/4	1604078A(1-3)	Accutest	0833	1452	Rob	—

TOT SR NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	16-04147
Analysis Code	SrTOT
Run Number	1

#	Date	Dept	User	Notes
1	05/02/16 06:43	PREP	MHIGHTOWER	Samples were aliquoted. Spike, carrier, and HNO3 were added and samples were dried. HNO3 and H2O2 were added and samples were dried, then transferred to c-tubes using 8M HNO3. Samples were centrifuged and run over columns conditioned with 8M HNO3. Columns were then rinsed with 8N HNO3. Waste was discarded. T0 was recorded. Columns were eluted with .05M HNO3. Solution was collected in clean c-tubes, dried on tared planchets, weighed, covered with foil, and submitted to count room

MH 2 MAY 16

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-04147	
Analysis Code	Run
SrTOT	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
016080P	Hydrogen Peroxide	0.3	MHIGHTOWER	5/2/2016
016886D01	Nitric Acid	0.05N	MHIGHTOWER	5/2/2016
016886D04	Nitric Acid	8N	MHIGHTOWER	5/2/2016
016886P	Nitric Acid	Reagent Grade	MHIGHTOWER	5/2/2016

CB4110 Aqua

Date	Samples	Client	Facility	CT/Hrs	Analysis	Tech
4/29	160314ZRA(1)	Accutest	1024	2hr	RA8	KB
4/29	160314ZRA(2-9)	Accutest	1024	2hr	RA8	KB
4/29	160405ZRA(1)	Ucon	1132	2hr	RA8	KB
4/29	160406SR(1-4)	Unitech	1229	1hr	SR207	KB
4/29	160407SR(1-4)	Unitech	1229	1hr	SR207	KB
4/29	Weekly Blood	LAB	1334	12hr	LAB	KB
5/2	Blood	LAB	0456	6hr	LAB	KB
5/2	ETFOL	LAB	0605	1hr	LAB	
5/2/16	160409IRA(1-12)	Aerostar	1000	2 hrs	RA8	ICB
5/2/16	160414ZSR(1-4)	WASH. Closure	1205	2 hr	TOT Sm	ICB
5/2/16	160408ZSR(1-4)	Unitech	1206	1 hr	TOT Sm	ICB

H-3 NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	16-04147
Analysis Code	H0003
Run Number	1

#	Date	Dept	User	Notes
1	05/03/16 13:58	PREP	JPACHELLA	SAMPLES WERE ALIQUOTED AND EQUILIBRATED WITH DI H2O. SAMPLES WERE ALLOWED TO SIT OVER NIGHT. SAMPLES WERE SHAKEN FOR 15 MINUTES AND CENTRIFUGED. EQUILIBRATE WAS DECANTED AND DISTILLED. DISTILLATE WAS ALIQUOTED AND MIXED WITH ULTIMA GOLD XR. SAMPLES WERE SUBMITTED TO COUNT ROOM.

5-3-16 JPachella

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-04147	
Analysis Code	Run
H0003	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
016329P	Ultima Gold XR	Reagent Grade	JPACHELLA	5/3/2016

Tricarb 3100 (B) 63

DATE	SAmple #	Protocol	Client	Lost Time	CT Time	Analysis	Tech
4/28	160405BA(1-3,5,B)	3	UCOR	1041	10hr	H-3	—
4/28	160407BA(1-4,6,B)	13	UCOR	1043	6hr	Tc99	—
4/29	160407BA(1-13,B)	1	UT Div of Waste	1220	14hr	H-3	—
5/2	160414SA(1-3,5,A,B)16	1	UCOR	0920	7hr	C-14	—
5/2	160414GA(1-3,5,B,A)	1	UCOR	0920	7hr	C-14	—
5/2	160405TA(1-4,5)	25	UCOR	1242	5hr	Pu241	—
5/2/16	160410BA(1-2,B)	1	Unitech	1504	5hrs	H3	ICB
5/2/16	160408BA(1-4,B)	3	Unitech	1516	5hrs	H3	ICB
5/3/16	160406BA(1-4,B)	16	Unitech	0827	5hr	Tc99	—
5/3/16	160407BA(1-4,B)	24	UCOR	1348	5hrs	Pu241	ICB
5/3/16	160414TA(1-5,B)	1	Wash. Closure	1456	6hrs	H3	ICB

NI-63 NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	16-04147
Analysis Code	Ni063
Run Number	1

#	Date	Dept	User	Notes
1	05/04/16 12:42	CHEM	KCOULSTON	SAMPLES WERE ALIQUOTED. SPIKES AND CARRIER WERE ADDED. SAMPLES WERE DRIED. DI H2O WAS ADDED. SAMPLES WERE PLACED ON STIRRING HOTPLATES. HCL WAS ADDED WHILE STIRRING. CITRIC ACID WAS ADDED WHILE STIRRING. NH4OH WAS ADDED TILL PH OF 8 WAS ACHIEVED. THREE ML OF DMG WERE ADDED. SAMPLES WERE FILTERED. PRECIPITATE WAS DISSOLVED WITH 8M HNO3. SAMPLES WERE DRIED 3 TIMES TO REMOVE HNO3. SAMPLES WERE TRANSFERRED TO VIALS WITH DI H2O. SCINTILLATIION COCKTAIL WAS ADDED. SAMPLES WERE SUBMITTED TO COUNT ROOM.

Kristen Coulston 5/4/16

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-04147	
Analysis Code	Run
Ni063	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
016370P	Ammonium Hydroxide	Reagent Grade	KCOULSTON	5/4/2016
016468S	Citric Acid	1M	KCOULSTON	5/4/2016
016469S	Dimethylglyoxime	1%	KCOULSTON	5/4/2016
016467S	Nickel Chloride	10 mg/ml	KCOULSTON	5/4/2016

Tricarb 3100 (A) 93

DATE	Sample #	Protocol	Client	Load Time	CT time	Analysis	Tech
4/28/16	1604027A (1-4, PB, RS)	21	Unitech	1515	6 HR	Ni-63	AG
4/28	1604058A (1-4, B)	22	UCor	1721	7HR	Ni-63	C
5/2	1604058A (1-4)	22	UCor	0721	7H	Ni-63	—
5/2	1604073A (1-4, B)	21	UCor	1304	7HR	Ni-63	C
5/2	1604060A (1-4, B, N)	22	Unitech	1304	6h	Ni-63	—
5/2/16	1604058A (1-4, 7)	26	UCOR	1424	5hr	Pu241	KB
5/2/16	1604073A (1-4 ms)	21	UCOR	1509	1 hr	Ni-63	KB
5/3/16	1604068A (1-4, B)	16	Unitech	0729	5hr	Tc99	—
5/3/16	1604074A (1-4, B)	17	Unitech	1228	5HRS	Tc99	KB
5/3/16	1604083A (1-4, B)	16	Unitech	1505	5 hr	Tc99	KB
5/4/16	1604147A (1-5, B, R)	21	WASH. Closure	1457	7hr	Ni-63	KB

GAMMA NOTES

DATE	SAMPLE #	Client	Load Time	CT Time	Analysis	Tech
4/27	GFS H2O	LAB	0512	1L	✓	C
4/27	Rinse	LAB	0532	1L	✓	C
4/27	1604136-06	Texaco	0745	2L	✓	
4/27	1604136-07	Texaco	0851	2L	✓	
4/27	1604132-06	James R.	0957	2L	✓	—
4/27/16	1604132-09	James R. Reed	1200	2 hr	✓	KD
4/27/16	1604138-06	Wachters	1401	2 hr	✓	KB
4/27/16	1604138-08	Wachters	1602	2 hr	✓	KB
4/27/16	1604132-11	James R. Reed	1804	2 hr	✓	KD
4/28	GFS H2O	LAB	0532	1L	✓	C
4/28	Rinse	LAB	0546	1L	✓	
4/28	GFS H2O	LAB	0606	1L	✓	—
4/28	1604028-03	Anixter	0625	2L	✓	C
4/28	1604028-04	Anixter	0726	2L	✓	
4/28	1604028-07	Anixter	0832	2L	✓	—
4/28	1604028-11	Anixter	0930	2L	✓	
4/28	1604028-15	Anixter	1035	2L	✓	C
4/28	1604021-07	Anixter	1158	2L	✓	—
4/28	1604021-10	Anixter	1300	2L	✓	
4/28	1604021-14	Anixter	1403	2L	✓	C
4/28/16	1604132-12	James Reed	1505	2 hr	✓	AG
4/29	GFS H2O	LAB	0548	1L	✓	C
4/29	Rinse	LAB	0540	1L	✓	
4/29	1604132-18	James R.	0558	2L	✓	—
4/29	1604147-02	Washington	0805	2L	✓	C
4/29	1604147-01	Washington	1012	2L	✓	

DATE	Sample #	Client	Lab Time	CT Time	Analysis	Tech
4/26/16	1603098-04	Republic Serv.	1430	15 mins	Ba	KB
4/26/16	1603098-06	Republic Servs	1446	25 mins	Ba	KB
4/27	GAC 14	LAS	0512	15	✓	
4/27	Dairyn	LAS	0552	15	✓	
4/27	1604136-01	Tesoro	0652	3h	✓	
4/27	1604136-02	Tesoro	0702	1h	✓	
4/27	1604132-01	James R.	0834	7h	✓	
4/27/16	1604138-02	WAchters	1348	2hr	✓	KB
4/27/16	1604138-01	WAchters	1550	30mins	✓	KB
4/27/16	1604119-06	USA	1621	15mins	Ba	KB
4/27/16	1604119-08	USA	1637	15mins	Ba	KB
4/27/16	1604119-10	USA	1653	15mins	Ba	KB
4/27/16	1604119-12	USA	1709	15mins	Ba	KB
4/27/16	1604119-14	USA	1724	15mins	Ba	KB
4/27/16	1604132-02	James R Reed	1745	4hrs	✓	KB
4/28	GAC 14	LAS	0512	15	✓	
4/28	Dairyn	LAS	0546	15	✓	
4/28	1604023-06	Sol. Teso	0606	1h	✓	
4/28	1604023-08	Sol. Teso	0708	1h	✓	
4/28	1604028-06	Smucker	0814	1h	✓	
4/28	1604028-10	Smucker	0906	1h	✓	
4/28	1604028-14	Smucker	1020	1h	✓	
4/28	1604021-06	Smucker	1127	1h	✓	
4/28	1604021-09	Smucker	1229	1h	✓	
4/28	1604021-13	Smucker	1371	1h	✓	
4/28	1604021-17	Smucker	1434	1h	✓	
4/28/16	1604132-15	James Reed	1539	4hr	✓	KB
4/29	GAC 14	LAS	0518	15	✓	
4/29	Dairyn	LAS	0540	15	✓	
4/29	1604147-03	Washington	0726	2h	✓	
4/29	1604147-04	Washington	0728	2h	✓	

SECTION VIII

ANALYTICAL DATA (ISOTOPIC PLUTONIUM)

16-04147
PulSO
Run 1

Work Order	16-04147
Analysis Code	PulSO
Run	1
Date Received	4/28/2016
Lab Deadline	5/4/2016
Client	Washington Closure Hanford
Project	S00W235A01
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	EML Pu-02 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Pu242
Radiometric Sol#	Pu-20
Tracer Act (dpm/g)	8.7
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/28/16 00:00	1.0000E+00
02	MBL	BLANK		04/28/16 00:00	1.0000E+00
03	DUP	J1V8X3 SAF: RC-189	42	04/26/16 10:25	1.0042E+00
04	DO	J1V8X3 SAF: RC-189	42	04/26/16 10:25	1.0062E+00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	1.0088	8.8		0.00								
02	MBL	1.0063	8.8		0.00								
03	DUP	1.0056	8.7		0.00								
04	DO	1.0056	8.7		0.00								

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

16-04147
PulSO
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			04/29/16 06:13	JWOLFE				
02	MBL			04/29/16 06:13	JWOLFE				
03	DUP			04/29/16 06:13	JWOLFE				
04	DO	04/29/16 07:02	KSALLINGS	04/29/16 06:13	JWOLFE				

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-PuISO-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-04147
Analysis Code: PuISO
Run: 1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	PU-238	LCS	LCS	pCi/g	4.54E+00	6.98E-01	1.05E-01	4.50E+00	100.87	OK		OK	
02	PU-238	MBL	BLANK	pCi/g	-1.44E-02	3.00E-02	8.90E-02					OK	OK
03	PU-238	DUP	J1V8X3 SAF: RC-189	pCi/g	6.06E-02	6.97E-02	1.04E-01				NA	OK	
04	PU-238	DO	J1V8X3 SAF: RC-189	pCi/g	1.01E-01	8.39E-02	1.02E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-PuISO-1

Run	Analysis Code	Eberline Analytical Work Order	Client
1	PuISO	16-04147	Washington Closure Hanford

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	PU-238	LCS	04/28/16 00:00	1.00E+00	128.38	0.00	0.00			
02	PU-238	MBL	04/28/16 00:00	1.00E+00	99.96	0.00	0.00			
03	PU-238	DUP	04/26/16 10:25	1.00E+00	98.84	0.00	0.00			
04	PU-238	DO	04/26/16 10:25	1.01E+00	95.40	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-PuISO-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-04147

Analysis Code: PuISO

Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	PU-238	LCS	05/04/16 08:32		A_Spec	Alpha_003	170.02	3.55 E+02	1.40 E-02	16.1
02	PU-238	MBL	05/04/16 08:32		A_Spec	Alpha_004	170	-1.02 E+00	6.00 E-03	18.8
03	PU-238	DUP	05/04/16 08:32		A_Spec	Alpha_010	170.02	4.30 E+00	1.00 E-02	19
04	PU-238	DO	05/04/16 08:32		A_Spec	Alpha_011	170	7.30 E+00	1.00 E-02	19.9

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-PuISO-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-04147
Analysis Code: PuISO
Run: 1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	PU-239	LCS	LCS	pCi/g	7.46E+00	1.03E+00	5.35E-02	7.37E+00	101.23	OK		OK	
02	PU-239	MBL	BLANK	pCi/g	-4.80E-03	2.85E-02	6.75E-02					OK	OK
03	PU-239	DUP	J1V8X3 SAF: RC-189	pCi/g	-2.40E-02	3.15E-02	1.04E-01				NA	OK	
04	PU-239	DO	J1V8X3 SAF: RC-189	pCi/g	1.13E-02	4.04E-02	9.15E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-PuISO-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-04147

Analysis Code: PuISO

Run: 1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	PU-239	LCS	04/28/16 00:00	1.00E+00	128.38	0.00	0.00			
02	PU-239	MBL	04/28/16 00:00	1.00E+00	99.96	0.00	0.00			
03	PU-239	DUP	04/26/16 10:25	1.00E+00	98.84	0.00	0.00			
04	PU-239	DO	04/26/16 10:25	1.01E+00	95.40	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-PuISO-1

Run	Analysis Code	Eberline Analytical Work Order	Client
1	PuISO	16-04147	Washington Closure Hanford

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	PU-239	LCS	05/04/16 08:32		A_Spec	Alpha_003	170.02	5.82 E+02	1.00 E-03	16.1
02	PU-239	MBL	05/04/16 08:32		A_Spec	Alpha_004	170	-3.40 E-01	2.00 E-03	18.8
03	PU-239	DUP	05/04/16 08:32		A_Spec	Alpha_010	170.02	-1.70 E+00	1.00 E-02	19
04	PU-239	DO	05/04/16 08:32		A_Spec	Alpha_011	170	8.10 E-01	7.00 E-03	19.9

Count Room Report
Client: Washington Closure Hanfor

16-04147-PuISO-1 (pCi/g) in
Tracer ID: Pu-20

2.5

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/28/16 00:00	1.0000	1.0088	8.7766		0.00		
02	MBL	BLANK	04/28/16 00:00	1.0000	1.0063	8.7548		0.00		
03	DUP	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0042	1.0056	8.7487		0.00		
04	DO	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0062	1.0056	8.7487		0.00		

7
0832
11

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-04147	1	PulSO	4/29/2016 6:09	JWOLFE		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Pu-238	Pu-21	10.940	4/29/2016	0.950	0.9141				4.50	0.031	0.00	0.000	0.00	0.000	0.00	0.000
Pu-239	Pu-22	155.720	4/29/2016	0.080	0.1050				7.37	0.236	0.00	0.000	0.00	0.000	0.00	0.000
Tc-99 MS	Tc-2a	22043.636	7/5/2014	0.1												

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Pu242	Pu-20	8.700	4/29/2016	1.0088	1.2600
02	Pu242	Pu-20	8.700	4/29/2016	1.0063	1.2600
03	Pu242	Pu-20	8.700	4/29/2016	1.0056	1.2600
04	Pu242	Pu-20	8.700	4/29/2016	1.0056	1.2600

Balance Printer Tapes

Tracer

1.0088 g
1.0063 g
1.0056 g
1.0056 g

LCS

0.9141 g
0.1050 g

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 4/29/2016 7:23 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-04147	1	PuISO	grams	5/4/2016	JWOLFE

Lab Fraction	Washington Closure Hanford Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	J1V8X3 SAF: RC-189	DUP					1.0042E+00	1.0042E+00				
04	J1V8X3 SAF: RC-189	DO					1.0062E+00	1.0062E+00				

Comments	

Technician: JWolfe Date: 4/29/16

Eberline Services - Oak Ridge
Prep Logbook
Version 2.0 8/1999

Rough Sample Preparation Log Book

Printed: 4/29/2016 7:01 AM

Work Order	Lab Deadline	Date Received in Prep	Date Sealed	Date Returned	Technician
16-04147	5/4/2016	4/28/2016	4/29/2016	4/30/2016	KSALLINGS

Eberline	Washington Closure Hanford	Tare (g)	Gross (g)		Net (g)		Percent		Gamma		Special
Fraction	Client ID	Pan Wt	Wet Wt.	Dry Wt.	Wet Wt.	Dry Wt.	Liquid	Solid	Dry Wt.	LEPS Wt.	Info
04	J1V8X3 SAF: RC-189	9.6700	146.9200	139.2800	137.2500	129.6100	5.57%	94.43%	0.0000	0.0000	
05	J1V8X3 SAF: RC-189 MS	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	

Comments	
Special Codes	H: Hot, O: Organic Hazard, P: PCB Hazard, R: Rush, T: Other (see comments)

000075

Technician: Kenny Sallings Date: Analysis: Rough Prep Logbook

KB 5/4/16

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001504
Batch Identification: 1604147A-PU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: Pu iso

Detector Name: Alpha_003
Chamber Serial Number:
Detector Serial Number: 3
Env. Background: System Bkgd 152079
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 5/4/2016 6:08:58 AM
Acquisition Date/Time: 5/4/2016 8:32:52 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Pu242_PU-20
Tracer Quantity: 1.009 mL
Effective Efficiency: 0.2070 +/- 0.0119
Counting Efficiency: 0.1612 +/- 0.0029 on 12/11/2015 2:46:09 PM
Chem. Recovery Factor: 1.2838 +/- 0.0772

Control Certificate Name: Pu238_PU-01
Chem. Recov. of Control: PU-238 0.096660 +/- 0.008109
Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
PU-236		5.713	3.30	136.60	1.70	0.00E+000	3.0
PU-238		5.476	354.62	10.45	2.38	0.00E+000	12.2
PU-239		5.129	581.83	8.13	0.17	0.00E+000	36.8
PU-242	T	4.870	308.83	11.16	0.17	0.00E+000	20.1
PU-244		4.548	8.83	66.70	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
PU-236	0.991	5755.00*	4.22E-002 +/- 5.79E-002	9.40E-002 +/- 1.06E-002
PU-238	0.999	5487.10*	4.54E+000 +/- 6.98E-001	1.05E-001 +/- 1.18E-002
PU-239	0.998	5147.70*	7.46E+000 +/- 1.03E+000	5.35E-002 +/- 6.02E-003
PU-242	0.998	4890.70*	3.94E+000 +/- 4.43E-001	5.32E-002 +/- 5.99E-003
PU-244	0.994	4580.60*	1.13E-001 +/- 7.65E-002	5.35E-002 +/- 6.02E-003

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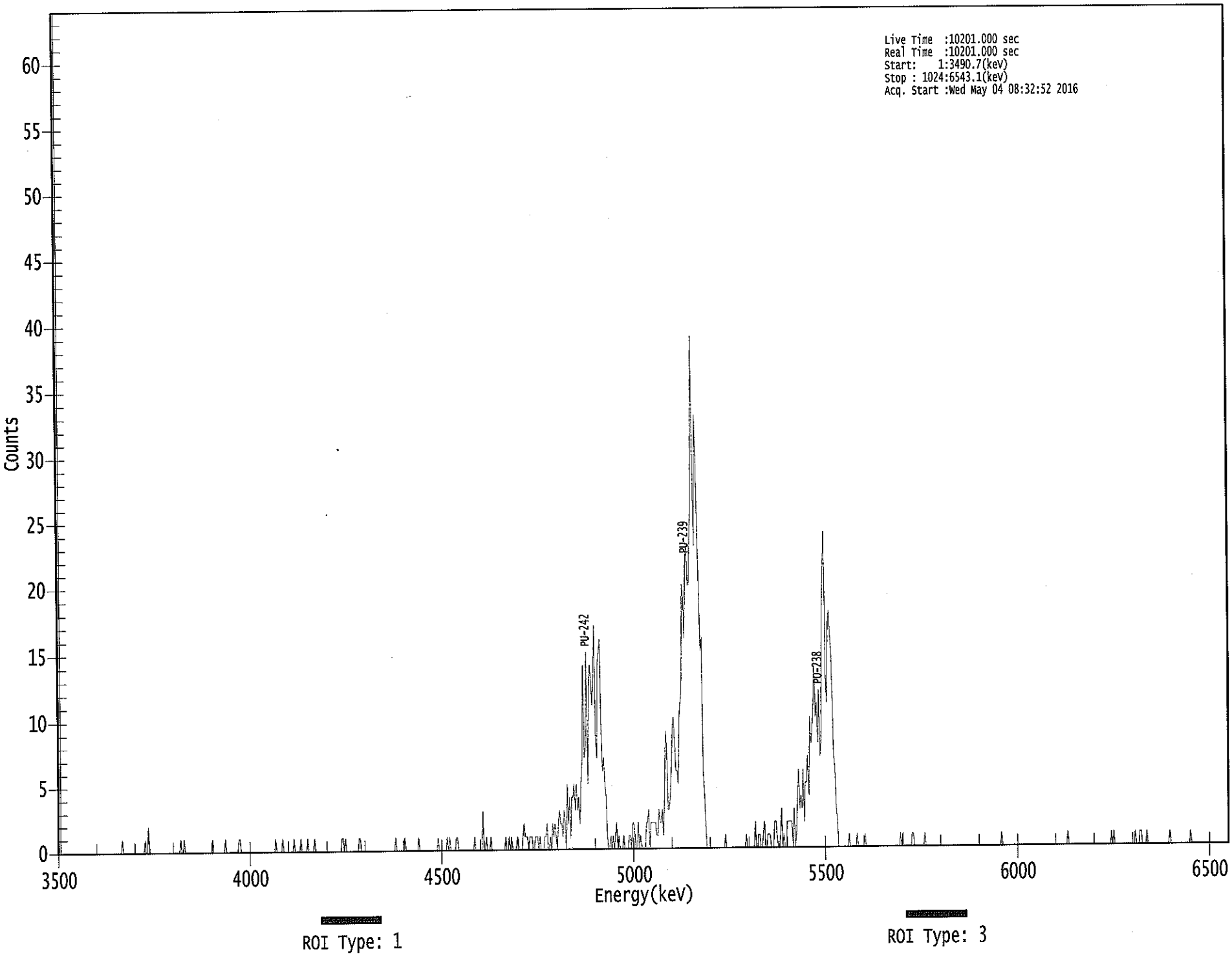
0000150442.CNF



T00001

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 01

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	1	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	1	0	0	2
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	1	0	0	1	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	1
137:	0	0	0	0	0	0	0	0
145:	0	0	1	0	0	0	0	0
153:	0	0	0	0	0	0	1	1
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	1	0
193:	0	0	0	0	1	0	0	0
201:	0	0	0	0	0	0	1	0
209:	0	0	0	0	1	0	0	0
217:	0	0	1	0	0	0	0	0
225:	1	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	1	1	0	1	0	0	0	0
257:	0	0	0	0	0	0	0	1
265:	1	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	0	0	0	1
305:	0	0	0	0	0	0	0	0
313:	0	0	0	1	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	1	0	0	0
337:	0	0	0	0	1	0	1	0
345:	0	0	0	0	1	1	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	1	0	0	0

369:	0	0	0	3	0	0	1	0

Sample Title: 01

Channel								
377:	0	0	1	0	0	0	0	0
385:	0	0	0	0	0	0	0	1
393:	0	0	1	0	1	0	0	0
401:	0	1	0	0	0	0	1	2
409:	1	1	1	0	1	1	1	0
417:	0	1	1	1	0	1	0	0
425:	0	1	1	2	0	0	1	0
433:	2	1	2	1	0	2	3	2
441:	2	1	3	2	0	5	2	4
449:	1	4	4	5	3	5	3	4
457:	2	5	7	14	7	8	15	5
465:	12	14	13	11	13	17	9	7
473:	14	15	16	9	6	7	5	4
481:	1	0	0	1	0	1	0	1
489:	2	0	1	0	0	0	1	0
497:	0	0	0	1	1	0	2	2
505:	1	0	0	2	0	1	0	0
513:	0	0	2	2	3	0	2	2
521:	2	2	2	1	1	3	2	2
529:	3	1	4	9	8	3	3	4
537:	6	9	10	8	6	6	5	10
545:	11	12	20	19	16	22	23	20
553:	20	24	26	39	29	23	33	29
561:	24	19	15	16	6	4	1	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	1
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	1	0	0	0	0	0	0
609:	0	2	0	0	1	1	0	0
617:	1	2	0	0	1	1	1	0
625:	0	0	2	2	1	0	0	1
633:	3	0	1	0	0	2	2	2
641:	2	2	0	3	0	1	4	6
649:	3	4	3	6	2	5	5	7
657:	4	10	8	9	11	14	10	11
665:	8	12	7	8	18	21	24	13
673:	11	17	18	16	15	11	7	6
681:	3	2	0	0	0	0	0	0
689:	0	0	0	1	0	0	0	0
697:	0	0	1	0	0	0	0	0
705:	0	1	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	1	0	1	0	0	0	0	0
745:	0	0	1	1	0	0	0	0
753:	0	0	0	0	0	1	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 01

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	1	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	1	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	1	0	1	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	1	0	0
945:	0	1	1	0	0	0	0	1
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	1	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	1	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	1

Apex-Alpha™

KB 5/4/16

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001504
Batch Identification: 1604147A-PU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: Pu iso

Detector Name: Alpha_004
Chamber Serial Number:
Detector Serial Number: 4
Env. Background: System Bkgd 152080
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 5/4/2016 6:08:58 AM
Acquisition Date/Time: 5/4/2016 8:32:53 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Pu242_PU-20
Tracer Quantity: 1.006 mL
Effective Efficiency: 0.1878 +/- 0.0113
Counting Efficiency: 0.1879 +/- 0.0033 on 12/11/2015 2:46:10 PM
Chem. Recovery Factor: 0.9996 +/- 0.0628

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
PU-236		5.710	0.49	416.97	0.51	0.00E+000	2.9
PU-238		5.491	-1.02	208.15	1.02	0.00E+000	0.0
PU-239		5.079	-0.34	592.91	0.34	0.00E+000	0.0
PU-242	T	4.877	279.49	11.74	0.51	0.00E+000	22.7
PU-244		4.556	0.49	416.97	0.51	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
PU-236	0.990	5755.00*	6.91E-003 +/- 2.88E-002	7.40E-002 +/- 8.76E-003
PU-238	1.000	5487.10*	-1.44E-002 +/- 3.00E-002	8.90E-002 +/- 1.05E-002
PU-239	0.976	5147.70*	-4.80E-003 +/- 2.85E-002	6.75E-002 +/- 7.99E-003
PU-242	0.999	4890.70*	3.93E+000 +/- 4.64E-001	7.37E-002 +/- 8.72E-003
PU-244	0.997	4580.60*	6.92E-003 +/- 2.89E-002	7.41E-002 +/- 8.76E-003

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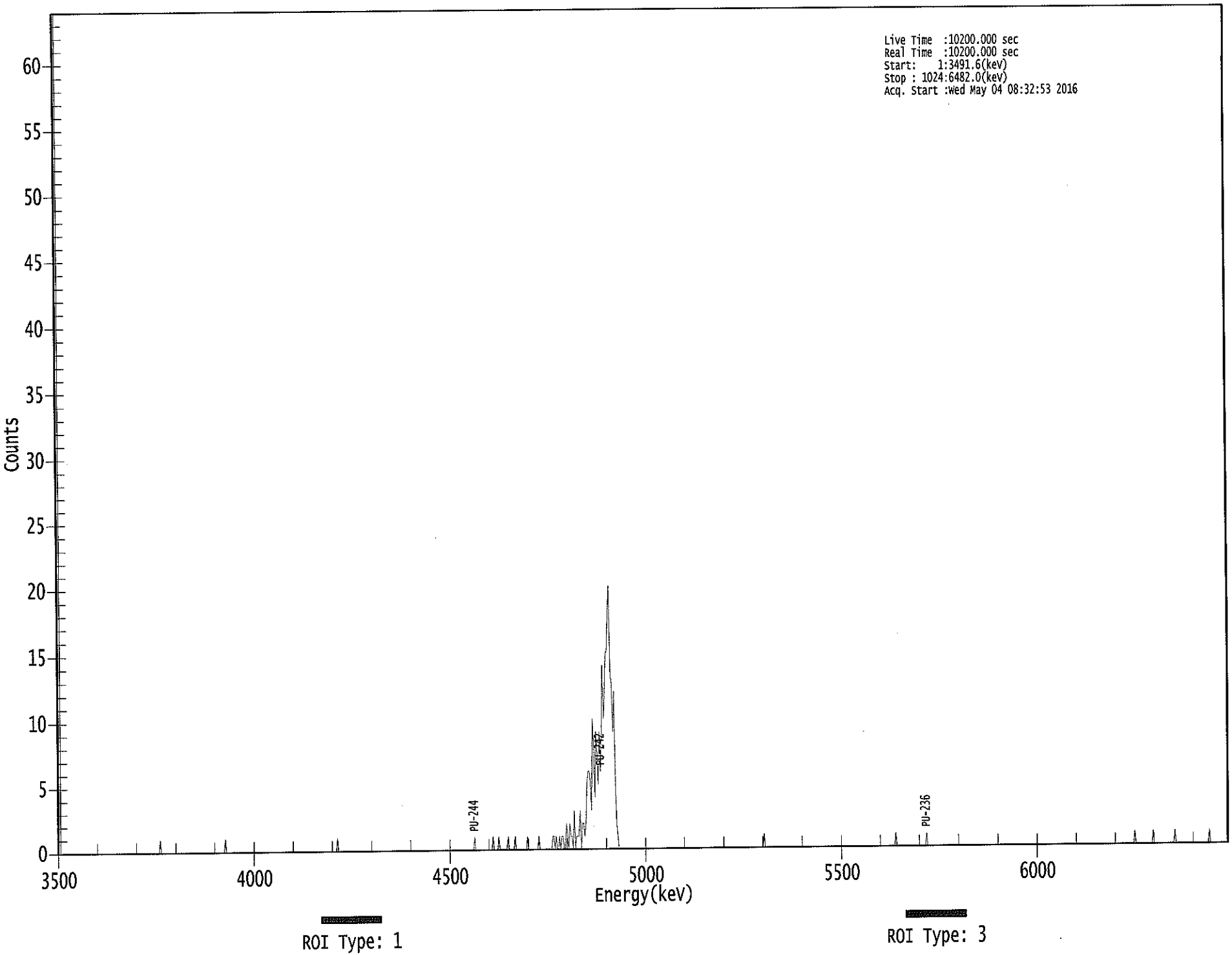
0000150443.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	1	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	1	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	1	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	1	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	1	0	0	0	0	0	1
401:	0	0	0	0	0	0	0	0
409:	0	0	1	0	0	0	0	0
417:	0	0	0	0	1	0	0	0
425:	0	0	0	0	0	0	0	0
433:	1	1	0	1	0	0	1	0
441:	1	1	0	0	2	1	0	2
449:	1	1	0	3	0	1	1	1
457:	3	0	2	2	1	2	5	6
465:	6	5	3	10	8	4	9	7
473:	5	9	6	9	14	10	12	15
481:	15	18	20	13	13	9	12	5
489:	2	1	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	1	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	1
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	1	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	1	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	1	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	1	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KD 5/4/16

Apex-Alpha™

Sample Description: J1V8X3 SAF: RC-189-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001504
Batch Identification: 1604147A-PU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: Pu iso

Detector Name: Alpha_010
Chamber Serial Number:
Detector Serial Number: 10
Env. Background: System Bkgd 152081
Reagent Blank: <not performed>

Sample Size: 1.004E+000 +/- 0.000E+000 gram
Sample Date/Time: 4/26/2016 6:08:58 AM
Acquisition Date/Time: 5/4/2016 8:32:50 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Pu242_PU-20
Tracer Quantity: 1.006 mL
Effective Efficiency: 0.1873 +/- 0.0113
Counting Efficiency: 0.1895 +/- 0.0033 on 12/11/2015 2:46:10 PM
Chem. Recovery Factor: 0.9884 +/- 0.0621

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
PU-236		5.685	1.79	229.07	2.21	0.00E+000	2.9
PU-238		5.430	4.30	114.31	1.70	0.00E+000	2.9
PU-239		5.079	-1.70	130.89	1.70	0.00E+000	0.0
PU-242	T	4.878	278.66	11.75	0.34	0.00E+000	25.1
PU-244		4.502	4.98	97.79	1.02	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
PU-236	0.974	5755.00*	2.53E-002 +/- 5.81E-002	1.13E-001 +/- 1.34E-002
PU-238	0.983	5487.10*	6.06E-002 +/- 6.97E-002	1.04E-001 +/- 1.23E-002
PU-239	0.975	5147.70*	-2.40E-002 +/- 3.15E-002	1.04E-001 +/- 1.23E-002
PU-242	0.999	4890.70*	3.91E+000 +/- 4.63E-001	6.71E-002 +/- 7.94E-003
PU-244	0.968	4580.60*	7.02E-002 +/- 6.92E-002	8.88E-002 +/- 1.05E-002

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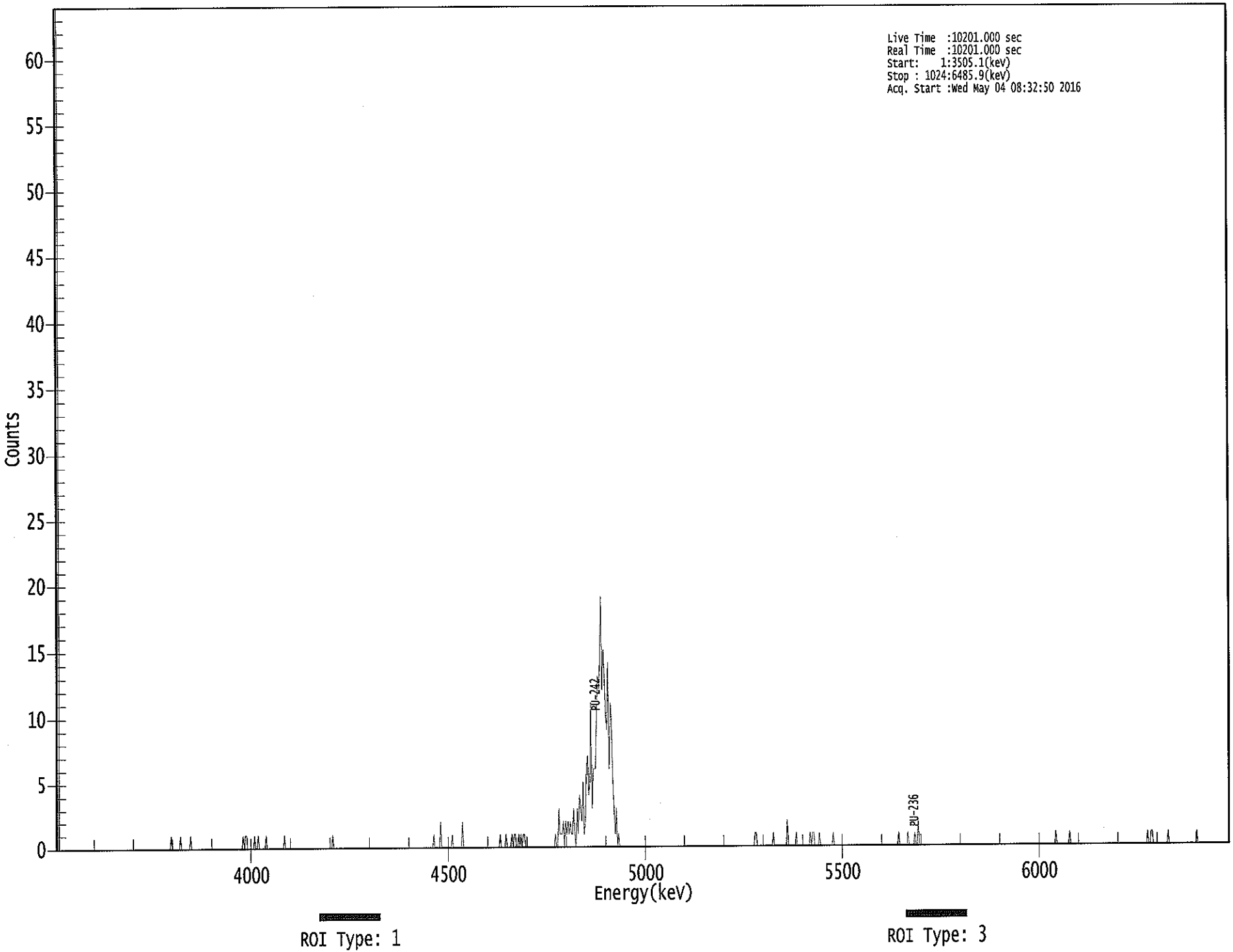
0000150440.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 03

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	1	0	0	0
105:	0	0	0	0	1	0	0	0
113:	0	0	0	0	0	1	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	1	0	1	1	0
169:	0	0	0	0	0	1	0	0
177:	1	0	0	0	0	0	0	1
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	1
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	1	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	1	0	0	0	0	0	2
337:	0	0	0	0	0	0	0	0
345:	0	1	0	0	0	0	0	0
353:	0	0	2	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	1	0	0	0	0
393:	1	0	0	0	0	1	0	1
401:	1	0	0	1	0	1	0	1
409:	1	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	1	0	0	3	1
441:	1	1	2	0	2	1	2	1
449:	2	1	1	3	1	0	3	1
457:	4	3	2	5	1	2	6	7
465:	4	5	11	3	6	6	6	10
473:	13	12	14	19	12	15	13	10
481:	9	14	6	11	10	5	3	1
489:	3	0	1	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	1	1	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	1	0	0	0	0	0	0
633:	0	0	0	0	0	2	0	0
641:	0	0	0	0	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	1	1	0	0	0
665:	0	1	0	0	0	0	0	0
673:	0	0	0	0	0	1	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	1	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	1	0	0	2
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	1
873:	0	0	0	0	0	0	0	0
881:	0	0	0	1	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	1
953:	0	0	1	1	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	1	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	1	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

ICB 5/4/16

Sample Description: J1V8X3 SAF: RC-189
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001504
Batch Identification: 1604147A-PU
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Pu iso

Detector Name: Alpha_011
Chamber Serial Number:
Detector Serial Number: 11
Env. Background: System Bkgd 152082
Reagent Blank: <not performed>

Sample Size: 1.006E+000 +/- 0.000E+000 gram
Sample Date/Time: 4/26/2016 6:08:58 AM
Acquisition Date/Time: 5/4/2016 8:32:51 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Pu242_PU-20
Tracer Quantity: 1.006 mL
Effective Efficiency: 0.1897 +/- 0.0114
Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2015 2:46:14 PM
Chem. Recovery Factor: 0.9540 +/- 0.0597

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
PU-236		5.707	6.47	87.07	1.53	0.00E+000	3.9
PU-238		5.457	7.30	81.83	1.70	0.00E+000	2.6
PU-239		5.084	0.81	359.09	1.19	0.00E+000	2.6
PU-242	T	4.873	282.15	11.69	0.85	0.00E+000	26.8
PU-244		4.529	0.13	2295.4	1.87	0.00E+000	2.6

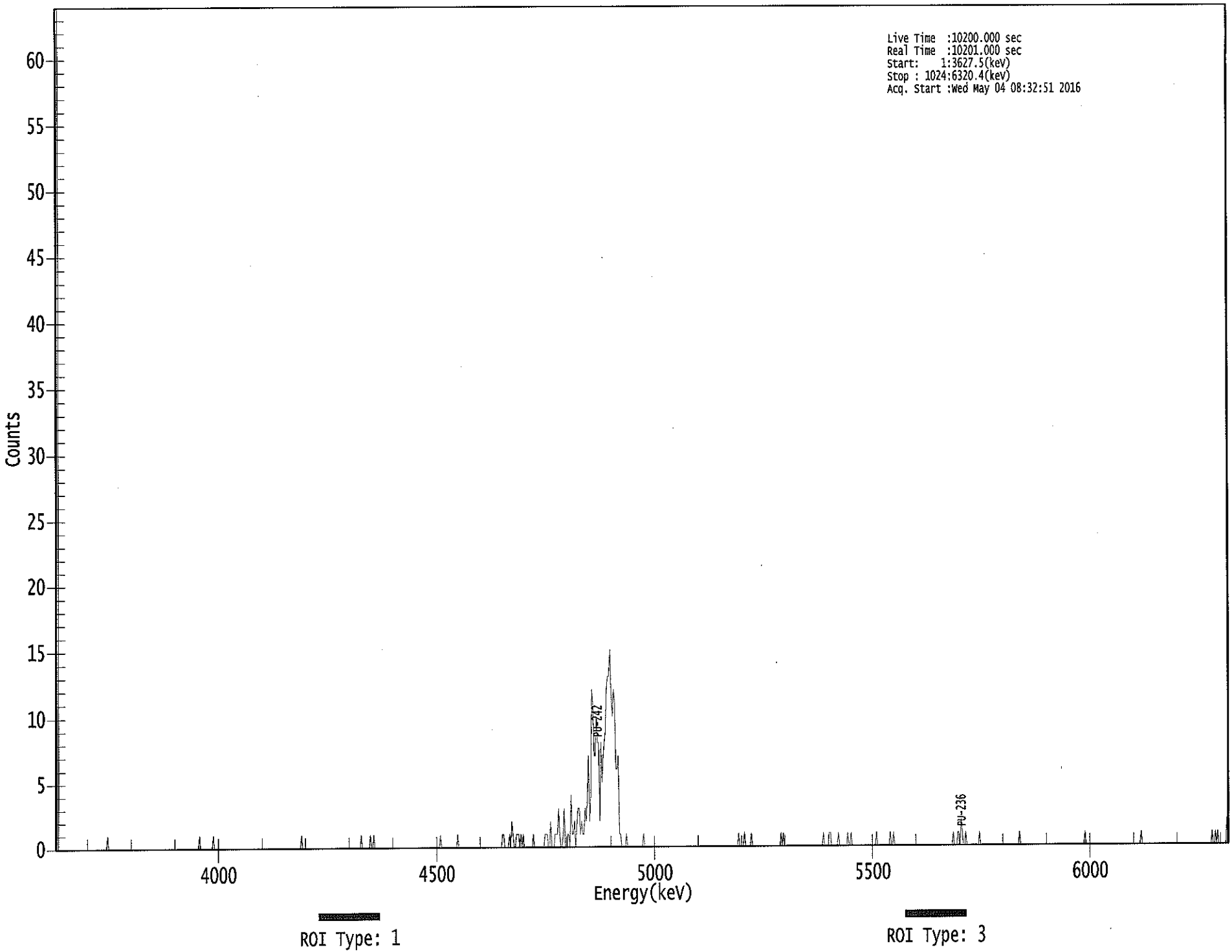
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
PU-236	0.988	5755.00*	9.03E-002 +/- 7.93E-002	9.92E-002 +/- 1.17E-002
PU-238	0.995	5487.10*	1.01E-001 +/- 8.39E-002	1.02E-001 +/- 1.20E-002
PU-239	0.979	5147.70*	1.13E-002 +/- 4.04E-002	9.15E-002 +/- 1.08E-002
PU-242	0.998	4890.70*	3.90E+000 +/- 4.59E-001	8.28E-002 +/- 9.75E-003
PU-244	0.986	4580.60*	1.81E-003 +/- 4.15E-002	1.05E-001 +/- 1.24E-002

AG 5/4/16

0000150441.CNF



****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 04

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	10201	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	1	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	1	0	0
129:	0	0	0	0	0	0	0	0
137:	0	1	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	1	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	0	1	0	0	1	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	1
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	1	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	1	1	0
393:	0	0	0	1	0	2	1	0
401:	0	1	1	1	0	1	0	1
409:	0	0	0	0	0	0	0	0
417:	1	0	0	0	0	0	0	0
425:	0	0	1	1	1	0	0	2
433:	0	0	0	1	1	1	3	1
441:	0	0	1	3	0	0	1	1
449:	0	4	1	1	2	0	2	3
457:	3	1	2	1	1	3	2	4
465:	7	2	4	12	11	7	7	10
473:	8	8	2	8	5	7	8	9
481:	12	13	13	15	12	10	12	11
489:	6	6	7	1	1	0	0	0
497:	0	1	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	1	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	1	0	0	0	0
601:	1	0	0	0	0	0	1	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	1	0	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	1	0	0
673:	0	0	1	1	0	0	0	0
681:	0	0	1	0	0	0	0	0
689:	0	0	1	0	0	1	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	1	0	0	0	0
721:	0	0	0	0	0	0	0	1
729:	0	0	1	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	1	0
785:	0	0	1	1	0	2	1	0
793:	0	1	0	0	0	0	0	0

801:	0	0	0	0	0	1	0	0

Sample Title: 04

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	1	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	1	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	1	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	1	0	0	1	0	1	0	0
1017:	0	0	0	0	0	2	0	2

5/4/2016 5:38:26 AM

Apex-Alpha™

QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 5/4/2016
Time : 5:38:26 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	5/4/2016 5:22:30 AM
Alpha_004	21f	ALL	Passed	5/4/2016 5:22:31 AM
Alpha_005	21f	ALL	Not Done	
Alpha_006	21f	ALL	Not Done	
Alpha_007	21f	ALL	Not Done	
Alpha_008	21f	ALL	Not Done	
Alpha_009	21f	ALL	Not Done	
Alpha_010	21f	ALL	Passed	5/4/2016 5:22:32 AM
Alpha_011	21f	ALL	Passed	5/4/2016 5:22:33 AM
Alpha_012	21f	ALL	Passed	5/4/2016 5:22:34 AM
Alpha_013	21f	ALL	Not Done	
Alpha_014	21f	ALL	Passed	5/4/2016 5:22:35 AM
Alpha_015	21f	ALL	Passed	5/4/2016 5:22:35 AM
Alpha_016	21f	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:37 AM
Alpha_034	Alpha Analyst100DC	Peak Energy	Action	5/4/2016 5:22:38 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:40 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:41 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:43 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:44 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:46 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:47 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:49 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:51 AM
Alpha_043	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:52 AM
Alpha_044	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:54 AM
Alpha_045	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:56 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:57 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:22:59 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:01 AM
Alpha_049	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:03 AM
Alpha_050	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:05 AM
Alpha_051	Alpha Analyst100DC	ALL	Not Done	
Alpha_052	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:06 AM
Alpha_053	Alpha Analyst100DC	Peak FWHM	Action	4/29/2016 4:59:04 AM
Alpha_054	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:08 AM
Alpha_055	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:10 AM
Alpha_056	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:12 AM
Alpha_057	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:14 AM
Alpha_058	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:16 AM

Review of QA Results - Pulser Check

5/4/2016 5:38:26 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_059	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:18 AM
Alpha_060	Alpha Analyst100DC	ALL	Passed	5/4/2016 5:23:20 AM

APPROVED BY: _____

APPROVAL DATE: 5/4/16

****
***** L I B R A R Y L I S T I N G R E P O R T *****
****

Nuclide Library Title: Plutonium

Nuclide Library Description: Pu-236,-238,-239,-242,-244

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert.(Abs.+-)
PU-236	9.019E+007	5755.000*	0.000	100.0000	0.0000
PU-238	2.768E+009	5487.100*	0.000	99.9000	0.0000
PU-239	7.608E+011	5147.700*	0.000	99.9000	0.0000
PU-242	1.178E+013	4890.700*	0.000	100.4000	0.0000
PU-244	2.367E+014	4580.600*	0.000	99.9000	0.0000

* = key line

TOTALS: 5 Nuclides 5 Energy Lines

SECTION IX

ANALYTICAL DATA (TOTAL STRONTIUM)

16-04147
SrTOT
Run 1

Work Order	16-04147
Analysis Code	SrTOT
Run	1
Date Received	4/28/2016
Lab Deadline	5/4/2016
Client	Washington Closure Hanford
Project	S00W235A01
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	ElChroM SRW01 Modified
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	
Radiometric Sol#	
Tracer Act (dpm/g)	
Carrier	Strontium
Carrier Conc (mg/ml)	118.9285

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/28/16 00:00	1.0000E+00
02	MBL	BLANK		04/28/16 00:00	1.0000E+00
03	DUP	J1V8X3 SAF: RC-189	42	04/26/16 10:25	1.0035E+00
04	DO	J1V8X3 SAF: RC-189	42	04/26/16 10:25	1.0018E+00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS				0.00	0.100	7.5676	7.5800	0.0124	104.26	104.26	1.00	1.00
02	MBL				0.00	0.100	7.5903	7.6026	0.0123	103.42	103.42	1.00	1.00
03	DUP				0.00	0.100	7.5929	7.6049	0.0120	100.90	100.90	1.00	1.00
04	DO				0.00	0.100	7.5617	7.5739	0.0122	102.58	102.58	1.00	1.00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

16-04147
SrTOT
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			04/30/16 04:22	MHIGHTOWER	05/02/16 05:50	MHIGHTOWER		
02	MBL			04/30/16 04:22	MHIGHTOWER	05/02/16 05:50	MHIGHTOWER		
03	DUP			04/30/16 04:22	MHIGHTOWER	05/02/16 05:50	MHIGHTOWER		
04	DO	04/29/16 07:02	KSALLINGS	04/30/16 04:22	MHIGHTOWER	05/02/16 05:50	MHIGHTOWER		

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-SrTOT-1

Run	Analysis Code	Eberline Analytical Work Order	Client
1	SrTOT	16-04147	Washington Closure Hanford

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TOTAL SR	LCS	LCS	pCi/g	3.87E+01	1.16E+00	6.51E-01	5.16E+01	75.00	INV		OK	
02	TOTAL SR	MBL	BLANK	pCi/g	2.85E-01	3.23E-01	6.60E-01					OK	OK
03	TOTAL SR	DUP	J1V8X3 SAF: RC-189	pCi/g	1.97E-01	3.39E-01	7.02E-01				NA	OK	
04	TOTAL SR	DO	J1V8X3 SAF: RC-189	pCi/g	4.32E-01	3.54E-01	7.10E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-SrTOT-1

Run	Analysis Code	Eberline Analytical Work Order	Client
1	SrTOT	16-04147	Washington Closure Hanford

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TOTAL SR	LCS	04/28/16 00:00	1.00E+00	0.00	104.26	104.26	1.00	5/2/2016 5:50	
02	TOTAL SR	MBL	04/28/16 00:00	1.00E+00	0.00	103.42	103.42	1.00	5/2/2016 5:50	
03	TOTAL SR	DUP	04/26/16 10:25	1.00E+00	0.00	100.90	100.90	1.00	5/2/2016 5:50	
04	TOTAL SR	DO	04/26/16 10:25	1.00E+00	0.00	102.58	102.58	1.00	5/2/2016 5:50	

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-SrTOT-1

Run	Analysis Code	Eberline Analytical Work Order	Client
1	SrTOT	16-04147	Washington Closure Hanford

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TOTAL SR	LCS	05/02/16 12:05		LB4110A	A1	120	4789	1.433333333	0.3998
02	TOTAL SR	MBL	05/02/16 12:05		LB4110A	A2	120	210	1.466666667	0.4021
03	TOTAL SR	DUP	05/02/16 12:05		LB4110A	A3	120	198	1.466666667	0.3859
04	TOTAL SR	DO	05/02/16 12:05		LB4110A	A4	120	217	1.416666667	0.3698

Count Room Report
Client: Washington Closure Hanfor

16-04147-SrTOT-1 (pCi/g) in
Tracer ID:

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/28/16 00:00	1.0000				0.00	1.00	1.00
02	MBL	BLANK	04/28/16 00:00	1.0000				0.00	1.00	1.00
03	DUP	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0035				0.00	1.00	1.00
04	DO	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0018				0.00	1.00	1.00

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-04147	1	SrTOT	4/30/2016 4:21	MHIGHTOWER	MH	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
TOTAL SR	Sr-13a	1614.130	4/30/2016	0.070	0.0709				51.55	0.289	0.00	0.000	0.00	0.000	0.00	0.000

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition

Balance Printer Tapes

Tracer

LCS

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 4/30/2016 4:17 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-04147	1	SrTOT	grams	5/4/2016	MHIGHTOWER

Lab Fraction	Washington Closure Hanford Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	J1V8X3 SAF: RC-189	DUP					1.0035E+00	1.0035E+00				
04	J1V8X3 SAF: RC-189	DO					1.0018E+00	1.0018E+00				

Comments	

Technician: MH Date: 4,30,16

Eberline Services - Oak Ridge
Version 1.0 9/1999

Gravimetric Worksheet

Printed: 5/2/2016 8:03 AM

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
16-04147	1	SrTOT	Strontium	118.9285	MHIGHTOWER

TRetec Fraction	Washington Closure Hanford Client ID	Sample Type	Carrier Data Carrier Added (ml)	Filter Data Filter Tare (g)	Filter Final (g)	Filter Net (g)	Gravimetric % Recovery
01	LCS	LCS	0.1000	7.5676	7.5800	0.0124	104.26
02	BLANK	MBL	0.1000	7.5903	7.6026	0.0123	103.42
03	DUP	DUP	0.1000	7.5929	7.6049	0.0120	100.90
04	J1V8X3 SAF: RC-189	DO	0.1000	7.5617	7.5739	0.0122	102.58

Technician: MH Date: 5/2/16

Eberline Services - Oak Ridge
Prep Logbook
Version 2.0 8/1999

Rough Sample Preparation Log Book

Printed: 4/29/2016 7:02 AM

Work Order	Lab Deadline	Date Received in Prep	Date Sealed	Date Returned	Technician
16-04147	5/4/2016	4/28/2016	4/29/2016	4/30/2016	KSALLINGS

Eberline Fraction	Washington Closure Hanford Client ID	Tare (g) Pan Wt	Gross (g) Wet Wt.	Gross (g) Dry Wt.	Net (g) Wet Wt.	Net (g) Dry Wt.	Percent Liquid	Percent Solid	Gamma Dry Wt.	Gamma LEPS Wt.	Special Info
04	J1V8X3 SAF: RC-189	9.6300	119.3500	113.0000	109.7200	103.3700	5.79%	94.21%	0.0000	0.0000	
05	J1V8X3 SAF: RC-189 MS	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	

Comments	
Special Codes	H: Hot, O: Organic Hazard, P: PCB Hazard, R: Rush, T: Other (see comments)

Technician: Kenny Sallings Date: Analysis: Rough Prep Logbook

Analysis: SrTOT Page No. 9631

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
A1	1604147-01	89	4789	120	1410	5/2/2016 12:05:35 PM
A2	1604147-02	21	210	120	1410	5/2/2016 12:05:35 PM
A3	1604147-03	13	198	120	1410	5/2/2016 12:05:35 PM
A4	1604147-04	12	217	120	1410	5/2/2016 12:05:35 PM

(A)
5/2/16
163

GPC Detector Report
(ALL Backgrounds)

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	10/20/2015	5/2/2016	1.67E-02	P	-7.99E-02	1.05E-01	2.90E-01
LB4110A - A2	Alpha	10/20/2015	5/2/2016	0.00E+00	P	-5.97E-02	7.75E-02	2.15E-01
LB4110A - A3	Alpha	10/20/2015	5/2/2016	1.00E-01	P	-4.57E-02	1.04E-01	2.55E-01
LB4110A - A4	Alpha	10/20/2015	5/2/2016	3.33E-02	P	-6.82E-02	9.29E-02	2.54E-01
LB4110A - B1	Alpha	10/20/2015	5/2/2016	6.67E-02	P	-8.76E-02	1.15E-01	3.17E-01
LB4110A - B2	Alpha	10/20/2015	5/2/2016	3.33E-02	P	-2.59E-02	1.17E-01	2.61E-01
LB4110A - B3	Alpha	10/20/2015	5/2/2016	3.33E-02	P	-6.46E-02	9.72E-02	2.59E-01
LB4110A - B4	Alpha	10/20/2015	5/2/2016	5.00E-02	P	-4.89E-02	8.29E-02	2.15E-01
LB4110A - C1	Alpha	10/20/2015	5/2/2016	3.33E-02	P	-1.26E-01	9.97E-02	3.25E-01
LB4110A - C2	Alpha	10/20/2015	5/2/2016	1.00E-01	P	-7.98E-02	7.26E-02	2.25E-01
LB4110A - C3	Alpha	10/20/2015	5/2/2016	1.17E-01	P	-8.16E-02	1.02E-01	2.85E-01
LB4110A - C4	Alpha	10/20/2015	5/2/2016	5.00E-02	P	-6.12E-02	8.64E-02	2.34E-01
LB4110A - D1	Alpha	10/20/2015	5/2/2016	1.50E-01	P	-7.42E-03	2.05E-01	4.17E-01
LB4110A - D2	Alpha	10/20/2015	5/2/2016	1.50E-01	P	-3.17E-02	1.80E-01	3.91E-01
LB4110A - D3	Alpha	10/20/2015	5/2/2016	1.50E-01	P	-7.94E-02	8.18E-02	2.43E-01
LB4110A - D4	Alpha	10/20/2015	5/2/2016	1.17E-01	P	-6.52E-03	1.06E-01	2.18E-01
LB4110A - E1	Alpha	10/20/2015	5/2/2016	1.83E-01	P	-1.32E-01	1.55E-01	4.42E-01
LB4110A - E2	Alpha	10/20/2015	5/2/2016	5.00E-02	P	-6.63E-02	6.28E-02	1.92E-01
LB4110A - E3	Alpha	10/20/2015	5/2/2016	1.50E-01	P	-7.60E-02	1.43E-01	3.61E-01
LB4110A - E4	Alpha	10/20/2015	5/2/2016	1.67E-02	P	-6.76E-02	7.78E-02	2.23E-01
LB4110A - F1	Alpha	10/20/2015	5/2/2016	5.00E-02	P	-6.24E-02	1.11E-01	2.85E-01
LB4110A - F2	Alpha	10/20/2015	5/2/2016	5.00E-02	P	-3.04E-01	7.89E-02	4.62E-01
LB4110A - F3	Alpha	10/20/2015	5/2/2016	8.33E-02	P	-9.80E-02	1.45E-01	3.88E-01
LB4110A - F4	Alpha	10/20/2015	5/2/2016	1.67E-02	P	-5.15E-02	8.80E-02	2.27E-01
LB4110A - G1	Alpha	10/20/2015	5/2/2016	3.33E-02	P	-7.01E-02	1.08E-01	2.86E-01
LB4110A - G2	Alpha	10/20/2015	5/2/2016	6.67E-02	P	-8.42E-02	8.32E-02	2.51E-01
LB4110A - G3	Alpha	10/20/2015	5/2/2016	6.67E-02	P	-7.05E-02	1.45E-01	3.60E-01
LB4110A - G4	Alpha	10/20/2015	5/2/2016	1.17E-01	P	-3.48E-02	9.80E-02	2.31E-01

GPC Detector Report
(ALL Backgrounds)

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	10/20/2015	5/2/2016	1.43E+00	P	9.40E-01	1.49E+00	2.04E+00
LB4110A - A2	Beta	10/20/2015	5/2/2016	1.47E+00	P	1.05E+00	1.48E+00	1.91E+00
LB4110A - A3	Beta	10/20/2015	5/2/2016	1.47E+00	P	1.02E+00	1.61E+00	2.19E+00
LB4110A - A4	Beta	10/20/2015	5/2/2016	1.42E+00	P	-1.03E+00	1.80E+00	4.63E+00
LB4110A - B1	Beta	10/20/2015	5/2/2016	1.47E+00	P	1.05E+00	1.63E+00	2.22E+00
LB4110A - B2	Beta	10/20/2015	5/2/2016	1.78E+00	P	8.78E-01	1.48E+00	2.08E+00
LB4110A - B3	Beta	10/20/2015	5/2/2016	1.63E+00	P	9.29E-01	1.49E+00	2.04E+00
LB4110A - B4	Beta	10/20/2015	5/2/2016	1.27E+00	P	9.09E-01	1.48E+00	2.05E+00
LB4110A - C1	Beta	10/20/2015	5/2/2016	1.20E+00	P	9.28E-01	1.39E+00	1.86E+00
LB4110A - C2	Beta	10/20/2015	5/2/2016	1.22E+00	P	7.29E-01	1.19E+00	1.64E+00
LB4110A - C3	Beta	10/20/2015	5/2/2016	1.82E+00	P	7.66E-01	1.71E+00	2.65E+00
LB4110A - C4	Beta	10/20/2015	5/2/2016	1.20E+00	P	7.93E-01	1.29E+00	1.78E+00
LB4110A - D1	Beta	10/20/2015	5/2/2016	1.20E+00	P	9.41E-01	5.16E+00	9.37E+00
LB4110A - D2	Beta	10/20/2015	5/2/2016	1.15E+00	P	2.39E+00	4.64E+00	6.89E+00
LB4110A - D3	Beta	10/20/2015	5/2/2016	1.38E+00	P	9.20E-01	3.28E+00	5.63E+00
LB4110A - D4	Beta	10/20/2015	5/2/2016	1.43E+00	P	6.35E-01	4.74E+00	8.84E+00
LB4110A - E1	Beta	10/20/2015	5/2/2016	1.35E+00	P	9.01E-01	1.45E+00	2.00E+00
LB4110A - E2	Beta	10/20/2015	5/2/2016	7.83E-01	P	4.98E-01	9.12E-01	1.33E+00
LB4110A - E3	Beta	10/20/2015	5/2/2016	1.18E+00	P	6.64E-01	1.25E+00	1.83E+00
LB4110A - E4	Beta	10/20/2015	5/2/2016	9.83E-01	P	6.42E-01	1.05E+00	1.45E+00
LB4110A - F1	Beta	10/20/2015	5/2/2016	1.50E+00	P	1.01E+00	1.51E+00	2.00E+00
LB4110A - F2	Beta	10/20/2015	5/2/2016	2.93E+01	F	-6.02E+02	3.87E+01	6.80E+02
LB4110A - F3	Beta	10/20/2015	5/2/2016	1.05E+00	P	6.53E-01	1.31E+00	1.97E+00
LB4110A - F4	Beta	10/20/2015	5/2/2016	1.15E+00	P	6.53E-01	1.10E+00	1.54E+00
LB4110A - G1	Beta	10/20/2015	5/2/2016	1.07E+00	P	7.29E-01	1.24E+00	1.75E+00
LB4110A - G2	Beta	10/20/2015	5/2/2016	1.30E+00	P	1.13E+00	1.66E+00	2.18E+00
LB4110A - G3	Beta	10/20/2015	5/2/2016	1.30E+00	P	7.72E-01	1.35E+00	1.94E+00
LB4110A - G4	Beta	10/20/2015	5/2/2016	1.10E+00	P	9.01E-01	1.36E+00	1.81E+00

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	10/20/2015	5/2/2016	0.2336	P	0.2251	0.2329	0.2408
LB4110A - A2	Alpha	10/20/2015	5/2/2016	0.2093	P	0.2032	0.2109	0.2186
LB4110A - A3	Alpha	10/20/2015	5/2/2016	0.2051	P	0.1931	0.2024	0.2117
LB4110A - A4	Alpha	10/20/2015	5/2/2016	0.2329	P	0.2211	0.2301	0.2391
LB4110A - B1	Alpha	10/20/2015	5/2/2016	0.2305	F	0.1968	0.2116	0.2265
LB4110A - B2	Alpha	10/20/2015	5/2/2016	0.2062	P	0.2015	0.2154	0.2294
LB4110A - B3	Alpha	10/20/2015	5/2/2016	0.2358	P	0.2220	0.2362	0.2505
LB4110A - B4	Alpha	10/20/2015	5/2/2016	0.2289	P	0.2143	0.2254	0.2365
LB4110A - C1	Alpha	10/20/2015	5/2/2016	0.2150	P	0.2031	0.2122	0.2213
LB4110A - C2	Alpha	10/20/2015	5/2/2016	0.2233	P	0.2107	0.2222	0.2337
LB4110A - C3	Alpha	10/20/2015	5/2/2016	0.2483	P	0.2363	0.2482	0.2602
LB4110A - C4	Alpha	10/20/2015	5/2/2016	0.2218	P	0.2096	0.2213	0.2330
LB4110A - D1	Alpha	10/20/2015	5/2/2016	0.2286	W	0.2123	0.2212	0.2300
LB4110A - D2	Alpha	10/20/2015	5/2/2016	0.2559	P	0.2374	0.2482	0.2591
LB4110A - D3	Alpha	10/20/2015	5/2/2016	0.2573	P	0.2458	0.2565	0.2672
LB4110A - D4	Alpha	10/20/2015	5/2/2016	0.1988	P	0.1821	0.1923	0.2025
LB4110A - E1	Alpha	10/20/2015	5/2/2016	0.2380	P	0.2246	0.2354	0.2461
LB4110A - E2	Alpha	10/20/2015	5/2/2016	0.2133	P	0.2018	0.2135	0.2252
LB4110A - E3	Alpha	10/20/2015	5/2/2016	0.2113	P	0.2026	0.2115	0.2204
LB4110A - E4	Alpha	10/20/2015	5/2/2016	0.2470	P	0.2359	0.2451	0.2543
LB4110A - F1	Alpha	10/20/2015	5/2/2016	0.2106	P	0.1513	0.1960	0.2406
LB4110A - F2	Alpha	10/20/2015	5/2/2016	0.1839	P	0.1538	0.1996	0.2453
LB4110A - F3	Alpha	10/20/2015	5/2/2016	0.2459	P	0.1857	0.2402	0.2947
LB4110A - F4	Alpha	10/20/2015	5/2/2016	0.2234	P	0.1679	0.2167	0.2655
LB4110A - G1	Alpha	10/20/2015	5/2/2016	0.2050	P	0.2011	0.2073	0.2134
LB4110A - G2	Alpha	10/20/2015	5/2/2016	0.2063	P	0.2028	0.2099	0.2170
LB4110A - G3	Alpha	10/20/2015	5/2/2016	0.2263	P	0.2243	0.2308	0.2373
LB4110A - G4	Alpha	10/20/2015	5/2/2016	0.2034	P	0.1982	0.2046	0.2110

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	10/20/2015	5/2/2016	0.5577	P	0.5300	0.5478	0.5656
LB4110A - A2	Beta	10/20/2015	5/2/2016	0.4747	P	0.4629	0.4781	0.4932
LB4110A - A3	Beta	10/20/2015	5/2/2016	0.4820	P	0.4605	0.4780	0.4954
LB4110A - A4	Beta	10/20/2015	5/2/2016	0.5645	P	0.5376	0.5546	0.5716
LB4110A - B1	Beta	10/20/2015	5/2/2016	0.5489	W	0.4997	0.5251	0.5504
LB4110A - B2	Beta	10/20/2015	5/2/2016	0.5115	P	0.4940	0.5193	0.5446
LB4110A - B3	Beta	10/20/2015	5/2/2016	0.5856	P	0.5559	0.5828	0.6096
LB4110A - B4	Beta	10/20/2015	5/2/2016	0.5519	P	0.5301	0.5524	0.5747
LB4110A - C1	Beta	10/20/2015	5/2/2016	0.4953	P	0.4733	0.4954	0.5175
LB4110A - C2	Beta	10/20/2015	5/2/2016	0.5217	P	0.5032	0.5289	0.5547
LB4110A - C3	Beta	10/20/2015	5/2/2016	0.6184	P	0.5877	0.6169	0.6462
LB4110A - C4	Beta	10/20/2015	5/2/2016	0.5389	P	0.5075	0.5398	0.5721
LB4110A - D1	Beta	10/20/2015	5/2/2016	0.6632	P	0.6319	0.6530	0.6741
LB4110A - D2	Beta	10/20/2015	5/2/2016	0.6617	W	0.6186	0.6403	0.6620
LB4110A - D3	Beta	10/20/2015	5/2/2016	0.6474	P	0.6122	0.6357	0.6592
LB4110A - D4	Beta	10/20/2015	5/2/2016	0.5058	W	0.4420	0.4782	0.5144
LB4110A - E1	Beta	10/20/2015	5/2/2016	0.5599	P	0.5428	0.5614	0.5801
LB4110A - E2	Beta	10/20/2015	5/2/2016	0.5098	P	0.4931	0.5138	0.5344
LB4110A - E3	Beta	10/20/2015	5/2/2016	0.5137	P	0.5000	0.5143	0.5287
LB4110A - E4	Beta	10/20/2015	5/2/2016	0.6097	P	0.5918	0.6094	0.6271
LB4110A - F1	Beta	10/20/2015	5/2/2016	0.5010	P	0.3742	0.4775	0.5809
LB4110A - F2	Beta	10/20/2015	5/2/2016	0.4573	P	0.3649	0.4731	0.5812
LB4110A - F3	Beta	10/20/2015	5/2/2016	0.6023	P	0.4612	0.5963	0.7315
LB4110A - F4	Beta	10/20/2015	5/2/2016	0.5311	P	0.4098	0.5291	0.6484
LB4110A - G1	Beta	10/20/2015	5/2/2016	0.4705	P	0.4570	0.4705	0.4840
LB4110A - G2	Beta	10/20/2015	5/2/2016	0.5076	P	0.4925	0.5047	0.5169
LB4110A - G3	Beta	10/20/2015	5/2/2016	0.5618	P	0.5464	0.5612	0.5761
LB4110A - G4	Beta	10/20/2015	5/2/2016	0.5038	P	0.4921	0.5055	0.5189

SECTION X

ANALYTICAL DATA (TRITIUM)

Work Order	16-04147
Analysis Code	H0003
Run	1
Date Received	4/28/2016
Lab Deadline	5/4/2016
Client	Washington Closure Hanford
Project	S00W235A01
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	LANL ER-210 Modified
Instrument Type	Beta LSC
Radiometric Tracer	H-3 MS
Radiometric Sol#	H-5a
Tracer Act (dpm/g)	5490.08
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/28/16 00:00	1.0000E+00
02	MBL	BLANK		04/28/16 00:00	1.0000E+00
03	DUP	J1V8X3 SAF: RC-189		04/26/16 10:25	1.0028E+00
04	DMSO	J1V8X3 SAF: RC-189	42	04/26/16 10:25	1.0055E+00
05	MS	J1V8X3 SAF: RC-189		04/26/16 10:25	1.0027E+00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	1.0000	5490.1		0.00								
02	MBL	1.0000	5490.1		0.00								
03	DUP	1.0000	5490.1		0.00								
04	DMSO	1.0000	5490.1		0.00								
05	MS	1.0000	5490.1		0.00								

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			05/03/16 13:56	JPACHELLA				
02	MBL			05/03/16 13:56	JPACHELLA				
03	DUP			05/03/16 13:56	JPACHELLA				
04	DMSO	04/29/16 07:02	KSALLINGS	05/03/16 13:56	JPACHELLA				
05	MS	04/29/16 07:02	KSALLINGS	05/03/16 13:56	JPACHELLA				

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-H0003-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-04147	H0003	1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	H-3	LCS	LCS	pCi/g	2.64E+02	6.04E+00	3.86E+00	2.60E+02	101.20	OK		OK	
02	H-3	MBL	BLANK	pCi/g	7.54E-01	2.29E+00	3.90E+00					OK	OK
03	H-3	DUP	J1V8X3 SAF: RC-189	pCi/g	9.47E-01	2.30E+00	3.92E+00				INV	OK	
04	H-3	DMSO	J1V8X3 SAF: RC-189	pCi/g	1.88E-01	2.27E+00	3.89E+00					OK	
05	H-3	MS	J1V8X3 SAF: RC-189	pCi/g	2.36E+02	5.80E+00	3.89E+00					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-H0003-1

Run	Analysis Code	Eberline Analytical Work Order	Client
1	H0003	16-04147	Washington Closure Hanford

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	H-3	LCS	04/28/16 00:00	1.00E+00	0.00	0.00	0.00			
02	H-3	MBL	04/28/16 00:00	1.00E+00	0.00	0.00	0.00			
03	H-3	DUP	04/26/16 10:25	1.00E+00	0.00	0.00	0.00			
04	H-3	DMSO	04/26/16 10:25	1.01E+00	0.00	0.00	0.00			
05	H-3	MS	04/26/16 10:25	1.00E+00	0.00	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-H0003-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-04147	H0003	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	H-3	LCS	05/03/16 19:33	4485.27	3100B	1	60	9150	11.3	0.241526662
02	H-3	MBL	05/03/16 20:36	4485.27	3100B	2	60	702	11.3	0.23905783
03	H-3	DUP	05/03/16 21:39	4485.27	3100B	3	60	708	11.3	0.23746718
04	H-3	DMSO	05/03/16 22:42	4485.27	3100B	4	60	684	11.3	0.238102471
05	H-3	MS	05/03/16 23:45	4485.27	3100B	5	60	8214	11.3	0.23904867

Count Room Report
Client: Washington Closure Hanfor

16-04147-H0003-1 (pCi/g) in SO
Tracer ID: H-5a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/28/16 00:00	1.0000	1.0000	5490.0800		0.00		
02	MBL	BLANK	04/28/16 00:00	1.0000	1.0000	5490.0800		0.00		
03	DUP	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0028	1.0000	5490.0800		0.00		
04	DMSO	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0055	1.0000	5490.0800		0.00		
05	MS	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0027	1.0000	5490.0800		0.00		

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 5/3/2016 1:56 PM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-04147	1	H0003	5/3/2016 13:54	JPACHELLA		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
H-3	H-5a	5490.080	5/3/2016	0.510	0.1053	0.1010			260.41	9.375	249.77	8.992	0.00	0.000	0.00	0.000
Tc-99 MS	Tc-2a	22043.636	7/5/2014	0.1												

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	H-3 MS	H-5a	5490.080	5/3/2016	1.0000	0.5100
02	H-3 MS	H-5a	5490.080	5/3/2016	1.0000	0.5100
03	H-3 MS	H-5a	5490.080	5/3/2016	1.0000	0.5100
04	H-3 MS	H-5a	5490.080	5/3/2016	1.0000	0.5100
05	H-3 MS	H-5a	5490.080	5/3/2016	1.0000	0.5100

Balance Printer Tapes

Tracer	LCS

Matrix Spike

H-3 Known for solids = LCS Known / Net Equiv. Aliq.

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 5/3/2016 11:16 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-04147	1	H0003	grams	5/4/2016	MMCDOUGALL

Lab Fraction	Washington Closure Hanford Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00			100.0000	
02	BLANK	MBL					1.0000E+00	1.0000E+00			100.0000	
03	J1V8X3 SAF: RC-189	DUP					1.0028E+00	1.0028E+00			100.0000	
04	J1V8X3 SAF: RC-189	DMSO					1.0055E+00	1.0055E+00			100.0000	
05	J1V8X3 SAF: RC-189	MS					1.0027E+00	1.0027E+00			100.0000	

Comments	

SDG 16-04147

Technician: _____ Date: 5/3/16

Assay Definition-

Assay Description:
H3

Assay Type: CPM
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\Default\H3_cpm.1\20160503_1931
Raw Results Path: C:\Packard\Tricarb\Results\Default\H3_cpm.1\20160503_1931\20160503_1931.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Default\H3_cpm.1\20160503_1931\1604147 ah3.csv
Assay File Name: C:\Packard\TriCarb\Assays\H3_cpm.1.lsa

Count Conditions-

Nuclide: 3H
Quench Indicator: tSIE
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 1.00
Quench Set: n/a
Count Time (min): 60.00
Count Mode: Normal
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: Off
Low CPM Threshold: Off
2 Sigma % Terminator: Off

Regions	LL	UL
A	0.0	18.6
B	2.0	18.6
C	0.0	0.0

Count Corrections-

Static Controller: On Luminescence Correction: Off
Colored Samples: n/a Heterogeneity Monitor: n/a
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

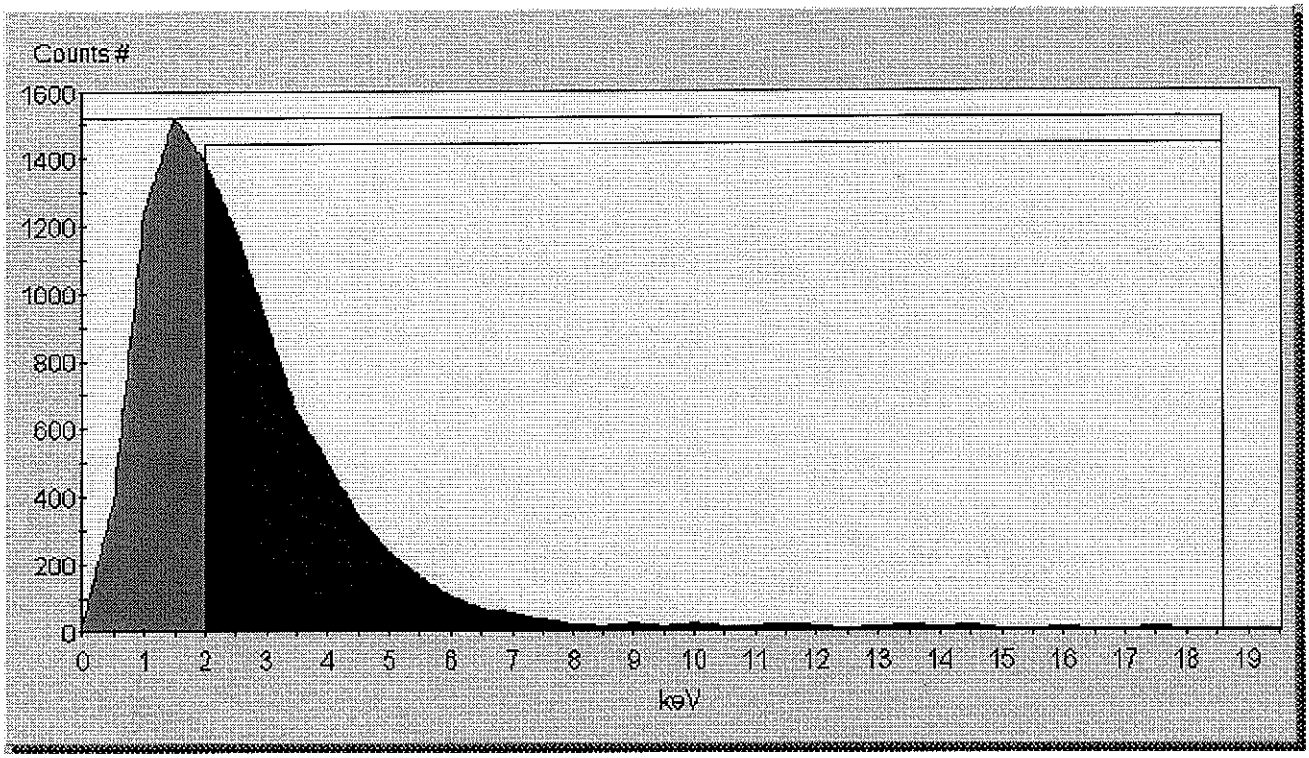
Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				
B				
C				

Cycle 1 Results

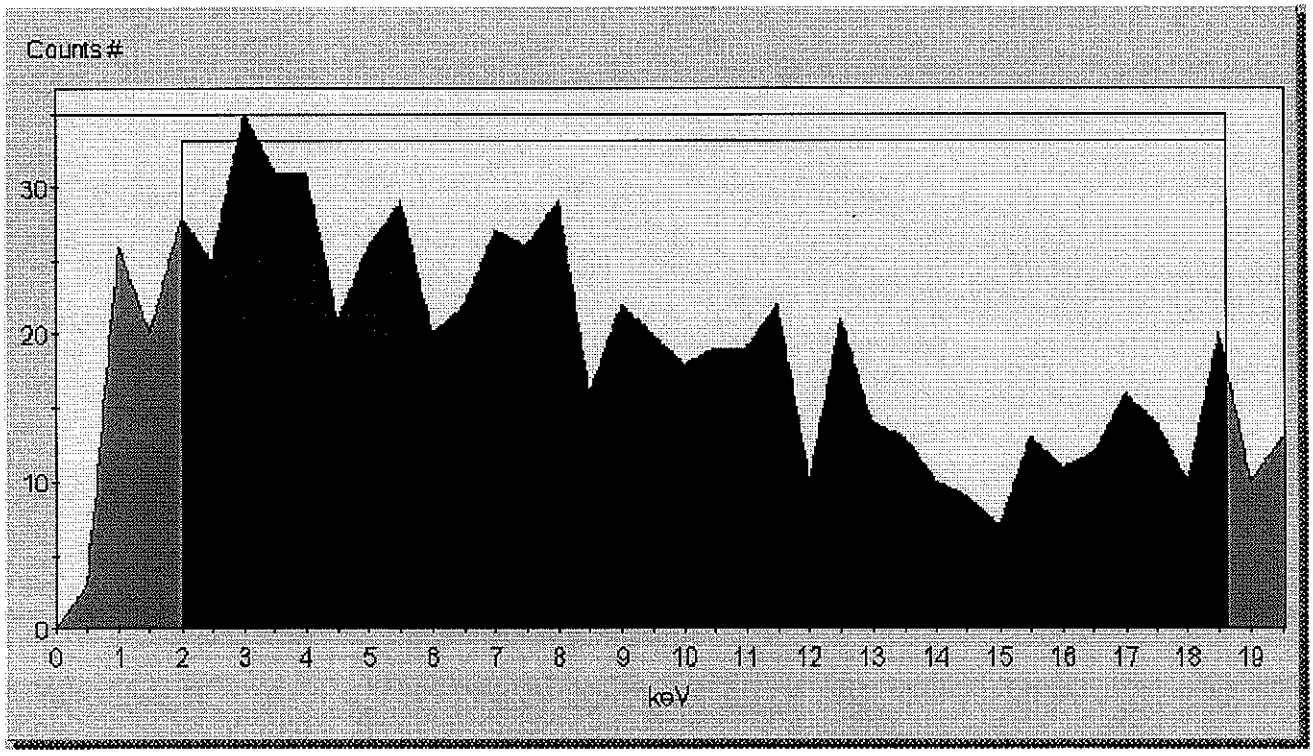
SMPL_ID	P#	PID	S#	CPMA	CPMB	CPMC	tSIE	Count Time	DATE TIME
16-04147-1-H3-01S	1	20	1	152.5	99.7	0.0	285.99	60.00	5/3/2016 7:33:07 PM

SpectraView Block Data



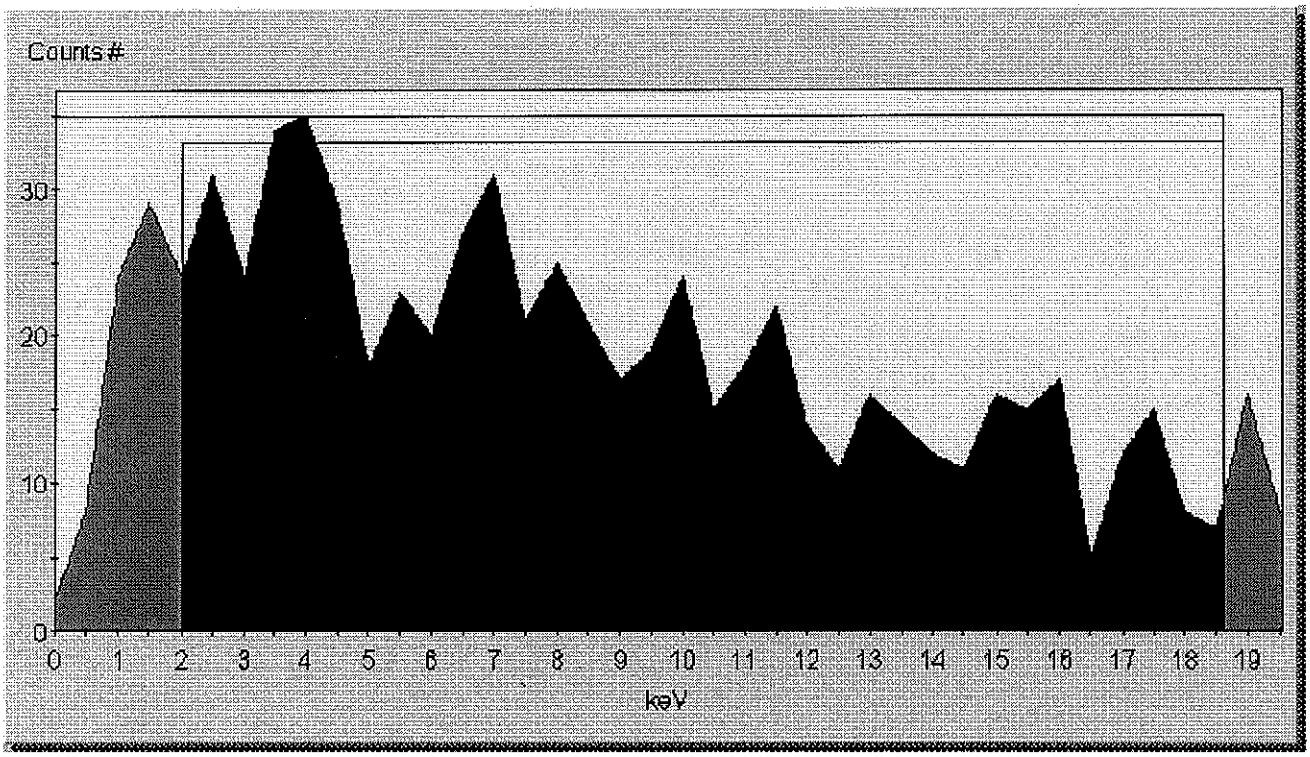
16-04147-1-H3-02S 1 20 2 11.7 10.8 0.0 276.26 60.00
5/3/2016 8:36:12 PM

SpectraView Block Data



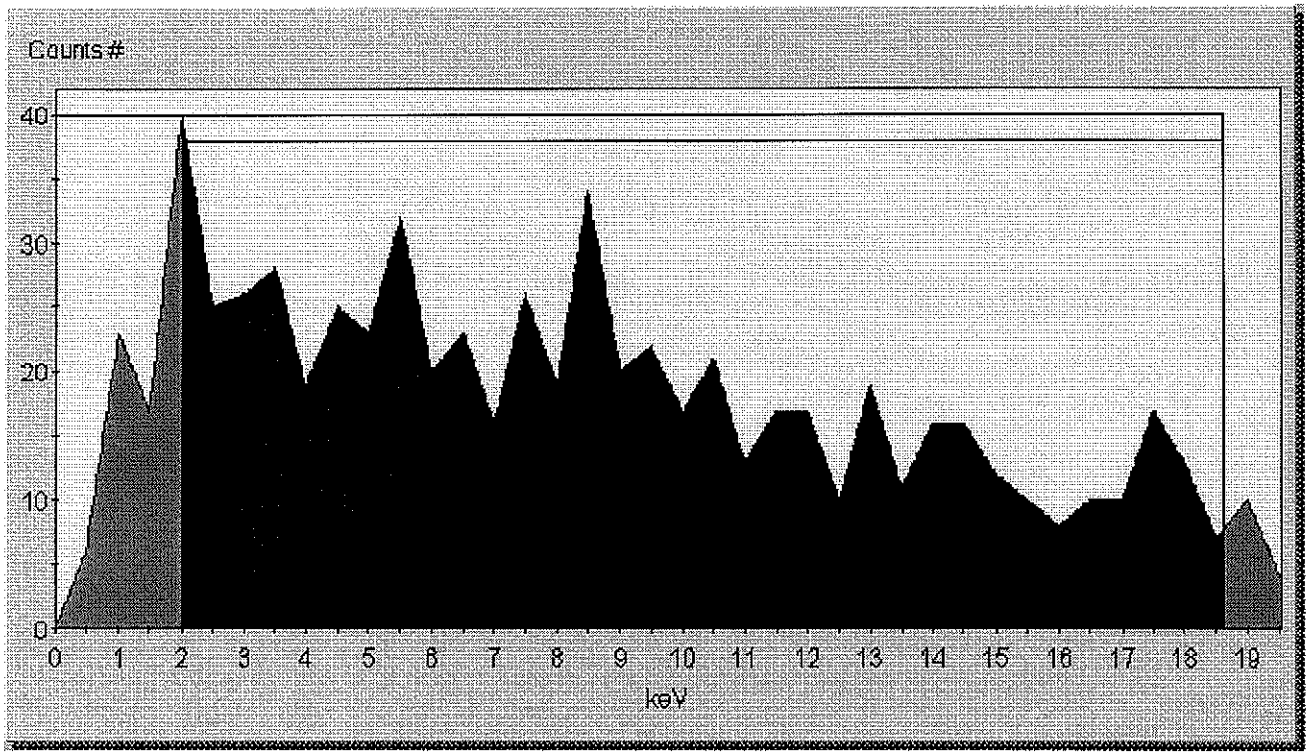
16-04147-1-H3-03S 1 20 3 11.8 10.8 0.0 271.44 60.00
5/3/2016 9:39:14 PM

SpectraView Block Data



16-04147-1-H3-04S 1 20 4 11.4 10.6 0.0 273.28 60.00
5/3/2016 10:42:19 PM

SpectraView Block Data



16-04147-1-H3-05S 1 20 5 136.9 88.3 0.0 276.23 60.00
5/3/2016 11:45:16 PM

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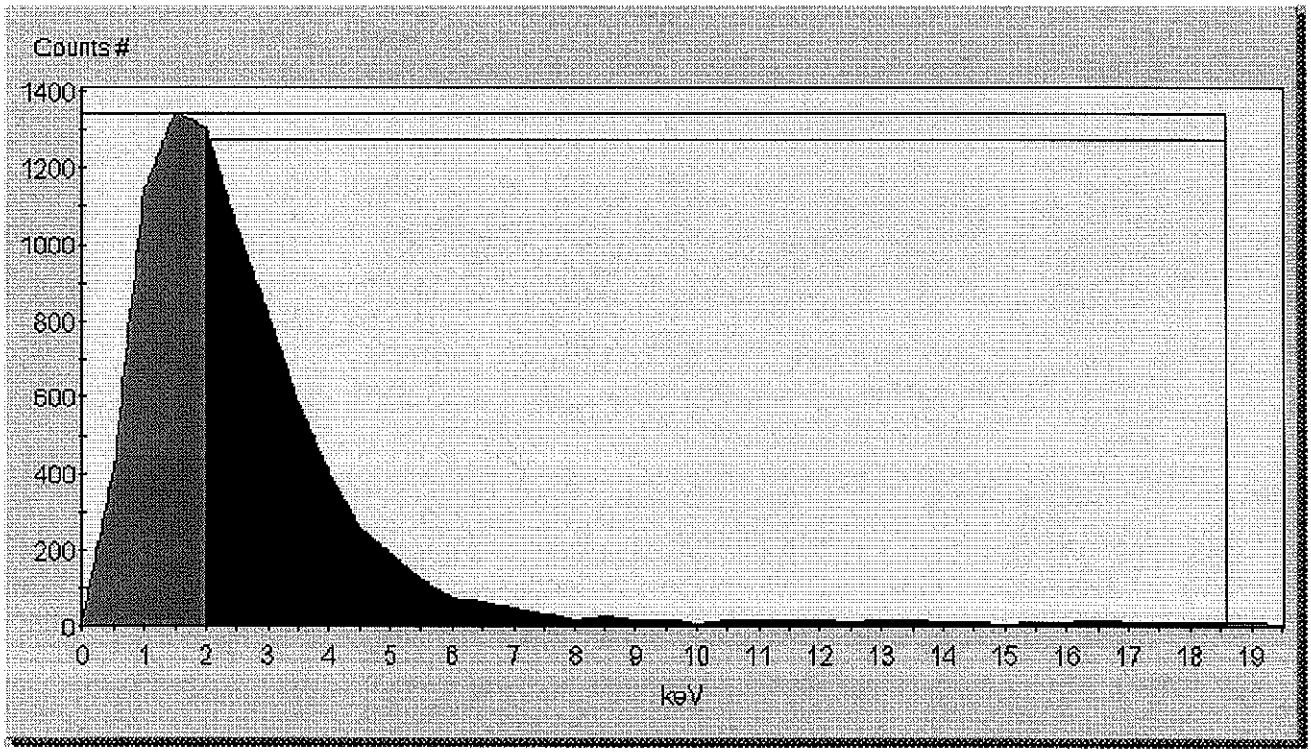
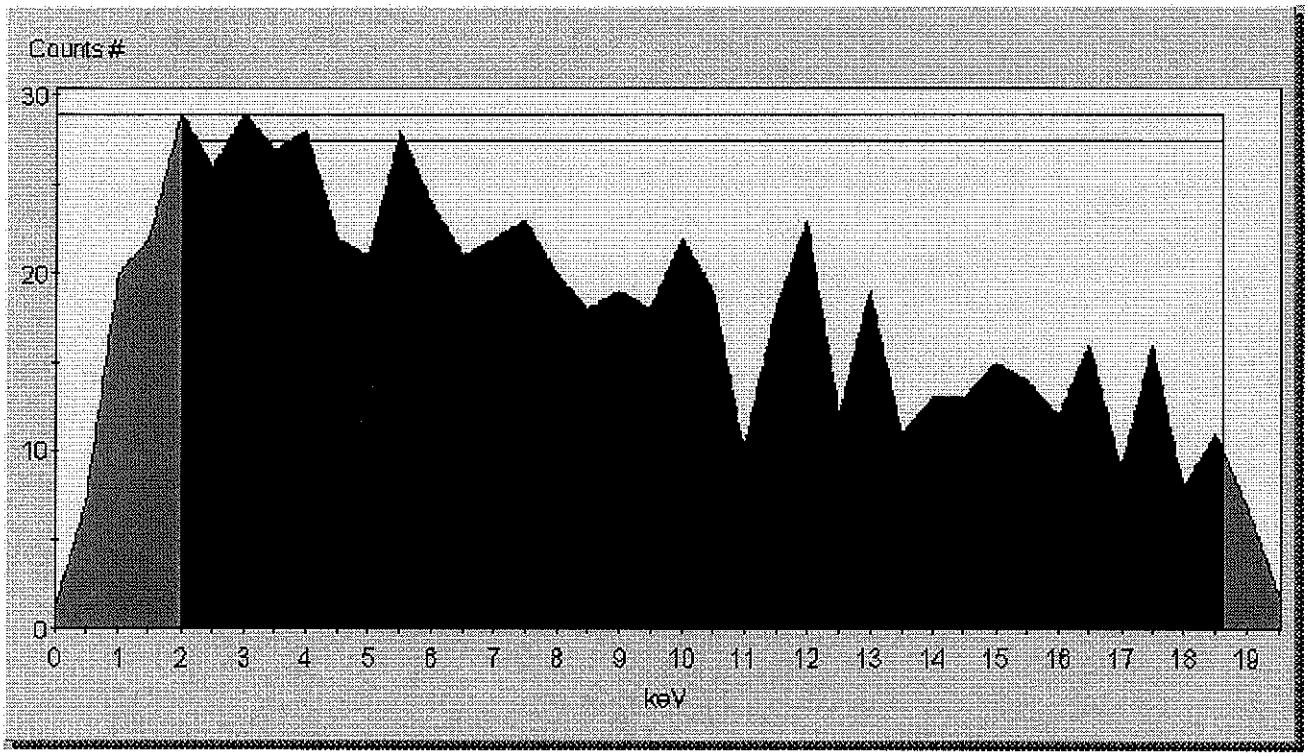


Sample #6	1	20	6	11.3	10.5	0.0	276.71	60.00

5/4/2016 12:47:52 AM

SpectraView Block Data



SNC Protocol

5/17/16 (B)

Calibration Information
Software Version IC: 2.12
Software Version EC: 2.02
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 427086
3H Chi Square: 12.08 Date Processed: 5/3/2016 3:50:01 AM
14C Chi Square: 13.89 Date Processed: 5/3/2016 3:50:01 AM
3H E^2/B (1-18.6 keV): 297.63 Date Processed: 5/3/2016 3:50:01 AM
14C E^2/B (4-156 keV): 566.37 Date Processed: 5/3/2016 3:50:01 AM
3H Efficiency (0-18.6 keV): 61.92 Date Processed: 5/3/2016 3:50:01 AM
14C Efficiency (0-156 keV): 96.24 Date Processed: 5/3/2016 3:50:01 AM
IPA Background Date Processed: 5/3/2016 3:50:01 AM
3H Background CPM (0-18.6 keV): 12.90 Date Processed: 5/3/2016 3:50:01 AM
14C Background CPM (0-156 keV): 20.08 Date Processed: 5/3/2016 3:50:01 AM
3H Calibration DPM: 207400
3H Reference Date: 10/29/2007
14C Calibration DPM: 120521

SECTION XI

ANALYTICAL DATA (NICKEL-63)

16-04147
Ni063
Run 1

Work Order	16-04147
Analysis Code	Ni063
Run	1
Date Received	4/28/2016
Lab Deadline	5/4/2016
Client	Washington Closure Hanford
Project	S00W235A01
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	ASTM 3500-Ni Modified
Instrument Type	Beta LSC
Radiometric Tracer	Ni-63MS
Radiometric Sol#	Ni-3
Tracer Act (dpm/g)	21900.26
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/28/16 00:00	1.0000E+00
02	MBL	BLANK		04/28/16 00:00	1.0000E+00
03	DUP	J1V8X3 SAF: RC-189		04/26/16 10:25	1.0050E+00
04	DMSO	J1V8X3 SAF: RC-189	42	04/26/16 10:25	1.0125E+00
05	MS	J1V8X3 SAF: RC-189		04/26/16 10:25	1.0187E+00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS				0.00								
02	MBL				0.00								
03	DUP				0.00								
04	DMSO				0.00								
05	MS	0.1514	3315.7		0.00								

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS								
02	MBL								
03	DUP								
04	DMSO	04/29/16 07:02	KSALLINGS						
05	MS	04/29/16 07:02	KSALLINGS	05/04/16 12:42	KCOULSTON				

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-Ni063-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-04147
Analysis Code: Ni063
Run: 1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	NI-63	LCS	LCS	pCi/g	1.46E+03	9.20E+00	2.41E+00	1.49E+03	97.78	OK		OK	
02	NI-63	MBL	BLANK	pCi/g	-1.59E+00	1.37E+00	2.40E+00					OK	OK
03	NI-63	DUP	J1V8X3 SAF: RC-189	pCi/g	-8.84E-01	1.39E+00	2.40E+00				OK	OK	
04	NI-63	DMSO	J1V8X3 SAF: RC-189	pCi/g	-7.70E-01	1.35E+00	2.33E+00					OK	
05	NI-63	MS	J1V8X3 SAF: RC-189	pCi/g	1.40E+03	8.92E+00	2.36E+00					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-Ni063-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-04147	Ni063	1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	NI-63	LCS	04/28/16 00:00	1.00E+00	0.00	0.00	0.00			
02	NI-63	MBL	04/28/16 00:00	1.00E+00	0.00	0.00	0.00			
03	NI-63	DUP	04/26/16 10:25	1.01E+00	0.00	0.00	0.00			
04	NI-63	DMSO	04/26/16 10:25	1.01E+00	0.00	0.00	0.00			
05	NI-63	MS	04/26/16 10:25	1.02E+00	0.00	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-04147-Ni063-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-04147	Ni063	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	NI-63	LCS	05/04/16 14:59	36561.525	3100A	1	60	100086	19.8	0.5091243
02	NI-63	MBL	05/04/16 16:02	36561.525	3100A	2	60	1080	19.8	0.510267947
03	NI-63	DUP	05/04/16 17:04	36561.525	3100A	3	60	1128	19.8	0.507326407
04	NI-63	DMSO	05/04/16 18:07	36561.525	3100A	4	60	1134	19.8	0.520275042
05	NI-63	MS	05/04/16 19:09	36561.525	3100A	5	60	97926	19.8	0.5099338

Count Room Report
Client: Washington Closure Hanfor

16-04147-Ni063-1 (pCi/g) in SO
Tracer ID: Ni-3

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/28/16 00:00	1.0000				0.00		
02	MBL	BLANK	04/28/16 00:00	1.0000				0.00		
03	DUP	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0050				0.00		
04	DMSO	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0125				0.00		
05	MS	J1V8X3 SAF: RC-189	04/26/16 10:25	1.0187	0.1514	3315.6994		0.00		

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 5/4/2016 12:42 PM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-04147	1	Ni063	5/4/2016 12:40	KCOULSTON	KC	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	*Sol #*	*Activity dpm/g*	*Solution Date*	*Approx Addition*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*
Ni-63	Ni-3	21900.260	5/4/2016	**0.150**	**0.1512**		0.1555		1491.59	44.748	0.00	0.000	1534.00	46.020	0.00	0.000

Tc-99 MS Tc-2a 22043.52 3/3/2016 0.1

Tracers

fraction	*Isotope*	*Sol #*	*Activity dpm/g*	*Solution Date*	*Volume Used (g)*	*Approx Addition*
01	**Ni-63MS**	Ni-3	21900.260	5/4/2016		**0.1500**
02	**Ni-63MS**	Ni-3	21900.260	5/4/2016		**0.1500**
03	**Ni-63MS**	Ni-3	21900.260	5/4/2016		**0.1500**
04	**Ni-63MS**	Ni-3	21900.260	5/4/2016		**0.1500**
05	**Ni-63MS**	Ni-3	21900.260	5/4/2016	**0.1514**	**0.1500**

Balance Printer Tapes

Tracer	LCS

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 5/2/2016 8:33 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-04147	1	Ni063	grams	5/4/2016	JPACHELLA

Lab Fraction	Washington Closure Hanford Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	J1V8X3 SAF: RC-189	DUP					1.0050E+00	1.0050E+00				
04	J1V8X3 SAF: RC-189	DMSO					1.0125E+00	1.0125E+00				
05	J1V8X3 SAF: RC-189 MS	MS					1.0187E+00	1.0187E+00				

Comments	

Technician: JPachello Date: 5/2/16

Eberline Services - Oak Ridge
Prep Logbook
Version 2.0 8/1999

Rough Sample Preparation Log Book

Printed: 4/29/2016 7:00 AM

Work Order	Lab Deadline	Date Received in Prep	Date Sealed	Date Returned	Technician
16-04147	5/4/2016	4/28/2016	4/29/2016	4/30/2016	KSALLINGS

Eberline	Washington Closure Hanford	Tare (g)	Gross (g)		Net (g)		Percent		Gamma		Special
Fraction	Client ID	Pan Wt	Wet Wt.	Dry Wt.	Wet Wt.	Dry Wt.	Liquid	Solid	Dry Wt.	LEPS Wt.	Info
04	J1V8X3 SAF: RC-189	9.6600	109.5900	104.1200	99.9300	94.4600	5.47%	94.53%	0.0000	0.0000	
05	J1V8X3 SAF: RC-189 MS	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	

Comments	
Special Codes	H: Hot, O: Organic Hazard, P: PCB Hazard, R: Rush, T: Other (see comments)

Technician: Kenny Sallings Date: Analysis: Rough Prep Logbook

Work Order #	16-04147		Ni-63 Recovery			EBERLINE SERVICES	
tSIE	EFFICIENCY	Recovery Spike Activity	Grams Added	Total Activity	cpm	Bkg, cpm	RF
265.83	24.815%	21900.26	0.1555	3405.49043	1847.2	19.8	2.16

5/5/2016 8:35

Efficiency = 1.923E-08x3 - 1.264Ex2 +3.013E-03x -2.1070R-02

RECOVERY FACTOR

2.16242534

Remarks

Assay Definition-

Assay Description:
ni-63

Assay Type: CPM
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\Default\Ni63-cpm-21\20160504_1457
Raw Results Path: C:\Packard\Tricarb\Results\Default\Ni63-cpm-21\20160504_1457\20160504_1457.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Default\Ni63-cpm-21\20160504_1457\1604147 ni63a.csv
Assay File Name: C:\Packard\TriCarb\Assays\Ni63-cpm-21.lsa

Count Conditions-

Nuclide: 63Ni
Quench Indicator: tSIE
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 1.00
Quench Set: n/a
Count Time (min): 60.00
Count Mode: Normal
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: Off
Low CPM Threshold: Off
2 Sigma % Terminator: Off

Regions	LL	UL
A	0.0	75.0
B	2.0	75.0
C	0.0	150.0

Count Corrections-

Static Controller: On Luminescence Correction: Off
Colored Samples: n/a Heterogeneity Monitor: n/a
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

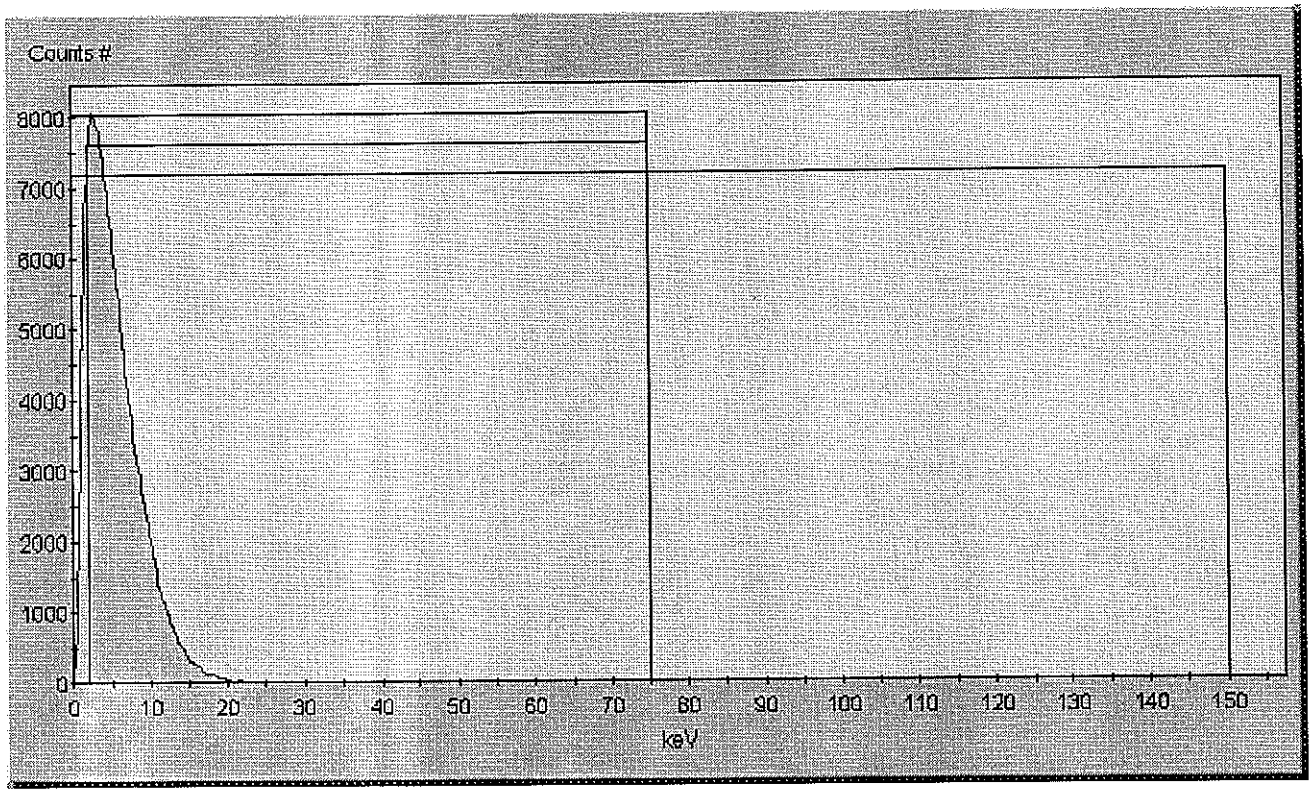
Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				
B				
C				

Cycle 1 Results

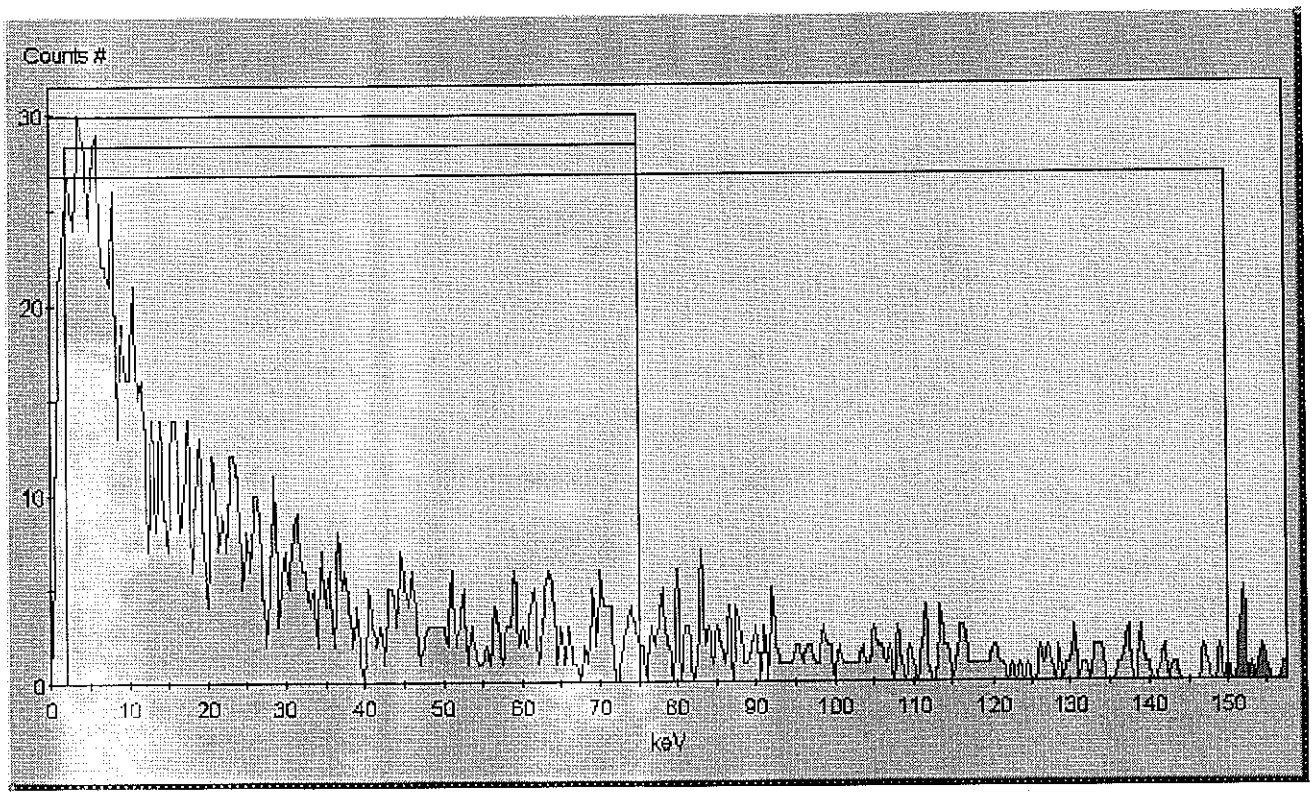
DATE	TIME	SMPL_ID	P#	PID	S#	CPMA	CPMB	CPMC	tSIE	Count Time
5/4/2016	2:59:29 PM	16-04147-1-N63-01S	21	13	1	1870.0	1668.1	1873.1	222.72	60.00

SpectraView Block Data



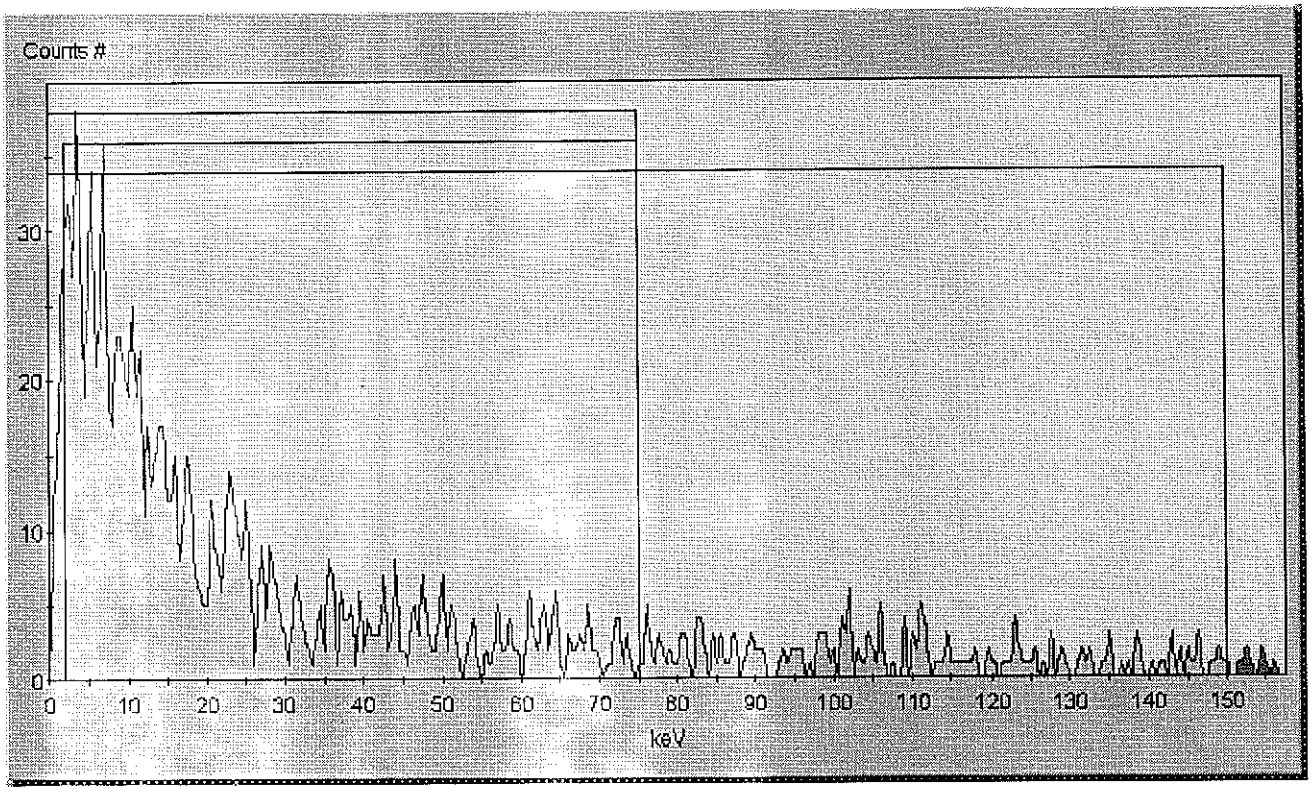
16-04147-1-N63-02S 21 13 2 18.9 18.0 22.4 224.88 60.00
5/4/2016 4:02:39 PM

SpectraView Block Data



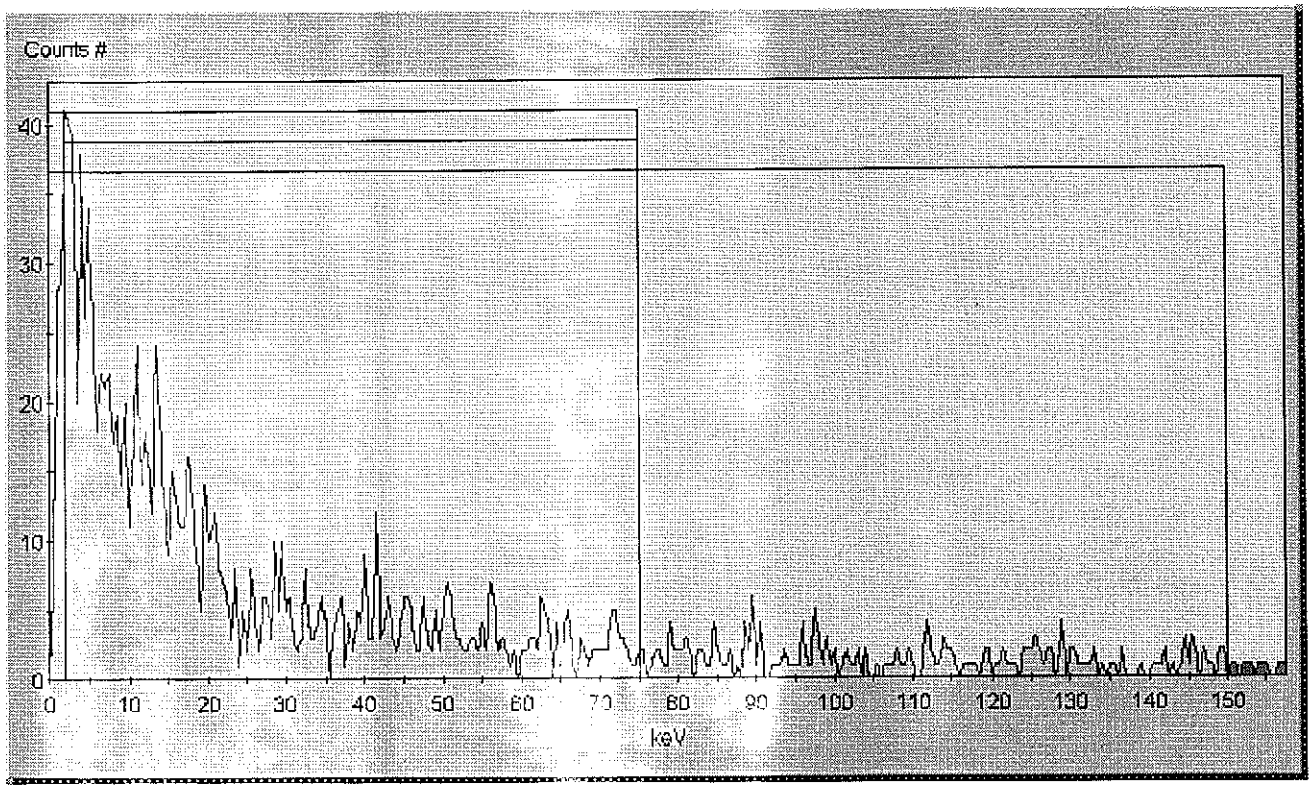
16-04147-1-N63-03S 21 13 3 19.7 18.8 23.3 219.31 60.00
5/4/2016 5:04:50 PM

SpectraView Block Data



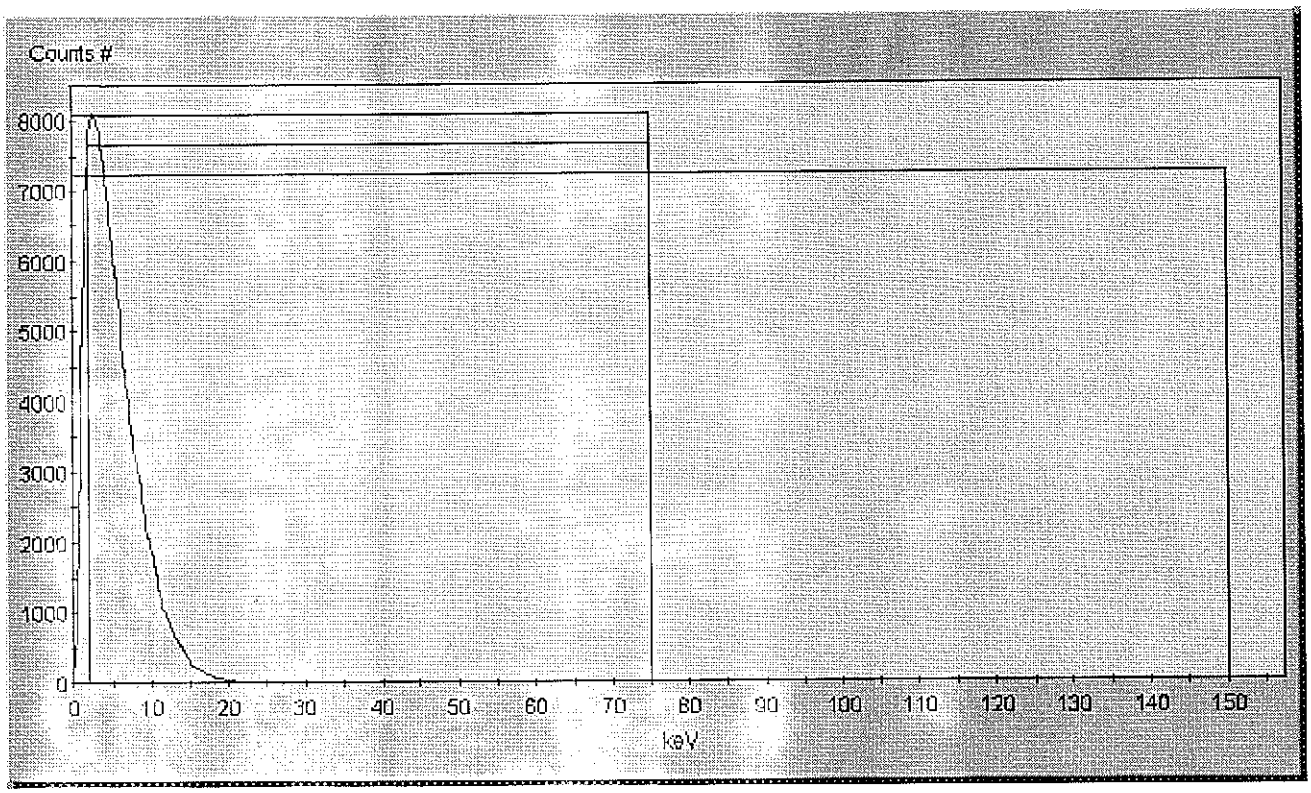
16-04147-1-N63-04S 21 13 4 20.1 18.9 23.5 242.84 60.00
5/4/2016 6:07:08 PM

SpectraView Block Data



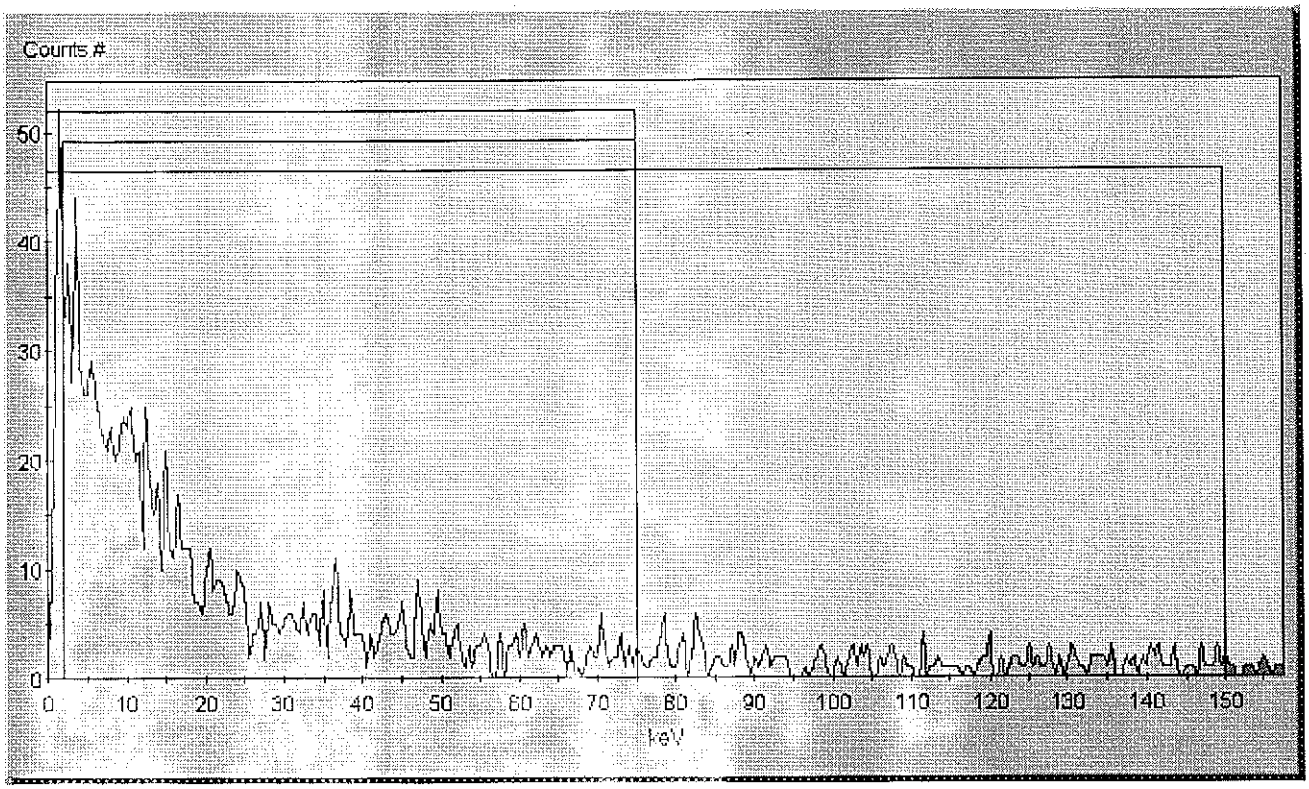
16-04147-1-N63-05S 21 13 5 1838.8 1632.1 1842.1 224.25 60.00
5/4/2016 7:09:22 PM

SpectraView Block Data



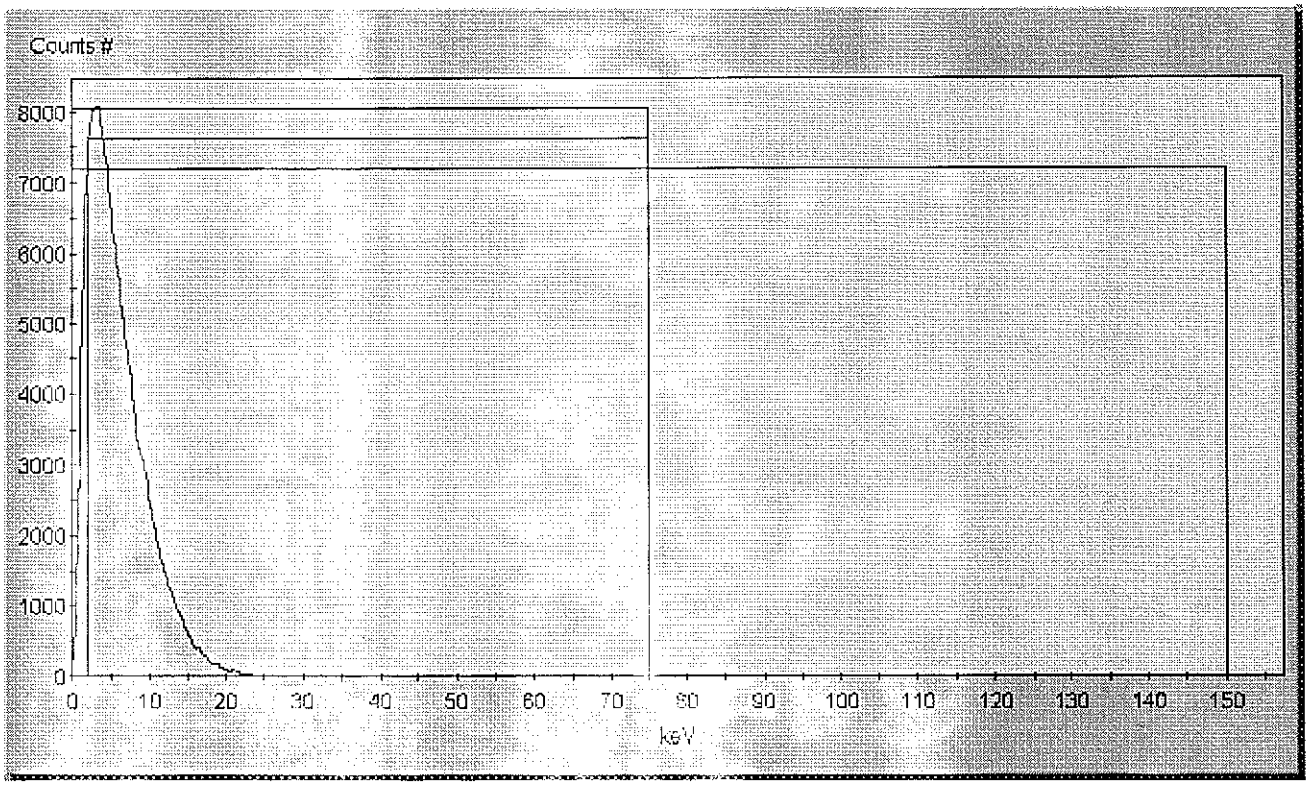
Sample #6 21 13 6 21.5 19.8 25.3 250.95 60.00
5/4/2016 8:12:31 PM

SpectraView Block Data



Sample #7 21 13 7 2048.9 1847.2 2052.4 265.83 60.00
5/4/2016 9:14:41 PM

SpectraView Block Data


Counts #
8000
7000
6000
5000
4000
3000
2000
1000
0
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
keV

SNC Protocol

5/4

(A)

Calibration Information
Software Version IC: 2.11
Software Version EC: 2.02
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 426825
3H Chi Square: 22.59 Date Processed: 5/4/2016 6:28:34 AM
14C Chi Square: 14.62 Date Processed: 5/4/2016 6:28:34 AM
3H E^2/B (1-18.6 keV): 281.08 Date Processed: 5/4/2016 6:28:34 AM
14C E^2/B (4-156 keV): 540.20 Date Processed: 5/4/2016 6:28:34 AM
3H Efficiency (0-18.6 keV): 60.16 Date Processed: 5/4/2016 6:28:34 AM
14C Efficiency (0-156 keV): 96.25 Date Processed: 5/4/2016 6:28:34 AM
IPA Background Date Processed: 5/4/2016 6:28:34 AM
3H Background CPM (0-18.6 keV): 12.90 Date Processed: 5/4/2016 6:28:34 AM
14C Background CPM (0-156 keV): 20.62 Date Processed: 5/4/2016 6:28:34 AM
3H Calibration DPM: 183600
3H Reference Date: 2/27/2007
14C Calibration DPM: 136900

SECTION XII

ANALYTICAL DATA (GAMMA SPECTROSCOPY)

Work Order	16-04147
Analysis Code	Gamma
Run	1
Date Received	4/28/2016
Lab Deadline	5/4/2016
Client	Washington Closure Hanford
Project	S00W235A01
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	LANL ER-130 Modified
Instrument Type	Gamma Spectroscopy
Radiometric Tracer	
Radiometric Sol#	
Tracer Act (dpm/g)	
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/28/16 00:00	1.0000E+00
02	MBL	BLANK		04/28/16 00:00	1.0000E+00
03	DUP	J1V8X3 SAF: RC-189	42	04/26/16 10:25	7.1154E+02
04	DO	J1V8X3 SAF: RC-189	42	04/26/16 10:25	7.1154E+02

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS				0.00								
02	MBL				0.00								
03	DUP				0.00								
04	DO				0.00								

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

16-04147
Gamma
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS								
02	MBL								
03	DUP								
04	DO	04/29/16 07:02	KSALLINGS						

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Work Order: 16-04147-Gamma-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LSC Known	LCS %R	LCS Flag	RPD Flag	Sample Date	Sample Aliquot	Counting Date/Time	Identified
01	CO-60	LCS	LCS	pCi/g	1.41E+02	8.18E+00	9.86E-01	1.37E+02	103.06	OK		04/28/16 00:00	1.00E+00	04/29/16 10:12	YES
01	CS-137	LCS	LCS	pCi/g	9.04E+01	8.00E+00	1.19E+00	8.69E+01	104.00	OK		04/28/16 00:00	1.00E+00	04/29/16 10:12	YES
02	AM-241	MBL	BLANK	pCi/g	-3.89E-03	3.34E-02	4.22E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	BI-214	MBL	BLANK	pCi/g	2.91E-02	3.25E-02	5.65E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	CO-60	MBL	BLANK	pCi/g	1.97E-02	1.43E-02	2.72E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	CS-137	MBL	BLANK	pCi/g	1.07E-02	1.80E-02	2.99E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	EU-152	MBL	BLANK	pCi/g	-1.59E-02	6.62E-02	4.67E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	EU-154	MBL	BLANK	pCi/g	-6.69E-04	4.67E-02	2.40E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	EU-155	MBL	BLANK	pCi/g	-1.98E-03	2.85E-02	3.83E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	K-40	MBL	BLANK	pCi/g	1.42E-01	1.35E-01	2.09E-01					04/28/16 00:00	1.00E+00	04/29/16 08:05	YES
02	PA-234M	MBL	BLANK	pCi/g	7.42E-01	1.74E+00	3.02E+00					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	PB-212	MBL	BLANK	pCi/g	1.13E-02	2.35E-02	3.70E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	PB-214	MBL	BLANK	pCi/g	7.83E-03	3.35E-02	5.16E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	RA-226	MBL	BLANK	pCi/g	2.91E-02	3.25E-02	5.65E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	TH-234	MBL	BLANK	pCi/g	2.79E-01	2.96E-01	4.20E-01					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	TL-208	MBL	BLANK	pCi/g	4.11E-02	4.08E-02	7.22E-02					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
02	U-235	MBL	BLANK	pCi/g	4.88E-02	6.50E-02	1.11E-01					04/28/16 00:00	1.00E+00	04/29/16 08:05	NO
03	AM-241	DUP	J1V8X3 SAF: RC-189	pCi/g	4.11E-02	7.38E-02	1.13E-01				NA	04/26/16 10:25	7.12E+02	04/29/16 07:26	NO
03	BI-214	DUP	J1V8X3 SAF: RC-189	pCi/g	8.70E-01	1.75E-01	2.10E-01					04/26/16 10:25	7.12E+02	04/29/16 07:26	YES
03	CO-60	DUP	J1V8X3 SAF: RC-189	pCi/g	9.90E-03	7.03E-02	9.60E-02				NA	04/26/16 10:25	7.12E+02	04/29/16 07:26	NO
03	CS-137	DUP	J1V8X3 SAF: RC-189	pCi/g	6.69E-02	6.18E-02	1.05E-01				NA	04/26/16 10:25	7.12E+02	04/29/16 07:26	NO
03	EU-152	DUP	J1V8X3 SAF: RC-189	pCi/g	6.41E-02	1.25E-01	2.38E-01					04/26/16 10:25	7.12E+02	04/29/16 07:26	NO
03	EU-154	DUP	J1V8X3 SAF: RC-189	pCi/g	4.83E-02	2.13E-01	1.23E-01					04/26/16 10:25	7.12E+02	04/29/16 07:26	NO
03	EU-155	DUP	J1V8X3 SAF: RC-189	pCi/g	6.39E-02	1.47E-01	1.69E-01					04/26/16 10:25	7.12E+02	04/29/16 07:26	NO
03	K-40	DUP	J1V8X3 SAF: RC-189	pCi/g	1.73E+01	2.46E+00	1.09E+00					04/26/16 10:25	7.12E+02	04/29/16 07:26	YES
03	PA-234M	DUP	J1V8X3 SAF: RC-189	pCi/g	-1.03E+00	6.34E+00	9.94E+00					04/26/16 10:25	7.12E+02	04/29/16 07:26	NO
03	PB-212	DUP	J1V8X3 SAF: RC-189	pCi/g	1.23E+00	2.03E-01	2.36E-01					04/26/16 10:25	7.12E+02	04/29/16 07:26	YES
03	PB-214	DUP	J1V8X3 SAF: RC-189	pCi/g	7.67E-01	1.65E-01	2.66E-01					04/26/16 10:25	7.12E+02	04/29/16 07:26	YES
03	RA-226	DUP	J1V8X3 SAF: RC-189	pCi/g	8.70E-01	1.75E-01	2.10E-01					04/26/16 10:25	7.12E+02	04/29/16 07:26	YES
03	TH-234	DUP	J1V8X3 SAF: RC-189	pCi/g	4.27E-01	7.41E-01	1.13E+00					04/26/16 10:25	7.12E+02	04/29/16 07:26	NO
03	TL-208	DUP	J1V8X3 SAF: RC-189	pCi/g	1.16E+00	2.99E-01	4.03E-01					04/26/16 10:25	7.12E+02	04/29/16 07:26	YES
03	U-235	DUP	J1V8X3 SAF: RC-189	pCi/g	2.66E-01	3.36E-01	5.20E-01					04/26/16 10:25	7.12E+02	04/29/16 07:26	NO
04	AM-241	DO	J1V8X3 SAF: RC-189	pCi/g	7.29E-02	7.25E-02	1.12E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	NO
04	BI-214	DO	J1V8X3 SAF: RC-189	pCi/g	8.92E-01	1.78E-01	2.38E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	YES
04	CO-60	DO	J1V8X3 SAF: RC-189	pCi/g	2.78E-02	7.41E-02	9.80E-02					04/26/16 10:25	7.12E+02	04/29/16 09:28	NO
04	CS-137	DO	J1V8X3 SAF: RC-189	pCi/g	3.15E-02	5.91E-02	9.60E-02					04/26/16 10:25	7.12E+02	04/29/16 09:28	NO
04	EU-152	DO	J1V8X3 SAF: RC-189	pCi/g	-1.66E+00	3.64E-01	2.30E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	NO
04	EU-154	DO	J1V8X3 SAF: RC-189	pCi/g	-5.12E-02	1.07E-01	1.17E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	NO

Work Order: 16-04147-Gamma-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LSC Known	LCS %R	LCS Flag	RPD Flag	Sample Date	Sample Aliquot	Counting Date/Time	Identified
04	EU-155	DO	J1V8X3 SAF: RC-189	pCi/g	3.90E-01	1.52E-01	2.18E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	YES
04	K-40	DO	J1V8X3 SAF: RC-189	pCi/g	1.70E+01	2.49E+00	1.45E+00					04/26/16 10:25	7.12E+02	04/29/16 09:28	YES
04	PA-234M	DO	J1V8X3 SAF: RC-189	pCi/g	5.35E+00	6.36E+00	1.10E+01					04/26/16 10:25	7.12E+02	04/29/16 09:28	NO
04	PB-212	DO	J1V8X3 SAF: RC-189	pCi/g	1.09E+00	1.97E-01	2.47E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	YES
04	PB-214	DO	J1V8X3 SAF: RC-189	pCi/g	7.62E-01	1.54E-01	2.46E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	YES
04	RA-226	DO	J1V8X3 SAF: RC-189	pCi/g	8.92E-01	1.78E-01	2.38E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	YES
04	TH-234	DO	J1V8X3 SAF: RC-189	pCi/g	6.51E-01	7.32E-01	1.13E+00					04/26/16 10:25	7.12E+02	04/29/16 09:28	NO
04	TL-208	DO	J1V8X3 SAF: RC-189	pCi/g	1.05E+00	2.72E-01	3.60E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	YES
04	U-235	DO	J1V8X3 SAF: RC-189	pCi/g	8.42E-02	3.30E-01	5.07E-01					04/26/16 10:25	7.12E+02	04/29/16 09:28	NO

Count Room Report
Client: Washington Closure Hanfor

16-04147-Gamma-1 (pCi/g) in
Tracer ID: 2L-GRS1402

Printed: 4/29/2016 7:14 AM
Page 1 of 1

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/28/16 00:00	1.0000				0.00		
02	MBL	BLANK	04/28/16 00:00	1.0000				0.00		
03	DUP	J1V8X3 SAF: RC-189	04/26/16 10:25	711.5400				0.00		
04	DO	J1V8X3 SAF: RC-189	04/26/16 10:25	711.5400				0.00		

KEM

0153

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 4/29/2016 7:14 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-04147	1	Gamma	grams	5/4/2016	KSALLINGS

Lab Fraction	Washington Closure Hanford Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	J1V8X3 SAF: RC-189	DUP					7.1154E+02	7.1154E+02				
04	J1V8X3 SAF: RC-189	DO					7.1154E+02	7.1154E+02				

Comments	

Technician: Kenny Sallings Date: 4/29/16

Eberline Services - Oak Ridge
Prep Logbook
Version 2.0 8/1999

Rough Sample Preparation Log Book

Printed: 4/29/2016 6:59 AM

Work Order	Lab Deadline	Date Received in Prep	Date Sealed	Date Returned	Technician
16-04147	5/4/2016	4/28/2016	4/29/2016	4/30/2016	KSALLINGS

Eberline Fraction	Washington Closure Hanford Client ID	Tare (g)	Gross (g)		Net (g)		Percent		Gamma		Special Info
		Pan Wt	Wet Wt.	Dry Wt.	Wet Wt.	Dry Wt.	Liquid	Solid	Dry Wt.	LEPS Wt.	
04	J1V8X3 SAF: RC-189	29.0900	837.2200	793.1400	808.1300	764.0500	5.45%	94.55%	0.0000	0.0000	
05	J1V8X3 SAF: RC-189 MS	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	

Comments	
Special Codes	H: Hot, O: Organic Hazard, P: PCB Hazard, R: Rush, T: Other (see comments)

SG155

Technician: Kenny Sallings Date: Analysis: Rough Prep Logbook

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

GAS-1302

94268

Sand in 16 Ounce PP Taral Jar Filled to Top

Customer: Eberline Analytical Corporation
P.O. No.: 1304009, Item 7 Product Code: 8401-EG-SAN
Reference Date: 01-Jul-2013 12:00 PM EST **Grams of Master Source:** 0.017994

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*
Am-241	59.5	1.580E+05	———	2.094E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.641E+05	2.952E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.865E+04	1.595E+03	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.243E+05	2.236E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.627E+05	4.727E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.736E+05	3.124E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.120E+05	2.015E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.197E+05	7.553E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.074E+05	3.732E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.074E+05	3.732E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.444E+05	7.996E+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)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

00166

Apex-Gamma

Analysis Report for 1604147-01
GAS-1302

514

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1604147-01
Sample Description	: GAS-1302
Sample Type	: SOIL
Sample Size	: 7.360E+02 grams
Facility	: Countroom
Sample Taken On	: 7/1/2013 7:29:16AM
Acquisition Started	: 4/29/2016 10:12:27AM
Procedure	: GAS-1402 pCi
Operator	: Administrator
Detector Name	: GE3
Geometry	: GAS-1402
Live Time	: 1800.0 seconds
Real Time	: 1885.8 seconds
Dead Time	: 4.55 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 9 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 10/25/2014
Efficiency Calibration Used Done On	: 10/25/2014
Efficiency Calibration Description	:
Sample Number	: 36898

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

Analysis Report for 1604147-01

GAS-1302

PEAK LOCATE REPORT

Peak Locate Performed on : 5/11/2016 10:51:17AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096
Peak Search Sensitivity : 2.50

Peak No.	Energy (keV)	Centroid Channel	Centroid Uncertainty	Peak Significance
1	17.75	18.00	0.0000	0.00
2	22.62	22.86	0.0000	0.00
3	32.23	32.47	0.0000	0.00
4	52.10	52.33	0.0000	0.00
5	59.71	59.93	0.0000	0.00
6	67.77	67.99	0.0000	0.00
7	88.27	88.48	0.0000	0.00
8	122.35	122.54	0.0000	0.00
9	136.68	136.86	0.0000	0.00
10	166.15	166.32	0.0000	0.00
11	239.89	240.02	0.0000	0.00
12	282.38	282.49	0.0000	0.00
13	290.44	290.54	0.0000	0.00
14	311.42	311.51	0.0000	0.00
15	499.60	499.59	0.0000	0.00
16	662.26	662.18	0.0000	0.00
17	983.90	983.67	0.0000	0.00
18	1028.42	1028.17	0.0000	0.00
19	1050.90	1050.64	0.0000	0.00
20	1174.06	1173.75	0.0000	0.00
21	1207.14	1206.82	0.0000	0.00
22	1214.12	1213.79	0.0000	0.00
23	1333.40	1333.03	0.0000	0.00
24	1570.77	1570.31	0.0000	0.00
25	1733.27	1732.75	0.0000	0.00
26	1837.20	1836.64	0.0000	0.00
27	1920.20	1919.62	0.0000	0.00
28	1982.20	1981.60	0.0000	0.00
29	2362.27	2361.56	0.0000	0.00
30	2371.74	2371.03	0.0000	0.00
31	2421.02	2420.29	0.0000	0.00
32	2506.91	2506.16	0.0000	0.00
33	2615.48	2614.71	0.0000	0.00

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1604147-01

GAS-1302

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/11/2016 10:51:17AM

Peak Analysis From Channel : 1

Peak Analysis To Channel : 4096

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	17.75	17 -	29	18.00	1.04E+03	151.82	7.44E+03	1.37
m	2	22.62	17 -	29	22.86	7.10E+04	646.70	1.48E+04	1.68
	3	32.23	30 -	35	32.47	1.88E+03	255.05	1.16E+04	1.96
M	4	52.10	45 -	65	52.33	1.29E+04	643.92	4.18E+04	3.79
m	5	59.71	45 -	65	59.93	9.55E+04	682.92	1.74E+04	1.81
	6	67.77	65 -	71	67.99	6.09E+02	357.04	2.28E+04	3.32
	7	88.27	83 -	92	88.48	3.12E+04	562.80	2.74E+04	1.93
	8	122.35	118 -	126	122.54	5.58E+03	353.82	1.58E+04	1.88
	9	136.68	134 -	140	136.86	6.72E+02	257.56	1.16E+04	1.50
	10	166.15	164 -	169	166.32	3.77E+02	214.55	8.91E+03	1.87
	11	239.89	237 -	243	240.02	3.30E+02	232.80	9.56E+03	4.43
	12	282.38	280 -	285	282.49	2.00E+02	179.44	6.29E+03	3.93
	13	290.44	289 -	294	290.54	1.72E+02	175.15	5.97E+03	2.80
	14	311.42	309 -	314	311.51	1.53E+02	172.47	5.83E+03	3.22
	15	499.60	497 -	502	499.59	1.56E+02	136.93	3.61E+03	3.55
	16	662.26	657 -	666	662.18	2.26E+04	349.63	4.55E+03	1.91
	17	983.90	981 -	986	983.67	1.02E+02	115.41	2.57E+03	1.53
	18	1028.42	1026 -	1031	1028.17	1.34E+02	111.84	2.39E+03	2.49
	19	1050.90	1048 -	1053	1050.64	9.25E+01	110.81	2.36E+03	4.10
	20	1174.06	1168 -	1180	1173.75	1.88E+04	311.31	2.54E+03	2.22
	21	1207.14	1203 -	1210	1206.82	7.92E+01	76.18	9.04E+02	2.35
	22	1214.12	1211 -	1217	1213.79	7.38E+01	63.41	6.74E+02	2.55
	23	1333.40	1327 -	1339	1333.03	1.68E+04	268.87	5.69E+02	2.24
	24	1570.77	1567 -	1573	1570.31	2.63E+01	21.08	5.95E+01	2.81
	25	1733.27	1718 -	1747	1732.75	6.01E+01	61.60	2.02E+02	23.54
	26	1837.20	1832 -	1841	1836.64	4.34E+01	31.22	1.13E+02	1.47
	27	1920.20	1915 -	1922	1919.62	1.88E+01	14.83	2.44E+01	3.04
	28	1982.20	1978 -	1984	1981.60	2.67E+01	14.88	2.06E+01	2.80
	29	2362.27	2357 -	2366	2361.56	1.58E+01	9.85	4.33E+00	3.32
	30	2371.74	2367 -	2374	2371.03	8.17E+00	8.94	7.67E+00	4.92
	31	2421.02	2416 -	2423	2420.29	7.00E+00	5.29	0.00E+00	1.33
	32	2506.91	2501 -	2510	2506.16	1.52E+02	26.04	1.00E+01	2.82
	33	2615.48	2609 -	2617	2614.71	1.70E+01	8.25	0.00E+00	2.16

Analysis Report for 1604147-01

GAS-1302

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/11/2016 10:51:17AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
M	1	17.75	17 -	29	1.04E+03	151.82	7.44E+03	1.42E+02
m	2	22.62	17 -	29	7.10E+04	646.70	1.48E+04	2.00E+02
	3	32.23	30 -	35	1.88E+03	255.05	1.16E+04	1.97E+02
M	4	52.10	45 -	65	1.29E+04	643.92	4.18E+04	3.36E+02
m	5	59.71	45 -	65	9.55E+04	682.92	1.74E+04	2.17E+02
	6	67.77	65 -	71	6.09E+02	357.04	2.28E+04	2.91E+02
	7	88.27	83 -	92	3.12E+04	562.80	2.74E+04	3.60E+02
	8	122.35	118 -	126	5.58E+03	353.82	1.58E+04	2.64E+02
	9	136.68	134 -	140	6.72E+02	257.56	1.16E+04	2.07E+02
	10	166.15	164 -	169	3.77E+02	214.55	8.91E+03	1.73E+02
	11	239.89	237 -	243	3.30E+02	232.80	9.56E+03	1.89E+02
	12	282.38	280 -	285	2.00E+02	179.44	6.29E+03	1.46E+02
	13	290.44	289 -	294	1.72E+02	175.15	5.97E+03	1.42E+02
	14	311.42	309 -	314	1.53E+02	172.47	5.83E+03	1.40E+02
	15	499.60	497 -	502	1.56E+02	136.93	3.61E+03	1.11E+02
	16	662.26	657 -	666	2.26E+04	349.63	4.55E+03	1.47E+02
	17	983.90	981 -	986	1.02E+02	115.41	2.57E+03	9.34E+01
	18	1028.42	1026 -	1031	1.34E+02	111.84	2.39E+03	8.99E+01
	19	1050.90	1048 -	1053	9.25E+01	110.81	2.36E+03	8.97E+01
	20	1174.06	1168 -	1180	1.88E+04	311.31	2.54E+03	1.22E+02
	21	1207.14	1203 -	1210	7.92E+01	76.18	9.04E+02	6.09E+01
	22	1214.12	1211 -	1217	7.38E+01	63.41	6.74E+02	5.02E+01
	23	1333.40	1327 -	1339	1.68E+04	268.87	5.69E+02	5.75E+01
	24	1570.77	1567 -	1573	2.63E+01	21.08	5.95E+01	1.51E+01
	25	1733.27	1718 -	1747	6.01E+01	61.60	2.02E+02	4.90E+01
	26	1837.20	1832 -	1841	4.34E+01	31.22	1.13E+02	2.33E+01
	27	1920.20	1915 -	1922	1.88E+01	14.83	2.44E+01	9.89E+00
	28	1982.20	1978 -	1984	2.67E+01	14.88	2.06E+01	8.80E+00
	29	2362.27	2357 -	2366	1.58E+01	9.85	4.33E+00	4.77E+00
	30	2371.74	2367 -	2374	8.17E+00	8.94	7.67E+00	5.66E+00
	31	2421.02	2416 -	2423	7.00E+00	5.29	0.00E+00	0.00E+00

Analysis Report for 1604147-01

GAS-1302

Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
32	2506.91	2501 -	2510	1.52E+02	26.04	1.00E+01	6.88E+00
33	2615.48	2609 -	2617	1.70E+01	8.25	0.00E+00	0.00E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

PEAK WITH NID REPORT

Peak Analysis Performed on : 5/11/2016 10:51:17AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Tentative NID Library : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB
Peak Match Tolerance : 1.000 keV

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
M	1	17.75	17 -	29	18.00	1.04E+03	151.82	7.44E+03	.....
m	2	22.62	17 -	29	22.86	7.10E+04	646.70	1.48E+04	.....
	3	32.23	30 -	35	32.47	1.88E+03	255.05	1.16E+04	.....
M	4	52.10	45 -	65	52.33	1.29E+04	643.92	4.18E+04	.....
m	5	59.71	45 -	65	59.93	9.55E+04	682.92	1.74E+04	AM-241
	6	67.77	65 -	71	67.99	6.09E+02	357.04	2.28E+04	TA-182 TH-230 TI-44
	7	88.27	83 -	92	88.48	3.12E+04	562.80	2.74E+04	LU-176 CD-109 SN-126
	8	122.35	118 -	126	122.54	5.58E+03	353.82	1.58E+04	CO-57 EU-152 EU-154
	9	136.68	134 -	140	136.86	6.72E+02	257.56	1.16E+04	CO-57 SE-75
	10	166.15	164 -	169	166.32	3.77E+02	214.55	8.91E+03	CE-139
	11	239.89	237 -	243	240.02	3.30E+02	232.80	9.56E+03	.....
	12	282.38	280 -	285	282.49	2.00E+02	179.44	6.29E+03	.....
	13	290.44	289 -	294	290.54	1.72E+02	175.15	5.97E+03	.....
	14	311.42	309 -	314	311.51	1.53E+02	172.47	5.83E+03	PA-233
	15	499.60	497 -	502	499.59	1.56E+02	136.93	3.61E+03	.....
	16	662.26	657 -	666	662.18	2.26E+04	349.63	4.55E+03	CS-137
	17	983.90	981 -	986	983.67	1.02E+02	115.41	2.57E+03	V-48

Analysis Report for 1604147-01

GAS-1302

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
18	1028.42	1026 -	1031	1028.17	1.34E+02	111.84	2.39E+03	.....
19	1050.90	1048 -	1053	1050.64	9.25E+01	110.81	2.36E+03	.....
20	1174.06	1168 -	1180	1173.75	1.88E+04	311.31	2.54E+03	CO-60
21	1207.14	1203 -	1210	1206.82	7.92E+01	76.18	9.04E+02	.....
22	1214.12	1211 -	1217	1213.79	7.38E+01	63.41	6.74E+02	.....
23	1333.40	1327 -	1339	1333.03	1.68E+04	268.87	5.69E+02	CO-60
24	1570.77	1567 -	1573	1570.31	2.63E+01	21.08	5.95E+01	.....
25	1733.27	1718 -	1747	1732.75	6.01E+01	61.60	2.02E+02	.....
26	1837.20	1832 -	1841	1836.64	4.34E+01	31.22	1.13E+02	.....
27	1920.20	1915 -	1922	1919.62	1.88E+01	14.83	2.44E+01	.....
28	1982.20	1978 -	1984	1981.60	2.67E+01	14.88	2.06E+01	.....
29	2362.27	2357 -	2366	2361.56	1.58E+01	9.85	4.33E+00	.....
30	2371.74	2367 -	2374	2371.03	8.17E+00	8.94	7.67E+00	.....
31	2421.02	2416 -	2423	2420.29	7.00E+00	5.29	0.00E+00	.....
32	2506.91	2501 -	2510	2506.16	1.52E+02	26.04	1.00E+01	.....
33	2615.48	2609 -	2617	2614.71	1.70E+01	8.25	0.00E+00	TL-208

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

PEAK EFFICIENCY REPORT

Peak Analysis Performed on : 5/11/2016 10:51:17AM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
M	1	17.75	1.04E+03	151.82	2.89E-04	1.58E-03
m	2	22.62	7.10E+04	646.70	1.35E-03	1.58E-03
	3	32.23	1.88E+03	255.05	6.19E-03	1.58E-03
M	4	52.10	1.29E+04	643.92	1.78E-02	1.58E-03
m	5	59.71	9.55E+04	682.92	2.06E-02	1.59E-03
	6	67.77	6.09E+02	357.04	2.26E-02	1.86E-03
	7	88.27	3.12E+04	562.80	2.44E-02	2.52E-03
	8	122.35	5.58E+03	353.82	2.30E-02	1.73E-03
	9	136.68	6.72E+02	257.56	2.19E-02	1.66E-03
	10	166.15	3.77E+02	214.55	1.97E-02	1.51E-03
	11	239.89	3.30E+02	232.80	1.52E-02	1.18E-03
	12	282.38	2.00E+02	179.44	1.33E-02	9.92E-04
	13	290.44	1.72E+02	175.15	1.30E-02	9.81E-04
	14	311.42	1.53E+02	172.47	1.23E-02	9.51E-04

Analysis Report for 1604147-01

GAS-1302

Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
15	499.60	1.56E+02	136.93	8.17E-03	7.30E-04
16	662.26	2.26E+04	349.63	6.39E-03	5.67E-04
17	983.90	1.02E+02	115.41	4.55E-03	3.59E-04
18	1028.42	1.34E+02	111.84	4.38E-03	3.50E-04
19	1050.90	9.25E+01	110.81	4.30E-03	3.46E-04
20	1174.06	1.88E+04	311.31	3.92E-03	3.23E-04
21	1207.14	7.92E+01	76.18	3.83E-03	3.16E-04
22	1214.12	7.38E+01	63.41	3.82E-03	3.15E-04
23	1333.40	1.68E+04	268.87	3.54E-03	2.88E-04
24	1570.77	2.63E+01	21.08	3.11E-03	2.53E-04
25	1733.27	6.01E+01	61.60	2.89E-03	2.29E-04
26	1837.20	4.34E+01	31.22	2.78E-03	2.13E-04
27	1920.20	1.88E+01	14.83	2.69E-03	2.13E-04
28	1982.20	2.67E+01	14.88	2.64E-03	2.13E-04
29	2362.27	1.58E+01	9.85	2.36E-03	2.13E-04
30	2371.74	8.17E+00	8.94	2.36E-03	2.13E-04
31	2421.02	7.00E+00	5.29	2.33E-03	2.13E-04
32	2506.91	1.52E+02	26.04	2.29E-03	2.13E-04
33	2615.48	1.70E+01	8.25	2.24E-03	2.13E-04

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000 sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/11/2016 10:51:17AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000035908.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	17.75	1.04E+03	151.82			1.04E+03	1.52E+02
m	2	22.62	7.10E+04	646.70	3.52E+01	7.14E+00	7.09E+04	6.47E+02
	3	32.23	1.88E+03	255.05			1.88E+03	2.55E+02
M	4	52.10	1.29E+04	643.92			1.29E+04	6.44E+02
m	5	59.71	9.55E+04	682.92	7.11E+00	6.53E-01	9.55E+04	6.83E+02
	6	67.77	6.09E+02	357.04			6.09E+02	3.57E+02
	7	88.27	3.12E+04	562.80	4.42E+00	2.55E+00	3.12E+04	5.63E+02
	8	122.35	5.58E+03	353.82			5.58E+03	3.54E+02
	9	136.68	6.72E+02	257.56			6.72E+02	2.58E+02
	10	166.15	3.77E+02	214.55			3.77E+02	2.15E+02
	11	239.89	3.30E+02	232.80			3.30E+02	2.33E+02

Analysis Report for 1604147-01

GAS-1302

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
12	282.38	2.00E+02	179.44			2.00E+02	1.79E+02
13	290.44	1.72E+02	175.15			1.72E+02	1.75E+02
14	311.42	1.53E+02	172.47			1.53E+02	1.72E+02
15	499.60	1.56E+02	136.93			1.56E+02	1.37E+02
16	662.26	2.26E+04	349.63	2.32E+00	1.67E+00	2.26E+04	3.50E+02
17	983.90	1.02E+02	115.41			1.02E+02	1.15E+02
18	1028.42	1.34E+02	111.84			1.34E+02	1.12E+02
19	1050.90	9.25E+01	110.81			9.25E+01	1.11E+02
20	1174.06	1.88E+04	311.31	2.08E+00	1.21E+00	1.88E+04	3.11E+02
21	1207.14	7.92E+01	76.18			7.92E+01	7.62E+01
22	1214.12	7.38E+01	63.41			7.38E+01	6.34E+01
23	1333.40	1.68E+04	268.87	1.01E+00	1.03E+00	1.68E+04	2.69E+02
24	1570.77	2.63E+01	21.08			2.63E+01	2.11E+01
25	1733.27	6.01E+01	61.60			6.01E+01	6.16E+01
26	1837.20	4.34E+01	31.22			4.34E+01	3.12E+01
27	1920.20	1.88E+01	14.83			1.88E+01	1.48E+01
28	1982.20	2.67E+01	14.88			2.67E+01	1.49E+01
29	2362.27	1.58E+01	9.85			1.58E+01	9.85E+00
30	2371.74	8.17E+00	8.94			8.17E+00	8.94E+00
31	2421.02	7.00E+00	5.29			7.00E+00	5.29E+00
32	2506.91	1.52E+02	26.04			1.52E+02	2.60E+01
33	2615.48	1.70E+01	8.25			1.70E+01	8.25E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 5/11/2016 10:51:17AM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000035908.CNF

Corrected Area is: Original * Peak Ratio - Background

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
M	1	17.75	1.04E+03	151.82			1.04E+03	1.52E+02
m	2	22.62	7.10E+04	646.70	3.52E+01	7.14E+00	7.09E+04	6.47E+02
	3	32.23	1.88E+03	255.05			1.88E+03	2.55E+02
M	4	52.10	1.29E+04	643.92			1.29E+04	6.44E+02
m	5	59.71	9.55E+04	682.92	7.11E+00	6.53E-01	9.55E+04	6.83E+02
	6	67.77	6.09E+02	357.04			6.09E+02	3.57E+02

Analysis Report for 1604147-01

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Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
7	88.27	3.12E+04	562.80	4.42E+00	2.55E+00	3.12E+04	5.63E+02
8	122.35	5.58E+03	353.82			5.58E+03	3.54E+02
9	136.68	6.72E+02	257.56			6.72E+02	2.58E+02
10	166.15	3.77E+02	214.55			3.77E+02	2.15E+02
11	239.89	3.30E+02	232.80			3.30E+02	2.33E+02
12	282.38	2.00E+02	179.44			2.00E+02	1.79E+02
13	290.44	1.72E+02	175.15			1.72E+02	1.75E+02
14	311.42	1.53E+02	172.47			1.53E+02	1.72E+02
15	499.60	1.56E+02	136.93			1.56E+02	1.37E+02
16	662.26	2.26E+04	349.63	2.32E+00	1.67E+00	2.26E+04	3.50E+02
17	983.90	1.02E+02	115.41			1.02E+02	1.15E+02
18	1028.42	1.34E+02	111.84			1.34E+02	1.12E+02
19	1050.90	9.25E+01	110.81			9.25E+01	1.11E+02
20	1174.06	1.88E+04	311.31	2.08E+00	1.21E+00	1.88E+04	3.11E+02
21	1207.14	7.92E+01	76.18			7.92E+01	7.62E+01
22	1214.12	7.38E+01	63.41			7.38E+01	6.34E+01
23	1333.40	1.68E+04	268.87	1.01E+00	1.03E+00	1.68E+04	2.69E+02
24	1570.77	2.63E+01	21.08			2.63E+01	2.11E+01
25	1733.27	6.01E+01	61.60			6.01E+01	6.16E+01
26	1837.20	4.34E+01	31.22			4.34E+01	3.12E+01
27	1920.20	1.88E+01	14.83			1.88E+01	1.48E+01
28	1982.20	2.67E+01	14.88			2.67E+01	1.49E+01
29	2362.27	1.58E+01	9.85			1.58E+01	9.85E+00
30	2371.74	8.17E+00	8.94			8.17E+00	8.94E+00
31	2421.02	7.00E+00	5.29			7.00E+00	5.29E+00
32	2506.91	1.52E+02	26.04			1.52E+02	2.60E+01
33	2615.48	1.70E+01	8.25			1.70E+01	8.25E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
CO-57	0.918	122.06	*	85.51	8.13E+01	8.06E+00
		136.48	*	10.60	8.28E+01	3.25E+01
CO-60	0.882	1173.22	*	100.00	1.42E+02	1.19E+01
		1332.49	*	100.00	1.41E+02	1.17E+01

Analysis Report for 1604147-01
GAS-1302

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
CD-109	0.967	88.03	*	3.72	3.28E+03	3.95E+02
SN-126	0.925	87.57	*	37.00	7.05E+01	7.39E+00
CS-137	0.943	661.65	*	85.12	9.04E+01	8.16E+00
CE-139	0.744	165.85	*	80.35	8.84E+01	5.07E+01
AM-241	0.996	59.54	*	35.90	2.65E+02	2.06E+01

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/11/2016 10:51:17AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	1	17.75	5.77512E-01	7.30		
m	2	22.62	3.94046E+01	0.46		
	3	32.23	1.04497E+00	6.78		
M	4	52.10	7.15995E+00	2.50		
	6	67.77	3.38366E-01	29.31	Tol.	TA-182 TH-230
	11	239.89	1.83456E-01	35.25		
	12	282.38	1.11384E-01	44.75		
	13	290.44	9.52833E-02	51.06		
	14	311.42	8.51320E-02	56.27	D-Esc	
	15	499.60	8.69074E-02	43.77		
	17	983.90	5.67325E-02	56.51		
	18	1028.42	7.44189E-02	41.75		
	19	1050.90	5.13679E-02	59.92		
	21	1207.14	4.39851E-02	48.11		
	22	1214.12	4.09901E-02	42.97		
	24	1570.77	1.45933E-02	40.13		
	25	1733.27	3.33989E-02	51.23		
	26	1837.20	2.41028E-02	35.99	Sum	
	27	1920.20	1.04480E-02	39.43		
	28	1982.20	1.48348E-02	27.87		
	29	2362.27	8.79630E-03	31.10		
	30	2371.74	4.53704E-03	54.76		

Analysis Report for 1604147-01

GAS-1302

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
31	2421.02	3.88889E-03	37.80		
32	2506.91	8.44444E-02	8.57	Sum	
33	2615.48	9.44444E-03	24.25	Tol.	TL-208

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
CO-57	0.91	122.06	*	85.51	8.13E+01	8.06E+00
		136.48	*	10.60	8.28E+01	3.25E+01
CO-60	0.88	1173.22	*	100.00	1.42E+02	1.19E+01
		1332.49	*	100.00	1.41E+02	1.17E+01
CD-109	0.96	88.03	*	3.72	3.28E+03	3.95E+02
SN-126	0.92	87.57	*	37.00	7.05E+01	7.39E+00
CS-137	0.94	661.65	*	85.12	9.04E+01	8.16E+00
CE-139	0.74	165.85	*	80.35	8.84E+01	5.07E+01
AM-241	0.99	59.54	*	35.90	2.65E+02	2.06E+01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for 1604147-01

GAS-1302

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	CO-57	0.918	8.14E+01	7.83E+00	
	CO-60	0.882	1.41E+02	8.35E+00	
?	CD-109	0.967	3.28E+03	3.95E+02	
?	SN-126	0.925	7.05E+01	7.39E+00	
	CS-137	0.943	9.04E+01	8.16E+00	
	CE-139	0.744	8.84E+01	5.07E+01	
	AM-241	0.996	2.65E+02	2.06E+01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1604147-01
GAS-1302

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/11/2016 10:51:17AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	1	17.75	5.77512E-01	7.30		
m	2	22.62	3.94046E+01	0.46		
	3	32.23	1.04497E+00	6.78		
M	4	52.10	7.15995E+00	2.50		
	6	67.77	3.38366E-01	29.31	Tol.	TA-182 TH-230
	11	239.89	1.83456E-01	35.25		
	12	282.38	1.11384E-01	44.75		
	13	290.44	9.52833E-02	51.06		
	14	311.42	8.51320E-02	56.27	D-Esc	
	15	499.60	8.69074E-02	43.77		
	17	983.90	5.67325E-02	56.51		
	18	1028.42	7.44189E-02	41.75		
	19	1050.90	5.13679E-02	59.92		
	21	1207.14	4.39851E-02	48.11		
	22	1214.12	4.09901E-02	42.97		
	24	1570.77	1.45933E-02	40.13		
	25	1733.27	3.33989E-02	51.23		
	26	1837.20	2.41028E-02	35.99	Sum	
	27	1920.20	1.04480E-02	39.43		
	28	1982.20	1.48348E-02	27.87		
	29	2362.27	8.79630E-03	31.10		
	30	2371.74	4.53704E-03	54.76		
	31	2421.02	3.88889E-03	37.80		
	32	2506.91	8.44444E-02	8.57	Sum	
	33	2615.48	9.44444E-03	24.25	Tol.	TL-208

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 1604147-01

GAS-1302

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+		BE-7	477.59		10.42	2.16E+06	3.88E+06	3.88E+06
+		NA-22	1274.54		99.94	4.35E-01	9.14E-01	9.14E-01
+	@	NA-24	1368.53		99.99	1.00E+26	1.00E+26	1.00E+26
	@		2754.09		99.86	0.00E+00		1.00E+26
+		AL-26	1808.65		99.76	1.65E-01	2.66E-01	2.66E-01
+		K-40	1460.81		10.67	1.04E+00	2.50E+00	2.50E+00
+	@	AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+		TI-44	67.88		94.40	5.06E-01	3.99E-01	4.33E-01
			78.34		96.00	-6.89E-03		3.99E-01
+		SC-46	889.25		99.98	-1.39E+03	4.21E+03	4.21E+03
			1120.51		99.99	3.27E+03		4.24E+03
+		V-48	983.52		99.98	1.70E+19	1.34E+19	2.53E+19
			1312.10		97.50	2.41E+18		1.34E+19
+		CR-51	320.08		9.83	1.06E+11	7.90E+11	7.90E+11
+		MN-54	834.83		99.97	-4.68E-01	7.26E+00	7.26E+00
+		CO-56	846.75		99.96	1.32E+03	1.29E+03	6.65E+03
			1037.75		14.03	-4.52E+04		5.31E+04
			1238.25		67.00	-1.22E+03		5.52E+03
			1771.40		15.51	6.67E+03		1.56E+04
			2598.48		16.90	0.00E+00		1.29E+03
+		CO-57	122.06	*	85.51	8.13E+01	7.73E+00	7.73E+00
			136.48	*	10.60	8.28E+01		5.15E+01
+		CO-58	810.76		99.40	2.01E+03	1.76E+04	1.76E+04
+		FE-59	1099.22		56.50	-3.17E+06	9.88E+06	1.47E+07
			1291.56		43.20	1.13E+07		9.88E+06
+		CO-60	1173.22	*	100.00	1.42E+02	9.86E-01	1.86E+00
			1332.49	*	100.00	1.41E+02		9.86E-01
+		ZN-65	1115.52		50.75	9.15E+00	3.23E+01	3.23E+01
+	@	GA-67	93.31		35.70	1.00E+26	1.00E+26	1.00E+26
	@		208.95		2.24	1.00E+26		1.00E+26
	@		300.22		16.00	1.00E+26		1.00E+26
+		SE-75	121.11		16.70	1.03E+04	2.02E+02	9.61E+02
			136.00		59.20	4.21E+02		2.02E+02
			264.65		59.80	3.72E+01		2.86E+02
			279.53		25.20	-2.07E+02		6.91E+02
			400.65		11.40	-3.63E+01		1.86E+03
+		RB-82	776.52		13.00	2.38E+12	7.59E+12	7.59E+12
+		RB-83	520.41		46.00	9.21E+02	4.97E+03	4.97E+03
			529.64		30.30	4.71E+03		7.55E+03
			552.65		16.40	1.79E+02		1.35E+04

Analysis Report for 1604147-01

GAS-1302

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+		KR-85	513.99		0.43	-2.39E+01	1.58E+02	1.58E+02
+		SR-85	513.99		99.27	-5.45E+03	3.60E+04	3.60E+04
+		Y-88	898.02		93.40	2.87E+02	2.99E+02	7.76E+02
			1836.01		99.38	3.48E+02		2.99E+02
+		NB-93M	16.57		9.43	6.11E+02	6.93E+02	6.93E+02
+		NB-94	702.63		100.00	-1.45E-01	5.76E-01	5.76E-01
			871.10		100.00	-5.07E-01		7.94E-01
+		NB-95	765.79		99.81	-2.95E+08	4.77E+08	4.77E+08
+	@	NB-95M	235.69		25.00	1.00E+26	1.00E+26	1.00E+26
+		ZR-95	724.18		43.70	-8.25E+03	8.32E+04	1.01E+05
			756.72		55.30	1.36E+04		8.32E+04
+	@	MO-99	181.06		6.20	1.00E+26	1.00E+26	1.00E+26
	@		739.58		12.80	1.00E+26		1.00E+26
	@		778.00		4.50	1.00E+26		1.00E+26
+		RU-103	497.08		89.00	-1.68E+07	5.00E+07	5.00E+07
+		RU-106	621.84		9.80	-9.22E+00	4.07E+01	4.07E+01
+		AG-108M	433.93		89.90	9.19E-02	6.36E-01	6.61E-01
			614.37		90.40	-3.33E-01		6.36E-01
			722.95		90.50	-3.42E-02		6.84E-01
+		CD-109	88.03	*	3.72	3.28E+03	7.60E+01	7.60E+01
+		AG-110M	657.75		93.14	-6.74E-01	1.91E+01	2.09E+01
			677.61		10.53	-1.21E+01		9.48E+01
			706.67		16.46	-1.34E+01		6.20E+01
			763.93		21.98	-2.24E+00		5.12E+01
			884.67		71.63	-4.88E+00		1.98E+01
			1384.27		23.94	5.98E-01		1.91E+01
+		CD-113M	263.70		0.02	-1.61E+02	2.17E+03	2.17E+03
+		SN-113	255.12		1.93	2.09E+03	4.19E+02	1.14E+04
			391.69		64.90	1.71E+02		4.19E+02
+		TE123M	159.00		84.10	-3.12E+01	1.36E+02	1.36E+02
+		SB-124	602.71		97.87	4.78E+03	7.71E+04	8.46E+04
			645.85		7.26	2.16E+05		1.18E+06
			722.78		11.10	-4.02E+04		8.05E+05
			1691.02		49.00	1.46E+04		7.71E+04
+		I-125	35.49		6.49	2.39E+06	1.98E+06	1.98E+06
+		SB-125	176.33		6.89	2.25E+00	3.94E+00	9.06E+00
			427.89		29.33	-5.79E-01		3.94E+00
			463.38		10.35	-4.74E+00		1.22E+01
			600.56		17.80	-5.68E-01		6.42E+00
			635.90		11.32	1.95E+00		1.07E+01
+	@	SB-126	414.70		83.30	1.00E+26	1.00E+26	1.00E+26
	@		666.33		99.60	1.00E+26		1.00E+26
	@		695.00		99.60	1.00E+26		1.00E+26
	@		720.50		53.80	1.00E+26		1.00E+26
+		SN-126	87.57	*	37.00	7.05E+01	1.63E+00	1.63E+00
+	@	SB-127	473.00		25.00	1.00E+26	1.00E+26	1.00E+26
	@		685.20		35.70	1.00E+26		1.00E+26

Analysis Report for 1604147-01

GAS-1302

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	@	SB-127	783.80		14.70	1.00E+26	1.00E+26	1.00E+26
+		I-129	29.78		57.00	-4.78E+01	2.70E+00	2.70E+00
			33.60		13.20	1.68E+01		8.52E+00
			39.58		7.52	-3.27E+01		9.30E+00
+	@	I-131	284.30		6.05	1.00E+26	1.00E+26	1.00E+26
	@		364.48		81.20	1.00E+26		1.00E+26
	@		636.97		7.26	1.00E+26		1.00E+26
	@		722.89		1.80	1.00E+26		1.00E+26
+	@	TE-132	49.72		13.10	1.00E+26	1.00E+26	1.00E+26
	@		228.16		88.00	1.00E+26		1.00E+26
+		BA-133	81.00		33.00	-1.15E+00	9.93E-01	1.34E+00
			302.84		17.80	-2.37E-02		3.07E+00
			356.01		60.00	1.55E-01		9.93E-01
+	@	I-133	529.87		86.30	1.00E+26	1.00E+26	1.00E+26
+	@	XE-133	81.00		38.00	1.00E+26	1.00E+26	1.00E+26
+		CS-134	563.23		8.38	-1.17E+01	1.50E+00	1.67E+01
			569.32		15.43	4.92E+00		9.28E+00
			604.70		97.60	-8.15E-01		1.50E+00
			795.84		85.40	8.52E-01		2.12E+00
			801.93		8.73	3.28E+00		2.07E+01
+		CS-135	268.24		16.00	-8.48E-01	2.71E+00	2.71E+00
+	@	I-135	1131.51		22.50	1.00E+26	1.00E+26	1.00E+26
	@		1260.41		28.60	1.00E+26		1.00E+26
	@		1678.03		9.54	1.00E+26		1.00E+26
+	@	CS-136	153.22		7.46	1.00E+26	1.00E+26	1.00E+26
	@		163.89		4.61	1.00E+26		1.00E+26
	@		176.55		13.56	1.00E+26		1.00E+26
	@		273.65		12.66	1.00E+26		1.00E+26
	@		340.57		48.50	1.00E+26		1.00E+26
	@		818.50		99.70	1.00E+26		1.00E+26
	@		1048.07		79.60	1.00E+26		1.00E+26
	@		1235.34		19.70	1.00E+26		1.00E+26
+		CS-137	661.65	*	85.12	9.04E+01	1.19E+00	1.19E+00
+		LA-138	788.74		34.00	-1.64E+00	4.15E-01	1.97E+00
			1435.80		66.00	2.78E-02		4.15E-01
+		CE-139	165.85	*	80.35	8.84E+01	8.19E+01	8.19E+01
+	@	BA-140	162.64		6.70	1.00E+26	1.00E+26	1.00E+26
	@		304.84		4.50	1.00E+26		1.00E+26
	@		423.70		3.20	1.00E+26		1.00E+26
	@		437.55		2.00	1.00E+26		1.00E+26
	@		537.32		25.00	1.00E+26		1.00E+26
+	@	LA-140	328.77		20.50	1.00E+26	1.00E+26	1.00E+26
	@		487.03		45.50	1.00E+26		1.00E+26
	@		815.85		23.50	1.00E+26		1.00E+26
	@		1596.49		95.49	1.00E+26		1.00E+26
+		CE-141	145.44		48.40	-2.73E+08	2.19E+09	2.19E+09
+	@	CE-143	57.36		11.80	1.00E+26	1.00E+26	1.00E+26
	@		293.26		42.00	1.00E+26		1.00E+26

Analysis Report for 1604147-01

GAS-1302

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
@	CE-143	664.55	5.20	1.00E+26	1.00E+26	1.00E+26
+	CE-144	133.54	10.80	5.76E+00	3.29E+01	3.29E+01
+	PM-144	476.78	42.00	5.73E+00	4.15E+00	1.06E+01
		618.01	98.60	1.13E+00		4.15E+00
		696.49	99.49	2.02E+00		4.29E+00
+	PM-145	36.85	21.70	3.17E+00	2.20E+00	4.07E+00
		37.36	39.70	6.10E-01		2.20E+00
		42.30	15.10	-3.83E+00		5.15E+00
		72.40	2.31	-6.11E+00		1.83E+01
+	PM-146	453.90	39.94	5.28E-01	2.20E+00	2.20E+00
		735.90	14.01	2.26E+00		6.32E+00
		747.13	13.10	3.10E+00		6.95E+00
+ @	ND-147	91.11	28.90	1.00E+26	1.00E+26	1.00E+26
@		531.02	13.10	1.00E+26		1.00E+26
+ @	PM-149	285.90	3.10	1.00E+26	1.00E+26	1.00E+26
+	EU-152	121.78	20.50	2.68E+01	2.20E+00	2.32E+00
		244.69	5.40	-6.91E-01		9.28E+00
		344.27	19.13	4.29E-01		2.93E+00
		778.89	9.20	1.34E+00		8.35E+00
		964.01	10.40	5.72E+00		1.02E+01
		1085.78	7.22	-3.60E+00		1.38E+01
		1112.02	9.60	3.35E+00		1.07E+01
		1407.95	14.94	-2.43E-02		2.20E+00
+	GD-153	97.43	31.30	-1.48E+00	1.65E+01	1.65E+01
		103.18	22.20	-5.16E-01		2.34E+01
+	EU-154	123.07	40.50	1.49E+01	1.27E+00	1.27E+00
		723.30	19.70	-1.93E-01		3.87E+00
		873.19	11.50	-7.76E-01		8.74E+00
		996.32	10.30	1.05E+01		1.07E+01
		1004.76	17.90	4.69E+00		6.05E+00
		1274.45	35.50	7.21E-01		1.51E+00
+	EU-155	86.50	30.90	1.09E+02	1.93E+00	3.59E+00
		105.30	20.70	2.18E-01		1.93E+00
+ @	EU-156	811.77	10.40	1.00E+26	1.00E+26	1.00E+26
@		1153.47	7.20	1.00E+26		1.00E+26
@		1230.71	8.90	1.00E+26		1.00E+26
+	HO-166M	184.41	72.60	2.93E-02	4.45E-01	4.45E-01
		280.45	29.60	-3.15E-01		1.50E+00
		410.94	11.10	-2.59E+00		4.93E+00
		711.69	54.10	-1.48E-01		1.09E+00
+	TM-171	66.72	0.14	3.67E+02	7.82E+02	7.82E+02
+	HF-172	81.75	4.52	-1.51E+01	7.19E+00	2.34E+01
		125.81	11.30	1.56E-01		7.19E+00
+ @	LU-172	181.53	20.60	1.00E+26	1.00E+26	1.00E+26
@		810.06	16.63	1.00E+26		1.00E+26
@		912.12	15.25	1.00E+26		1.00E+26
@		1093.66	62.50	1.00E+26		1.00E+26
+	LU-173	100.72	5.24	-2.29E+00	8.64E+00	2.13E+01
		272.11	21.20	-1.07E+00		8.64E+00

Analysis Report for 1604147-01

GAS-1302

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	HF-175	343.40	84.00	2.24E+03	1.60E+04	1.60E+04
+	LU-176	88.34	13.30	1.88E+02	4.69E-01	5.60E+00
		201.83	86.00	-3.66E-02		4.69E-01
		306.78	94.00	-3.59E-02		4.83E-01
+	TA-182	67.75	41.20	5.87E+02	5.02E+02	5.02E+02
		1121.30	34.90	9.50E+02		1.22E+03
		1189.05	16.23	8.20E+02		1.91E+03
		1221.41	26.98	2.57E+02		9.41E+02
		1231.02	11.44	1.01E+03		2.12E+03
+	IR-192	308.46	29.68	-2.61E+03	2.09E+04	2.47E+04
		468.07	48.10	9.66E+03		2.09E+04
+	HG-203	279.19	77.30	-2.50E+05	2.69E+06	2.69E+06
+	BI-207	569.67	97.72	1.55E-01	6.02E-01	6.02E-01
		1063.62	74.90	-3.76E-02		1.18E+00
+	TL-208	583.14	30.22	5.99E-01	5.56E-01	1.87E+00
		860.37	4.48	3.31E+00		1.72E+01
		2614.66	35.85	3.96E-01		5.56E-01
+	BI-210M	262.00	45.00	-4.77E-02	9.67E-01	9.67E-01
		300.00	23.00	3.58E-01		1.98E+00
+	PB-210	46.50	4.25	-1.23E+02	1.95E+01	1.95E+01
+	PB-211	404.84	2.90	-1.19E+00	1.88E+01	1.88E+01
		831.96	2.90	-7.05E+00		2.52E+01
+	BI-212	727.17	11.80	-1.54E+00	5.15E+00	5.15E+00
		1620.62	2.75	3.43E+00		9.67E+00
+	PB-212	238.63	44.60	1.12E+00	1.01E+00	1.01E+00
		300.09	3.41	2.41E+00		1.34E+01
+	BI-214	609.31	46.30	5.04E-01	1.25E+00	1.25E+00
		1120.29	15.10	4.23E+00		5.48E+00
		1764.49	15.80	-5.34E-01		1.49E+00
		2204.22	4.98	9.33E-01		5.16E+00
+	PB-214	295.21	19.19	6.96E-01	1.31E+00	2.34E+00
		351.92	37.19	-3.48E-01		1.31E+00
+	RN-219	401.80	6.50	-1.13E+00	8.32E+00	8.32E+00
+	RA-223	323.87	3.88	3.24E+00	1.20E+01	1.20E+01
+	RA-224	240.98	3.95	8.38E+00	1.14E+01	1.14E+01
+	@ RA-225	40.00	31.00	1.00E+26	1.00E+26	1.00E+26
+	RA-226	186.21	3.28	1.09E+00	9.98E+00	9.98E+00
+	TH-227	50.10	8.40	4.49E+01	3.90E+00	1.00E+01
		236.00	11.50	6.12E-02		3.90E+00
		256.20	6.30	3.55E+00		6.98E+00
+	AC-228	338.32	11.40	1.72E+00	3.12E+00	4.26E+00
		911.07	27.70	-1.61E+00		3.12E+00
		969.11	16.60	-1.04E+00		5.21E+00
+	TH-230	48.44	16.90	1.47E+01	4.98E+00	4.98E+00
		62.85	4.60	-7.34E+01		1.55E+01
		67.67	0.37	1.25E+02		1.07E+02
+	PA-231	283.67	1.60	3.47E+00	1.97E+01	2.83E+01
		302.67	2.30	-1.52E-01		1.97E+01

Analysis Report for 1604147-01

GAS-1302

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+		TH-231	25.64		14.70	-1.25E+03	5.88E+00	4.99E+01
			84.21		6.40	-2.44E+02		5.88E+00
+		PA-233	311.98		38.60	3.91E+11	4.00E+11	4.00E+11
+		PA-234	131.20		20.40	-3.22E-01	1.35E+00	1.35E+00
			733.99		8.80	-5.52E+00		6.94E+00
			946.00		12.00	-1.96E+00		7.99E+00
+		PA-234M	1001.03		0.92	-4.37E+01	9.30E+01	9.30E+01
+		TH-234	63.29		3.80	-8.18E+02	1.06E+01	1.06E+01
+		U-235	143.76		10.50	-3.20E-02	2.71E+00	2.71E+00
			163.35		4.70	6.75E-01		6.49E+00
			205.31		4.70	-3.47E+00		8.65E+00
+		NP-237	86.50		12.60	1.81E+02	5.92E+00	5.92E+00
+	@	NP-239	106.10		22.70	1.00E+26	1.00E+26	1.00E+26
	@		228.18		10.70	1.00E+26		1.00E+26
	@		277.60		14.10	1.00E+26		1.00E+26
+		AM-241	59.54	*	35.90	2.65E+02	4.13E+00	4.13E+00
+		AM-243	74.67		66.00	-2.95E-01	5.65E-01	5.65E-01
+		CM-243	209.75		3.29	1.47E+00	3.36E+00	1.37E+01
			228.14		10.60	3.78E-01		4.46E+00
			277.60		14.00	-1.00E-01		3.36E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
BE-7	477.59	10.42	3.88E+06	3.88E+06	2.16E+06	1.92E+06

Analysis Report for 1604147-01

GAS-1302

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	NA-22	1274.54		99.94	9.14E-01	9.14E-01	4.35E-01	4.41E-01
@	NA-24	1368.53		99.99	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		2754.09		99.86	1.00E+26		0.00E+00	1.00E+20
	AL-26	1808.65		99.76	2.66E-01	2.66E-01	1.65E-01	1.23E-01
	K-40	1460.81		10.67	2.50E+00	2.50E+00	1.04E+00	1.17E+00
@	AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26	1.00E+20
	TI-44	67.88		94.40	4.33E-01	3.99E-01	5.06E-01	2.15E-01
		78.34		96.00	3.99E-01		-6.89E-03	1.98E-01
	SC-46	889.25		99.98	4.21E+03	4.21E+03	-1.39E+03	2.07E+03
		1120.51		99.99	4.24E+03		3.27E+03	2.09E+03
	V-48	983.52		99.98	2.53E+19	1.34E+19	1.70E+19	1.25E+19
		1312.10		97.50	1.34E+19		2.41E+18	6.45E+18
	CR-51	320.08		9.83	7.90E+11	7.90E+11	1.06E+11	3.91E+11
	MN-54	834.83		99.97	7.26E+00	7.26E+00	-4.68E-01	3.58E+00
	CO-56	846.75		99.96	6.65E+03	1.29E+03	1.32E+03	3.28E+03
		1037.75		14.03	5.31E+04		-4.52E+04	2.61E+04
		1238.25		67.00	5.52E+03		-1.22E+03	2.66E+03
		1771.40		15.51	1.56E+04		6.67E+03	7.27E+03
		2598.48		16.90	1.29E+03		0.00E+00	0.00E+00
+	CO-57	122.06	*	85.51	7.73E+00	7.73E+00	8.13E+01	3.84E+00
		136.48	*	10.60	5.15E+01		8.28E+01	2.56E+01
	CO-58	810.76		99.40	1.76E+04	1.76E+04	2.01E+03	8.65E+03
	FE-59	1099.22		56.50	1.47E+07	9.88E+06	-3.17E+06	7.25E+06
		1291.56		43.20	9.88E+06		1.13E+07	4.78E+06
+	CO-60	1173.22	*	100.00	1.86E+00	9.86E-01	1.42E+02	9.18E-01
		1332.49	*	100.00	9.86E-01		1.41E+02	4.82E-01
	ZN-65	1115.52		50.75	3.23E+01	3.23E+01	9.15E+00	1.59E+01
@	GA-67	93.31		35.70	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		208.95		2.24	1.00E+26		1.00E+26	1.00E+20
@		300.22		16.00	1.00E+26		1.00E+26	1.00E+20
	SE-75	121.11		16.70	9.61E+02	2.02E+02	1.03E+04	4.78E+02
		136.00		59.20	2.02E+02		4.21E+02	1.00E+02
		264.65		59.80	2.86E+02		3.72E+01	1.42E+02
		279.53		25.20	6.91E+02		-2.07E+02	3.42E+02
		400.65		11.40	1.86E+03		-3.63E+01	9.22E+02
	RB-82	776.52		13.00	7.59E+12	7.59E+12	2.38E+12	3.74E+12
	RB-83	520.41		46.00	4.97E+03	4.97E+03	9.21E+02	2.45E+03
		529.64		30.30	7.55E+03		4.71E+03	3.73E+03
		552.65		16.40	1.35E+04		1.79E+02	6.68E+03
	KR-85	513.99		0.43	1.58E+02	1.58E+02	-2.39E+01	7.80E+01
	SR-85	513.99		99.27	3.60E+04	3.60E+04	-5.45E+03	1.78E+04
	Y-88	898.02		93.40	7.76E+02	2.99E+02	2.87E+02	3.83E+02
		1836.01		99.38	2.99E+02		3.48E+02	1.41E+02
	NB-93M	16.57		9.43	6.93E+02	6.93E+02	6.11E+02	3.45E+02
	NB-94	702.63		100.00	5.76E-01	5.76E-01	-1.45E-01	2.84E-01
		871.10		100.00	7.94E-01		-5.07E-01	3.91E-01
	NB-95	765.79		99.81	4.77E+08	4.77E+08	-2.95E+08	2.35E+08
@	NB-95M	235.69		25.00	1.00E+26	1.00E+26	1.00E+26	1.00E+20
	ZR-95	724.18		43.70	1.01E+05	8.32E+04	-8.25E+03	4.96E+04
		756.72		55.30	8.32E+04		1.36E+04	4.09E+04
@	MO-99	181.06		6.20	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		739.58		12.80	1.00E+26		1.00E+26	1.00E+20
@		778.00		4.50	1.00E+26		1.00E+26	1.00E+20

Analysis Report for 1604147-01

GAS-1302

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	RU-103	497.08		89.00	5.00E+07	5.00E+07	-1.68E+07	2.47E+07
	RU-106	621.84		9.80	4.07E+01	4.07E+01	-9.22E+00	2.01E+01
	AG-108M	433.93		89.90	6.61E-01	6.36E-01	9.19E-02	3.27E-01
		614.37		90.40	6.36E-01		-3.33E-01	3.13E-01
		722.95		90.50	6.84E-01		-3.42E-02	3.37E-01
+	CD-109	88.03	*	3.72	7.60E+01	7.60E+01	3.28E+03	3.79E+01
	AG-110M	657.75		93.14	2.09E+01	1.91E+01	-6.74E-01	1.04E+01
		677.61		10.53	9.48E+01		-1.21E+01	4.67E+01
		706.67		16.46	6.20E+01		-1.34E+01	3.05E+01
		763.93		21.98	5.12E+01		-2.24E+00	2.52E+01
		884.67		71.63	1.98E+01		-4.88E+00	9.77E+00
		1384.27		23.94	1.91E+01		5.98E-01	8.96E+00
	CD-113M	263.70		0.02	2.17E+03	2.17E+03	-1.61E+02	1.07E+03
	SN-113	255.12		1.93	1.14E+04	4.19E+02	2.09E+03	5.65E+03
		391.69		64.90	4.19E+02		1.71E+02	2.07E+02
	TE123M	159.00		84.10	1.36E+02	1.36E+02	-3.12E+01	6.76E+01
	SB-124	602.71		97.87	8.46E+04	7.71E+04	4.78E+03	4.17E+04
		645.85		7.26	1.18E+06		2.16E+05	5.81E+05
		722.78		11.10	8.05E+05		-4.02E+04	3.96E+05
		1691.02		49.00	7.71E+04		1.46E+04	3.57E+04
	I-125	35.49		6.49	1.98E+06	1.98E+06	2.39E+06	9.85E+05
	SB-125	176.33		6.89	9.06E+00	3.94E+00	2.25E+00	4.49E+00
		427.89		29.33	3.94E+00		-5.79E-01	1.95E+00
		463.38		10.35	1.22E+01		-4.74E+00	6.03E+00
		600.56		17.80	6.42E+00		-5.68E-01	3.17E+00
		635.90		11.32	1.07E+01		1.95E+00	5.26E+00
@	SB-126	414.70		83.30	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		666.33		99.60	1.00E+26		1.00E+26	1.00E+20
@		695.00		99.60	1.00E+26		1.00E+26	1.00E+20
@		720.50		53.80	1.00E+26		1.00E+26	1.00E+20
+	SN-126	87.57	*	37.00	1.63E+00	1.63E+00	7.05E+01	8.14E-01
@	SB-127	473.00		25.00	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		685.20		35.70	1.00E+26		1.00E+26	1.00E+20
@		783.80		14.70	1.00E+26		1.00E+26	1.00E+20
	I-129	29.78		57.00	2.70E+00	2.70E+00	-4.78E+01	1.34E+00
		33.60		13.20	8.52E+00		1.68E+01	4.23E+00
		39.58		7.52	9.30E+00		-3.27E+01	4.61E+00
@	I-131	284.30		6.05	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		364.48		81.20	1.00E+26		1.00E+26	1.00E+20
@		636.97		7.26	1.00E+26		1.00E+26	1.00E+20
@		722.89		1.80	1.00E+26		1.00E+26	1.00E+20
@	TE-132	49.72		13.10	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		228.16		88.00	1.00E+26		1.00E+26	1.00E+20
	BA-133	81.00		33.00	1.34E+00	9.93E-01	-1.15E+00	6.67E-01
		302.84		17.80	3.07E+00		-2.37E-02	1.52E+00
		356.01		60.00	9.93E-01		1.55E-01	4.92E-01
@	I-133	529.87		86.30	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@	XE-133	81.00		38.00	1.00E+26	1.00E+26	1.00E+26	1.00E+20
	CS-134	563.23		8.38	1.67E+01	1.50E+00	-1.17E+01	8.22E+00
		569.32		15.43	9.28E+00		4.92E+00	4.58E+00
		604.70		97.60	1.50E+00		-8.15E-01	7.37E-01
		795.84		85.40	2.12E+00		8.52E-01	1.04E+00
		801.93		8.73	2.07E+01		3.28E+00	1.02E+01

Analysis Report for 1604147-01

GAS-1302

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	CS-135	268.24		16.00	2.71E+00	2.71E+00	-8.48E-01	1.34E+00
@	I-135	1131.51		22.50	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		1260.41		28.60	1.00E+26		1.00E+26	1.00E+20
@		1678.03		9.54	1.00E+26		1.00E+26	1.00E+20
@	CS-136	153.22		7.46	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		163.89		4.61	1.00E+26		1.00E+26	1.00E+20
@		176.55		13.56	1.00E+26		1.00E+26	1.00E+20
@		273.65		12.66	1.00E+26		1.00E+26	1.00E+20
@		340.57		48.50	1.00E+26		1.00E+26	1.00E+20
@		818.50		99.70	1.00E+26		1.00E+26	1.00E+20
@		1048.07		79.60	1.00E+26		1.00E+26	1.00E+20
@		1235.34		19.70	1.00E+26		1.00E+26	1.00E+20
+	CS-137	661.65	*	85.12	1.19E+00	1.19E+00	9.04E+01	5.88E-01
	LA-138	788.74		34.00	1.97E+00	4.15E-01	-1.64E+00	9.68E-01
		1435.80		66.00	4.15E-01		2.78E-02	1.95E-01
+	CE-139	165.85	*	80.35	8.19E+01	8.19E+01	8.84E+01	4.07E+01
@	BA-140	162.64		6.70	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		304.84		4.50	1.00E+26		1.00E+26	1.00E+20
@		423.70		3.20	1.00E+26		1.00E+26	1.00E+20
@		437.55		2.00	1.00E+26		1.00E+26	1.00E+20
@		537.32		25.00	1.00E+26		1.00E+26	1.00E+20
@	LA-140	328.77		20.50	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		487.03		45.50	1.00E+26		1.00E+26	1.00E+20
@		815.85		23.50	1.00E+26		1.00E+26	1.00E+20
@		1596.49		95.49	1.00E+26		1.00E+26	1.00E+20
	CE-141	145.44		48.40	2.19E+09	2.19E+09	-2.73E+08	1.08E+09
@	CE-143	57.36		11.80	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		293.26		42.00	1.00E+26		1.00E+26	1.00E+20
@		664.55		5.20	1.00E+26		1.00E+26	1.00E+20
	CE-144	133.54		10.80	3.29E+01	3.29E+01	5.76E+00	1.63E+01
	PM-144	476.78		42.00	1.06E+01	4.15E+00	5.73E+00	5.23E+00
		618.01		98.60	4.15E+00		1.13E+00	2.04E+00
		696.49		99.49	4.29E+00		2.02E+00	2.11E+00
	PM-145	36.85		21.70	4.07E+00	2.20E+00	3.17E+00	2.02E+00
		37.36		39.70	2.20E+00		6.10E-01	1.09E+00
		42.30		15.10	5.15E+00		-3.83E+00	2.56E+00
		72.40		2.31	1.83E+01		-6.11E+00	9.08E+00
	PM-146	453.90		39.94	2.20E+00	2.20E+00	5.28E-01	1.09E+00
		735.90		14.01	6.32E+00		2.26E+00	3.11E+00
		747.13		13.10	6.95E+00		3.10E+00	3.43E+00
@	ND-147	91.11		28.90	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		531.02		13.10	1.00E+26		1.00E+26	1.00E+20
@	PM-149	285.90		3.10	1.00E+26	1.00E+26	1.00E+26	1.00E+20
	EU-152	121.78		20.50	2.32E+00	2.20E+00	2.68E+01	1.15E+00
		244.69		5.40	9.28E+00		-6.91E-01	4.60E+00
		344.27		19.13	2.93E+00		4.29E-01	1.45E+00
		778.89		9.20	8.35E+00		1.34E+00	4.11E+00
		964.01		10.40	1.02E+01		5.72E+00	5.01E+00
		1085.78		7.22	1.38E+01		-3.60E+00	6.80E+00
		1112.02		9.60	1.07E+01		3.35E+00	5.27E+00
		1407.95		14.94	2.20E+00		-2.43E-02	1.04E+00
	GD-153	97.43		31.30	1.65E+01	1.65E+01	-1.48E+00	8.16E+00
		103.18		22.20	2.34E+01		-5.16E-01	1.16E+01

Analysis Report for 1604147-01

GAS-1302

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
EU-154	123.07	40.50	1.27E+00	1.27E+00	1.49E+01	6.32E-01
	723.30	19.70	3.87E+00		-1.93E-01	1.90E+00
	873.19	11.50	8.74E+00		-7.76E-01	4.31E+00
	996.32	10.30	1.07E+01		1.05E+01	5.26E+00
	1004.76	17.90	6.05E+00		4.69E+00	2.98E+00
	1274.45	35.50	1.51E+00		7.21E-01	7.30E-01
EU-155	86.50	30.90	3.59E+00	1.93E+00	1.09E+02	1.79E+00
	105.30	20.70	1.93E+00		2.18E-01	9.55E-01
@ EU-156	811.77	10.40	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@	1153.47	7.20	1.00E+26		1.00E+26	1.00E+20
@	1230.71	8.90	1.00E+26		1.00E+26	1.00E+20
HO-166M	184.41	72.60	4.45E-01	4.45E-01	2.93E-02	2.21E-01
	280.45	29.60	1.50E+00		-3.15E-01	7.43E-01
	410.94	11.10	4.93E+00		-2.59E+00	2.44E+00
	711.69	54.10	1.09E+00		-1.48E-01	5.38E-01
TM-171	66.72	0.14	7.82E+02	7.82E+02	3.67E+02	3.88E+02
HF-172	81.75	4.52	2.34E+01	7.19E+00	-1.51E+01	1.16E+01
	125.81	11.30	7.19E+00		1.56E-01	3.56E+00
@ LU-172	181.53	20.60	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@	810.06	16.63	1.00E+26		1.00E+26	1.00E+20
@	912.12	15.25	1.00E+26		1.00E+26	1.00E+20
@	1093.66	62.50	1.00E+26		1.00E+26	1.00E+20
LU-173	100.72	5.24	2.13E+01	8.64E+00	-2.29E+00	1.05E+01
	272.11	21.20	8.64E+00		-1.07E+00	4.28E+00
HF-175	343.40	84.00	1.60E+04	1.60E+04	2.24E+03	7.93E+03
LU-176	88.34	13.30	5.60E+00	4.69E-01	1.88E+02	2.79E+00
	201.83	86.00	4.69E-01		-3.66E-02	2.32E-01
	306.78	94.00	4.83E-01		-3.59E-02	2.39E-01
TA-182	67.75	41.20	5.02E+02	5.02E+02	5.87E+02	2.50E+02
	1121.30	34.90	1.22E+03		9.50E+02	5.98E+02
	1189.05	16.23	1.91E+03		8.20E+02	9.33E+02
	1221.41	26.98	9.41E+02		2.57E+02	4.56E+02
	1231.02	11.44	2.12E+03		1.01E+03	1.03E+03
IR-192	308.46	29.68	2.47E+04	2.09E+04	-2.61E+03	1.22E+04
	468.07	48.10	2.09E+04		9.66E+03	1.03E+04
HG-203	279.19	77.30	2.69E+06	2.69E+06	-2.50E+05	1.33E+06
BI-207	569.67	97.72	6.02E-01	6.02E-01	1.55E-01	2.97E-01
	1063.62	74.90	1.18E+00		-3.76E-02	5.81E-01
TL-208	583.14	30.22	1.87E+00	5.56E-01	5.99E-01	9.22E-01
	860.37	4.48	1.72E+01		3.31E+00	8.49E+00
	2614.66	35.85	5.56E-01		3.96E-01	2.44E-01
BI-210M	262.00	45.00	9.67E-01	9.67E-01	-4.77E-02	4.79E-01
	300.00	23.00	1.98E+00		3.58E-01	9.80E-01
PB-210	46.50	4.25	1.95E+01	1.95E+01	-1.23E+02	9.71E+00
PB-211	404.84	2.90	1.88E+01	1.88E+01	-1.19E+00	9.29E+00
	831.96	2.90	2.52E+01		-7.05E+00	1.24E+01
BI-212	727.17	11.80	5.15E+00	5.15E+00	-1.54E+00	2.54E+00
	1620.62	2.75	9.67E+00		3.43E+00	4.50E+00
PB-212	238.63	44.60	1.01E+00	1.01E+00	1.12E+00	5.03E-01
	300.09	3.41	1.34E+01		2.41E+00	6.61E+00
BI-214	609.31	46.30	1.25E+00	1.25E+00	5.04E-01	6.17E-01
	1120.29	15.10	5.48E+00		4.23E+00	2.70E+00
	1764.49	15.80	1.49E+00		-5.34E-01	6.82E-01

Analysis Report for 1604147-01

GAS-1302

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	BI-214	2204.22		4.98	5.16E+00	1.25E+00	9.33E-01	2.36E+00
	PB-214	295.21		19.19	2.34E+00	1.31E+00	6.96E-01	1.16E+00
		351.92		37.19	1.31E+00		-3.48E-01	6.47E-01
	RN-219	401.80		6.50	8.32E+00	8.32E+00	-1.13E+00	4.12E+00
	RA-223	323.87		3.88	1.20E+01	1.20E+01	3.24E+00	5.93E+00
	RA-224	240.98		3.95	1.14E+01	1.14E+01	8.38E+00	5.65E+00
@	RA-225	40.00		31.00	1.00E+26	1.00E+26	1.00E+26	1.00E+20
	RA-226	186.21		3.28	9.98E+00	9.98E+00	1.09E+00	4.94E+00
	TH-227	50.10		8.40	1.00E+01	3.90E+00	4.49E+01	5.00E+00
		236.00		11.50	3.90E+00		6.12E-02	1.93E+00
		256.20		6.30	6.98E+00		3.55E+00	3.46E+00
	AC-228	338.32		11.40	4.26E+00	3.12E+00	1.72E+00	2.11E+00
		911.07		27.70	3.12E+00		-1.61E+00	1.54E+00
		969.11		16.60	5.21E+00		-1.04E+00	2.57E+00
	TH-230	48.44		16.90	4.98E+00	4.98E+00	1.47E+01	2.48E+00
		62.85		4.60	1.55E+01		-7.34E+01	7.70E+00
		67.67		0.37	1.07E+02		1.25E+02	5.33E+01
	PA-231	283.67		1.60	2.83E+01	1.97E+01	3.47E+00	1.40E+01
		302.67		2.30	1.97E+01		-1.52E-01	9.75E+00
	TH-231	25.64		14.70	4.99E+01	5.88E+00	-1.25E+03	2.49E+01
		84.21		6.40	5.88E+00		-2.44E+02	2.92E+00
	PA-233	311.98		38.60	4.00E+11	4.00E+11	3.91E+11	1.98E+11
	PA-234	131.20		20.40	1.35E+00	1.35E+00	-3.22E-01	6.71E-01
		733.99		8.80	6.94E+00		-5.52E+00	3.42E+00
		946.00		12.00	7.99E+00		-1.96E+00	3.94E+00
	PA-234M	1001.03		0.92	9.30E+01	9.30E+01	-4.37E+01	4.58E+01
	TH-234	63.29		3.80	1.06E+01	1.06E+01	-8.18E+02	5.28E+00
	U-235	143.76		10.50	2.71E+00	2.71E+00	-3.20E-02	1.34E+00
		163.35		4.70	6.49E+00		6.75E-01	3.21E+00
		205.31		4.70	8.65E+00		-3.47E+00	4.29E+00
	NP-237	86.50		12.60	5.92E+00	5.92E+00	1.81E+02	2.95E+00
@	NP-239	106.10		22.70	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		228.18		10.70	1.00E+26		1.00E+26	1.00E+20
@		277.60		14.10	1.00E+26		1.00E+26	1.00E+20
+	AM-241	59.54	*	35.90	4.13E+00	4.13E+00	2.65E+02	2.06E+00
	AM-243	74.67		66.00	5.65E-01	5.65E-01	-2.95E-01	2.81E-01
	CM-243	209.75		3.29	1.37E+01	3.36E+00	1.47E+00	6.81E+00
		228.14		10.60	4.46E+00		3.78E-01	2.21E+00
		277.60		14.00	3.36E+00		-1.00E-01	1.66E+00

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

Analysis Report for 1604147-01
GAS-1302

No Action Level results available for reporting purposes.

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

No Data Review Comments Entered.

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: GAS-1302

Elapsed Live time: 1800
Elapsed Real Time: 1886

Channel								
1:	0	0	0	0	0	0	0	0
9:	214	1491	2327	4667	4612	2165	2255	1955
17:	1813	2566	1817	1973	6189	38498	41917	7331
25:	14160	12493	3010	1077	878	888	1013	1884
33:	1885	1072	932	1119	1329	1195	1146	1245
41:	1358	1431	1691	1946	1999	2300	2590	3136
49:	4255	5018	5035	4774	4774	4664	5027	5195
57:	5442	6011	19512	55541	18983	2168	1485	1507
65:	1521	1641	1786	1792	1778	1774	1741	1708
73:	1611	1686	1774	1701	1728	1804	1714	1713
81:	1730	1690	1791	1866	1880	1956	2740	13786
89:	16136	2797	997	981	1019	967	893	918
97:	916	912	914	912	917	910	895	921
105:	915	892	934	905	891	903	912	934
113:	956	896	915	923	893	922	926	938
121:	1119	3041	3652	1122	886	876	828	871
129:	845	823	774	871	852	826	866	979
137:	1225	938	818	798	833	797	814	791
145:	839	788	830	771	848	782	823	789
153:	799	789	768	739	737	769	760	719
161:	747	768	759	724	782	977	929	710
169:	708	777	718	775	749	710	735	774
177:	739	744	716	688	701	724	737	750
185:	758	783	812	782	818	778	866	783
193:	850	808	817	819	772	790	758	798
201:	703	783	719	783	746	754	733	732
209:	817	750	799	856	783	786	807	792
217:	801	796	848	813	828	800	795	805
225:	759	747	801	718	735	778	742	704
233:	722	748	716	740	709	760	784	754
241:	716	718	671	635	689	625	632	602
249:	601	613	630	616	652	656	571	599
257:	625	624	635	576	592	583	597	574
265:	571	566	570	567	563	556	553	565
273:	576	544	572	588	542	540	494	527
281:	557	573	576	565	549	520	574	499
289:	539	587	525	537	493	477	490	554
297:	520	539	523	511	529	489	499	474
305:	523	499	490	477	485	512	536	537
313:	522	477	502	467	456	483	494	457
321:	500	477	463	443	477	471	474	463
329:	440	479	493	482	482	488	460	506
337:	472	489	478	479	473	450	446	461
345:	502	455	460	429	457	457	448	436
353:	443	477	422	426	512	451	458	451
361:	460	473	446	457	437	431	459	464

369:	438	434	474	458	421	451	453	456

Sample Title: GAS-1302

Channel								
377:	453	433	432	449	436	436	446	429
385:	430	416	465	452	464	429	461	504
393:	447	439	485	440	432	439	432	440
401:	463	445	444	420	451	439	473	426
409:	422	458	430	465	401	440	466	439
417:	419	411	502	431	425	463	423	456
425:	449	445	415	453	388	445	479	439
433:	458	443	428	472	454	499	444	467
441:	442	442	469	449	503	483	456	455
449:	460	442	473	457	465	439	443	498
457:	490	470	454	473	462	480	418	449
465:	453	460	463	493	422	479	468	472
473:	435	459	441	441	407	434	452	372
481:	389	367	363	369	360	318	367	350
489:	335	323	358	349	319	324	290	305
497:	319	341	328	342	353	280	307	331
505:	335	317	308	296	351	338	339	330
513:	328	326	320	292	306	329	293	331
521:	274	306	301	299	292	297	314	259
529:	301	318	293	327	263	271	258	268
537:	245	294	317	258	291	299	271	300
545:	236	272	278	262	240	263	276	244
553:	265	252	260	256	265	265	250	257
561:	256	231	262	241	214	241	266	267
569:	252	250	259	223	245	240	273	240
577:	262	241	258	249	246	237	266	253
585:	270	235	229	243	255	245	237	234
593:	238	236	254	260	218	240	240	248
601:	229	219	233	249	237	242	237	226
609:	248	268	252	233	219	230	244	221
617:	208	236	231	249	218	228	213	237
625:	222	230	257	207	227	269	226	209
633:	259	229	213	245	252	248	230	244
641:	250	216	246	224	207	227	229	222
649:	213	226	192	228	254	226	236	216
657:	238	220	228	502	3891	11444	6874	1002
665:	248	220	237	230	206	205	194	182
673:	241	189	198	194	173	207	189	187
681:	216	183	187	197	195	176	203	191
689:	196	205	220	204	194	195	226	194
697:	202	194	216	177	173	203	191	186
705:	194	191	193	178	170	210	199	185
713:	180	205	201	209	200	210	204	210
721:	201	221	214	189	206	160	213	182
729:	217	213	201	188	185	226	196	220
737:	154	215	217	192	191	187	195	212
745:	196	206	199	200	230	214	215	187
753:	190	207	206	203	209	194	197	203
761:	199	213	188	185	195	199	231	210
769:	199	223	227	197	199	202	199	218
777:	213	221	218	195	193	209	205	213
785:	228	197	204	206	206	232	204	202
793:	249	221	198	243	231	192	229	210

801:	229	219	223	210	222	197	242	210

Sample Title: GAS-1302

Channel								
809:	223	220	195	216	242	242	204	230
817:	234	230	227	192	229	226	216	223
825:	237	203	234	216	235	252	210	198
833:	228	255	209	243	239	221	225	231
841:	208	205	232	250	208	236	226	227
849:	221	243	241	218	258	224	229	242
857:	226	223	236	225	252	235	269	226
865:	235	244	260	265	246	225	230	266
873:	261	236	276	273	266	243	257	256
881:	240	274	232	265	231	253	248	264
889:	247	266	258	246	271	281	290	273
897:	284	294	310	291	262	277	272	288
905:	260	302	280	260	279	255	270	296
913:	270	273	285	283	316	261	267	289
921:	298	282	307	293	279	255	284	304
929:	298	307	260	303	273	305	286	281
937:	319	324	274	310	301	307	301	316
945:	295	322	300	333	329	321	349	304
953:	341	314	315	319	315	292	285	275
961:	276	306	308	256	288	259	242	247
969:	244	237	239	246	247	222	209	234
977:	230	226	213	220	228	234	233	253
985:	220	220	195	216	232	215	216	239
993:	261	251	207	259	226	245	238	213
1001:	194	230	247	218	233	240	236	214
1009:	196	234	203	189	233	240	208	232
1017:	232	197	210	198	221	220	218	251
1025:	197	215	227	246	248	206	185	203
1033:	218	252	192	192	196	215	222	213
1041:	198	214	223	211	239	171	221	212
1049:	238	211	205	209	197	169	209	195
1057:	221	174	203	209	189	196	175	186
1065:	193	208	205	193	188	203	230	192
1073:	178	193	213	230	195	189	183	190
1081:	187	191	204	214	190	193	187	211
1089:	204	216	225	217	196	209	176	205
1097:	223	215	210	214	197	215	218	252
1105:	188	194	206	226	234	180	209	194
1113:	194	225	195	184	180	205	201	171
1121:	157	144	162	137	130	129	135	114
1129:	125	130	123	129	128	139	111	131
1137:	137	119	118	103	115	127	143	110
1145:	138	135	144	127	115	116	113	115
1153:	117	112	97	107	102	117	111	119
1161:	108	131	102	101	111	125	113	110
1169:	102	112	200	1386	6053	7977	3196	471
1177:	133	107	92	96	78	79	81	74
1185:	73	75	83	83	88	80	86	68
1193:	86	61	81	80	75	67	64	74
1201:	65	68	61	63	67	77	87	70
1209:	54	52	49	62	70	72	52	58
1217:	48	45	59	47	53	47	53	52
1225:	39	47	41	43	52	54	42	43

1233:	48	38	35	39	36	39	31	28

Sample Title: GAS-1302

Channel								
1241:	44	38	32	37	35	40	32	30
1249:	33	41	39	30	23	44	32	25
1257:	28	27	26	31	33	39	26	30
1265:	31	31	29	24	30	32	28	28
1273:	28	34	21	26	36	24	22	23
1281:	27	28	23	35	25	25	28	34
1289:	41	27	33	34	25	32	34	20
1297:	18	23	33	31	28	25	23	31
1305:	26	19	36	24	24	37	32	17
1313:	28	34	34	24	29	23	27	34
1321:	27	32	40	36	28	28	26	30
1329:	42	68	736	3916	7249	4151	746	88
1337:	35	31	15	20	11	13	9	19
1345:	17	14	12	13	12	13	15	9
1353:	19	11	12	6	9	12	7	5
1361:	10	15	9	10	4	12	7	9
1369:	9	10	4	6	13	8	11	12
1377:	8	7	8	4	5	12	12	9
1385:	4	11	9	12	6	13	10	5
1393:	8	9	9	10	16	7	16	9
1401:	9	6	12	5	10	8	13	10
1409:	10	12	15	9	10	13	9	8
1417:	11	9	8	8	4	7	6	9
1425:	15	9	5	9	10	12	5	13
1433:	9	11	10	8	7	10	9	7
1441:	7	3	10	5	8	11	8	7
1449:	11	8	8	13	6	6	9	10
1457:	9	3	12	7	11	13	6	4
1465:	7	4	8	5	14	6	7	11
1473:	8	9	12	7	12	12	8	5
1481:	8	8	5	4	8	5	9	10
1489:	7	5	12	5	5	9	14	12
1497:	3	5	2	7	8	7	12	5
1505:	10	5	8	7	11	14	6	5
1513:	6	6	10	6	5	6	11	12
1521:	7	6	3	11	9	6	9	8
1529:	9	7	7	9	6	4	3	7
1537:	6	8	10	7	8	6	12	8
1545:	8	6	8	9	15	4	8	6
1553:	8	3	12	10	4	9	9	6
1561:	12	6	5	8	8	5	7	8
1569:	6	12	11	9	3	3	7	7
1577:	6	7	3	10	4	9	10	5
1585:	9	4	4	13	4	7	7	7
1593:	9	10	5	10	11	4	4	3
1601:	8	7	5	10	4	5	5	7
1609:	11	9	3	6	7	7	6	7
1617:	5	5	8	6	10	6	11	5
1625:	4	5	6	6	7	2	4	5
1633:	6	5	13	5	6	10	9	4
1641:	4	11	9	4	5	5	4	5
1649:	4	5	6	4	11	6	9	4
1657:	6	10	9	5	4	9	8	8

1665:	2	4	2	5	8	6	5	2

Sample Title: GAS-1302

Channel								
1673:	10	4	6	7	7	4	8	3
1681:	6	6	5	6	6	5	4	5
1689:	3	11	4	5	7	11	5	7
1697:	4	4	4	3	6	5	3	5
1705:	3	2	4	9	6	3	7	7
1713:	6	4	1	5	9	1	6	8
1721:	11	8	9	6	2	2	4	4
1729:	6	7	6	5	4	8	5	5
1737:	5	6	8	4	7	3	8	3
1745:	4	5	1	3	4	6	6	6
1753:	5	8	4	8	4	4	4	6
1761:	2	5	5	4	6	1	9	4
1769:	5	10	8	5	7	5	5	5
1777:	6	5	3	4	9	1	13	0
1785:	7	5	4	5	5	7	3	6
1793:	2	6	3	6	0	1	5	2
1801:	4	3	2	6	5	5	9	4
1809:	6	9	6	3	6	1	4	6
1817:	4	3	7	4	8	5	8	5
1825:	6	6	4	3	8	3	6	7
1833:	3	8	11	16	30	10	8	4
1841:	3	7	0	5	6	6	4	5
1849:	3	7	2	5	4	5	4	5
1857:	4	1	4	5	7	6	7	5
1865:	2	4	4	3	11	4	5	2
1873:	4	1	6	7	3	5	8	6
1881:	7	4	4	2	5	3	1	4
1889:	5	4	3	3	6	4	2	3
1897:	4	5	7	6	3	7	6	1
1905:	3	4	7	8	6	7	3	8
1913:	2	3	1	3	0	4	8	7
1921:	8	0	2	3	8	2	3	6
1929:	0	4	4	8	5	3	0	4
1937:	6	4	4	9	8	6	4	6
1945:	6	4	3	7	5	4	4	6
1953:	4	5	8	10	0	5	6	5
1961:	6	4	5	1	4	2	3	4
1969:	5	6	4	3	5	4	4	4
1977:	2	2	5	2	9	10	8	1
1985:	1	4	4	6	6	3	5	3
1993:	2	2	4	4	1	8	1	2
2001:	6	7	6	4	2	4	6	5
2009:	2	3	5	3	2	3	4	8
2017:	5	2	7	7	6	5	7	4
2025:	4	2	3	1	7	6	1	7
2033:	1	5	3	5	4	5	5	1
2041:	6	7	3	2	3	3	1	2
2049:	7	1	8	3	4	6	4	7
2057:	2	2	2	1	6	3	2	3
2065:	2	4	3	5	6	4	7	6
2073:	4	2	4	2	4	4	1	2
2081:	4	4	1	6	1	5	5	2
2089:	3	3	2	3	5	4	3	4

2097:	2	3	3	4	4	1	3	6

Sample Title: GAS-1302

Channel								
2105:	6	6	5	4	5	3	1	6
2113:	3	1	3	3	5	3	7	1
2121:	5	3	2	3	7	3	2	3
2129:	3	2	7	8	4	4	6	1
2137:	5	6	3	4	3	2	5	2
2145:	2	1	2	2	2	3	3	6
2153:	7	3	4	7	3	2	5	6
2161:	5	5	5	4	2	6	1	4
2169:	4	4	7	2	4	3	5	2
2177:	3	2	4	4	1	7	3	3
2185:	1	2	3	1	2	3	3	0
2193:	3	2	2	3	3	2	6	3
2201:	3	6	2	5	6	4	4	4
2209:	3	5	2	2	0	4	4	4
2217:	1	5	4	7	2	4	4	1
2225:	4	2	5	5	3	2	1	5
2233:	3	4	4	4	3	6	2	5
2241:	4	0	6	2	7	1	5	2
2249:	5	1	1	5	2	4	5	4
2257:	5	3	5	3	2	10	6	3
2265:	3	4	5	1	4	0	4	6
2273:	4	4	8	7	3	2	3	4
2281:	4	6	5	7	2	4	2	6
2289:	2	5	5	0	1	4	4	2
2297:	0	1	0	1	3	1	1	2
2305:	1	3	1	2	4	8	0	2
2313:	3	2	0	3	2	4	1	2
2321:	1	0	3	2	2	3	2	2
2329:	3	1	2	2	1	1	2	0
2337:	2	2	0	1	3	1	2	2
2345:	0	2	2	0	0	1	1	1
2353:	3	2	1	0	1	2	0	2
2361:	5	2	3	2	1	0	0	1
2369:	3	0	1	3	4	0	2	0
2377:	1	4	0	0	3	3	0	2
2385:	1	3	3	0	0	2	0	1
2393:	0	0	0	1	0	2	0	2
2401:	0	2	0	1	3	0	0	1
2409:	0	2	1	0	0	0	0	0
2417:	0	0	1	4	1	1	0	0
2425:	0	2	2	1	0	1	0	0
2433:	1	3	0	0	0	0	0	0
2441:	1	1	0	0	0	1	0	2
2449:	1	1	2	0	1	1	0	0
2457:	0	0	0	0	0	3	2	0
2465:	3	0	0	1	0	0	0	2
2473:	1	0	0	0	0	0	0	1
2481:	0	1	1	0	1	0	0	0
2489:	0	0	0	1	0	1	0	0
2497:	1	1	0	0	1	0	0	4
2505:	37	55	47	12	1	0	1	1
2513:	0	0	0	0	0	1	1	1
2521:	1	1	0	0	1	0	0	0

2529:	0	0	0	1	0	0	0	0

Sample Title: GAS-1302

Channel								
2537:	0	0	0	0	0	0	0	0
2545:	0	0	0	0	1	0	0	0
2553:	0	0	0	0	0	0	0	0
2561:	0	0	0	0	0	0	0	0
2569:	0	0	0	0	0	0	1	0
2577:	0	0	0	1	0	0	0	1
2585:	0	0	0	0	0	0	0	1
2593:	0	0	0	0	0	0	0	0
2601:	0	0	0	0	0	1	0	0
2609:	0	1	0	0	1	3	7	5
2617:	0	0	0	1	0	0	0	0
2625:	0	0	0	0	0	0	0	0
2633:	0	0	0	0	0	0	0	0
2641:	0	0	0	0	0	0	0	0
2649:	0	0	0	0	0	0	0	0
2657:	0	1	0	0	0	0	0	0
2665:	0	0	0	0	0	0	0	0
2673:	0	0	0	0	0	0	0	0
2681:	0	0	0	0	0	0	0	1
2689:	0	1	0	0	0	0	0	0
2697:	0	1	0	0	0	0	0	0
2705:	0	0	1	1	0	0	0	0
2713:	0	0	0	0	0	0	0	0
2721:	0	0	0	0	0	1	0	0
2729:	0	0	0	1	0	1	0	0
2737:	0	0	0	0	0	0	0	0
2745:	1	0	0	0	0	0	0	0
2753:	0	0	0	0	0	0	0	0
2761:	1	0	0	0	0	0	0	0
2769:	0	0	0	0	1	0	0	0
2777:	0	0	0	0	0	0	0	0
2785:	0	0	0	0	0	0	0	0
2793:	0	0	0	0	0	0	0	0
2801:	0	0	0	0	0	1	0	0
2809:	0	0	0	0	0	0	0	0
2817:	0	1	0	0	0	0	0	0
2825:	0	0	0	0	0	0	0	0
2833:	1	0	0	0	0	0	0	0
2841:	0	0	0	0	0	0	0	0
2849:	0	0	0	0	0	0	0	0
2857:	0	0	0	0	0	0	0	0
2865:	0	0	0	1	0	0	0	0
2873:	0	0	0	0	0	1	0	0
2881:	0	0	0	0	0	0	0	0
2889:	0	0	0	0	0	0	0	1
2897:	0	0	0	0	0	0	0	0
2905:	0	0	0	1	1	0	1	0
2913:	0	0	0	0	0	0	0	0
2921:	0	0	0	0	0	0	0	0
2929:	0	0	0	0	0	0	0	0
2937:	0	0	0	0	0	0	0	0
2945:	0	0	0	0	0	0	0	0
2953:	0	0	0	0	0	0	0	0

2961:	0	0	0	0	0	0	0	0

Sample Title: GAS-1302

Channel								
2969:	0	1	0	0	0	0	0	0
2977:	0	0	0	0	0	0	0	0
2985:	0	1	0	0	0	1	0	0
2993:	0	0	0	1	1	0	0	0
3001:	0	0	0	0	0	0	0	0
3009:	1	0	0	0	0	0	0	0
3017:	0	0	0	0	0	0	0	0
3025:	0	0	0	0	0	1	0	0
3033:	0	0	2	0	0	0	0	1
3041:	0	0	0	0	0	1	0	0
3049:	0	0	0	0	0	0	0	0
3057:	0	0	0	0	1	0	0	0
3065:	0	0	0	0	0	0	0	0
3073:	0	0	0	0	0	0	0	0
3081:	0	0	0	0	0	0	0	0
3089:	0	0	0	0	0	0	0	0
3097:	0	0	0	0	0	0	0	0
3105:	0	0	0	0	0	0	0	0
3113:	0	0	0	0	1	0	0	0
3121:	0	0	0	0	0	0	0	0
3129:	0	0	0	0	0	0	0	0
3137:	0	0	0	0	0	0	0	0
3145:	0	1	0	0	0	0	0	0
3153:	0	0	0	0	0	0	0	0
3161:	0	0	0	0	0	0	0	0
3169:	0	0	0	0	0	0	0	0
3177:	0	0	0	0	0	0	0	0
3185:	0	0	0	2	0	0	0	0
3193:	0	0	0	0	0	1	0	0
3201:	0	0	0	0	0	0	0	0
3209:	0	0	0	0	0	0	0	0
3217:	0	0	0	0	0	0	0	0
3225:	0	0	0	0	0	0	0	0
3233:	0	0	0	0	0	0	0	0
3241:	1	0	0	0	0	0	0	0
3249:	0	0	0	0	0	0	0	0
3257:	0	0	0	0	1	0	0	0
3265:	0	0	0	0	0	0	0	0
3273:	0	0	0	0	0	0	0	0
3281:	0	0	0	0	0	0	0	0
3289:	0	0	0	0	0	0	0	0
3297:	0	1	0	0	0	0	0	0
3305:	0	0	0	0	0	0	0	0
3313:	0	0	0	0	0	0	0	0
3321:	0	0	0	0	0	0	0	0
3329:	0	0	0	0	0	0	0	0
3337:	0	0	0	0	0	0	0	1
3345:	0	0	0	0	0	0	0	0
3353:	0	0	0	0	0	0	0	0
3361:	0	0	0	0	1	1	0	0
3369:	0	0	0	0	0	0	1	1
3377:	0	0	0	0	0	0	0	0
3385:	0	0	0	1	0	0	0	0

3393:	0	0	0	0	0	0	0	0

Sample Title: GAS-1302

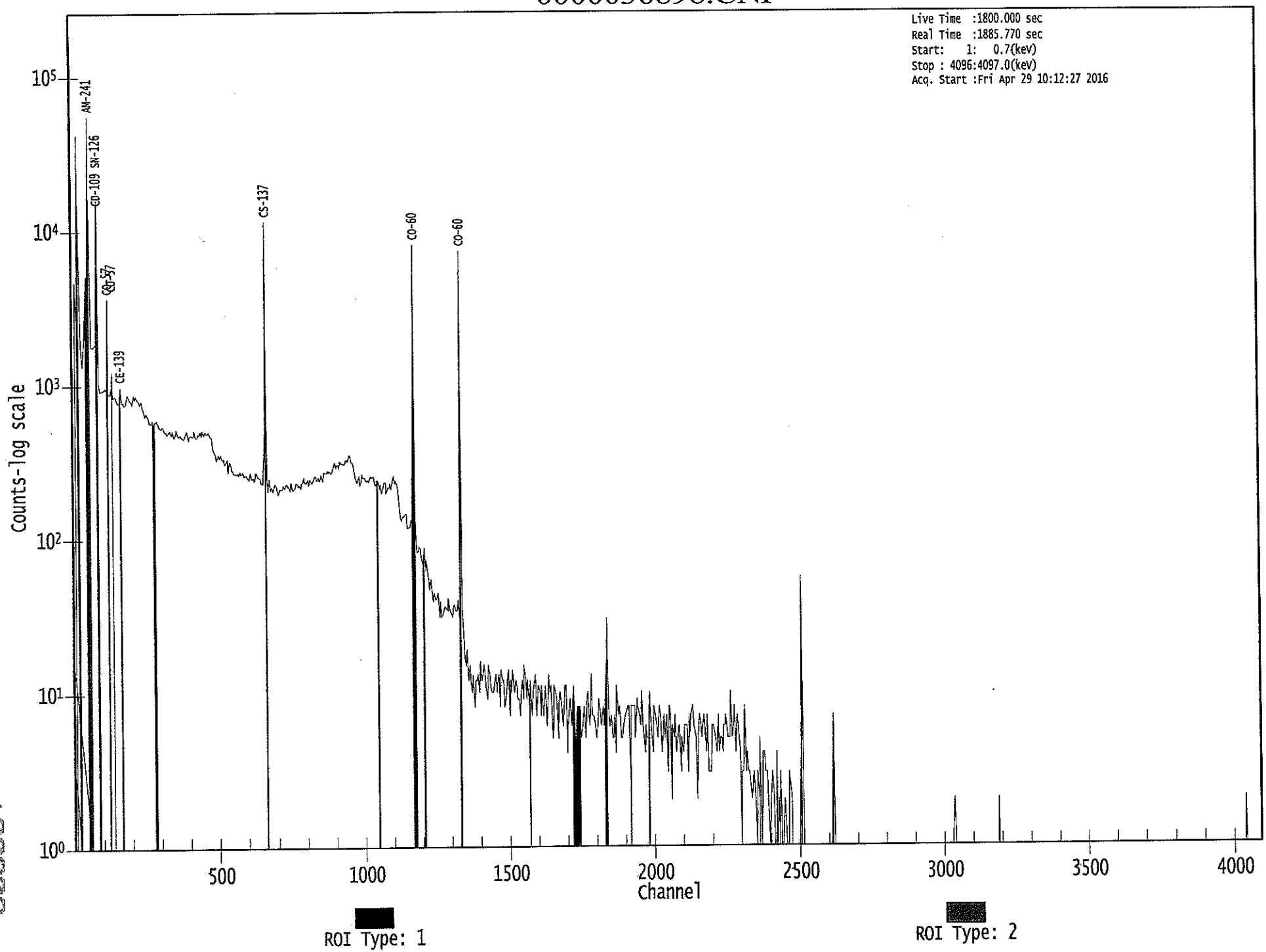
Channel								
3401:	0	0	0	0	0	0	0	0
3409:	0	0	0	0	0	0	0	0
3417:	0	0	0	0	0	0	0	0
3425:	0	0	0	0	0	0	0	0
3433:	0	0	0	0	0	0	0	0
3441:	0	0	0	0	0	1	0	0
3449:	0	1	0	0	0	0	0	0
3457:	0	0	0	0	0	0	0	0
3465:	0	0	0	0	0	0	0	0
3473:	0	0	0	0	0	0	0	0
3481:	0	0	0	0	0	0	0	0
3489:	0	0	0	0	0	0	0	0
3497:	0	0	1	0	0	0	1	0
3505:	0	0	0	0	1	0	0	0
3513:	0	0	0	0	0	0	0	0
3521:	0	0	0	0	0	0	0	0
3529:	0	0	0	0	0	0	0	0
3537:	0	0	0	0	0	0	0	0
3545:	0	0	0	0	0	0	0	0
3553:	0	0	0	0	0	0	0	0
3561:	1	0	0	0	0	0	0	0
3569:	0	0	0	0	0	0	0	0
3577:	0	0	0	0	0	0	0	0
3585:	1	0	0	0	0	0	0	0
3593:	1	0	0	0	0	0	0	0
3601:	0	0	0	0	0	0	0	1
3609:	0	0	0	0	0	0	0	0
3617:	0	0	0	1	0	1	0	0
3625:	0	0	0	0	0	0	0	0
3633:	0	0	0	0	0	0	0	0
3641:	0	0	0	0	0	0	0	0
3649:	0	0	0	0	0	1	0	0
3657:	0	0	0	0	0	0	0	0
3665:	1	1	0	0	0	0	0	0
3673:	0	0	0	0	0	0	1	0
3681:	0	0	0	0	0	0	0	0
3689:	0	0	0	0	0	1	0	0
3697:	0	0	0	0	0	0	0	0
3705:	0	0	0	0	0	0	0	0
3713:	0	0	0	0	0	0	0	0
3721:	0	0	0	0	0	0	0	0
3729:	0	0	0	0	0	0	0	0
3737:	0	0	0	0	0	0	0	0
3745:	0	0	0	0	0	0	0	0
3753:	0	0	0	0	0	0	0	0
3761:	0	0	0	0	0	1	0	0
3769:	0	0	0	0	0	0	0	0
3777:	0	0	0	0	0	0	0	0
3785:	0	0	0	0	0	0	0	0
3793:	0	0	0	0	0	0	0	0
3801:	1	0	0	0	0	0	1	0
3809:	0	0	0	0	0	0	0	0
3817:	0	0	0	0	0	0	0	1

3825:	0	0	0	0	0	0	0	0

Sample Title: GAS-1302

Channel								
3833:	0	0	0	0	0	0	0	0
3841:	0	0	0	0	0	0	0	0
3849:	0	0	0	0	0	0	0	0
3857:	0	0	0	0	0	0	0	0
3865:	0	0	0	0	0	0	0	0
3873:	0	0	0	0	1	0	1	0
3881:	0	0	0	0	0	0	0	0
3889:	0	0	0	0	0	0	1	0
3897:	0	0	0	0	0	0	0	0
3905:	0	0	0	0	0	0	0	0
3913:	1	0	0	0	0	0	0	1
3921:	0	0	0	0	0	0	0	0
3929:	0	0	0	0	0	0	0	0
3937:	0	0	0	0	0	0	0	1
3945:	0	0	0	0	0	0	0	0
3953:	0	0	0	0	0	0	0	0
3961:	0	0	0	1	0	0	0	0
3969:	0	0	0	0	0	0	0	0
3977:	0	0	0	0	0	0	0	0
3985:	0	0	0	0	0	0	0	0
3993:	0	0	0	0	0	0	0	0
4001:	0	0	0	0	0	0	0	0
4009:	0	0	0	0	0	0	0	0
4017:	0	0	0	0	0	1	0	0
4025:	0	0	0	0	0	0	0	1
4033:	0	0	0	0	0	0	2	0
4041:	0	0	1	0	0	0	0	0
4049:	0	0	0	0	0	0	0	0
4057:	0	0	0	0	0	0	0	0
4065:	1	0	0	0	1	0	0	0
4073:	0	0	0	0	0	0	0	0
4081:	0	0	0	0	0	0	0	0
4089:	0	1	0	0	0	0	0	0

0000036898.CNF



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Apex-Gamma

Analysis Report for 1604147-02
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GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1604147-02
Sample Description	: BLANK
Sample Type	: SOIL
Sample Size	: 7.834E+02 grams
Facility	: Countroom
Sample Taken On	: 4/29/2016 7:29:38AM
Acquisition Started	: 4/29/2016 8:05:33AM
Procedure	: GAS-1402 pCi
Operator	: Administrator
Detector Name	: GE3
Geometry	: GAS-1402
Live Time	: 7200.0 seconds
Real Time	: 7359.4 seconds
Dead Time	: 2.17 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 9 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 10/25/2014
Efficiency Calibration Used Done On	: 10/25/2014
Efficiency Calibration Description	:
Sample Number	: 36399

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

Analysis Report for 1604147-02

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PEAK LOCATE REPORT

Peak Locate Performed on : 4/29/2016 10:08:14AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096
Peak Search Sensitivity : 2.50

Peak No.	Energy (keV)	Centroid Channel	Centroid Uncertainty	Peak Significance
1	240.44	240.57	0.0000	0.00
2	253.75	253.87	0.0000	0.00
3	527.02	527.00	0.0000	0.00
4	548.33	548.30	0.0000	0.00
5	612.88	612.82	0.0000	0.00
6	765.13	765.00	0.0000	0.00
7	769.95	769.82	0.0000	0.00
8	810.15	810.00	0.0000	0.00
9	836.24	836.08	0.0000	0.00
10	843.80	843.63	0.0000	0.00
11	851.64	851.48	0.0000	0.00
12	870.06	869.88	0.0000	0.00
13	904.31	904.11	0.0000	0.00
14	912.49	912.29	0.0000	0.00
15	977.13	976.90	0.0000	0.00
16	1208.18	1207.85	0.0000	0.00
17	1260.03	1259.68	0.0000	0.00
18	1423.97	1423.56	0.0000	0.00
19	1461.46	1461.04	0.0000	0.00
20	1514.78	1514.34	0.0000	0.00
21	1788.40	1787.86	0.0000	0.00
22	1818.35	1817.80	0.0000	0.00
23	1865.19	1864.62	0.0000	0.00
24	2592.35	2591.58	0.0000	0.00

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1604147-02

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PEAK ANALYSIS REPORT

Peak Analysis Performed on : 4/29/2016 10:08:14AM

Peak Analysis From Channel : 1

Peak Analysis To Channel : 4096

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	240.44	236 -	246	240.57	6.70E+01	41.17	1.84E+02	2.55
	2	253.75	247 -	266	253.87	6.69E+01	66.96	3.58E+02	5.29
m	3	527.02	507 -	533	527.00	1.51E+01	15.43	2.08E+01	1.95
	4	548.33	545 -	553	548.30	2.38E+01	20.27	4.63E+01	3.82
	5	612.88	606 -	622	612.82	4.41E+01	37.68	1.16E+02	3.52
M	6	765.13	763 -	772	765.10	1.19E+01	8.72	1.26E+01	2.09
m	7	769.95	763 -	772	769.32	1.33E+01	14.34	2.60E+01	2.30
m	8	810.15	799 -	817	810.00	9.21E+00	12.53	2.34E+01	2.12
	9	836.24	832 -	839	836.08	1.30E+01	15.62	3.20E+01	1.24
	10	843.80	841 -	847	843.63	2.37E+01	13.76	1.67E+01	3.52
	11	851.64	848 -	858	851.48	2.38E+01	19.79	4.25E+01	6.43
	12	870.06	867 -	873	869.88	9.08E+00	8.89	7.85E+00	2.71
	13	904.31	902 -	906	904.11	1.05E+01	8.65	6.93E+00	2.67
	14	912.49	908 -	916	912.29	2.40E+01	14.59	1.80E+01	2.94
	15	977.13	973 -	980	976.90	1.17E+01	11.66	1.27E+01	2.91
	16	1208.18	1203 -	1211	1207.85	1.11E+01	12.69	1.79E+01	3.76
	17	1260.03	1256 -	1262	1259.68	9.32E+00	7.50	3.36E+00	1.39
	18	1423.97	1420 -	1426	1423.56	7.28E+00	6.95	3.44E+00	4.51
	19	1461.46	1456 -	1464	1461.04	1.04E+01	10.02	9.20E+00	2.07
	20	1514.78	1511 -	1517	1514.34	7.44E+00	6.95	3.11E+00	2.27
	21	1788.40	1784 -	1790	1787.86	7.00E+00	5.29	0.00E+00	2.99
	22	1818.35	1814 -	1820	1817.80	5.00E+00	4.47	0.00E+00	2.41
	23	1865.19	1860 -	1867	1864.62	8.82E+00	7.75	4.36E+00	3.06
	24	2592.35	2587 -	2594	2591.58	4.86E+00	6.53	4.29E+00	2.74

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 1604147-02

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PEAK ANALYSIS REPORT

Peak Analysis Performed on : 4/29/2016 10:08:14AM

Peak Analysis From Channel : 1

Peak Analysis To Channel : 4096

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
	1	240.44	236 -	246	6.70E+01	41.17	1.84E+02	3.11E+01
	2	253.75	247 -	266	6.69E+01	66.96	3.58E+02	5.34E+01
m	3	527.02	507 -	533	1.51E+01	15.43	2.08E+01	7.50E+00
	4	548.33	545 -	553	2.38E+01	20.27	4.63E+01	1.46E+01
	5	612.88	606 -	622	4.41E+01	37.68	1.16E+02	2.90E+01
M	6	765.13	763 -	772	1.19E+01	8.72	1.26E+01	5.84E+00
m	7	769.95	763 -	772	1.33E+01	14.34	2.60E+01	8.38E+00
m	8	810.15	799 -	817	9.21E+00	12.53	2.34E+01	7.96E+00
	9	836.24	832 -	839	1.30E+01	15.62	3.20E+01	1.14E+01
	10	843.80	841 -	847	2.37E+01	13.76	1.67E+01	7.99E+00
	11	851.64	848 -	858	2.38E+01	19.79	4.25E+01	1.42E+01
	12	870.06	867 -	872	9.08E+00	8.89	7.85E+00	5.37E+00
	13	904.31	902 -	906	1.05E+01	8.65	6.93E+00	4.69E+00
	14	912.49	908 -	916	2.40E+01	14.59	1.80E+01	8.89E+00
	15	977.13	973 -	980	1.17E+01	11.66	1.27E+01	7.77E+00
	16	1208.18	1203 -	1211	1.11E+01	12.69	1.79E+01	8.88E+00
	17	1260.03	1256 -	1262	9.32E+00	7.50	3.36E+00	3.58E+00
	18	1423.97	1420 -	1426	7.28E+00	6.95	3.44E+00	3.60E+00
	19	1461.46	1456 -	1464	1.04E+01	10.02	9.20E+00	6.31E+00
	20	1514.78	1511 -	1517	7.44E+00	6.95	3.11E+00	3.53E+00
	21	1788.40	1784 -	1790	7.00E+00	5.29	0.00E+00	0.00E+00
	22	1818.35	1814 -	1820	5.00E+00	4.47	0.00E+00	0.00E+00
	23	1865.19	1860 -	1867	8.82E+00	7.75	4.36E+00	4.09E+00
	24	2592.35	2587 -	2594	4.86E+00	6.63	4.29E+00	4.07E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 1604147-02

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PEAK WITH NID REPORT

Peak Analysis Performed on : 4/29/2016 10:08:14AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Tentative NID Library : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB
Peak Match Tolerance : 1.000 keV

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	1	240.44	236 -	246	240.57	6.70E+01	41.17	1.84E+02	RA-224
	2	253.75	247 -	266	253.87	6.69E+01	66.96	3.58E+02	.....
m	3	527.02	507 -	533	527.00	1.51E+01	15.43	2.08E+01	.....
	4	548.33	545 -	553	548.30	2.38E+01	20.27	4.63E+01	.....
	5	612.88	606 -	622	612.82	4.41E+01	37.68	1.16E+02	.....
M	6	765.13	763 -	772	765.00	1.19E+01	8.72	1.26E+01	NB-95
m	7	769.95	763 -	772	769.82	1.33E+01	14.34	2.60E+01	.....
m	8	810.15	799 -	817	810.00	9.21E+00	12.53	2.34E+01	LU-172 CO-58
	9	836.24	832 -	839	836.08	1.30E+01	15.62	3.20E+01	.....
	10	843.80	841 -	847	843.63	2.37E+01	13.76	1.67E+01	.....
	11	851.64	848 -	858	851.48	2.38E+01	19.79	4.25E+01	.....
	12	870.06	867 -	872	869.88	9.08E+00	8.89	7.85E+00	.....
	13	904.31	902 -	906	904.11	1.05E+01	8.65	6.93E+00	.....
	14	912.49	908 -	916	912.29	2.40E+01	14.59	1.80E+01	LU-172
	15	977.13	973 -	980	976.90	1.17E+01	11.66	1.27E+01	.....
	16	1208.18	1203 -	1211	1207.85	1.11E+01	12.69	1.79E+01	.....
	17	1260.03	1256 -	1262	1259.68	9.32E+00	7.50	3.36E+00	I-135
	18	1423.97	1420 -	1426	1423.56	7.28E+00	6.95	3.44E+00	.....
	19	1461.46	1456 -	1464	1461.04	1.04E+01	10.02	9.20E+00	K-40
	20	1514.78	1511 -	1517	1514.34	7.44E+00	6.95	3.11E+00	.....
	21	1788.40	1784 -	1790	1787.86	7.00E+00	5.29	0.00E+00	.....
	22	1818.35	1814 -	1820	1817.90	5.00E+00	4.47	0.00E+00	.....
	23	1865.19	1860 -	1867	1864.62	8.82E+00	7.75	4.36E+00	.....
	24	2592.35	2587 -	2594	2591.58	4.86E+00	6.63	4.29E+00	.....

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 1604147-02

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PEAK EFFICIENCY REPORT

Peak Analysis Performed on : 4/29/2016 10:08:14AM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
	1	240.44	6.70E+01	41.17	1.51E-02	1.17E-03
	2	253.75	6.69E+01	66.96	1.45E-02	1.11E-03
m	3	527.02	1.51E+01	15.43	7.80E-03	7.02E-04
	4	548.33	2.38E+01	20.27	7.53E-03	6.81E-04
	5	612.88	4.41E+01	37.68	6.84E-03	6.17E-04
M	6	765.13	1.19E+01	8.72	5.64E-03	4.83E-04
m	7	769.95	1.33E+01	14.34	5.61E-03	4.79E-04
m	8	810.15	9.21E+00	12.53	5.37E-03	4.46E-04
	9	836.24	1.30E+01	15.62	5.22E-03	4.25E-04
	10	843.80	2.37E+01	13.76	5.18E-03	4.19E-04
	11	851.64	2.38E+01	19.79	5.14E-03	4.13E-04
	12	870.06	9.98E+00	8.89	5.05E-03	3.98E-04
	13	904.31	1.05E+01	8.65	4.88E-03	3.73E-04
	14	912.49	2.40E+01	14.59	4.85E-03	3.72E-04
	15	977.13	1.17E+01	11.66	4.57E-03	3.60E-04
	16	1208.18	1.11E+01	12.69	3.83E-03	3.16E-04
	17	1260.03	9.32E+00	7.50	3.70E-03	3.04E-04
	18	1423.97	7.28E+00	6.95	3.36E-03	2.75E-04
	19	1461.46	1.04E+01	10.02	3.29E-03	2.69E-04
	20	1514.78	7.44E+00	6.95	3.20E-03	2.61E-04
	21	1788.40	7.00E+00	5.29	2.83E-03	2.20E-04
	22	1818.35	5.00E+00	4.47	2.80E-03	2.16E-04
	23	1865.19	8.82E+00	7.75	2.75E-03	2.13E-04
	24	2592.35	4.86E+00	6.63	2.25E-03	2.13E-04

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000 sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 4/29/2016 10:08:14AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000035908.CNF

Analysis Report for 1604147-02

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	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	240.44	6.70E+01	41.17			6.70E+01	4.12E+01
	2	253.75	6.69E+01	66.96			6.69E+01	6.70E+01
m	3	527.02	1.51E+01	15.43			1.51E+01	1.54E+01
	4	548.33	2.38E+01	20.27			2.38E+01	2.03E+01
	5	612.88	4.41E+01	37.68			4.41E+01	3.77E+01
M	6	765.13	1.19E+01	8.72			1.19E+01	8.72E+00
m	7	769.95	1.33E+01	14.34			1.33E+01	1.43E+01
m	8	810.15	9.21E+00	12.53			9.21E+00	1.25E+01
	9	836.24	1.30E+01	15.62			1.30E+01	1.56E+01
	10	843.80	2.37E+01	13.76			2.37E+01	1.38E+01
	11	851.64	2.38E+01	19.79			2.38E+01	1.98E+01
	12	870.06	9.08E+00	8.89			9.08E+00	8.89E+00
	13	904.31	1.05E+01	8.65			1.05E+01	8.65E+00
	14	912.49	2.40E+01	14.59	3.08E+00	5.24E+00	2.09E+01	1.55E+01
	15	977.13	1.17E+01	11.66			1.17E+01	1.17E+01
	16	1208.18	1.11E+01	12.69			1.11E+01	1.27E+01
	17	1260.03	9.32E+00	7.50			9.32E+00	7.50E+00
	18	1423.97	7.28E+00	6.95			7.28E+00	6.95E+00
	19	1461.46	1.04E+01	10.02			1.04E+01	1.00E+01
	20	1514.78	7.44E+00	6.95			7.44E+00	6.95E+00
	21	1788.40	7.00E+00	5.29			7.00E+00	5.29E+00
	22	1818.35	5.00E+00	4.47			5.00E+00	4.47E+00
	23	1865.19	8.82E+00	7.75			8.82E+00	7.75E+00
	24	2592.35	4.86E+00	6.63			4.86E+00	6.63E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 4/29/2016 10:08:14AM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000035908.CNF

Corrected Area is: Original * Peak Ratio - Background

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
	1	240.44	6.70E+01	41.17			6.70E+01	4.12E+01
	2	253.75	6.69E+01	66.96			6.69E+01	6.70E+01
m	3	527.02	1.51E+01	15.43			1.51E+01	1.54E+01
	4	548.33	2.38E+01	20.27			2.38E+01	2.03E+01

Analysis Report for 1604147-02

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	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
	5	612.88	4.41E+01	37.68			4.41E+01	3.77E+01
M	6	765.13	1.19E+01	8.72			1.19E+01	8.72E+00
m	7	769.95	1.33E+01	14.34			1.33E+01	1.43E+01
m	8	810.15	9.21E+00	12.53			9.21E+00	1.25E+01
	9	836.24	1.30E+01	15.62			1.30E+01	1.56E+01
	10	843.80	2.37E+01	13.76			2.37E+01	1.38E+01
	11	851.64	2.38E+01	19.79			2.38E+01	1.98E+01
	12	870.06	9.08E+00	8.89			9.08E+00	8.89E+00
	13	904.31	1.05E+01	8.65			1.05E+01	8.65E+00
	14	912.49	2.40E+01	14.59	3.08E+00	5.24E+00	2.09E+01	1.55E+01
	15	977.13	1.17E+01	11.66			1.17E+01	1.17E+01
	16	1208.18	1.11E+01	12.69			1.11E+01	1.27E+01
	17	1260.03	9.32E+00	7.50			9.32E+00	7.50E+00
	18	1423.97	7.28E+00	6.95			7.28E+00	6.95E+00
	19	1461.46	1.04E+01	10.02			1.04E+01	1.00E+01
	20	1514.78	7.44E+00	6.95			7.44E+00	6.95E+00
	21	1788.40	7.00E+00	5.29			7.00E+00	5.29E+00
	22	1818.35	5.00E+00	4.47			5.00E+00	4.47E+00
	23	1865.19	8.82E+00	7.75			8.82E+00	7.75E+00
	24	2592.35	4.86E+00	6.63			4.86E+00	6.63E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.935	1460.81	*	10.67	1.42E-01	1.37E-01
CO-58	0.943	810.76	*	99.40	8.28E-03	1.13E-02
NB-95	0.933	765.79	*	99.81	1.02E-02	7.48E-03
RA-224	0.954	240.98	*	3.95	5.37E-01	3.33E-01

Analysis Report for 1604147-02

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* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

UNIDENTIFIED PEAKS

Peak Locate Performed on : 4/29/2016 10:08:14AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	2	253.75	9.29200E-03	50.05		
m	3	327.02	2.09312E-03	51.18		
	4	548.33	3.30969E-03	42.52		
	5	612.88	6.13017E-03	42.68		
m	7	769.95	1.84661E-03	53.94		
	9	836.24	1.80556E-03	60.08		
	10	843.80	3.28776E-03	29.06		
	11	851.64	3.30093E-03	41.64		
	12	870.06	1.26068E-03	48.96		
	13	904.31	1.46329E-03	41.03		
	14	912.49	2.90538E-03	37.06	Tol.	LU-172
	15	977.13	1.62037E-03	49.98		
	16	1208.18	1.53432E-03	57.41		
	17	1260.03	1.29419E-03	40.24	Tol.	I-135
	18	1423.97	1.01080E-03	47.72		
	20	1514.78	1.03395E-03	46.65		
	21	1788.40	9.72222E-04	37.80		
	22	1818.35	6.94444E-04	44.72		
	23	1865.19	1.22475E-03	43.92		
	24	2592.35	6.74603E-04	68.28		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 1604147-02
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NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.93	1460.81	*	10.67	1.42E-01	1.37E-01
CO-58	0.94	810.76	*	99.40	8.28E-03	1.13E-02
NB-95	0.93	765.79	*	99.81	1.02E-02	7.48E-03
RA-224	0.95	240.98	*	3.95	5.37E-01	3.33E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.935	1.42E-01	1.37E-01	
CO-58	0.943	8.28E-03	1.13E-02	
NB-95	0.933	1.02E-02	7.48E-03	
RA-224	0.954	5.37E-01	3.33E-01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1604147-02
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UNIDENTIFIED PEAKS

Peak Locate Performed on : 4/29/2016 10:08:14AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	2	253.75	9.29200E-03	50.05		
m	3	527.02	2.09312E-03	51.18		
	4	548.33	3.30969E-03	42.52		
	5	612.88	6.13017E-03	42.68		
m	7	769.95	1.84661E-03	53.94		
	9	836.24	1.80556E-03	60.08		
	10	843.80	3.28776E-03	29.06		
	11	851.64	3.30093E-03	41.64		
	12	870.06	1.26068E-03	48.96		
	13	904.31	1.46329E-03	41.03		
	14	912.49	2.90538E-03	37.06	Tol.	LU-172
	15	977.13	1.62037E-03	49.98		
	16	1208.18	1.53472E-03	57.41		
	17	1260.03	1.29419E-03	40.24	Tol.	I-135
	18	1423.97	1.01036E-03	47.72		
	20	1514.78	1.03395E-03	46.65		
	21	1788.40	9.72222E-04	37.80		
	22	1818.35	6.94444E-04	44.72		
	23	1865.19	1.22475E-03	43.92		
	24	2592.35	6.74603E-04	68.28		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\CR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

Analysis Report for 1604147-02

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	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	BE-7	477.59		10.42	-7.30E-02	1.62E-01	1.62E-01
+	NA-22	1274.54		99.94	-2.38E-04	2.37E-02	2.37E-02
+	NA-24	1368.53		99.99	1.27E-02	2.20E-02	3.09E-02
		2754.09		99.86	-2.37E-03		2.20E-02
+	AL-26	1808.65		99.76	7.79E-03	2.85E-02	2.85E-02
+	K-40	1460.81	*	10.67	1.42E-01	2.09E-01	2.09E-01
+	AR-41	1293.64		99.16	-1.97E-02	4.19E-02	4.19E-02
+	TI-44	67.88		94.40	-1.24E-02	1.23E-02	1.28E-02
		78.34		96.00	-3.12E-04		1.23E-02
+	SC-46	889.25		99.98	-1.21E-02	1.82E-02	1.82E-02
		1120.51		99.99	-2.67E-03		2.44E-02
+	V-48	983.52		99.98	-1.51E-03	1.59E-02	1.59E-02
		1312.10		97.50	-4.64E-03		2.18E-02
+	CR-51	320.08		9.83	-5.30E-02	1.63E-01	1.63E-01
+	MN-54	834.83		99.97	1.10E-02	2.42E-02	2.42E-02
+	CO-56	846.75		99.96	-1.63E-02	2.62E-02	2.62E-02
		1037.75		14.03	8.30E-03		1.76E-01
		1238.25		67.00	7.80E-04		3.46E-02
		1771.40		15.51	-4.52E-02		1.53E-01
		2598.48		16.90	-4.63E-02		1.52E-01
+	CO-57	122.06		85.51	-6.22E-03	1.12E-02	1.12E-02
		136.48		10.68	-5.39E-02		1.01E-01
+	CO-58	810.76	*	99.40	8.28E-03	4.58E-02	4.58E-02
+	FE-59	1099.22		56.50	2.71E-03	4.12E-02	4.12E-02
		1291.56		43.20	1.01E-02		6.15E-02
+	CO-60	1173.22		100.00	1.97E-02	2.72E-02	3.05E-02
		1332.49		100.00	1.58E-02		2.72E-02
+	ZN-65	1115.52		50.75	-5.69E-03	4.78E-02	4.78E-02
+	GA-67	93.31		35.70	8.78E-02	4.55E-02	4.55E-02
		208.95		2.24	1.61E-01		6.75E-01
		300.22		16.00	-4.45E-02		1.13E-01
+	SE-75	121.11		16.70	-1.22E-02	1.78E-02	3.82E-02
		136.00		59.20	-1.06E-02		1.78E-02
		264.65		59.80	2.29E-03		2.55E-02
		279.53		25.20	1.63E-02		6.06E-02
		400.65		11.40	-5.51E-02		1.46E-01
+	RB-82	776.52		13.00	-2.33E-02	1.81E-01	1.81E-01
+	RB-83	520.41		46.00	-1.54E-02	3.67E-02	3.67E-02
		529.64		30.30	2.29E-02		6.00E-02
		552.65		16.40	-1.72E-02		9.96E-02
+	KR-85	513.99		0.43	1.32E+01	7.92E+00	7.92E+00
+	SR-85	513.99		99.27	5.76E-02	3.46E-02	3.46E-02
+	Y-88	898.02		93.40	2.88E-03	2.09E-02	2.61E-02
		1836.01		99.38	-1.30E-03		2.09E-02
+	NB-93M	16.57		9.43	1.58E+01	2.86E+01	2.86E+01
+	NB-94	702.63		100.00	-7.10E-04	1.91E-02	2.39E-02
		871.10		100.00	-2.38E-03		1.91E-02

Analysis Report for 1604147-02

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	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	NB-95	765.79	*	99.81	1.02E-02	2.22E-02	2.22E-02
+	NB-95M	235.69		25.00	7.68E-03	6.51E-02	6.51E-02
+	ZR-95	724.18		43.70	4.83E-03	3.33E-02	5.61E-02
		756.72		55.30	-1.06E-02		3.33E-02
+	MO-99	181.06		6.20	-6.90E-02	1.79E-01	2.13E-01
		739.58		12.80	5.20E-02		1.79E-01
		778.00		4.50	1.08E-01		5.66E-01
+	RU-103	497.08		89.00	-8.92E-04	2.25E-02	2.25E-02
+	RU-106	621.84		9.80	-1.55E-02	1.95E-01	1.95E-01
+	AG-108M	433.93		89.90	5.57E-03	2.20E-02	2.20E-02
		614.37		90.40	-9.89E-04		2.61E-02
		722.95		90.50	-1.19E-02		2.48E-02
+	CD-109	88.03		3.72	1.09E-01	3.26E-01	3.26E-01
+	AG-110M	657.75		93.14	-8.08E-03	2.36E-02	2.36E-02
		677.61		10.53	7.17E-02		2.11E-01
		706.67		16.46	5.87E-02		1.51E-01
		763.93		21.98	8.50E-03		1.00E-01
		884.67		71.63	2.69E-03		2.87E-02
		1384.27		23.94	-4.62E-02		1.14E-01
+	CD-113M	263.70		0.02	-1.89E+01	6.53E+01	6.53E+01
+	SN-113	255.12		1.93	-8.16E-01	3.03E-02	7.53E-01
		391.69		64.90	2.04E-02		2.03E-02
+	TE123M	159.00		84.10	-3.04E-03	1.40E-02	1.40E-02
+	SB-124	602.71		97.87	7.06E-03	2.30E-02	2.30E-02
		645.85		7.26	-1.91E-02		3.10E-01
		722.78		11.10	-9.75E-02		2.03E-01
		1691.02		49.00	7.47E-03		5.27E-02
+	I-125	35.49		6.49	-3.95E-01	5.01E-01	5.01E-01
+	SB-125	176.33		6.89	6.41E-02	6.50E-02	1.91E-01
		427.89		29.33	-4.58E-03		6.50E-02
		463.38		10.35	1.74E-02		1.82E-01
		600.56		17.80	3.40E-02		1.27E-01
		635.90		11.32	-8.56E-03		1.83E-01
+	SB-126	414.70		83.30	4.43E-04	2.24E-02	2.24E-02
		666.33		99.60	-9.55E-03		2.36E-02
		695.00		99.60	8.33E-03		2.56E-02
		720.50		53.80	-6.24E-03		4.11E-02
+	SN-126	87.57		37.00	1.09E-02	3.28E-02	3.28E-02
+	SB-127	473.00		25.00	5.72E-03	5.69E-02	7.02E-02
		685.20		35.70	3.85E-03		5.69E-02
		783.80		14.70	3.98E-03		1.68E-01
+	I-129	29.78		57.00	4.94E-02	1.16E-01	1.16E-01
		33.60		13.20	1.44E-01		3.15E-01
		39.58		7.52	-9.27E-02		3.31E-01
+	I-131	284.30		6.05	-8.70E-02	2.07E-02	2.51E-01
		364.48		81.20	-7.74E-03		2.07E-02
		636.97		7.26	-1.31E-01		2.79E-01
		722.89		1.80	-6.04E-01		1.26E+00

Analysis Report for 1604147-02

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	TE-132	49.72	13.10	-1.68E-01	1.61E-02	1.34E-01
		228.16	88.00	-1.37E-02		1.61E-02
+	BA-133	81.00	33.00	-1.83E-02	3.27E-02	3.27E-02
		302.84	17.80	4.11E-02		1.02E-01
		356.01	60.00	3.52E-03		3.29E-02
+	I-133	529.87	86.30	8.50E-03	2.22E-02	2.22E-02
+	XE-133	81.00	38.00	-1.61E-02	2.86E-02	2.86E-02
+	CS-134	563.23	8.38	-1.05E-01	2.25E-02	2.53E-01
		569.32	15.43	6.95E-02		1.34E-01
		604.70	97.60	7.10E-03		2.48E-02
		795.84	85.40	-1.65E-03		2.25E-02
		801.93	8.73	1.20E-02		2.86E-01
+	CS-135	268.24	16.00	3.01E-02	9.96E-02	9.96E-02
+	I-135	1131.51	22.50	1.01E-02	9.33E-02	1.33E-01
		1260.41	28.60	2.33E-02		9.33E-02
		1678.03	9.54	4.01E-02		3.18E-01
+	CS-136	153.22	7.46	-5.20E-02	1.98E-02	1.52E-01
		163.89	4.61	6.48E-02		2.61E-01
		176.55	13.56	-4.35E-03		9.56E-02
		273.65	12.66	-3.63E-02		1.15E-01
		340.57	48.50	9.99E-03		3.93E-02
		818.50	99.70	-1.51E-03		1.98E-02
		1048.07	79.60	6.43E-03		3.07E-02
		1235.34	19.70	-1.89E-02		9.15E-02
+	CS-137	661.65	85.12	1.07E-02	2.99E-02	2.99E-02
+	LA-138	788.74	34.00	-1.17E-03	3.79E-02	6.29E-02
		1435.80	66.00	1.20E-02		3.79E-02
+	CE-139	165.85	80.35	3.54E-04	1.47E-02	1.47E-02
+	BA-140	162.64	6.70	1.59E-04	7.97E-02	1.79E-01
		304.84	4.50	1.29E-01		3.95E-01
		423.70	3.20	1.20E-01		5.73E-01
		437.55	2.00	-5.01E-02		9.42E-01
		537.32	25.00	1.25E-02		7.97E-02
+	LA-140	328.77	20.50	1.70E-02	2.73E-02	8.55E-02
		487.03	45.50	5.30E-03		4.38E-02
		815.85	23.50	2.30E-03		8.82E-02
		1596.49	95.49	-8.55E-03		2.73E-02
+	CE-141	145.44	48.40	-9.88E-03	2.23E-02	2.23E-02
+	CE-143	57.36	11.80	-3.96E-02	4.42E-02	1.32E-01
		293.26	42.00	-8.30E-03		4.42E-02
		664.55	5.20	-4.52E-03		1.97E-01
+	CE-144	133.54	10.80	-2.00E-03	9.80E-02	9.80E-02
+	PM-144	476.78	42.00	-7.43E-03	2.19E-02	4.05E-02
		618.01	98.60	6.13E-03		2.19E-02
		696.49	99.49	-2.36E-03		2.50E-02
+	PM-145	36.85	21.70	-2.69E-02	7.24E-02	1.40E-01
		37.36	39.70	-1.26E-02		7.24E-02
		42.30	15.10	-7.60E-02		1.32E-01
		72.40	2.31	-2.72E-01		5.27E-01

Analysis Report for 1604147-02

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	PM-146	453.90	39.94	-1.49E-02	4.49E-02	4.49E-02
		735.90	4.01	7.63E-02		1.58E-01
		747.13	13.10	-2.22E-02		1.53E-01
+	ND-147	91.11	28.90	3.62E-02	5.30E-02	5.30E-02
		531.02	13.10	-5.39E-02		1.25E-01
+	PM-149	285.90	3.10	-1.87E-01	5.03E-01	5.03E-01
+	EU-152	121.78	20.50	-2.59E-02	4.67E-02	4.67E-02
		244.69	5.40	-3.86E-01		2.44E-01
		344.27	19.13	-1.59E-02		9.56E-02
		778.89	9.20	1.19E-02		2.72E-01
		964.01	10.40	9.51E-03		2.44E-01
		1085.78	7.22	-1.03E-01		3.19E-01
		1112.02	9.60	-2.53E-01		2.03E-01
		1407.95	14.94	-4.43E-02		1.72E-01
+	GD-153	97.43	31.30	-3.96E-02	3.22E-02	3.22E-02
		103.18	22.20	4.47E-05		4.40E-02
+	EU-154	123.07	40.50	-1.18E-02	2.40E-02	2.40E-02
		723.30	19.70	-5.19E-02		1.14E-01
		873.19	11.50	-1.54E-02		1.61E-01
		996.32	10.30	3.49E-02		2.43E-01
		1004.76	17.90	-4.80E-02		1.41E-01
		1274.45	35.50	-6.69E-04		6.67E-02
+	EU-155	86.50	30.90	3.93E-03	3.83E-02	3.83E-02
		105.30	20.70	-1.78E-03		4.67E-02
+	EU-156	811.77	10.40	-2.09E-02	1.72E-01	2.03E-01
		1153.47	7.20	-1.17E-01		2.66E-01
		1230.71	8.90	-3.04E-02		1.72E-01
+	HO-166M	184.41	72.60	3.35E-02	2.37E-02	2.37E-02
		280.45	29.60	1.29E-02		5.17E-02
		410.94	11.10	2.54E-03		1.70E-01
		711.69	54.10	-9.78E-03		4.22E-02
+	TM-171	66.72	0.14	-1.37E+01	9.11E+00	9.11E+00
+	HF-172	81.75	4.52	-1.19E-01	9.47E-02	2.37E-01
		125.81	11.30	4.14E-02		9.47E-02
+	LU-172	181.53	20.60	-4.44E-02	3.96E-02	6.74E-02
		810.06	16.63	-5.61E-02		1.27E-01
		912.12	15.25	1.57E-01		1.87E-01
		1093.66	62.50	4.64E-03		3.96E-02
+	LU-173	100.72	5.24	-2.54E-02	7.00E-02	1.89E-01
		272.11	21.20	-1.45E-02		7.00E-02
+	HF-175	343.40	84.00	3.40E-03	2.24E-02	2.24E-02
+	LU-176	88.34	13.30	-2.20E-01	1.61E-02	9.00E-02
		201.83	86.00	-6.70E-03		1.61E-02
		306.78	94.00	2.52E-03		1.81E-02
+	TA-182	67.75	41.20	-2.85E-02	2.93E-02	2.93E-02
		1121.30	34.90	1.12E-04		6.99E-02
		1189.05	16.23	3.42E-02		1.53E-01
		1221.41	26.98	3.51E-02		8.49E-02
		1231.02	11.44	2.67E-02		1.46E-01

Analysis Report for 1604147-02

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	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	IR-192	308.46		29.68	-1.89E-02	3.57E-02	5.44E-02
		468.07		48.10	-1.34E-02		3.57E-02
+	HG-203	279.19		77.30	1.21E-02	2.07E-02	2.07E-02
+	BI-207	569.67		97.72	3.17E-03	2.03E-02	2.03E-02
		1063.62		74.90	5.73E-03		3.45E-02
+	TL-208	583.14		30.22	4.11E-02	7.22E-02	7.22E-02
		860.37		4.48	1.47E-01		4.82E-01
		2614.66		35.85	2.39E-02		8.96E-02
+	BI-210M	262.00		45.00	1.05E-02	3.49E-02	3.49E-02
		300.00		23.00	-3.05E-02		7.71E-02
+	PB-210	46.50		4.25	9.57E-01	5.36E-01	5.36E-01
+	PB-211	404.84		2.90	2.60E-01	6.73E-01	6.73E-01
		831.96		2.90	-9.45E-02		7.07E-01
+	BI-212	727.17		11.80	9.76E-02	2.14E-01	2.14E-01
		1620.62		2.75	5.73E-02		9.98E-01
+	PB-212	238.63		44.60	1.13E-02	3.70E-02	3.70E-02
		300.09		3.41	-2.06E-01		5.20E-01
+	BI-214	609.31		46.30	2.91E-02	5.65E-02	5.65E-02
		1120.29		15.10	-1.76E-02		1.61E-01
		1764.49		15.80	1.13E-03		1.77E-01
		2204.22		4.98	1.58E-01		3.51E-01
+	PB-214	295.21		19.19	6.33E-02	5.16E-02	9.86E-02
		351.92		37.19	7.83E-03		5.16E-02
+	RN-219	401.80		6.50	-2.38E-02	2.68E-01	2.68E-01
+	RA-223	323.87		3.88	-7.80E-02	4.22E-01	4.22E-01
+	RA-224	240.98	*	3.95	5.37E-01	5.20E-01	5.20E-01
+	RA-225	40.00		31.00	-2.20E-02	7.87E-02	7.87E-02
+	RA-226	186.21		3.28	7.42E-01	5.25E-01	5.25E-01
+	TH-227	50.10		8.40	-2.55E-01	1.40E-01	2.03E-01
		236.00		11.50	1.65E-02		1.40E-01
		256.20		6.30	-5.16E-02		2.42E-01
+	AC-228	338.32		11.40	1.71E-02	9.74E-02	1.53E-01
		911.07		27.70	6.37E-02		9.74E-02
		969.11		16.60	1.84E-04		1.37E-01
+	TH-230	48.44		16.90	1.27E-01	1.26E-01	1.26E-01
		62.85		4.60	2.63E-01		3.63E-01
		67.67		0.37	-3.17E+00		3.26E+00
+	PA-231	283.67		1.60	-3.26E-01	7.89E-01	9.41E-01
		302.67		2.30	3.18E-01		7.89E-01
+	TH-231	25.64		14.70	-9.65E-01	1.73E-01	8.77E-01
		84.21		6.40	-2.02E-02		1.73E-01
+	PA-233	311.98		38.60	6.96E-03	4.28E-02	4.28E-02
+	PA-234	131.20		20.40	-6.30E-04	5.17E-02	5.17E-02
		733.99		8.80	-4.18E-01		1.69E-01
		946.00		12.00	5.43E-02		1.95E-01
+	PA-234M	1001.03		0.92	7.42E-01	3.02E+00	3.02E+00
+	TH-234	63.29		3.80	2.79E-01	4.20E-01	4.20E-01

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	U-235	143.76	10.50	4.86E-02	1.11E-01	1.11E-01
		163.35	4.70	6.32E-02		2.55E-01
		205.31	4.79	7.19E-02		3.07E-01
+	NP-237	86.50	12.60	9.77E-03	9.40E-02	9.40E-02
+	NP-239	106.10	22.70	8.12E-03	4.45E-02	4.45E-02
		228.18	10.70	-9.69E-02		1.33E-01
		277.60	14.10	9.58E-02		1.18E-01
+	AM-241	59.54	35.90	-3.89E-03	4.22E-02	4.22E-02
+	AM-243	74.67	66.00	1.07E-02	1.98E-02	1.98E-02
+	CM-243	209.75	3.29	-4.55E-02	1.17E-01	4.39E-01
		228.14	10.60	-9.59E-02		1.32E-01
		277.60	14.00	9.46E-02		1.17E-01

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	BE-7	477.59		10.42	1.62E-01	1.62E-01	-7.30E-02	7.35E-02
	NA-22	1274.54		99.94	2.37E-02	2.37E-02	-2.38E-04	1.01E-02
	NA-24	1368.53		99.99	3.09E-02	2.20E-02	1.27E-02	1.34E-02
		2754.09		99.86	2.20E-02		-2.37E-03	7.78E-03
	AL-26	1808.65		99.76	2.85E-02	2.85E-02	7.79E-03	1.19E-02
+	K-40	1460.81	*	10.67	2.09E-01	2.09E-01	1.42E-01	8.61E-02
	AR-41	1293.64		99.16	4.19E-02	4.19E-02	-1.97E-02	1.77E-02
	TI-44	67.88		94.40	1.28E-02	1.23E-02	-1.24E-02	6.07E-03
		78.34		96.00	1.23E-02		-3.12E-04	5.85E-03
	SC-46	889.25		99.98	1.82E-02	1.82E-02	-1.21E-02	7.80E-03

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	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	SC-46	1120.51		99.99	2.44E-02	1.82E-02	-2.67E-03	1.06E-02
	V-48	983.52		99.98	1.59E-02	1.59E-02	-1.51E-03	6.51E-03
		1312.10		97.50	2.18E-02		-4.64E-03	9.05E-03
	CR-51	320.08		9.83	1.63E-01	1.63E-01	-5.30E-02	7.58E-02
	MN-54	834.83		99.97	2.42E-02	2.42E-02	1.10E-02	1.09E-02
	CO-56	846.75		99.96	2.62E-02	2.62E-02	-1.63E-02	1.18E-02
		1037.75		14.03	1.76E-01		8.30E-03	7.76E-02
		1238.25		67.00	3.46E-02		7.80E-04	1.47E-02
		1771.40		15.51	1.53E-01		-4.52E-02	6.18E-02
		2598.48		16.90	1.52E-01		-4.63E-02	5.88E-02
	CO-57	122.06		85.51	1.12E-02	1.12E-02	-6.22E-03	5.28E-03
		136.48		10.60	1.01E-01		-5.39E-02	4.77E-02
+	CO-58	810.76	*	99.40	4.58E-02	4.58E-02	8.28E-03	2.17E-02
	FE-59	1099.22		56.50	4.12E-02	4.12E-02	2.71E-03	1.78E-02
		1291.56		43.20	6.15E-02		1.01E-02	2.66E-02
	CO-60	1173.22		100.00	3.05E-02	2.72E-02	1.97E-02	1.36E-02
		1332.49		100.00	2.72E-02		1.58E-02	1.18E-02
	ZN-65	1115.52		50.75	4.78E-02	4.78E-02	-5.69E-03	2.08E-02
	GA-67	93.31		35.70	4.55E-02	4.55E-02	8.78E-02	2.20E-02
		208.95		2.24	6.75E-01		1.61E-01	3.20E-01
		300.22		16.00	1.13E-01		-4.45E-02	5.30E-02
	SE-75	121.11		16.70	5.82E-02	1.78E-02	-1.22E-02	2.74E-02
		136.00		59.10	1.78E-02		-1.06E-02	8.39E-03
		264.65		59.80	2.55E-02		2.29E-03	1.20E-02
		279.53		25.20	6.06E-02		1.63E-02	2.84E-02
		400.65		11.40	1.46E-01		-5.51E-02	6.70E-02
	RB-82	776.52		13.00	1.81E-01	1.81E-01	-2.33E-02	8.17E-02
	RB-83	520.41		46.00	3.67E-02	3.67E-02	-1.54E-02	1.66E-02
		529.64		30.30	6.00E-02		2.29E-02	2.72E-02
		552.65		16.40	9.96E-02		-1.72E-02	4.45E-02
	KR-85	513.99		0.43	7.92E+00	7.92E+00	1.32E+01	3.77E+00
	SR-85	513.99		99.27	3.46E-02	3.46E-02	5.76E-02	1.65E-02
	Y-88	898.02		93.40	2.61E-02	2.09E-02	2.88E-03	1.17E-02
		1836.01		99.38	2.09E-02		-1.30E-03	8.08E-03
	NB-93M	16.57		9.43	2.86E+01	2.86E+01	1.58E+01	1.39E+01
	NB-94	702.63		100.00	2.39E-02	1.91E-02	-7.10E-04	1.09E-02
		871.10		100.00	1.91E-02		-2.38E-03	8.27E-03
+	NB-95	765.79	*	99.81	2.22E-02	2.22E-02	1.02E-02	9.92E-03
	NB-95M	235.69		25.00	6.51E-02	6.51E-02	7.68E-03	3.08E-02
	ZR-95	724.18		43.70	5.61E-02	3.33E-02	4.83E-03	2.55E-02
		756.72		55.30	3.33E-02		-1.06E-02	1.46E-02
	MO-99	181.06		6.20	2.13E-01	1.79E-01	-6.90E-02	1.01E-01
		739.58		12.80	1.79E-01		5.20E-02	8.07E-02
		778.00		4.50	5.66E-01		1.08E-01	2.56E-01
	RU-103	497.08		89.00	2.25E-02	2.25E-02	-8.92E-04	1.04E-02
	RU-106	621.84		9.80	1.95E-01	1.95E-01	-1.55E-02	8.76E-02
	AG-108M	433.93		89.90	2.20E-02	2.20E-02	5.57E-03	1.02E-02
		614.37		90.40	2.61E-02		-9.89E-04	1.20E-02
		722.95		90.50	2.48E-02		-1.19E-02	1.12E-02
	CD-109	88.03		3.72	3.26E-01	3.26E-01	1.09E-01	1.56E-01
	AG-110M	657.75		93.14	2.36E-02	2.36E-02	-8.08E-03	1.07E-02
		677.61		10.53	2.11E-01		7.17E-02	9.56E-02
		706.67		16.46	1.51E-01		5.87E-02	6.91E-02

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Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
AG-110M	763.93	21.98	1.00E-01	2.36E-02	3.50E-03	4.49E-02
	884.67	71.63	2.87E-02		2.69E-03	1.25E-02
	1384.27	23.94	1.14E-01		-4.62E-02	4.89E-02
CD-113M	263.70	0.02	6.53E+01	6.53E+01	-1.89E+01	3.06E+01
SN-113	255.12	1.93	7.53E-01	3.03E-02	-8.16E-01	3.53E-01
	391.69	64.90	3.03E-02		2.04E-02	1.41E-02
TE123M	159.00	84.10	1.40E-02	1.40E-02	-3.04E-03	6.62E-03
SB-124	602.71	97.87	2.30E-02	2.30E-02	7.06E-03	1.05E-02
	645.85	7.26	3.10E-01		-1.91E-02	1.41E-01
	722.78	11.10	2.03E-01		-9.75E-02	9.14E-02
	1691.02	49.00	5.27E-02		7.47E-03	2.18E-02
I-125	35.49	6.49	5.01E-01	5.01E-01	-3.95E-01	2.39E-01
SB-125	176.33	6.89	1.91E-01	6.50E-02	6.41E-02	9.07E-02
	427.89	29.33	6.50E-02		-4.58E-03	3.02E-02
	463.38	10.35	1.82E-01		1.74E-02	8.37E-02
	600.56	17.80	1.27E-01		3.40E-02	5.83E-02
	635.90	11.32	1.83E-01		-8.56E-03	8.28E-02
SB-126	414.70	83.30	2.24E-02	2.24E-02	4.43E-04	1.04E-02
	666.33	99.60	2.36E-02		-9.55E-03	1.08E-02
	695.00	99.60	2.56E-02		8.33E-03	1.17E-02
	720.50	53.80	4.11E-02		-6.24E-03	1.85E-02
SN-126	87.57	37.00	3.28E-02	3.28E-02	1.09E-02	1.57E-02
SB-127	473.00	25.00	7.02E-02	5.69E-02	5.72E-03	3.20E-02
	685.20	35.70	5.69E-02		3.85E-03	2.55E-02
	783.80	14.70	1.68E-01		3.98E-03	7.61E-02
I-129	29.78	57.00	1.16E-01	1.16E-01	4.94E-02	5.55E-02
	33.60	13.20	3.15E-01		1.44E-01	1.50E-01
	39.58	7.52	3.31E-01		-9.27E-02	1.58E-01
I-131	284.30	6.05	2.51E-01	2.07E-02	-8.70E-02	1.17E-01
	364.48	81.20	2.07E-02		-7.74E-03	9.63E-03
	636.97	7.26	2.79E-01		-1.31E-01	1.26E-01
	722.89	1.80	1.26E+00		-6.04E-01	5.66E-01
TE-132	49.72	13.10	1.34E-01	1.61E-02	-1.68E-01	6.39E-02
	228.16	88.00	1.61E-02		-1.17E-02	7.56E-03
BA-133	81.00	33.00	3.27E-02	3.27E-02	-1.83E-02	1.55E-02
	302.84	17.80	1.02E-01		4.11E-02	4.81E-02
	356.01	60.00	3.29E-02		3.52E-03	1.55E-02
I-133	529.87	86.30	2.22E-02	2.22E-02	8.50E-03	1.01E-02
XE-133	81.00	38.00	2.86E-02	2.86E-02	-1.61E-02	1.36E-02
CS-134	563.23	8.38	2.53E-01	2.25E-02	-1.05E-01	1.16E-01
	569.32	15.43	1.34E-01		6.95E-02	6.11E-02
	604.70	97.60	2.48E-02		7.10E-03	1.14E-02
	795.84	85.40	2.25E-02		-1.65E-03	9.88E-03
	801.93	8.73	2.86E-01		1.20E-02	1.29E-01
CS-135	268.24	16.00	9.96E-02	9.96E-02	3.01E-02	4.69E-02
I-135	1131.51	22.50	1.33E-01	9.33E-02	1.01E-02	5.80E-02
	1260.41	28.60	9.33E-02		2.33E-02	3.94E-02
	1678.03	9.54	3.18E-01		4.01E-02	1.32E-01
CS-136	153.22	7.46	1.52E-01	1.98E-02	-5.20E-02	7.18E-02
	163.89	4.61	2.61E-01		6.48E-02	1.23E-01
	176.55	13.56	9.56E-02		-4.35E-03	4.53E-02
	273.65	12.66	1.15E-01		-3.63E-02	5.38E-02
	340.57	48.50	3.93E-02		9.99E-03	1.85E-02

Analysis Report for 1604147-02

BLANK

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
CS-136	818.50	99.70	1.98E-02	1.98E-02	-1.51E-03	8.70E-03
	1048.07	79.60	3.07E-02		6.43E-03	1.34E-02
	1235.34	19.70	9.15E-02		-1.89E-02	3.70E-02
CS-137	661.65	85.12	2.99E-02	2.99E-02	1.07E-02	1.37E-02
LA-138	788.74	34.00	6.29E-02	3.79E-02	-1.17E-03	2.80E-02
	1435.80	66.00	3.79E-02		1.20E-02	1.60E-02
CE-139	165.85	80.35	1.47E-02	1.47E-02	3.54E-04	6.93E-03
BA-140	162.64	6.70	1.79E-01	7.97E-02	1.59E-04	8.45E-02
	304.84	4.50	3.95E-01		1.29E-01	1.86E-01
	423.70	3.20	5.73E-01		1.20E-01	2.65E-01
	437.55	2.00	9.42E-01		-5.01E-02	4.36E-01
	537.32	25.00	7.97E-02		1.25E-02	3.64E-02
LA-140	328.77	20.50	8.55E-02	2.73E-02	1.70E-02	4.01E-02
	487.03	45.50	4.38E-02		5.30E-03	2.02E-02
	815.85	23.50	8.82E-02		2.30E-03	3.89E-02
	1596.49	95.49	2.73E-02		-8.55E-03	1.14E-02
CE-141	145.44	48.40	2.23E-02	2.23E-02	-9.88E-03	1.05E-02
CE-143	57.36	11.80	1.32E-01	4.42E-02	-3.96E-02	6.30E-02
	293.26	42.00	4.42E-02		-8.30E-03	2.09E-02
	664.55	5.20	4.97E-01		-4.52E-03	2.28E-01
CE-144	133.54	10.80	9.80E-02	9.80E-02	-2.00E-03	4.63E-02
PM-144	476.78	42.00	4.05E-02	2.19E-02	-7.43E-03	1.85E-02
	618.01	98.60	2.19E-02		6.13E-03	1.00E-02
	696.49	99.49	2.50E-02		-2.36E-03	1.14E-02
PM-145	36.85	21.70	1.40E-01	7.24E-02	-2.69E-02	6.66E-02
	37.36	39.70	7.24E-02		-1.26E-02	3.45E-02
	42.30	15.10	1.32E-01		-7.60E-02	6.25E-02
	72.40	2.31	5.27E-01		-2.72E-01	2.52E-01
PM-146	453.90	39.94	4.49E-02	4.49E-02	-1.49E-02	2.06E-02
	735.90	14.01	1.58E-01		7.63E-02	7.09E-02
	747.13	13.10	1.53E-01		-2.22E-02	6.78E-02
ND-147	91.11	28.90	5.30E-02	5.30E-02	3.62E-02	2.56E-02
	531.02	13.10	1.25E-01		-5.39E-02	5.62E-02
PM-149	285.90	3.10	5.03E-01	5.03E-01	-1.87E-01	2.35E-01
EU-152	121.78	20.50	4.67E-02	4.67E-02	-2.59E-02	2.20E-02
	244.69	5.40	2.44E-01		-3.86E-01	1.14E-01
	344.27	19.13	9.56E-02		-1.59E-02	4.48E-02
	778.89	9.20	2.72E-01		1.19E-02	1.23E-01
	964.01	10.40	2.44E-01		9.51E-03	1.09E-01
	1085.78	7.22	3.19E-01		-1.03E-01	1.38E-01
	1112.02	9.60	2.03E-01		-2.53E-01	8.49E-02
	1407.95	14.94	1.72E-01		-4.43E-02	7.30E-02
GD-153	97.43	31.30	3.22E-02	3.22E-02	-3.96E-02	1.53E-02
	103.18	22.20	4.40E-02		3.47E-05	2.08E-02
EU-154	123.07	40.50	2.40E-02	2.40E-02	-1.18E-02	1.13E-02
	723.30	19.70	1.14E-01		-5.49E-02	5.15E-02
	873.19	11.50	1.61E-01		-1.54E-02	6.95E-02
	996.32	10.30	2.43E-01		3.49E-02	1.08E-01
	1004.76	17.90	1.41E-01		-4.80E-02	6.24E-02
	1274.45	35.50	6.67E-02		-6.69E-04	2.84E-02
EU-155	86.50	30.90	3.83E-02	3.83E-02	3.98E-03	1.83E-02
	105.30	20.70	4.67E-02		-1.98E-03	2.20E-02
EU-156	811.77	10.40	2.03E-01	1.72E-01	-2.09E-02	8.98E-02

Analysis Report for 1604147-02

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Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
EU-156	1153.47	7.20	2.66E-01	1.72E-01	-1.17E-01	1.10E-01
	1230.71	8.90	1.72E-01		-3.04E-02	6.66E-02
HO-166M	184.41	72.60	2.37E-02	2.37E-02	-3.35E-02	1.14E-02
	280.45	29.60	5.17E-02		1.29E-02	2.42E-02
	410.94	11.10	1.70E-01		2.54E-03	7.90E-02
	711.69	54.10	4.22E-02		-9.78E-03	1.91E-02
TM-171	66.72	0.14	9.11E+00	9.11E+00	-1.37E+01	4.35E+00
HF-172	81.75	4.52	2.37E-01	9.47E-02	-1.19E-01	1.13E-01
	125.81	11.30	9.47E-02		4.14E-02	4.48E-02
LU-172	181.53	20.60	6.74E-02	3.96E-02	-4.44E-02	3.20E-02
	810.06	16.63	1.27E-01		-5.61E-02	5.62E-02
	912.12	15.25	1.87E-01		1.57E-01	8.45E-02
	1093.66	62.50	3.96E-02		4.64E-03	1.73E-02
LU-173	100.72	5.24	1.89E-01	7.00E-02	-2.54E-02	8.95E-02
	272.11	21.20	7.00E-02		-1.45E-02	3.28E-02
HF-175	343.40	84.00	2.24E-02	2.24E-02	3.40E-03	1.05E-02
LU-176	88.34	13.30	9.00E-02	1.61E-02	-2.20E-01	4.30E-02
	201.83	86.00	1.61E-02		-6.70E-03	7.62E-03
	306.78	94.00	1.81E-02		2.52E-03	8.49E-03
TA-182	67.75	41.20	2.93E-02	2.93E-02	-2.85E-02	1.39E-02
	1121.30	34.90	6.99E-02		1.12E-04	3.04E-02
	1189.05	16.23	1.53E-01		3.42E-02	6.62E-02
	1221.41	26.98	8.49E-02		3.51E-02	3.61E-02
	1231.02	11.44	1.46E-01		2.67E-02	5.78E-02
IR-192	308.46	29.68	5.44E-02	3.57E-02	-1.89E-02	2.54E-02
	468.07	48.10	3.57E-02		-1.34E-02	1.63E-02
HG-203	279.19	77.30	2.07E-02	2.07E-02	1.21E-02	9.74E-03
BI-207	569.67	97.72	2.03E-02	2.03E-02	3.17E-03	9.26E-03
	1063.62	74.90	3.45E-02		5.73E-03	1.52E-02
TL-208	583.14	30.22	7.22E-02	7.22E-02	4.11E-02	3.31E-02
	860.37	4.48	4.82E-01		1.47E-01	2.13E-01
	2614.66	35.85	8.96E-02		2.39E-02	3.67E-02
BI-210M	262.00	45.00	3.49E-02	3.49E-02	1.05E-02	1.64E-02
	300.00	23.00	7.71E-02		-3.05E-02	3.63E-02
PB-210	46.50	4.25	5.36E-01	5.36E-01	9.57E-01	2.58E-01
PB-211	404.84	2.90	6.73E-01	6.73E-01	2.60E-01	3.14E-01
	831.96	2.90	7.07E-01		-9.45E-02	3.11E-01
BI-212	727.17	11.80	2.14E-01	2.14E-01	9.76E-02	9.75E-02
	1620.62	2.75	9.98E-01		5.73E-02	4.21E-01
PB-212	238.63	44.60	3.70E-02	3.70E-02	1.13E-02	1.75E-02
	300.09	3.41	5.20E-01		-2.06E-01	2.45E-01
BI-214	609.31	46.30	5.65E-02	5.65E-02	2.91E-02	2.62E-02
	1120.29	15.10	1.61E-01		-1.76E-02	7.01E-02
	1764.49	15.80	1.77E-01		1.18E-03	7.41E-02
	2204.22	4.98	5.51E-01		1.58E-01	2.23E-01
PB-214	295.21	19.19	9.86E-02	5.16E-02	6.33E-02	4.66E-02
	351.92	37.19	5.16E-02		7.83E-03	2.42E-02
RN-219	401.80	6.50	2.68E-01	2.68E-01	-2.38E-02	1.24E-01
RA-223	323.87	3.88	4.22E-01	4.22E-01	-7.80E-02	1.97E-01
+ RA-224	240.98	3.95	5.20E-01	5.20E-01	5.37E-01	2.49E-01
RA-225	40.00	31.00	7.87E-02	7.87E-02	-2.20E-02	3.75E-02
RA-226	186.21	3.28	5.25E-01	5.25E-01	7.42E-01	2.52E-01
TH-227	50.10	8.40	2.03E-01	1.40E-01	-2.55E-01	9.71E-02

Analysis Report for 1604147-02

BLANK

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
TH-227	236.00	11.50	1.40E-01	1.40E-01	1.65E-02	6.62E-02
	256.20	6.30	2.42E-01		-5.16E-02	1.14E-01
AC-223	338.32	11.40	1.53E-01	9.74E-02	1.71E-02	7.15E-02
	911.07	27.70	9.74E-02		6.37E-02	4.39E-02
	969.11	16.60	1.37E-01		1.84E-04	6.01E-02
TH-230	48.44	16.90	1.26E-01	1.26E-01	1.27E-01	6.08E-02
	62.85	4.60	3.63E-01		2.63E-01	1.75E-01
	67.67	0.37	3.26E+00		-3.17E+00	1.55E+00
PA-231	283.67	1.60	9.41E-01	7.89E-01	-3.26E-01	4.40E-01
	302.67	2.30	7.89E-01		3.18E-01	3.72E-01
TH-231	25.64	14.70	8.77E-01	1.73E-01	-9.65E-01	4.21E-01
	84.21	6.40	1.73E-01		-2.02E-02	8.23E-02
PA-233	311.98	38.60	4.28E-02	4.28E-02	6.96E-03	2.00E-02
PA-234	131.20	20.40	5.17E-02	5.17E-02	-6.30E-04	2.44E-02
	733.99	8.80	1.69E-01		-4.18E-01	7.19E-02
	946.00	12.00	1.95E-01		5.43E-02	8.62E-02
PA-234M	1001.03	0.92	3.02E+00	3.02E+00	7.42E-01	1.35E+00
TH-234	63.29	3.80	4.20E-01	4.20E-01	2.79E-01	2.02E-01
U-235	143.76	10.50	1.11E-01	1.11E-01	4.88E-02	5.27E-02
	163.35	4.70	2.55E-01		6.32E-02	1.20E-01
	205.31	4.70	3.07E-01		7.19E-02	1.45E-01
NP-237	86.50	12.60	9.40E-02	9.40E-02	9.77E-03	4.49E-02
NP-239	106.10	22.70	4.45E-02	4.45E-02	8.12E-03	2.11E-02
	229.18	10.70	1.33E-01		-9.69E-02	6.25E-02
	277.60	14.10	1.18E-01		9.58E-02	5.58E-02
AM-241	59.54	35.90	4.22E-02	4.22E-02	-3.89E-03	2.02E-02
AM-243	74.67	66.00	1.98E-02	1.98E-02	1.07E-02	9.49E-03
CM-243	209.75	3.29	4.39E-01	1.17E-01	-4.55E-02	2.08E-01
	228.14	10.60	1.32E-01		-9.59E-02	6.19E-02
	277.60	14.00	1.17E-01		9.46E-02	5.51E-02

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

No Action Level results available for reporting purposes.

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

Analysis Report for 1604147-02

BLANK

No Data Review Comments Entered.

****
***** SPECTRAL DATA REPORT *****
****

Sample Title: BLANK

Elapsed Live time: 7200
Elapsed Real Time: 7359

Channel								
1:	0	0	0	0	0	0	0	0
9:	1	168	223	155	97	91	98	83
17:	90	78	52	58	54	58	76	48
25:	36	49	27	38	42	29	34	35
33:	32	28	37	26	21	20	37	32
41:	23	23	36	13	19	27	96	51
49:	25	22	24	30	19	27	25	30
57:	26	22	35	50	46	26	45	78
65:	45	27	27	17	33	31	33	16
73:	34	27	38	41	36	35	27	22
81:	26	20	28	26	29	23	32	29
89:	34	37	25	32	132	85	24	15
97:	27	21	21	25	19	20	19	27
105:	15	19	17	24	16	20	28	12
113:	16	23	17	21	21	22	20	19
121:	13	24	14	17	31	26	23	20
129:	20	11	22	19	28	18	20	14
137:	23	21	21	31	22	17	27	30
145:	20	19	13	12	26	21	21	12
153:	24	12	29	26	19	27	17	22
161:	17	23	14	30	16	17	23	9
169:	17	21	21	15	19	22	23	23
177:	24	21	17	24	22	21	21	31
185:	20	59	55	18	13	19	14	17
193:	16	16	16	14	12	16	18	22
201:	9	10	22	11	11	23	17	15
209:	9	16	10	24	15	19	11	14
217:	13	16	21	16	19	12	11	22
225:	17	11	7	10	14	10	17	18
233:	17	15	13	9	13	16	27	25
241:	16	8	15	13	8	9	4	11
249:	16	20	23	9	15	18	6	10
257:	9	11	17	14	10	7	12	10
265:	18	6	16	12	10	14	11	7
273:	10	8	13	11	9	17	6	11
281:	20	8	3	9	5	12	13	15
289:	14	9	12	13	13	11	19	19
297:	14	17	9	12	11	14	13	14
305:	12	17	9	8	8	11	11	6
313:	11	12	13	9	11	7	10	11
321:	8	6	11	15	7	10	9	11
329:	10	10	10	14	9	7	6	11
337:	6	9	17	16	5	11	10	15
345:	10	13	11	6	9	8	9	17
353:	21	12	4	13	11	9	13	10
361:	10	9	8	5	13	8	7	6

369:	9	11	10	9	3	10	10	7

Sample Title: BLANK

Channel								
377:	12	3	9	4	3	7	7	9
385:	12	7	6	4	9	9	14	11
393:	8	7	11	6	7	4	11	2
401:	6	10	6	7	9	11	8	13
409:	11	8	7	8	3	8	4	11
417:	10	11	8	8	5	4	11	6
425:	5	10	10	4	5	10	11	7
433:	9	10	4	8	9	7	6	14
441:	3	6	6	9	7	9	5	9
449:	8	8	7	4	8	5	6	4
457:	9	6	9	6	5	6	9	9
465:	4	7	5	5	6	9	1	4
473:	7	6	4	6	5	4	5	5
481:	5	7	7	6	11	5	7	5
489:	5	8	3	8	8	4	6	4
497:	4	11	9	8	4	7	7	4
505:	6	3	4	4	1	18	39	36
513:	28	18	6	5	5	5	3	6
521:	3	4	3	6	6	5	9	4
529:	7	4	3	5	1	2	2	7
537:	9	3	5	11	6	8	5	4
545:	3	7	10	4	9	5	3	4
553:	2	2	4	4	4	8	10	4
561:	7	11	6	5	3	5	9	5
569:	3	6	6	4	2	3	6	5
577:	4	1	2	4	8	5	3	10
585:	10	1	3	6	4	6	5	5
593:	4	4	10	5	6	3	6	6
601:	3	8	9	7	4	4	5	11
609:	6	12	16	2	5	5	1	8
617:	7	4	6	2	8	0	6	2
625:	3	4	5	3	8	3	5	8
633:	4	6	5	5	6	4	1	2
641:	5	7	6	4	4	9	3	7
649:	3	4	6	0	1	3	4	4
657:	5	2	4	9	5	13	7	2
665:	5	7	4	4	8	5	6	5
673:	6	3	3	5	3	6	5	5
681:	5	4	0	4	5	1	2	9
689:	2	1	6	6	5	7	6	8
697:	8	3	4	6	6	3	2	4
705:	6	8	6	7	2	5	7	2
713:	7	6	2	5	4	4	5	1
721:	4	4	6	5	6	3	7	8
729:	4	4	1	3	4	0	1	1
737:	1	11	9	2	2	2	5	4
745:	2	0	3	2	6	4	3	4
753:	5	3	2	0	3	3	4	2
761:	3	2	1	1	7	3	8	3
769:	4	8	3	1	3	6	1	4
777:	7	3	4	5	8	1	5	5
785:	5	2	4	5	3	3	3	2
793:	2	2	2	4	1	4	2	4

801: 2 1 9 6 6 [illegible] [illegible] 1

Sample Title: BLANK

Channel								
809:	2	6	2	2	1	5	2	6
817:	0	3	2	2	2	0	5	5
825:	1	3	3	3	2	2	2	2
833:	4	2	4	4	8	2	3	1
841:	2	6	7	8	5	3	1	1
849:	6	6	8	6	5	3	6	1
857:	1	2	3	4	1	6	2	1
865:	3	2	1	0	6	2	4	0
873:	0	2	1	4	3	2	3	1
881:	1	4	3	4	3	0	1	3
889:	1	2	3	2	5	2	3	5
897:	3	2	5	4	1	1	4	4
905:	5	0	1	1	3	2	5	7
913:	7	3	4	1	1	5	2	4
921:	1	2	4	5	1	1	1	3
929:	3	3	4	3	2	1	1	4
937:	3	1	0	3	0	3	2	2
945:	5	4	2	3	1	1	3	5
953:	3	5	4	1	2	3	3	5
961:	4	3	5	5	2	2	1	2
969:	3	6	1	2	2	1	2	5
977:	4	3	1	0	0	1	0	3
985:	2	1	3	2	2	1	0	1
993:	2	3	2	2	5	4	2	4
1001:	4	3	5	3	2	2	3	2
1009:	2	6	3	0	7	2	1	1
1017:	1	1	2	1	2	2	0	1
1025:	0	3	1	0	2	3	1	0
1033:	5	2	4	1	2	2	2	3
1041:	4	3	0	3	3	2	2	1
1049:	3	3	3	4	0	0	1	2
1057:	4	1	2	3	7	1	1	3
1065:	4	0	3	2	0	0	2	3
1073:	0	1	0	2	1	2	3	0
1081:	4	3	1	3	3	2	0	3
1089:	2	3	2	3	1	2	1	4
1097:	0	3	1	4	0	2	1	3
1105:	2	3	3	5	0	1	3	0
1113:	3	0	2	7	2	1	3	3
1121:	3	2	1	2	0	1	2	1
1129:	2	4	2	3	2	2	0	5
1137:	0	3	2	1	2	0	3	2
1145:	1	2	3	4	2	1	2	0
1153:	2	0	2	1	1	2	2	1
1161:	3	2	1	3	2	3	1	1
1169:	2	1	2	1	8	7	3	1
1177:	0	1	5	1	3	0	2	3
1185:	1	4	2	0	2	3	3	0
1193:	1	1	3	2	2	0	2	1
1201:	1	1	2	0	0	2	6	5
1209:	1	4	0	1	1	1	1	0
1217:	1	0	2	1	4	0	1	3
1225:	1	0	0	2	1	1	0	0

1233:	0	1	1	0	0	4	4	2

Sample Title: BLANK

Channel								
1241:	0	2	3	1	1	3	1	1
1249:	4	4	1	1	3	0	0	1
1257:	1	1	2	2	4	0	0	1
1265:	1	4	0	1	0	1	1	1
1273:	1	1	0	3	2	1	2	2
1281:	0	1	1	0	2	1	5	1
1289:	0	2	1	0	1	1	3	1
1297:	1	2	1	1	3	1	3	2
1305:	0	2	0	2	0	0	0	2
1313:	1	1	1	1	2	1	2	1
1321:	0	1	1	2	1	0	0	1
1329:	0	1	3	2	2	4	1	0
1337:	1	0	1	1	1	0	2	1
1345:	0	1	1	1	1	1	0	0
1353:	1	2	3	1	0	2	0	0
1361:	2	1	1	0	2	2	3	3
1369:	1	2	0	2	0	1	2	4
1377:	0	2	2	3	3	0	1	0
1385:	3	1	2	0	2	3	2	2
1393:	3	1	1	1	2	0	1	1
1401:	0	3	1	1	2	1	1	0
1409:	1	1	2	2	2	1	1	1
1417:	1	0	1	0	2	0	2	2
1425:	3	0	0	2	0	1	2	1
1433:	2	1	1	1	1	0	1	0
1441:	1	0	0	2	0	0	0	0
1449:	1	2	1	1	2	1	2	0
1457:	2	1	0	2	4	5	1	0
1465:	0	0	0	1	0	0	4	1
1473:	0	1	1	1	0	1	1	0
1481:	0	1	1	1	0	1	0	0
1489:	1	1	0	0	1	0	0	1
1497:	0	0	1	2	0	1	0	4
1505:	0	0	0	2	0	0	1	0
1513:	1	3	3	1	0	0	1	1
1521:	1	2	2	3	2	1	3	0
1529:	1	1	2	1	0	0	1	1
1537:	0	1	0	1	4	2	2	1
1545:	0	2	3	1	2	0	2	1
1553:	0	0	1	0	0	0	0	3
1561:	1	0	1	1	0	1	1	1
1569:	0	0	0	0	3	2	0	0
1577:	1	1	0	3	2	0	1	1
1585:	1	1	0	0	2	3	3	0
1593:	2	1	1	2	0	1	2	0
1601:	0	1	0	2	1	3	0	2
1609:	0	1	1	0	1	1	0	0
1617:	0	1	3	2	0	2	2	0
1625:	3	0	1	2	0	1	1	3
1633:	1	1	1	2	5	1	1	1
1641:	3	0	0	1	3	0	1	3
1649:	1	0	2	0	1	2	0	0
1657:	0	2	0	0	2	2	0	1

1665:	0	3	1	1	1	0	1	0

Sample Title: BLANK

Channel								
1673:	0	0	3	1	1	1	0	2
1681:	0	0	1	1	1	1	1	2
1689:	0	0	1	1	0	2	1	1
1697:	0	0	1	0	0	1	2	1
1705:	1	1	0	1	0	0	0	0
1713:	2	1	0	1	1	1	3	0
1721:	0	0	1	1	0	1	0	2
1729:	3	1	2	0	4	0	0	0
1737:	4	1	0	1	1	1	1	3
1745:	0	0	0	1	1	0	0	0
1753:	0	1	1	2	1	3	0	0
1761:	1	1	1	2	0	3	1	0
1769:	0	1	1	2	0	0	1	0
1777:	1	1	2	2	0	2	0	0
1785:	0	1	2	1	3	0	0	0
1793:	1	0	0	0	0	0	2	0
1801:	1	0	3	1	2	1	2	0
1809:	1	0	1	1	0	0	0	0
1817:	2	2	1	0	0	0	2	0
1825:	0	0	1	0	2	0	0	0
1833:	1	0	0	1	1	0	1	0
1841:	1	0	1	1	1	0	0	1
1849:	1	2	0	1	0	0	0	0
1857:	0	0	0	1	0	0	1	4
1865:	1	4	0	0	0	0	0	0
1873:	0	0	1	1	2	1	1	1
1881:	0	1	1	1	0	1	1	2
1889:	0	1	1	0	1	0	0	0
1897:	2	1	0	0	2	0	2	0
1905:	0	2	0	0	1	1	0	0
1913:	0	1	1	0	2	0	0	3
1921:	0	1	2	0	1	1	2	2
1929:	0	0	0	0	0	1	2	1
1937:	1	1	0	2	1	2	0	1
1945:	2	1	1	0	0	2	1	1
1953:	0	1	0	0	1	2	2	1
1961:	1	1	0	0	0	0	1	0
1969:	1	0	0	0	1	0	2	1
1977:	0	1	1	1	0	1	0	1
1985:	0	0	0	1	0	0	1	0
1993:	1	0	1	0	1	0	1	0
2001:	0	0	2	0	0	0	0	0
2009:	1	0	2	0	0	1	1	0
2017:	0	2	0	1	2	1	0	2
2025:	2	0	1	0	0	0	1	0
2033:	2	1	0	1	0	0	0	2
2041:	1	0	2	0	1	1	0	0
2049:	1	0	1	0	1	1	1	1
2057:	0	0	0	1	1	1	1	0
2065:	0	0	0	0	1	2	0	0
2073:	1	0	0	0	0	0	0	2
2081:	1	1	0	0	1	1	1	1
2089:	0	0	0	0	0	0	1	0

2097:	0	0	1	1	1	0	2	0

Sample Title: BLANK

Channel								
2105:	2	0	1	1	0	0	0	0
2113:	0	0	0	1	0	0	1	0
2121:	0	0	1	0	0	0	0	0
2129:	0	0	0	1	1	1	0	1
2137:	0	0	2	0	1	1	1	0
2145:	0	0	1	0	0	1	0	0
2153:	0	0	0	1	2	0	0	2
2161:	0	0	1	0	0	0	0	1
2169:	0	0	1	1	0	0	1	0
2177:	0	0	1	0	1	0	0	1
2185:	1	1	2	0	1	0	0	0
2193:	2	0	0	0	0	0	0	2
2201:	1	0	0	1	0	1	0	1
2209:	0	0	1	0	3	0	1	0
2217:	0	1	0	0	1	3	0	1
2225:	0	0	1	0	0	0	0	0
2233:	0	0	1	0	0	0	0	1
2241:	0	1	2	0	0	1	0	0
2249:	2	1	0	0	0	0	0	0
2257:	0	0	0	0	0	2	1	0
2265:	0	0	0	1	0	1	2	0
2273:	0	0	1	0	2	0	0	0
2281:	1	0	0	1	0	0	1	0
2289:	1	0	2	0	0	0	0	0
2297:	0	0	2	1	0	1	0	0
2305:	0	0	2	0	0	0	0	0
2313:	1	0	2	0	0	1	0	1
2321:	0	1	0	0	0	2	0	0
2329:	0	2	1	2	0	0	1	0
2337:	0	0	0	1	0	0	1	1
2345:	0	0	1	1	1	0	1	1
2353:	1	1	0	1	0	0	1	1
2361:	0	1	0	0	0	2	0	0
2369:	0	1	0	2	1	1	0	1
2377:	0	1	0	0	0	0	0	0
2385:	0	0	1	0	0	1	0	0
2393:	1	0	1	0	0	0	0	0
2401:	1	0	0	0	1	0	0	0
2409:	0	0	0	2	0	1	1	0
2417:	1	1	1	1	1	0	0	0
2425:	0	1	0	2	2	0	0	1
2433:	2	0	0	1	0	0	0	0
2441:	0	0	0	0	0	1	0	0
2449:	0	1	1	2	1	2	2	2
2457:	0	0	0	0	0	0	0	0
2465:	0	0	0	1	1	0	0	0
2473:	0	2	0	0	0	0	0	1
2481:	0	2	2	1	0	1	0	1
2489:	0	0	0	0	1	1	0	0
2497:	2	0	2	1	0	0	2	0
2505:	0	1	0	0	0	1	1	0
2513:	0	0	0	0	0	0	3	0
2521:	0	2	1	0	1	0	0	0

2529:	1	0	3	0	0	0	1	0

Sample Title: BLANK

Channel								
2537:	0	0	0	0	1	0	0	1
2545:	0	0	0	0	0	0	1	0
2553:	1	2	0	0	0	0	0	0
2561:	0	0	0	0	0	2	2	0
2569:	1	1	0	1	0	0	0	0
2577:	1	0	0	0	0	0	1	1
2585:	0	0	1	0	0	0	2	2
2593:	2	0	0	0	0	2	2	0
2601:	0	0	0	1	1	0	0	0
2609:	1	0	0	0	1	3	0	2
2617:	0	1	1	0	0	0	0	0
2625:	1	0	0	0	0	1	0	2
2633:	0	0	0	0	0	0	0	1
2641:	0	0	0	1	0	0	0	0
2649:	0	0	0	0	0	0	0	1
2657:	0	0	1	1	0	0	0	0
2665:	0	0	0	0	0	1	0	0
2673:	0	0	0	0	0	0	0	0
2681:	0	0	0	0	0	0	0	0
2689:	0	1	0	0	0	2	0	0
2697:	0	0	1	0	0	0	0	1
2705:	1	0	1	0	0	0	1	0
2713:	1	0	0	0	0	0	1	0
2721:	0	0	0	0	1	0	0	1
2729:	0	0	1	0	1	0	0	0
2737:	0	0	0	0	0	1	0	0
2745:	0	1	0	0	0	1	0	0
2753:	1	0	0	0	0	0	0	1
2761:	0	0	1	4	0	0	2	0
2769:	0	0	0	0	2	0	0	1
2777:	0	0	0	1	0	0	0	0
2785:	0	0	2	0	2	0	1	0
2793:	0	0	0	0	0	0	0	0
2801:	1	0	0	0	1	0	0	1
2809:	0	0	0	0	0	0	1	0
2817:	0	1	0	0	0	0	0	0
2825:	0	0	0	0	0	1	1	0
2833:	0	1	0	0	0	1	1	1
2841:	0	1	0	1	0	0	1	0
2849:	0	0	1	2	0	1	0	1
2857:	0	1	0	0	0	0	0	0
2865:	0	0	1	2	0	0	0	0
2873:	0	0	0	0	0	1	0	0
2881:	0	0	0	1	0	0	0	0
2889:	0	0	0	0	1	0	0	0
2897:	0	0	0	0	0	0	0	0
2905:	1	0	0	1	1	0	0	0
2913:	0	1	0	1	0	0	0	0
2921:	0	0	0	0	0	0	0	1
2929:	2	2	0	0	1	0	0	0
2937:	0	0	0	0	0	1	0	0
2945:	0	0	0	0	0	1	0	1
2953:	0	0	1	0	0	1	0	1

2961:	0	0	0	0	1	0	0	0

Sample Title: BLANK

Channel								
2969:	1	0	0	0	0	0	0	0
2977:	0	0	0	0	0	0	1	1
2985:	0	1	0	0	0	0	0	0
2993:	0	0	0	0	0	0	1	0
3001:	0	0	0	0	0	1	0	1
3009:	1	0	0	0	0	0	0	1
3017:	0	0	0	0	0	0	0	0
3025:	1	0	1	0	0	0	0	0
3033:	1	0	1	1	0	0	0	0
3041:	0	0	0	0	0	0	0	0
3049:	0	0	0	0	1	0	1	0
3057:	0	0	1	0	0	0	0	0
3065:	0	0	1	0	0	0	0	0
3073:	0	0	0	0	0	0	1	0
3081:	0	0	0	0	0	0	0	0
3089:	0	0	1	0	0	0	0	0
3097:	0	1	0	2	0	0	0	1
3105:	0	0	0	0	0	0	0	0
3113:	1	1	0	0	0	0	0	0
3121:	0	0	1	1	0	0	0	0
3129:	0	0	0	0	0	0	0	0
3137:	0	1	0	0	0	0	0	0
3145:	0	1	0	0	1	1	2	0
3153:	0	0	0	0	0	0	0	0
3161:	1	0	0	0	2	0	0	0
3169:	0	0	0	0	0	0	0	0
3177:	0	1	0	0	1	0	0	1
3185:	0	0	0	0	0	0	0	0
3193:	0	0	1	0	1	0	1	1
3201:	0	0	0	0	0	0	0	1
3209:	0	0	0	0	1	2	0	0
3217:	1	0	0	0	0	0	0	1
3225:	0	0	0	0	0	0	0	1
3233:	0	0	0	0	0	0	0	0
3241:	2	0	2	0	1	0	0	0
3249:	0	0	0	0	0	0	1	0
3257:	1	0	0	0	1	0	0	0
3265:	0	0	0	1	0	0	1	1
3273:	0	0	0	1	1	1	0	0
3281:	1	0	0	0	0	0	0	1
3289:	0	0	0	1	0	0	0	0
3297:	1	1	0	1	0	0	0	0
3305:	0	0	0	0	0	0	2	0
3313:	0	1	0	0	0	1	0	1
3321:	1	0	1	0	0	0	0	0
3329:	0	1	0	0	1	1	0	1
3337:	0	0	1	1	0	0	0	1
3345:	0	0	0	0	1	0	0	1
3353:	0	0	0	0	0	0	0	0
3361:	0	0	0	2	0	0	1	0
3369:	0	0	0	1	0	0	1	1
3377:	0	0	0	0	0	1	2	0
3385:	0	0	2	1	0	0	0	0

3393:	0	1	1	0	0	2	1	0

Sample Title: BLANK

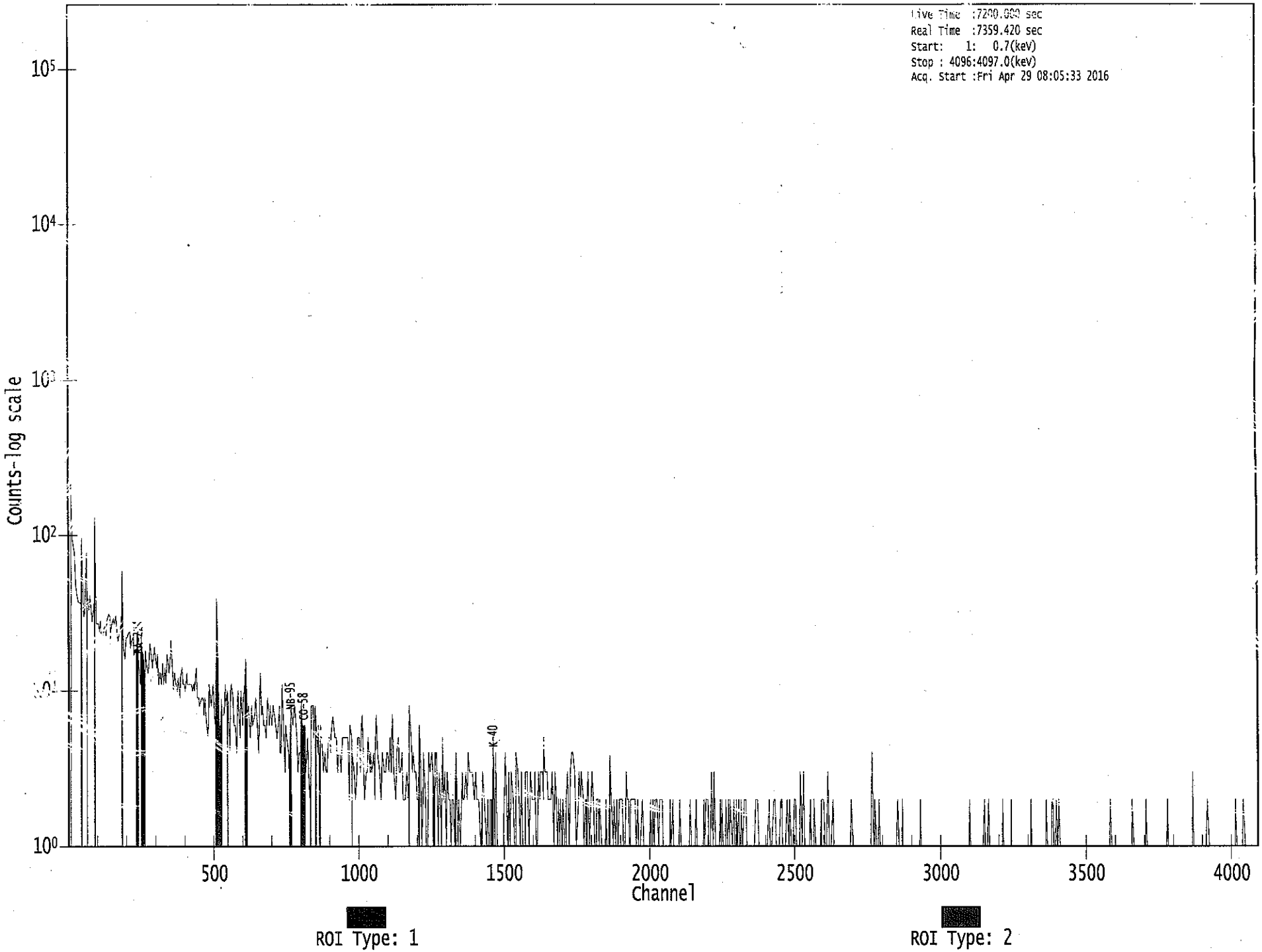
Channel								
3401:	0	0	1	1	1	0	2	0
3409:	1	1	1	0	1	1	0	0
3417:	0	0	0	0	0	0	0	0
3425:	0	0	0	0	0	0	0	1
3433:	0	0	0	0	0	1	0	1
3441:	0	1	0	0	0	0	0	0
3449:	0	0	0	0	0	0	0	1
3457:	0	1	1	0	0	0	0	1
3465:	0	0	0	0	0	0	0	1
3473:	0	0	0	0	1	0	0	0
3481:	0	0	0	1	0	0	0	0
3489:	0	1	0	0	0	0	0	0
3497:	0	0	0	0	0	0	0	0
3505:	0	0	0	0	0	1	1	0
3513:	1	0	1	0	0	0	0	0
3521:	0	0	1	0	0	0	1	0
3529:	0	0	0	0	1	0	0	1
3537:	0	0	0	0	0	0	0	1
3545:	0	0	1	0	0	0	0	0
3553:	0	0	0	0	1	0	0	0
3561:	0	1	0	0	1	0	1	0
3569:	0	0	0	1	0	1	0	0
3577:	1	1	0	1	0	2	0	0
3585:	0	0	1	0	0	1	0	0
3593:	0	1	0	1	0	0	0	0
3601:	0	0	0	0	0	1	0	1
3609:	0	0	0	0	0	0	1	0
3617:	0	0	1	0	0	0	0	0
3625:	1	1	1	0	0	0	0	0
3633:	0	0	0	1	0	0	0	0
3641:	1	0	1	0	1	0	0	0
3649:	0	0	0	1	0	1	1	1
3657:	2	0	0	0	0	0	1	0
3665:	0	0	0	1	0	0	1	0
3673:	1	0	1	0	0	1	0	1
3681:	0	0	0	0	0	0	0	0
3689:	0	0	0	0	0	1	0	0
3697:	0	1	0	0	1	0	1	0
3705:	2	0	0	0	0	0	0	0
3713:	1	0	1	0	0	0	0	0
3721:	0	0	0	1	0	0	0	1
3729:	0	0	0	0	0	0	0	1
3737:	0	0	1	0	0	0	0	0
3745:	0	0	0	0	1	0	0	0
3753:	0	0	0	1	0	1	1	1
3761:	0	1	0	0	0	0	0	0
3769:	1	0	0	1	1	0	0	1
3777:	1	0	2	0	0	0	0	0
3785:	0	1	0	0	0	1	0	0
3793:	1	0	0	1	0	0	1	0
3801:	0	0	0	0	0	1	0	0
3809:	0	0	0	0	0	1	0	0
3817:	0	0	0	0	0	0	1	0

3825:	0	0	1	0	0	0	0	0

Sample Title: BLANK

Channel								
3833:	0	0	0	0	1	0	0	0
3841:	0	0	0	0	1	0	0	0
3849:	0	0	0	0	0	0	0	0
3857:	0	0	1	0	0	0	0	0
3865:	0	0	3	0	0	0	0	0
3873:	0	0	0	0	1	0	0	0
3881:	0	0	0	0	0	0	0	0
3889:	0	1	0	0	0	0	0	0
3897:	0	0	0	0	0	0	0	1
3905:	1	0	0	0	0	0	1	1
3913:	1	0	0	0	2	1	0	0
3921:	1	1	1	1	0	0	0	0
3929:	0	0	0	0	0	0	0	1
3937:	0	0	0	0	0	0	0	0
3945:	0	1	0	1	0	0	0	0
3953:	1	0	0	0	0	1	0	0
3961:	0	0	0	0	1	0	0	0
3969:	0	0	0	0	0	0	1	0
3977:	0	0	0	1	0	0	0	1
3985:	0	0	0	0	1	0	1	0
3993:	0	0	0	0	0	0	0	0
4001:	0	0	0	0	0	0	1	0
4009:	0	0	0	0	0	0	0	0
4017:	0	0	1	1	0	0	0	0
4025:	0	0	0	1	0	1	0	0
4033:	0	1	0	0	0	1	0	0
4041:	2	0	0	0	0	0	0	1
4049:	1	1	0	0	0	0	0	0
4057:	0	1	0	1	0	0	0	1
4065:	1	0	1	0	0	0	0	1
4073:	0	0	0	0	0	0	0	0
4081:	0	0	0	0	0	0	0	0
4089:	0	0	1	0	0	0	0	0

0000036399.CNF



Apex-Gamma

Analysis Report for 1604147-03
J1V8X3 SAF: RC-189

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1604147-03
Sample Description	: J1V8X3 SAF: RC-189
Sample Type	: SOIL
Sample Size	: 7.115E+02 grams
Facility	: Countroom
Sample Taken On	: 4/26/2016 7:25:46AM
Acquisition Started	: 4/29/2016 7:26:05AM
Procedure	: GAS-1402 pCi
Operator	: Administrator
Detector Name	: GE4
Geometry	: GAS-1402
Live Time	: 7200.0 seconds
Real Time	: 7365.6 seconds
Dead Time	: 2.25 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 15 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 10/25/2014
Efficiency Calibration Used Done On	: 11/8/2014
Efficiency Calibration Description	:
Sample Number	: 36398

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

PEAK LOCATE REPORT

Peak Locate Performed on : 4/29/2016 9:28:51AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096
Peak Search Sensitivity : 2.50

Peak No.	Energy (keV)	Centroid Channel	Centroid Uncertainty	Peak Significance
1	76.25	75.52	0.0000	0.00
2	87.61	86.88	0.0000	0.00
3	93.29	92.57	0.0000	0.00
4	129.26	128.55	0.0000	0.00
5	186.48	185.80	0.0000	0.00
6	209.78	209.10	0.0000	0.00
7	239.17	238.50	0.0000	0.00
8	271.06	270.41	0.0000	0.00
9	295.33	294.69	0.0000	0.00
10	338.69	338.07	0.0000	0.00
11	352.45	351.83	0.0000	0.00
12	463.65	463.09	0.0000	0.00
13	510.99	510.45	0.0000	0.00
14	565.40	564.89	0.0000	0.00
15	583.62	583.12	0.0000	0.00
16	609.78	609.29	0.0000	0.00
17	728.14	727.70	0.0000	0.00
18	912.17	911.83	0.0000	0.00
19	968.82	968.51	0.0000	0.00
20	1102.80	1102.56	0.0000	0.00
21	1175.48	1175.29	0.0000	0.00
22	1236.91	1236.75	0.0000	0.00
23	1339.14	1339.04	0.0000	0.00
24	1378.60	1378.53	0.0000	0.00
25	1420.67	1420.62	0.0000	0.00
26	1461.60	1461.57	0.0000	0.00
27	1523.11	1523.12	0.0000	0.00
28	1530.20	1530.21	0.0000	0.00
29	1583.32	1583.37	0.0000	0.00
30	1592.20	1592.26	0.0000	0.00
31	1731.23	1731.37	0.0000	0.00
32	1766.23	1766.40	0.0000	0.00
33	1973.92	1974.22	0.0000	0.00
34	2006.69	2007.02	0.0000	0.00
35	2167.78	2168.21	0.0000	0.00
36	2204.66	2205.12	0.0000	0.00
37	2262.47	2262.97	0.0000	0.00
38	2474.60	2475.26	0.0000	0.00
39	2510.71	2511.41	0.0000	0.00
40	2603.24	2604.00	0.0000	0.00
41	2615.99	2616.77	0.0000	0.00

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1604147-03

J1V3X3 SAF: RC-189

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 4/29/2016 9:28:51AM

Peak Analysis From Channel : 1

Peak Analysis To Channel : 4096

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	76.25	70 -	80	75.52	1.16E+03	180.88	3.74E+03	4.05
M	2	87.61	81 -	96	86.88	4.43E+02	185.70	3.79E+03	5.54
m	3	93.29	81 -	96	92.57	3.10E+02	111.05	1.84E+03	2.46
	4	129.26	125 -	134	128.55	1.48E+02	121.98	2.04E+03	3.44
	5	186.48	181 -	191	185.80	1.99E+02	117.23	1.72E+03	3.33
	6	209.78	206 -	213	209.10	1.12E+02	33.31	1.08E+03	2.28
	7	239.17	232 -	244	238.50	9.96E+02	128.12	1.46E+03	2.34
	8	271.06	267 -	274	270.41	1.17E+02	65.33	6.36E+02	4.05
	9	295.33	289 -	299	294.69	2.65E+02	39.86	9.36E+02	2.75
	10	338.69	334 -	342	338.07	8.25E+01	68.60	6.69E+02	1.92
	11	352.45	347 -	357	351.83	3.30E+02	82.03	7.09E+02	2.17
	12	463.65	459 -	467	463.09	1.06E+01	48.22	3.13E+02	2.73
	13	510.99	506 -	517	510.45	1.88E+02	63.12	4.10E+02	2.63
	14	565.40	562 -	569	564.89	3.48E+01	36.66	2.02E+02	2.03
	15	583.62	578 -	591	583.12	2.68E+02	64.03	3.39E+02	3.17
	16	609.78	605 -	614	609.29	3.01E+02	53.74	2.41E+02	2.77
	17	728.14	725 -	732	727.70	3.72E+01	33.41	1.64E+02	2.56
	18	912.17	904 -	917	911.83	1.81E+02	50.53	2.03E+02	2.91
	19	968.82	963 -	972	968.51	5.84E+01	44.10	2.43E+02	2.12
	20	1102.80	1096 -	1110	1102.56	3.51E+01	43.06	1.82E+02	8.62
	21	1175.48	1169 -	1180	1175.29	3.37E+01	35.78	1.41E+02	1.38
	22	1236.91	1232 -	1240	1236.75	3.07E+01	36.69	1.87E+02	1.90
	23	1339.14	1336 -	1343	1339.04	1.86E+01	18.44	4.47E+01	1.51
	24	1378.60	1376 -	1382	1378.53	1.87E+01	15.69	3.07E+01	3.67
	25	1420.67	1417 -	1424	1420.62	1.38E+01	14.97	2.85E+01	1.85
	26	1461.60	1456 -	1469	1461.57	5.88E+02	52.83	4.76E+01	2.92
	27	1523.11	1520 -	1526	1523.12	7.13E+00	9.21	9.75E+00	1.86
	28	1530.20	1527 -	1532	1530.21	6.00E+00	7.05	6.00E+00	1.73
M	29	1583.32	1578 -	1598	1583.37	1.29E+01	10.25	1.44E+00	4.79
m	30	1592.20	1578 -	1598	1592.26	3.15E+01	15.91	8.88E+00	4.79
	31	1731.23	1726 -	1737	1731.37	1.68E+01	14.56	1.83E+01	6.36
	32	1766.23	1760 -	1777	1766.40	3.08E+01	25.00	4.84E+01	4.58
	33	1973.92	1971 -	1976	1974.22	5.13E+00	7.07	5.75E+00	1.84
	34	2006.69	2004 -	2010	2007.02	8.55E+00	7.23	2.90E+00	3.09
	35	2167.78	2163 -	2173	2168.21	1.40E+01	7.48	0.00E+00	1.66
	36	2204.66	2200 -	2208	2205.12	1.01E+01	8.26	3.83E+00	2.30
	37	2262.47	2259 -	2267	2262.97	1.01E+01	8.26	3.83E+00	4.88
	38	2474.60	2472 -	2477	2475.26	4.42E+00	5.74	3.17E+00	1.88
	39	2510.71	2508 -	2514	2511.41	7.00E+00	8.03	6.00E+00	2.84
	40	2603.24	2599 -	2606	2604.00	5.00E+00	4.47	0.00E+00	2.98

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
41	2615.99	2612 -	2621	2616.77	8.10E+01	18.00	0.00E+00	2.41

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 4/29/2016 9:28:51AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
	1	76.25	70 -	80	1.16E+03	180.88	3.74E+03	1.38E+02
M	2	87.61	81 -	96	4.43E+02	185.70	3.79E+03	1.01E+02
m	3	93.29	81 -	96	3.10E+02	111.05	1.84E+03	7.05E+01
	4	129.26	125 -	134	1.48E+02	121.98	2.04E+03	9.83E+01
	5	186.48	181 -	191	1.99E+02	117.23	1.72E+03	9.35E+01
	6	209.78	206 -	213	1.12E+02	83.31	1.08E+03	6.62E+01
	7	239.17	232 -	244	9.96E+02	128.12	1.46E+03	9.17E+01
	8	271.06	267 -	274	1.17E+02	65.33	6.36E+02	5.07E+01
	9	295.33	289 -	299	2.65E+02	89.86	9.36E+02	6.88E+01
	10	338.69	334 -	342	8.25E+01	68.60	6.69E+02	5.44E+01
	11	352.45	347 -	357	3.30E+02	82.03	7.09E+02	6.05E+01
	12	463.65	459 -	467	7.06E+01	48.22	3.13E+02	3.72E+01
	13	510.99	506 -	517	1.88E+02	63.12	4.10E+02	4.67E+01
	14	565.40	562 -	569	3.48E+01	36.66	2.02E+02	2.85E+01
	15	583.62	578 -	591	2.68E+02	64.03	3.39E+02	4.52E+01
	16	609.78	605 -	614	3.01E+02	53.74	2.41E+02	3.37E+01
	17	728.14	725 -	732	3.72E+01	33.41	1.64E+02	2.56E+01
	18	912.17	904 -	917	1.81E+02	50.53	2.03E+02	3.51E+01
	19	968.82	963 -	972	5.84E+01	44.10	2.43E+02	3.40E+01
	20	1102.80	1096 -	1110	3.51E+01	43.06	1.82E+02	3.40E+01
	21	1175.48	1169 -	1180	3.37E+01	35.78	1.41E+02	2.78E+01
	22	1236.91	1232 -	1240	3.07E+01	36.69	1.87E+02	2.88E+01
	23	1339.14	1336 -	1343	1.86E+01	18.44	4.47E+01	1.34E+01
	24	1378.60	1376 -	1382	1.87E+01	15.69	3.07E+01	1.08E+01
	25	1420.67	1417 -	1424	1.38E+01	14.97	2.35E+01	1.07E+01
	26	1461.60	1456 -	1469	5.88E+02	52.83	4.76E+01	1.72E+01

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
	27	1523.11	1520 -	1526	7.13E+00	9.21	9.75E+00	6.17E+00
	28	1530.20	1527 -	1532	6.00E+00	7.35	6.00E+00	4.50E+00
M	29	1583.32	1578 -	1598	1.29E+01	10.25	1.44E+00	1.97E+00
m	30	1592.20	1578 -	1598	3.15E+01	15.91	8.88E+00	4.90E+00
	31	1731.23	1726 -	1737	1.68E+01	14.56	1.83E+01	9.89E+00
	32	1766.23	1760 -	1777	3.08E+01	25.00	4.84E+01	1.84E+01
	33	1973.92	1971 -	1976	5.13E+00	7.07	5.75E+00	4.46E+00
	34	2006.69	2004 -	2010	8.55E+00	7.23	2.90E+00	3.49E+00
	35	2167.78	2163 -	2173	1.40E+01	7.48	0.00E+00	0.00E+00
	36	2204.66	2200 -	2208	1.01E+01	8.26	3.83E+00	4.34E+00
	37	2262.47	2259 -	2267	1.01E+01	8.26	3.83E+00	4.34E+00
	38	2474.60	2472 -	2477	4.42E+00	5.74	3.17E+00	3.22E+00
	39	2510.71	2508 -	2514	7.00E+00	8.03	6.00E+00	4.97E+00
	40	2603.24	2599 -	2606	5.00E+00	4.47	0.00E+00	0.00E+00
	41	2615.99	2612 -	2621	8.10E+01	18.00	0.00E+00	0.00E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

PEAK WITH NID REPORT

Peak Analysis Performed on : 4/29/2016 9:28:51AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Tentative NID Library : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB
Peak Match Tolerance : 1.000 keV

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	1	76.25	70 -	80	75.52	1.16E+03	180.88	3.74E+03	.....
M	2	87.61	81 -	96	86.88	4.43E+02	185.70	3.79E+03	SN-126 CD-109 LU-176
m	3	93.29	81 -	96	92.57	3.10E+02	111.05	1.84E+03	GA-67
	4	129.26	125 -	134	128.55	1.48E+02	121.98	2.04E+03	.....
	5	186.48	181 -	191	185.80	1.99E+02	117.23	1.72E+03	RA-226
	6	209.78	206 -	213	209.10	1.12E+02	83.31	1.08E+03	CM-243 GA-67
	7	239.17	232 -	244	238.50	9.96E+02	128.12	1.46E+03	PB-212

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	8	271.06	267 -	274	270.41	1.17E+02	65.33	6.36E+02	.....
	9	295.33	289 -	299	294.69	2.65E+02	89.86	9.36E+02	PB-214
	10	338.69	334 -	342	338.07	8.25E+01	68.60	6.69E+02	AC-228
	11	352.45	347 -	357	351.83	3.30E+02	82.03	7.09E+02	PB-214
	12	463.65	459 -	467	463.09	7.06E+01	48.22	3.13E+02	SB-125
	13	510.99	506 -	517	510.45	1.88E+02	63.12	4.10E+02	.....
	14	565.40	562 -	569	564.89	3.48E+01	36.66	2.02E+02	.....
	15	583.62	578 -	591	583.12	2.68E+02	64.03	3.39E+02	TL-208
	16	609.78	605 -	614	609.29	3.01E+02	53.74	2.41E+02	BI-214
	17	728.14	725 -	732	727.70	3.72E+01	33.41	1.64E+02	BI-212
	18	912.17	904 -	917	911.83	1.81E+02	50.53	2.03E+02	LU-172
	19	968.82	963 -	972	968.51	5.84E+01	44.10	2.43E+02	AC-228
	20	1102.80	1096 -	1110	1102.56	3.51E+01	43.06	1.82E+02	.....
	21	1175.48	1169 -	1180	1175.29	3.37E+01	35.78	1.41E+02	.....
	22	1236.91	1232 -	1240	1236.75	3.07E+01	36.69	1.87E+02	.....
	23	1339.14	1336 -	1343	1339.04	1.86E+01	18.44	4.47E+01	.....
	24	1378.60	1376 -	1382	1378.53	1.87E+01	15.69	3.07E+01	.....
	25	1420.67	1417 -	1424	1420.62	1.38E+01	14.97	2.85E+01	.....
	26	1461.60	1456 -	1469	1461.57	5.88E+02	52.83	4.76E+01	K-40
	27	1523.11	1520 -	1526	1523.12	7.13E+00	9.21	9.75E+00	.....
	28	1530.20	1527 -	1532	1530.21	6.00E+00	7.35	6.00E+00	.....
M	29	1583.32	1578 -	1598	1583.37	1.29E+01	10.25	1.44E+00	.....
m	30	1592.20	1578 -	1598	1592.26	3.15E+01	15.91	8.88E+00	.....
	31	1731.23	1726 -	1737	1731.37	1.68E+01	14.56	1.83E+01	.....
	32	1766.23	1760 -	1777	1766.40	3.08E+01	25.00	4.84E+01	.....
	33	1973.92	1971 -	1976	1974.22	5.13E+00	7.07	5.75E+00	.....
	34	2006.69	2004 -	2010	2007.02	8.55E+00	7.23	2.90E+00	.....
	35	2167.78	2163 -	2173	2168.21	1.40E+01	7.48	0.00E+00	.....
	36	2204.66	2200 -	2208	2205.12	1.01E+01	8.26	3.83E+00	BI-214
	37	2262.47	2259 -	2267	2262.97	1.01E+01	8.26	3.83E+00	.....
	38	2474.60	2472 -	2477	2475.26	4.42E+00	5.74	3.17E+00	.....
	39	2510.71	2508 -	2514	2511.41	7.00E+00	8.03	6.00E+00	.....
	40	2603.24	2599 -	2606	2604.00	5.00E+00	4.47	0.00E+00	.....
	41	2615.99	2612 -	2621	2616.77	8.10E+01	18.00	0.00E+00	.....

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

PEAK EFFICIENCY REPORT

Peak Analysis Performed on : 4/29/2016 9:28:51AM

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
	1	76.25	1.16E+03	180.88	2.12E-02	1.69E-03
M	2	87.61	4.43E+02	185.70	1.97E-02	1.63E-03
m	3	93.29	3.10E+02	111.05	1.90E-02	1.62E-03
	4	129.26	1.48E+02	121.98	1.53E-02	1.47E-03
	5	186.48	1.99E+02	117.23	1.16E-02	1.15E-03
	6	209.78	1.12E+02	83.31	1.05E-02	1.08E-03
	7	239.17	9.96E+02	128.12	9.40E-03	9.85E-04
	8	271.06	1.17E+02	65.33	8.41E-03	8.86E-04
	9	295.33	2.65E+02	89.86	7.78E-03	8.43E-04
	10	338.69	8.25E+01	68.60	6.85E-03	7.95E-04
	11	352.45	3.30E+02	82.03	6.60E-03	7.80E-04
	12	463.65	7.06E+01	48.22	5.07E-03	6.31E-04
	13	510.99	1.88E+02	63.12	4.61E-03	5.61E-04
	14	565.40	3.48E+01	36.66	4.17E-03	4.81E-04
	15	583.62	2.68E+02	64.03	4.04E-03	4.55E-04
	16	609.78	3.01E+02	53.74	3.87E-03	4.16E-04
	17	728.14	3.72E+01	33.41	3.25E-03	3.03E-04
	18	912.17	1.81E+02	50.53	2.61E-03	2.06E-04
	19	968.82	5.84E+01	44.10	2.46E-03	1.99E-04
	20	1102.80	3.51E+01	43.06	2.18E-03	1.82E-04
	21	1175.48	3.37E+01	35.78	2.05E-03	1.73E-04
	22	1236.91	3.07E+01	36.69	1.96E-03	1.90E-04
	23	1339.14	1.86E+01	18.44	1.82E-03	2.14E-04
	24	1378.60	1.87E+01	15.69	1.77E-03	2.06E-04
	25	1420.67	1.38E+01	14.97	1.73E-03	1.97E-04
	26	1461.60	5.88E+02	52.83	1.68E-03	1.89E-04
	27	1523.11	7.13E+00	9.21	1.62E-03	1.76E-04
	28	1530.20	6.00E+00	7.35	1.62E-03	1.75E-04
M	29	1583.32	1.29E+01	10.25	1.57E-03	1.64E-04
m	30	1592.20	3.15E+01	15.91	1.56E-03	1.62E-04
	31	1731.23	1.68E+01	14.56	1.46E-03	1.33E-04
	32	1766.23	3.08E+01	25.00	1.43E-03	1.26E-04
	33	1973.92	5.13E+00	7.07	1.31E-03	1.11E-04
	34	2006.69	8.55E+00	7.23	1.29E-03	1.11E-04
	35	2167.78	1.40E+01	7.48	1.22E-03	1.11E-04
	36	2204.66	1.01E+01	8.26	1.21E-03	1.11E-04
	37	2262.47	1.01E+01	8.26	1.18E-03	1.11E-04
	38	2474.60	4.42E+00	5.74	1.11E-03	1.11E-04
	39	2510.71	7.00E+00	8.03	1.10E-03	1.11E-04
	40	2603.24	5.00E+00	4.47	1.07E-03	1.11E-04
	41	2615.99	8.10E+01	18.00	1.07E-03	1.11E-04

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000 sigma

Analysis Report for 1604147-03

J1V8X3 SAE: RC-189

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 4/29/2016 9:28:51AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Counroom\Data\0000035909.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	76.25	1.16E+03	180.88			1.16E+03	1.81E+02
M	2	87.61	4.43E+02	185.70			4.43E+02	1.86E+02
m	3	93.29	3.10E+02	111.05	1.03E+02	1.79E+01	2.06E+02	1.12E+02
	4	129.26	1.48E+02	121.98			1.48E+02	1.22E+02
	5	186.48	1.99E+02	117.23	1.54E+01	2.37E+01	1.83E+02	1.20E+02
	6	209.78	1.12E+02	83.31			1.12E+02	8.33E+01
	7	239.17	9.96E+02	128.12	1.94E+01	1.18E+01	9.76E+02	1.29E+02
	8	271.06	1.17E+02	65.33			1.17E+02	6.53E+01
	9	295.33	2.65E+02	89.86			2.65E+02	8.99E+01
	10	338.69	8.25E+01	68.60			8.25E+01	6.86E+01
	11	352.45	3.30E+02	82.03			3.30E+02	8.20E+01
	12	463.65	7.06E+01	48.22			7.06E+01	4.82E+01
	13	510.99	1.88E+02	63.12	8.68E+01	1.02E+01	1.01E+02	6.39E+01
	14	565.40	3.48E+01	36.66			3.48E+01	3.67E+01
	15	583.62	2.68E+02	64.03			2.68E+02	6.40E+01
	16	609.78	3.01E+02	53.74	6.01E+00	6.33E+00	2.95E+02	5.41E+01
	17	728.14	3.72E+01	32.41			3.72E+01	3.34E+01
	18	912.17	1.81E+02	50.53			1.81E+02	5.05E+01
	19	968.82	5.84E+01	44.10			5.84E+01	4.41E+01
	20	1102.80	3.51E+01	43.06			3.51E+01	4.31E+01
	21	1175.48	3.37E+01	35.78			3.37E+01	3.58E+01
	22	1236.91	3.07E+01	36.69			3.07E+01	3.67E+01
	23	1339.14	1.86E+01	18.44			1.86E+01	1.84E+01
	24	1378.60	1.87E+01	15.69			1.87E+01	1.57E+01
	25	1420.67	1.38E+01	14.97			1.38E+01	1.50E+01
	26	1461.60	5.88E+02	52.83			5.88E+02	5.28E+01
	27	1523.11	7.13E+00	9.21			7.13E+00	9.21E+00
	28	1530.20	6.00E+00	7.35			6.00E+00	7.35E+00
M	29	1583.32	1.29E+01	10.25			1.29E+01	1.02E+01
m	30	1592.20	3.15E+01	15.91			3.15E+01	1.59E+01
	31	1731.23	1.68E+01	14.56			1.68E+01	1.46E+01
	32	1766.23	3.08E+01	25.00			3.08E+01	2.50E+01
	33	1973.92	5.13E+00	7.07			5.13E+00	7.07E+00
	34	2006.69	8.55E+00	7.23			8.55E+00	7.23E+00
	35	2167.78	1.40E+01	7.48			1.40E+01	7.48E+00
	36	2204.66	1.01E+01	8.26			1.01E+01	8.26E+00
	37	2262.47	1.01E+01	8.26			1.01E+01	8.26E+00
	38	2474.60	4.42E+00	5.74			4.42E+00	5.74E+00
	39	2510.71	7.00E+00	8.03			7.00E+00	8.03E+00
	40	2603.24	5.00E+00	4.47			5.00E+00	4.47E+00
	41	2615.99	8.10E+01	18.00			8.10E+01	1.80E+01

Analysis Report for 1604147-03
J1V8X3 SAF: RC-139

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 4/29/2016 9:28:51AM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000035909.CNF

Corrected Area is: Original * Peak Ratio - Background

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
	1	76.25	1.16E+03	180.88			1.16E+03	1.81E+02
M	2	87.61	4.43E+02	185.70			4.43E+02	1.86E+02
m	3	93.29	3.10E+02	111.05	1.03E+02	1.79E+01	2.06E+02	1.12E+02
	4	129.26	1.48E+02	121.98			1.48E+02	1.22E+02
	5	186.48	1.99E+02	117.23	1.54E+01	2.37E+01	1.83E+02	1.20E+02
	6	209.78	1.12E+02	83.31			1.12E+02	8.33E+01
	7	239.17	9.96E+02	128.12	1.94E+01	1.18E+01	9.76E+02	1.29E+02
	8	271.06	1.17E+02	65.33			1.17E+02	6.53E+01
	9	295.33	2.65E+02	89.86			2.65E+02	8.99E+01
	10	338.69	8.25E+01	68.60			8.25E+01	6.86E+01
	11	352.45	3.30E+02	82.03			3.30E+02	8.20E+01
	12	463.65	7.06E+01	48.22			7.06E+01	4.82E+01
	13	510.99	1.88E+02	63.12	8.68E+01	1.02E+01	1.01E+02	6.39E+01
	14	565.40	3.48E+01	36.66			3.48E+01	3.67E+01
	15	583.62	2.68E+02	64.03			2.68E+02	6.40E+01
	16	609.78	3.01E+02	53.74	6.01E+00	6.33E+00	2.95E+02	5.41E+01
	17	728.14	3.72E+01	33.41			3.72E+01	3.34E+01
	18	912.17	1.81E+02	50.53			1.81E+02	5.05E+01
	19	968.82	5.84E+01	44.10			5.84E+01	4.41E+01
	20	1102.80	3.51E+01	43.06			3.51E+01	4.31E+01
	21	1175.48	3.37E+01	35.78			3.37E+01	3.58E+01
	22	1236.91	3.07E+01	36.69			3.07E+01	3.67E+01
	23	1339.14	1.86E+01	18.44			1.86E+01	1.84E+01
	24	1378.60	1.87E+01	15.69			1.87E+01	1.57E+01
	25	1420.67	1.38E+01	14.97			1.38E+01	1.50E+01
	26	1461.60	5.88E+02	52.83			5.88E+02	5.28E+01
	27	1523.11	7.13E+00	9.21			7.13E+00	9.21E+00
	28	1530.20	6.00E+00	7.35			6.00E+00	7.35E+00
M	29	1583.32	1.29E+01	10.25			1.29E+01	1.02E+01
m	30	1592.20	3.15E+01	15.91			3.15E+01	1.59E+01
	31	1731.23	1.68E+01	14.56			1.68E+01	1.46E+01
	32	1766.23	3.08E+01	25.00			3.08E+01	2.50E+01

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
33	1973.92	5.13E+00	7.07			5.13E+00	7.07E+00
34	2006.69	8.55E+00	7.23			8.55E+00	7.23E+00
35	2167.78	1.40E+01	7.48			1.40E+01	7.48E+00
36	2204.66	1.01E+01	8.26			1.01E+01	8.26E+00
37	2262.47	1.01E+01	8.26			1.01E+01	8.26E+00
38	2474.60	4.42E+00	5.74			4.42E+00	5.74E+00
39	2510.71	7.00E+00	8.03			7.00E+00	8.03E+00
40	2603.24	5.00E+00	4.47			5.00E+00	4.47E+00
41	2615.99	8.10E+01	18.00			8.10E+01	1.80E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.905	1460.81	*	10.67	1.73E+01	2.51E+00
GA-67	0.650	93.31	*	35.70	3.07E-01	4.02E-01
		208.95	*	2.24	4.80E+00	4.06E+00
		300.22		16.00		
CD-109	0.972	88.03	*	3.72	3.21E+00	1.38E+00
SN-126	1.000	87.57	*	37.00	3.21E-01	1.37E-01
TL-208	0.307	583.14	*	30.22	1.16E+00	3.05E-01
		860.37		4.48		
		2614.66		35.85		
BI-212	0.665	727.17	*	11.80	5.12E-01	4.62E-01
		1620.62		2.75		
PB-212	0.855	238.63	*	44.60	1.23E+00	2.07E-01
		300.09		3.41		
BI-214	0.501	609.31	*	46.30	8.69E-01	1.85E-01
		1120.29		15.10		
		1764.49		15.80		
		2204.22	*	4.98	8.85E-01	7.30E-01
PB-214	0.971	295.21	*	19.19	9.37E-01	3.33E-01
		351.92	*	37.19	7.08E-01	1.95E-01
RA-226	0.988	186.21	*	3.28	2.54E+00	4.94E+00

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

UNIDENTIFIED PEAKS

Peak Locate Performed on : 4/29/2016 9:28:51AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	76.25	1.61097E-01	7.80		
	4	129.26	2.05787E-02	41.16		
	8	271.06	1.62229E-02	27.97		
	10	338.69	1.14522E-02	41.60	Tol.	AC-228
	12	463.65	9.80146E-03	34.17	Tol.	SB-125
	13	510.99	1.40293E-02	31.65		
	14	565.40	4.83047E-03	52.70		
	18	912.17	2.51863E-02	13.93	Tol.	LU-172
	19	968.82	8.11343E-03	37.75	Tol.	AC-228
	20	1102.80	4.88095E-03	61.26		
	21	1175.48	4.67682E-03	53.12		
	22	1236.91	4.26859E-03	59.70		
	23	1339.14	2.58808E-03	49.48		
	24	1378.60	2.59191E-03	42.04		
	25	1420.67	1.90972E-03	54.42		
	27	1523.11	9.89583E-04	64.60		
	28	1530.20	8.33333E-04	61.24		
M	29	1583.32	1.79735E-03	39.59		
m	30	1592.20	4.36918E-03	25.28		
	31	1731.23	2.33707E-03	43.26		
	32	1766.23	4.27904E-03	40.57		
	33	1973.92	7.11806E-04	68.99		
	34	2006.69	1.18750E-03	42.27		
	35	2167.78	1.94444E-03	26.73		
	37	2262.47	1.40046E-03	40.97		
	38	2474.60	6.13426E-04	65.03		
	39	2510.71	9.72222E-04	57.37		
	40	2603.24	6.94444E-04	44.72		
	41	2615.39	1.12500E-02	11.11		

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.90	1460.81	*	10.67	1.73E+03	2.51E+00
GA-67	0.65	93.31	*	35.70	3.07E-01	4.02E-01
		208.95	*	2.24	4.80E+00	4.06E+00
		300.22		16.00		
CD-109	0.97	88.03	*	3.72	3.21E+00	1.38E+00
SN-126	1.00	87.57	*	37.00	3.21E-01	1.37E-01
TL-208	0.30	583.14	*	30.22	1.16E+00	3.05E-01
		860.37		4.48		
		2614.66		35.85		
BI-212	0.66	727.17	*	11.80	5.12E-01	4.62E-01
		1620.62		2.75		
PB-212	0.85	238.63	*	44.60	1.23E+00	2.07E-01
		300.09		3.41		
BI-214	0.50	609.31	*	46.30	8.69E-01	1.85E-01
		1120.29		15.10		
		1764.49		15.80		
		2204.22	*	4.98	8.85E-01	7.30E-01
PB-214	0.97	295.21	*	19.19	9.37E-01	3.33E-01
		351.92	*	37.19	7.08E-01	1.95E-01
RA-226	0.98	186.21	*	3.28	2.54E+00	4.94E+00

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.905	1.73E+01	2.51E+00	
	GA-67	0.650	3.58E-01	4.06E-01	
?	CD-109	0.972	3.21E+00	1.38E+00	
?	SN-126	1.000	3.21E-01	1.37E-01	
	TL-208	0.307	1.16E+00	3.05E-01	
	BI-212	0.665	5.12E-01	4.62E-01	
	PB-212	0.855	1.23E+00	2.07E-01	
	BI-214	0.501	8.70E-01	1.79E-01	
	PB-214	0.971	7.67E-01	1.68E-01	
	RA-226	0.988	2.54E+00	4.94E+00	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1604147-03

J1V8X3 SAF: RC-169

UNIDENTIFIED PEAKS

Peak Locate Performed on : 4/29/2016 9:28:51AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	1	76.25	1.61097E-01	7.80		
	4	129.26	2.05787E-02	41.16		
	8	271.06	1.62229E-02	27.97		
	10	338.69	1.14522E-02	41.60	Tol.	AC-228
	12	463.65	9.80146E-03	34.17	Tol.	SB-125
	13	510.99	1.40293E-02	31.65		
	14	565.40	4.83047E-03	52.70		
	18	912.17	2.51863E-02	13.93	Tol.	LU-172
	19	968.82	8.11343E-03	37.75	Tol.	AC-228
	20	1102.80	4.88095E-03	61.26		
	21	1175.48	4.67652E-03	53.12		
	22	1236.91	4.26859E-03	59.70		
	23	1339.14	2.58808E-03	49.48		
	24	1378.60	2.59191E-03	42.04		
	25	1420.67	1.90972E-03	54.42		
	27	1523.11	9.89583E-04	64.60		
	28	1530.20	8.33333E-04	61.24		
M	29	1583.32	1.79735E-03	39.59		
m	30	1592.20	4.36918E-03	25.28		
	31	1731.23	2.33707E-03	43.26		
	32	1766.23	4.27904E-03	40.57		
	33	1973.92	7.11806E-04	68.99		
	34	2006.69	1.18750E-03	42.27		
	35	2167.78	1.94444E-03	26.73		
	37	2262.47	1.40046E-03	40.97		
	38	2474.60	6.13426E-04	65.03		
	39	2510.71	9.72222E-04	57.37		
	40	2603.24	5.94444E-04	44.72		
	41	2615.99	1.12500E-02	11.11		

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	BE-7	477.59		10.42	3.83E-01	7.43E-01	7.43E-01
+	NA-22	1274.54		99.94	1.72E-02	1.24E-01	1.24E-01
+	NA-24	1368.53		99.99	-1.26E-01	1.79E+00	2.64E+00
		2754.09		99.86	1.36E-01		1.79E+00
+	AL-26	1808.65		99.76	1.48E-02	8.23E-02	8.23E-02
+	K-40	1460.81	*	10.67	1.73E+01	1.09E+00	1.09E+00
+	AR-41	1293.64		99.16	4.72E+10	1.23E+11	1.23E+11
+	TI-44	67.88		94.40	1.66E-02	4.76E-02	4.76E-02
		78.34		96.00	2.09E-01		6.27E-02
+	SC-46	889.25		99.98	3.75E-02	9.33E-02	9.33E-02
		1120.51		99.99	1.20E-01		1.41E-01
+	V-48	983.52		99.98	8.15E-03	1.11E-01	1.11E-01
		1312.10		97.50	4.70E-02		1.24E-01
+	CR-51	320.08		9.83	-7.09E-03	6.78E-01	6.78E-01
+	MN-54	834.83		99.97	7.85E-03	9.67E-02	9.67E-02
+	CO-56	846.75		99.96	-6.50E-02	8.82E-02	8.82E-02
		1037.75		14.03	1.64E-01		7.21E-01
		1238.25		67.00	-8.74E-03		2.29E-01
		1771.40		15.51	-2.43E-01		6.89E-01
		2598.48		16.90	1.07E-01		4.47E-01
+	CO-57	122.06		85.51	-2.29E-02	5.76E-02	5.76E-02
		136.48		10.60	-6.15E-02		4.99E-01
+	CO-58	810.76		99.40	1.92E-02	8.94E-02	8.94E-02
+	FE-59	1099.22		56.50	-6.28E-03	1.93E-01	1.93E-01
		1291.56		43.20	5.49E-03		2.78E-01
+	CO-60	1173.22		100.00	9.90E-03	9.60E-02	1.14E-01
		1332.49		100.00	-2.60E-03		9.60E-02
+	ZN-65	1115.52		50.75	-1.11E-01	2.34E-01	2.34E-01
+	GA-67	93.31	*	35.70	3.07E-01	5.00E-01	5.00E-01
		208.95	*	2.24	4.80E+00		5.78E+00
		300.22		16.00	8.11E-02		8.69E-01
+	SE-75	121.11		16.70	-1.54E-01	8.98E-02	2.98E-01

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	SE-75	136.00	59.20	-1.51E-02	8.98E-02	8.98E-02
		264.65	59.80	-2.09E-03		1.02E-01
		279.53	25.20	1.04E-01		2.61E-01
		400.65	11.40	3.53E-01		5.97E-01
+	RB-82	776.52	13.00	-5.94E-01	6.98E-01	6.98E-01
+	RB-83	520.41	46.00	3.63E-03	1.60E-01	1.60E-01
		529.64	30.30	4.19E-02		2.52E-01
		552.65	16.40	-2.19E-01		4.51E-01
+	KR-85	513.99	0.43	3.43E+01	2.29E+01	2.29E+01
+	SR-85	513.99	99.27	1.55E-01	1.03E-01	1.03E-01
+	Y-88	898.02	93.40	-6.17E-02	6.50E-02	9.30E-02
		1836.01	99.36	5.78E-03		6.50E-02
+	NB-93M	16.57	9.43	6.55E-01	2.42E-01	2.42E-01
+	NB-94	702.63	100.00	4.50E-02	8.72E-02	9.17E-02
		871.10	100.00	3.97E-02		8.72E-02
+	NB-95	765.79	99.81	-1.48E-03	1.00E-01	1.00E-01
+	NB-95M	235.69	25.00	2.38E+00	6.76E-01	6.76E-01
+	ZR-95	724.18	43.70	-2.36E-02	1.62E-01	2.18E-01
		756.72	55.30	-1.24E-02		1.62E-01
+	MO-99	181.06	6.20	-4.04E-02	1.36E+00	2.02E+00
		739.58	12.80	-4.64E-01		1.36E+00
		778.00	4.50	-4.77E-01		4.23E+00
+	RU-103	497.08	89.00	-7.53E-02	7.81E-02	7.81E-02
+	RU-106	621.84	9.80	6.67E-01	8.90E-01	8.90E-01
+	AG-108M	433.93	89.90	-2.33E-03	7.61E-02	7.61E-02
		614.37	90.40	-2.38E-04		1.20E-01
		722.95	90.50	-7.12E-03		9.97E-02
+	CD-109	88.03	3.72	3.21E+00	2.53E+00	2.53E+00
+	AG-110M	657.75	93.14	-6.55E-02	8.57E-02	8.57E-02
		677.61	10.53	-2.77E-01		8.04E-01
		706.67	16.46	-1.10E-02		5.38E-01
		763.93	21.98	-2.49E-02		4.29E-01
		884.67	71.63	-3.99E-02		1.16E-01
		1384.27	23.94	1.23E-01		3.75E-01
+	CD-113M	263.70	0.02	-3.76E+01	2.57E+02	2.57E+02
+	SN-113	255.12	1.93	3.04E-01	1.08E-01	3.21E+00
		391.69	64.90	2.43E-02		1.08E-01
+	TE123M	159.00	84.10	1.17E-02	6.56E-02	6.56E-02
+	SB-124	602.71	97.87	-2.70E-02	8.09E-02	8.09E-02
		645.85	7.26	-8.73E-02		1.10E+00
		722.78	11.10	-3.83E-03		8.10E-01
		1691.02	49.00	2.25E-02		1.56E-01
+	I-125	35.49	6.49	3.53E-01	4.37E-01	4.37E-01
+	SB-125	176.33	6.89	-2.53E-01	2.35E-01	8.07E-01
		427.89	29.33	1.67E-02		2.35E-01
		463.38	10.35	6.70E-01		7.33E-01
		600.56	17.80	-9.40E-02		4.47E-01
		635.90	11.32	1.15E-01		7.21E-01

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	SB-126	414.70		83.30	5.61E-03	9.84E-02	9.84E-02
		666.33		99.60	7.39E-03		1.06E-01
		695.00		99.60	-2.68E-03		1.04E-01
		720.50		53.80	1.28E-02		1.98E-01
+	SN-126	87.57	*	37.00	3.21E-01	2.53E-01	2.53E-01
+	SB-127	473.00		25.00	-6.47E-02	4.19E-01	4.81E-01
		685.20		35.70	6.36E-02		4.19E-01
		783.80		14.70	4.72E-01		1.10E+00
+	I-129	29.78		57.00	-2.38E-02	4.55E-02	4.55E-02
		33.60		13.20	-3.55E-02		2.00E-01
		39.58		7.52	-5.89E-01		3.64E-01
+	I-131	284.30		6.05	-3.49E-03	9.88E-02	1.36E+00
		364.48		81.20	1.95E-02		9.88E-02
		636.97		7.26	-6.33E-01		1.39E+00
		722.89		1.80	-2.97E-02		6.27E+00
+	TE-132	49.72		13.10	2.23E-01	1.34E-01	4.98E-01
		228.16		88.00	-3.84E-04		1.34E-01
+	BA-133	81.00		33.00	-1.08E-01	1.54E-01	1.71E-01
		302.84		17.80	-6.20E-02		3.67E-01
		356.01		60.00	-1.35E-03		3.54E-01
+	I-133	529.87		86.30	1.64E-01	9.84E-01	9.84E-01
+	XE-133	81.00		38.00	-1.40E-01	2.22E-01	2.22E-01
+	CS-134	563.23		8.38	-1.36E-01	9.51E-02	9.14E-01
		569.32		15.43	-4.64E-02		4.76E-01
		604.70		97.60	-1.18E-02		9.51E-02
		795.84		85.40	9.17E-03		1.06E-01
		801.93		8.73	-6.90E-01		1.00E+00
+	CS-135	268.24		16.00	-1.90E-03	4.07E-01	4.07E-01
+	I-135	1131.51		22.50	2.92E+02	7.98E+02	1.07E+03
		1260.41		28.60	-1.11E+01		7.98E+02
		1678.03		9.54	-4.01E+00		1.52E+03
+	CS-136	153.22		7.46	9.80E-02	9.39E-02	8.49E-01
		163.89		4.61	-6.90E-01		1.36E+00
		176.55		13.56	-1.51E-01		4.81E-01
		273.65		12.66	8.30E-02		6.24E-01
		340.57		48.50	-1.34E-02		1.82E-01
		818.50		99.70	7.58E-03		9.39E-02
		1048.07		79.60	5.46E-02		1.62E-01
		1235.34		19.70	4.67E-01		8.89E-01
+	CS-137	661.65		85.12	6.69E-02	1.05E-01	1.05E-01
+	LA-133	788.74		34.00	-7.05E-02	1.28E-01	2.61E-01
		1435.80		66.00	-2.80E-02		1.28E-01
+	CE-139	165.85		80.35	-2.40E-02	6.83E-02	6.83E-02
+	BA-140	162.64		6.70	-1.95E-01	3.71E-01	9.45E-01
		304.84		4.50	1.15E-01		1.68E+00
		423.70		3.20	-9.98E-01		2.52E+00
		437.55		2.00	-5.53E-01		4.03E+00
		537.32		25.00	1.07E-01		3.71E-01
+	LA-140	328.77		20.50	1.40E-01	1.12E-01	3.96E-01

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J1V8X3 SAF: RC-183

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	LA-140	487.03	45.50	-4.23E-02	1.12E-01	1.81E-01
		815.85	23.50	-1.54E-01		3.96E-01
		1596.49	95.49	-4.18E-03		1.12E-01
+	CE-141	145.44	48.40	1.86E-02	1.19E-01	1.19E-01
+	CE-143	57.36	11.80	-1.24E+00	8.90E-01	1.50E+00
		293.26	42.00	1.60E+00		8.90E-01
		664.55	5.20	3.87E+00		8.04E+00
+	CE-144	133.54	10.80	-3.83E-02	4.93E-01	4.93E-01
+	PM-144	476.78	42.00	8.73E-02	8.16E-02	1.78E-01
		618.01	98.60	-2.47E-02		8.16E-02
		696.49	99.49	-2.77E-02		8.76E-02
+	PM-145	36.85	21.70	4.50E-02	6.87E-02	1.26E-01
		37.36	39.70	-7.52E-03		6.87E-02
		42.30	15.10	6.49E-03		1.97E-01
		72.40	2.31	3.77E-01		2.43E+00
+	PM-146	453.90	39.94	5.01E-03	1.74E-01	1.74E-01
		735.90	14.01	1.34E-02		5.85E-01
		747.13	13.10	2.30E-01		6.69E-01
+	ND-147	91.11	28.90	4.96E-01	2.31E-01	2.31E-01
		531.02	13.10	-6.12E-02		6.89E-01
+	PM-149	285.90	3.10	1.34E+00	5.25E+00	5.25E+00
+	EU-152	121.78	20.50	-9.48E-02	2.38E-01	2.38E-01
		244.69	5.40	-1.46E-01		1.34E+00
		344.27	19.13	6.41E-02		3.48E-01
		778.89	9.20	-1.09E-01		9.63E-01
		964.01	10.40	-2.77E-02		1.17E+00
		1085.78	7.22	-5.73E-01		1.40E+00
		1112.02	9.60	-2.64E-01		1.12E+00
		1407.95	14.94	2.03E-01		6.96E-01
+	GD-153	97.43	31.30	-4.82E-03	1.55E-01	1.55E-01
		103.18	22.20	5.66E-02		2.13E-01
+	EU-154	123.07	40.50	-5.08E-03	1.23E-01	1.23E-01
		723.30	19.70	-3.28E-02		4.58E-01
		873.19	11.50	-1.69E-02		7.35E-01
		996.32	10.30	-1.79E-02		8.73E-01
		1004.76	17.90	1.60E-01		5.17E-01
		1274.45	35.50	4.83E-02		3.48E-01
+	EU-155	86.50	30.90	-3.28E-02	1.69E-01	1.69E-01
		105.30	20.70	6.39E-02		2.26E-01
+	EU-156	811.77	10.40	5.12E-02	9.59E-01	9.59E-01
		1153.47	7.20	4.11E-01		1.78E+00
		1230.71	8.90	1.61E-01		1.76E+00
+	HO-166M	184.41	72.60	1.06E-01	8.84E-02	8.84E-02
		280.45	29.60	1.42E-01		2.21E-01
		410.94	11.10	1.15E-01		6.08E-01
		711.69	54.10	-4.69E-02		1.57E-01
+	TM-171	66.72	0.14	1.80E+01	3.22E+01	3.22E+01
+	HF-172	81.75	4.52	-3.72E+00	4.65E-01	1.18E+00
		125.81	11.30	-1.44E-02		4.65E-01

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	LU-172	181.53		20.60	1.00E-02	2.24E-01	4.01E-01
		810.06		16.63	1.52E-01		7.10E-01
		912.12		15.25	3.20E+00		1.36E+00
		1093.66		62.50	9.08E-02		2.24E-01
+	LU-173	100.72		5.24	-4.88E-01	3.10E-01	8.73E-01
		272.11		21.20	4.57E-02		3.10E-01
+	HF-175	343.40		84.00	1.50E-02	8.64E-02	8.64E-02
+	LU-176	88.34		13.30	4.93E-01	6.54E-02	4.07E-01
		201.83		86.00	7.91E-03		7.17E-02
		306.78		94.00	-1.58E-02		6.54E-02
+	TA-182	67.75		41.20	3.87E-02	1.11E-01	1.11E-01
		1121.30		34.90	2.64E-01		3.96E-01
		1189.05		16.23	6.07E-02		7.77E-01
		1221.41		26.98	2.30E-01		4.93E-01
		1231.02		11.44	1.11E-01		1.22E+00
+	IR-192	308.46		29.68	-2.01E-02	1.45E-01	2.10E-01
		468.07		48.10	-5.34E-02		1.45E-01
+	HG-203	279.19		77.30	3.48E-02	8.75E-02	8.75E-02
+	BI-207	569.67		97.72	-7.31E-03	7.50E-02	7.50E-02
		1063.62		74.90	9.13E-03		1.20E-01
+	TL-208	583.14		30.22	1.16E+00	4.03E-01	4.03E-01
		860.37		4.48	5.20E-01		2.01E+00
		2614.66		35.85	0.00E+00		6.12E-01
+	BI-210M	262.00		45.00	3.82E-03	1.34E-01	1.34E-01
		300.00		23.00	4.19E-02		3.43E-01
+	PB-210	46.50		4.25	2.96E-01	7.60E-01	7.60E-01
+	PB-211	404.84		2.90	-1.19E+00	2.23E+00	2.23E+00
		831.96		2.90	-5.00E-01		3.18E+00
+	BI-212	727.17	*	11.80	5.12E-01	7.41E-01	7.41E-01
		1620.62		2.75	1.27E+00		3.12E+00
+	PB-212	238.63	*	44.60	1.23E+00	2.36E-01	2.36E-01
		300.09		3.41	2.83E-01		2.32E+00
+	BI-214	609.31	*	46.30	8.69E-01	2.10E-01	2.10E-01
		1120.29		15.10	7.73E-01		9.99E-01
		1764.49		15.80	6.87E-01		7.65E-01
		2204.22	*	4.98	8.85E-01		1.00E+00
+	PB-214	295.21	*	19.19	9.37E-01	2.66E-01	4.96E-01
		351.92	*	37.19	7.08E-01		2.66E-01
+	RN-219	401.80		6.50	3.24E-01	1.01E+00	1.01E+00
+	RA-223	323.87		3.88	-9.13E-01	1.66E+00	1.66E+00
+	RA-224	240.98		3.95	1.32E+01	2.58E+00	2.58E+00
+	RA-225	40.00		31.00	-1.65E-01	1.02E-01	1.02E-01
+	RA-226	186.21	*	3.28	2.54E+00	2.70E+00	2.70E+00
+	TH-227	50.10		8.40	1.83E-01	4.08E-01	4.08E-01
		236.00		11.50	2.52E+00		8.21E-01
		256.20		6.30	2.31E-01		9.62E-01
+	AC-228	338.32		11.40	5.46E-01	5.44E-01	6.59E-01
		911.07		27.70	1.23E+00		5.44E-01

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	AC-228	969.11	16.60	6.71E-01	5.44E-01	8.14E-01
+	TH-230	48.44	16.90	6.40E-02	1.98E-01	1.98E-01
		62.85	4.60	2.90E-01		9.29E-01
		67.67	0.37	4.23E+00		1.21E+01
+	PA-231	283.67	1.60	-5.96E-01	2.84E+00	3.94E+00
		302.67	2.30	-4.79E-01		2.84E+00
+	TH-231	25.64	14.70	2.15E-02	1.82E-01	1.82E-01
		84.21	6.40	-3.37E+00		7.90E-01
+	PA-233	311.98	38.60	-1.95E-02	1.68E-01	1.68E-01
+	PA-234	131.20	20.40	1.96E-01	2.63E-01	2.63E-01
		733.99	8.80	2.88E-01		9.41E-01
		946.00	12.00	-3.17E-01		7.07E-01
+	PA-234M	1001.03	0.92	-1.03E+00	9.94E+00	9.94E+00
+	TH-234	63.29	3.80	4.27E-01	1.13E+00	1.13E+00
+	U-235	143.76	10.50	2.66E-01	5.20E-01	5.20E-01
		163.35	4.70	-5.75E-01		1.14E+00
		205.31	4.70	-2.10E-01		1.36E+00
+	NP-237	86.50	12.60	-8.02E-02	4.14E-01	4.14E-01
+	NP-239	106.10	22.70	1.43E-01	5.07E-01	5.07E-01
		228.18	10.70	-3.08E-01		1.40E+00
		277.60	14.10	-2.15E-01		1.10E+00
+	AM-241	59.54	35.90	4.11E-02	1.13E-01	1.13E-01
+	AM-243	74.67	66.00	4.15E-01	9.12E-02	9.12E-02
+	CM-243	209.75	3.29	4.65E-01	4.52E-01	1.95E+00
		228.14	10.60	-1.67E-03		5.81E-01
		277.60	14.00	-8.85E-02		4.52E-01

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Counroom\Library\TMA2.NLB

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	BE-7	477.59		10.42	7.43E-01	7.43E-01	3.85E-01	3.57E-01
	NA-22	1274.54		99.94	1.24E-01	1.24E-01	1.72E-02	5.82E-02
	NA-24	1368.53		99.99	2.64E+00	1.79E+00	-1.26E-01	1.21E+00
		2754.09		99.86	1.79E+00		1.36E-01	6.92E-01
	AL-26	1808.65		99.76	8.23E-02	8.23E-02	1.48E-02	3.61E-02
+	K-40	1460.81	*	10.67	1.09E+00	1.09E+00	1.73E+01	5.06E-01
	AR-41	1293.64		99.16	1.23E+11	1.23E+11	4.72E+10	5.76E+10
	TI-44	67.88		94.40	4.76E-02	4.76E-02	1.66E-02	2.35E-02
		78.34		96.00	6.27E-02		2.09E-01	3.10E-02
	SC-46	889.25		99.98	9.33E-02	9.33E-02	3.75E-02	4.39E-02
		1120.51		99.99	1.41E-01		1.20E-01	6.70E-02
	V-48	983.52		99.98	1.11E-01	1.11E-01	8.15E-03	5.20E-02
		1312.10		97.50	1.24E-01		4.70E-02	5.75E-02
	CR-51	320.08		9.83	6.78E-01	6.78E-01	-7.09E-03	3.28E-01
	MN-54	834.83		99.97	9.67E-02	9.67E-02	7.85E-03	4.58E-02
	CO-56	846.75		99.96	8.82E-02	8.82E-02	-6.50E-02	4.15E-02
		1037.75		14.03	7.21E-01		1.64E-01	3.38E-01
		1238.25		67.00	2.29E-01		-8.74E-03	1.09E-01
		1771.40		15.51	6.89E-01		-2.43E-01	3.11E-01
		2598.48		16.90	4.47E-01		1.07E-01	1.83E-01
	CO-57	122.06		85.51	5.76E-02	5.76E-02	-2.29E-02	2.83E-02
		136.48		10.60	4.99E-01		-6.15E-02	2.45E-01
	CO-58	810.76		99.40	8.94E-02	8.94E-02	1.92E-02	4.22E-02
	FE-59	1099.22		56.50	1.93E-01	1.93E-01	-6.28E-03	9.04E-02
		1291.56		43.20	2.78E-01		5.49E-03	1.30E-01
	CO-60	1173.22		100.00	1.14E-01	9.60E-02	9.90E-03	5.35E-02
		1332.49		100.00	9.60E-02		-2.60E-03	4.41E-02
	ZN-65	1115.52		50.75	2.34E-01	2.34E-01	-1.11E-01	1.10E-01
+	GA-67	93.31	*	35.70	5.00E-01	5.00E-01	3.07E-01	2.48E-01
		208.95	*	2.24	5.78E+00		4.80E+00	2.83E+00
		300.22		16.00	8.69E-01		8.11E-02	4.23E-01
	SE-75	121.11		16.70	2.98E-01	8.98E-02	-1.54E-01	1.46E-01
		136.00		59.20	8.98E-02		-1.51E-02	4.41E-02
		264.65		59.80	1.02E-01		-2.09E-03	4.98E-02
		279.53		25.20	2.61E-01		1.04E-01	1.27E-01
		400.65		11.40	5.97E-01		3.53E-01	2.88E-01
	RB-82	776.52		13.00	6.98E-01	6.98E-01	-5.94E-01	3.29E-01
	RB-83	520.41		46.00	1.60E-01	1.60E-01	3.63E-03	7.66E-02
		529.64		30.30	2.52E-01		4.19E-02	1.21E-01
		552.65		16.40	4.51E-01		-2.19E-01	2.15E-01
	KR-85	513.99		0.43	2.29E+01	2.29E+01	3.43E+01	1.11E+01
	SR-85	513.99		99.27	1.03E-01	1.03E-01	1.55E-01	5.00E-02
	Y-88	898.02		93.40	9.30E-02	6.50E-02	-6.17E-02	4.35E-02
		1836.01		99.38	6.50E-02		5.78E-03	2.72E-02
	NB-93M	16.57		9.43	2.42E-01	2.42E-01	6.55E-01	1.18E-01
	NB-94	702.63		100.00	9.17E-02	8.72E-02	4.50E-02	4.37E-02
		871.10		100.00	8.72E-02		3.97E-02	4.10E-02
	NB-95	765.79		99.81	1.00E-01	1.00E-01	-1.48E-03	4.78E-02
	NB-95M	235.69		25.00	6.76E-01	6.76E-01	2.03E+00	3.33E-01
	ZR-95	724.18		43.70	2.18E-01	1.62E-01	-2.36E-02	1.04E-01
		756.72		55.30	1.62E-01		-1.24E-02	7.69E-02

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	MO-99	181.06		6.20	2.02E+00	1.36E+00	-4.04E-02	9.88E-01
		739.58		12.80	1.36E+00		-4.64E-01	6.45E-01
		778.00		4.50	4.23E+00		-4.77E-01	2.00E+00
	RU-103	497.08		89.00	7.81E-02	7.81E-02	-7.53E-02	3.72E-02
	RU-106	621.84		9.80	8.90E-01	8.90E-01	6.67E-01	4.26E-01
	AG-108M	433.93		89.90	7.61E-02	7.61E-02	-2.33E-03	3.66E-02
		614.37		90.40	1.20E-01		-2.38E-04	5.77E-02
		722.95		90.50	9.97E-02		-7.12E-03	4.74E-02
+	CD-109	88.03	*	3.72	2.53E+00	2.53E+00	3.21E+00	1.25E+00
	AG-110M	657.75		93.14	8.57E-02	8.57E-02	-6.55E-02	4.07E-02
		677.61		10.53	8.04E-01		-2.77E-01	3.83E-01
		706.67		16.46	5.38E-01		-1.10E-02	2.56E-01
		763.93		21.98	4.29E-01		-2.49E-02	2.04E-01
		884.67		71.63	1.16E-01		-3.99E-02	5.42E-02
		1384.27		23.94	3.75E-01		1.23E-01	1.71E-01
	CD-113M	263.70		0.02	2.57E+02	2.57E+02	-3.76E+01	1.25E+02
	SN-113	255.12		1.93	3.21E+00	1.08E-01	3.04E-01	1.56E+00
		391.69		64.90	1.08E-01		2.43E-02	5.23E-02
	TE123M	159.00		84.10	6.56E-02	6.56E-02	1.17E-02	3.22E-02
	SB-124	602.71		97.87	8.09E-02	8.09E-02	-2.70E-02	3.85E-02
		645.85		7.26	1.10E+00		-8.73E-02	5.20E-01
		722.78		11.10	8.10E-01		-3.83E-03	3.85E-01
		1691.02		49.00	1.56E-01		2.25E-02	6.76E-02
	I-125	35.49		6.49	4.37E-01	4.37E-01	3.53E-01	2.14E-01
	SB-125	176.33		6.89	8.07E-01	2.35E-01	-2.53E-01	3.95E-01
		427.89		29.33	2.35E-01		1.67E-02	1.13E-01
		463.38		10.35	7.33E-01		9.70E-01	3.53E-01
		600.56		17.80	4.47E-01		-9.40E-02	2.13E-01
		635.90		11.32	7.21E-01		1.15E-01	3.44E-01
	SB-126	414.70		83.30	9.84E-02	9.84E-02	5.61E-03	4.74E-02
		666.33		99.60	1.06E-01		7.39E-03	5.04E-02
		695.00		99.60	1.04E-01		-2.68E-03	4.95E-02
		720.50		53.80	1.98E-01		1.28E-02	9.42E-02
+	SN-126	87.57	*	37.00	2.53E-01	2.53E-01	3.21E-01	1.25E-01
	SB-127	473.00		25.00	4.81E-01	4.19E-01	-6.47E-02	2.30E-01
		685.20		35.70	4.19E-01		6.36E-02	1.99E-01
		783.80		14.70	1.10E+00		4.72E-01	5.23E-01
	I-129	29.78		57.00	4.55E-02	4.55E-02	-2.38E-02	2.23E-02
		33.60		13.20	2.00E-01		-3.55E-02	9.80E-02
		39.58		7.52	3.64E-01		-5.89E-01	1.79E-01
	I-131	284.30		6.05	1.36E+00	9.88E-02	-3.49E-03	6.60E-01
		364.48		81.20	9.88E-02		1.95E-02	4.76E-02
		636.97		7.26	1.39E+00		-6.33E-01	6.60E-01
		722.89		1.80	6.27E+00		-2.97E-02	2.98E+00
	TE-132	49.72		13.10	4.98E-01	1.34E-01	2.23E-01	2.45E-01
		228.16		88.00	1.34E-01		-3.84E-04	6.53E-02
	BA-133	81.00		33.00	1.71E-01	1.54E-01	-1.08E-01	8.43E-02
		302.84		17.80	3.67E-01		-6.20E-02	1.78E-01
		356.01		60.00	1.54E-01		-1.35E-03	7.49E-02
	I-133	529.87		86.30	9.84E-01	9.84E-01	1.64E-01	4.71E-01
	XE-133	81.00		38.00	2.22E-01	2.22E-01	-1.40E-01	1.09E-01
	CS-134	563.23		8.38	9.14E-01	9.51E-02	-1.36E-01	4.37E-01
		569.32		15.43	4.76E-01		-4.64E-02	2.27E-01

Analysis Report for 1604147-03

J1V8X3 SAF: RC-189

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
CS-134	604.70	97.60	9.51E-02	9.51E-02	-1.18E-02	4.57E-02
	795.84	85.40	1.06E-01		9.17E-03	5.00E-02
	801.93	8.73	1.00E+00		-6.90E-01	4.74E-01
CS-135	268.24	16.00	4.07E-01	4.07E-01	-1.90E-03	1.98E-01
I-135	1131.51	22.50	1.07E+03	7.98E+02	2.92E+02	5.03E+02
	1260.41	28.60	7.98E+02		-1.11E+01	3.72E+02
	1678.03	9.54	1.52E+03		-4.01E+00	6.56E+02
CS-136	153.22	7.46	8.49E-01	9.39E-02	9.80E-02	4.16E-01
	163.89	4.61	1.36E+00		-6.90E-01	6.68E-01
	176.55	13.56	4.81E-01		-1.51E-01	2.35E-01
	273.65	12.66	6.24E-01		8.30E-02	3.04E-01
	340.57	48.50	1.82E-01		-1.34E-02	8.86E-02
	818.50	99.70	9.39E-02		7.58E-03	4.40E-02
	1048.07	79.60	1.62E-01		5.46E-02	7.65E-02
	1235.34	19.70	8.89E-01		4.67E-01	4.23E-01
CS-137	661.65	85.12	1.05E-01	1.05E-01	6.69E-02	4.99E-02
LA-138	788.74	34.00	2.61E-01	1.28E-01	-7.05E-02	1.24E-01
	1435.80	66.00	1.28E-01		-2.80E-02	5.75E-02
CE-139	165.85	80.35	6.83E-02	6.83E-02	-2.40E-02	3.34E-02
BA-140	162.64	6.70	9.45E-01	3.71E-01	-1.95E-01	4.63E-01
	304.84	4.00	1.68E+00		1.15E-01	8.15E-01
	423.70	3.20	2.52E+00		-9.98E-01	1.21E+00
	437.55	2.00	4.03E+00		-5.53E-01	1.94E+00
	537.32	25.00	3.71E-01		1.07E-01	1.78E-01
LA-140	328.77	20.50	3.96E-01	1.12E-01	1.40E-01	1.92E-01
	487.03	45.50	1.81E-01		-4.23E-02	8.66E-02
	815.85	23.50	3.96E-01		-1.54E-01	1.86E-01
	1596.49	95.49	1.12E-01		-4.18E-03	5.05E-02
CE-141	145.44	48.40	1.19E-01	1.19E-01	1.86E-02	5.82E-02
CE-143	57.36	11.80	1.50E+00	8.90E-01	-1.24E+00	7.41E-01
	293.26	42.00	8.90E-01		1.60E+00	4.35E-01
	664.55	5.20	8.04E+00		3.87E+00	3.84E+00
CE-144	133.54	10.80	4.93E-01	4.93E-01	-3.83E-02	2.42E-01
PM-144	476.78	42.00	1.78E-01	8.16E-02	8.73E-02	8.53E-02
	618.01	98.60	8.16E-02		-2.47E-02	3.89E-02
	696.49	99.49	8.76E-02		-2.77E-02	4.17E-02
PM-145	36.85	21.70	1.26E-01	6.87E-02	4.50E-02	6.17E-02
	37.36	39.70	6.87E-02		-7.52E-03	3.37E-02
	42.30	15.10	1.97E-01		6.49E-03	9.67E-02
	72.40	2.31	2.43E+00		3.77E-01	1.20E+00
PM-146	453.90	39.84	1.74E-01	1.74E-01	5.01E-03	8.34E-02
	735.90	14.01	5.85E-01		1.34E-02	2.77E-01
	747.13	13.10	6.69E-01		2.30E-01	3.17E-01
ND-147	91.11	28.90	2.31E-01	2.31E-01	4.96E-01	1.14E-01
	531.02	13.10	6.39E-01		-6.12E-02	3.30E-01
PM-149	285.90	3.10	5.25E+00	5.25E+00	1.34E+00	2.55E+00
EU-152	121.78	20.50	2.38E-01	2.38E-01	-9.45E-02	1.17E-01
	244.69	5.40	1.34E+00		-1.46E-01	6.55E-01
	344.27	19.13	3.48E-01		6.41E-02	1.69E-01
	778.89	9.20	9.63E-01		-1.09E-01	4.56E-01
	964.01	10.40	1.17E+00		-2.77E-02	5.57E-01
	1085.78	7.22	1.40E+00		-5.73E-01	6.54E-01
	1112.02	9.60	1.12E+00		-2.64E-01	5.27E-01

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J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	EU-152	1407.95		14.94	5.96E-01	2.38E-01	2.03E-01	3.20E-01
	GD-153	97.43		31.30	1.55E-01	1.55E-01	-4.82E-03	7.65E-02
		103.18		22.20	2.13E-01		5.66E-02	1.04E-01
	EU-154	123.07		40.50	1.23E-01	1.23E-01	-5.08E-03	6.06E-02
		723.30		19.70	4.58E-01		-3.28E-02	2.18E-01
		873.19		11.50	7.35E-01		-1.69E-02	3.44E-01
		996.32		10.30	8.73E-01		-1.79E-02	4.07E-01
		1004.76		17.90	5.17E-01		1.60E-01	2.42E-01
		1274.45		35.50	3.48E-01		4.83E-02	1.64E-01
	EU-155	86.50		30.90	1.69E-01	1.69E-01	-3.28E-02	8.34E-02
		105.30		20.70	2.26E-01		6.39E-02	1.11E-01
	EU-156	811.77		10.40	9.59E-01	9.59E-01	5.12E-02	4.52E-01
		1153.47		7.20	1.78E+00		4.11E-01	8.34E-01
		1230.71		8.90	1.76E+00		1.61E-01	8.34E-01
	HO-166M	184.41		72.60	8.84E-02	8.84E-02	1.06E-01	4.33E-02
		280.45		29.60	2.21E-01		1.42E-01	1.07E-01
		410.94		11.10	6.08E-01		1.15E-01	2.93E-01
		711.69		54.10	1.57E-01		-4.69E-02	7.44E-02
	TM-171	66.72		0.14	3.22E+01	3.22E+01	1.80E+01	1.59E+01
	HF-172	81.75		4.52	1.18E+00	4.65E-01	-2.72E+00	5.82E-01
		125.81		11.30	4.65E-01		1.44E-02	2.28E-01
	LU-172	181.53		20.60	4.01E-01	2.24E-01	1.00E-02	1.97E-01
		810.06		16.63	7.10E-01		1.52E-01	3.35E-01
		912.12		15.25	1.36E+00		3.20E+00	6.58E-01
		1093.66		62.50	2.24E-01		9.08E-02	1.05E-01
	LU-173	100.72		5.24	8.73E-01	3.10E-01	-4.88E-01	4.29E-01
		272.11		21.20	3.10E-01		4.57E-02	1.51E-01
	HF-175	343.40		84.00	8.64E-02	8.64E-02	1.50E-02	4.19E-02
	LU-176	88.34		13.30	4.07E-01	6.54E-02	4.93E-01	2.01E-01
		201.83		86.00	7.17E-02		7.91E-03	3.51E-02
		306.78		94.00	6.54E-02		-1.58E-02	3.17E-02
	TA-182	67.75		41.20	1.11E-01	1.11E-01	3.87E-02	5.47E-02
		1121.30		34.90	3.96E-01		2.64E-01	1.88E-01
		1189.05		16.23	7.77E-01		6.07E-02	3.66E-01
		1221.41		26.98	4.93E-01		2.30E-01	2.33E-01
		1231.02		11.44	1.22E+00		1.11E-01	5.75E-01
	IR-192	308.46		29.68	2.10E-01	1.45E-01	-2.01E-02	1.02E-01
		468.07		48.10	1.45E-01		-5.34E-02	6.95E-02
	HG-203	279.19		77.30	8.75E-02	8.75E-02	3.48E-02	4.25E-02
	BI-207	569.67		97.72	7.50E-02	7.50E-02	-7.31E-03	3.58E-02
		1063.62		74.90	1.29E-01		9.13E-03	6.00E-02
+	TL-208	583.14	*	30.22	4.03E-01	4.03E-01	1.16E+00	1.95E-01
		860.37		4.48	2.01E+00		5.20E-01	9.47E-01
		2614.66		35.85	6.12E-01		0.00E+00	2.87E-01
	BI-210M	262.00		45.00	1.34E-01	1.34E-01	3.82E-03	6.51E-02
		300.00		23.00	3.43E-01		4.19E-02	1.68E-01
	PB-210	46.50		4.25	7.60E-01	7.60E-01	2.96E-01	3.73E-01
	PB-211	404.84		2.90	2.23E+00	2.23E+00	-1.19E+00	1.07E+00
		831.96		2.90	3.18E+00		-5.00E-01	1.51E+00
+	BI-212	727.17	*	11.80	7.41E-01	7.41E-01	5.12E-01	3.52E-01
		1620.62		2.75	3.12E+00		1.27E+00	1.39E+00
-	PB-212	238.63	*	44.60	2.36E-01	2.36E-01	1.23E+00	1.16E-01
		300.09		3.41	2.32E+00		2.83E-01	1.13E+00

Analysis Report for 1604147-03

J1V8X3 SAF: RC-169

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
+	BI-214	609.31	*	46.30	2.10E-01	2.10E-01	8.69E-01	1.01E-01
		1120.29		15.10	9.09E-01		7.73E-01	4.32E-01
		1764.49		15.80	7.65E-01		6.87E-01	3.51E-01
		2204.22	*	4.98	1.00E+00		8.85E-01	3.82E-01
+	PB-214	295.21	*	19.19	4.96E-01	2.66E-01	9.37E-01	2.43E-01
		351.92	*	37.19	2.66E-01		7.08E-01	1.30E-01
	RN-219	401.80		6.50	1.01E+00	1.01E+00	3.24E-01	4.86E-01
	RA-223	323.87		3.88	1.66E+00	1.66E+00	-9.13E-01	8.03E-01
	RA-224	240.98		3.95	2.58E+00	2.58E+00	1.32E+01	1.27E+00
	RA-225	40.00		31.00	1.02E-01	1.02E-01	-1.65E-01	5.01E-02
+	RA-226	186.21	*	3.28	2.70E+00	2.70E+00	2.54E+00	1.33E+00
	TH-227	50.10		8.40	4.08E-01	4.08E-01	1.83E-01	2.01E-01
		236.00		11.50	8.21E-01		2.52E+00	4.04E-01
		256.20		6.30	9.62E-01		2.31E-01	4.68E-01
	AC-228	338.32		11.40	6.59E-01	5.44E-01	5.46E-01	3.20E-01
		911.07		27.70	5.44E-01		1.23E+00	2.62E-01
		969.11		16.60	8.14E-01		6.71E-01	3.90E-01
	TH-230	48.44		16.90	1.98E-01	1.98E-01	6.40E-02	9.72E-02
		62.85		4.60	9.29E-01		2.90E-01	4.58E-01
		67.67		0.37	1.21E+01		4.23E+00	5.98E+00
	PA-231	283.67		1.60	3.94E+00	2.84E+00	-5.96E-01	1.92E+00
		302.67		2.30	2.84E+00		-4.79E-01	1.38E+00
	TH-231	25.64		14.70	1.82E-01	1.82E-01	2.15E-02	8.94E-02
		84.21		6.40	7.90E-01		-3.37E+00	3.89E-01
	PA-233	311.98		38.60	1.68E-01	1.68E-01	-1.95E-02	8.13E-02
	PA-234	131.20		20.40	2.63E-01	2.63E-01	1.96E-01	1.29E-01
		883.99		8.80	9.41E-01		2.88E-01	4.45E-01
		946.00		12.00	7.07E-01		-3.17E-01	3.30E-01
	PA-234M	1001.03		0.92	9.94E+00	9.94E+00	-1.03E+00	4.65E+00
	TH-234	63.29		3.80	1.13E+00	1.13E+00	4.27E-01	5.58E-01
	U-235	143.76		10.50	5.20E-01	5.20E-01	2.66E-01	2.55E-01
		163.35		4.70	1.14E+00		-5.75E-01	5.57E-01
		205.31		4.70	1.36E+00		-2.10E-01	6.64E-01
	NP-237	86.50		12.60	4.14E-01	4.14E-01	-8.02E-02	2.04E-01
	NP-239	106.10		22.70	5.07E-01	5.07E-01	1.43E-01	2.49E-01
		228.18		10.70	1.40E+00		-3.08E-01	6.83E-01
		277.60		14.10	1.10E+00		-2.15E-01	5.34E-01
	AM-241	59.54		35.90	1.13E-01	1.13E-01	4.11E-02	5.57E-02
	AM-243	74.67		66.00	9.12E-02	9.12E-02	4.15E-01	4.51E-02
	CM-243	209.75		3.29	1.95E+00	4.52E-01	4.65E-01	9.55E-01
		228.14		10.60	5.81E-01		-1.67E-03	2.84E-01
		277.60		14.00	4.52E-01		-8.85E-02	2.20E-01

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

Analysis Report for 1604147-03

J1V8X3 SAP: RC-189

No Action Level results available for reporting purposes.

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

No Data Review Comments Entered.

****
***** SPECTRAL DATA REPORT *****
****

Sample Title: J1V8X3 SAF: RC-189

Elapsed Live time: 7200
Elapsed Real Time: 7366

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	23	152
17:	186	147	125	134	130	141	112	127
25:	110	96	108	115	98	75	114	103
33:	114	118	91	92	115	102	119	91
41:	93	95	118	123	153	146	157	121
49:	111	132	123	139	154	124	166	137
57:	155	157	182	152	165	199	205	209
65:	163	171	169	216	177	174	167	204
73:	254	361	419	457	429	243	169	152
81:	178	164	166	211	198	191	240	182
89:	196	180	178	238	247	162	127	122
97:	121	126	144	107	119	100	135	114
105:	129	140	114	103	130	113	94	115
113:	137	112	107	120	87	103	114	108
121:	121	118	120	92	109	120	122	128
129:	141	119	109	112	100	110	97	114
137:	100	110	100	113	91	127	111	111
145:	107	101	99	89	79	104	77	98
153:	112	103	93	90	89	103	72	94
161:	74	88	75	80	89	92	90	90
169:	75	101	79	84	85	80	67	78
177:	82	78	91	75	84	88	80	102
185:	134	124	112	101	74	88	74	81
193:	74	68	80	69	83	86	75	82
201:	78	81	69	86	74	67	72	107
209:	107	83	84	65	66	64	85	79
217:	63	80	60	48	74	65	67	73
225:	59	64	67	62	62	68	54	58
233:	66	72	71	78	179	390	327	155
241:	117	104	56	54	59	58	45	56
249:	49	47	55	62	41	51	53	52
257:	49	48	44	52	53	42	41	52
265:	48	39	35	57	49	72	71	58
273:	47	46	38	56	60	47	44	42
281:	46	57	50	44	37	38	49	44
289:	31	48	45	50	55	101	132	119
297:	51	53	48	47	50	40	41	42
305:	26	39	45	37	32	31	34	34
313:	30	33	30	42	32	30	37	33
321:	38	32	36	33	41	35	44	52
329:	52	40	36	34	42	38	36	42
337:	54	83	64	34	36	30	40	30
345:	42	37	41	24	35	69	131	172
353:	80	39	31	37	25	29	29	37
361:	26	24	23	24	23	27	27	29

369:	24	22	23	18	22	30	27	26

Sample Title: J1V8X3 SAF: R0-189

Channel								
377:	28	30	27	24	27	32	35	27
385:	30	26	33	33	25	27	41	34
393:	28	22	20	27	31	23	22	37
401:	23	23	24	25	17	23	19	24
409:	35	19	36	22	20	30	20	29
417:	27	32	24	20	32	30	29	22
425:	20	27	16	26	28	25	25	25
433:	17	20	25	18	27	21	30	21
441:	27	30	19	20	20	27	31	19
449:	28	16	18	19	23	20	27	24
457:	22	17	20	18	20	36	42	34
465:	21	18	18	15	12	19	18	22
473:	29	23	21	23	19	24	27	17
481:	23	23	17	15	15	17	22	28
489:	16	20	26	18	15	18	22	21
497:	9	16	17	10	19	19	22	30
505:	15	14	28	29	34	69	69	44
513:	33	16	22	20	15	23	15	23
521:	19	15	11	20	17	15	19	28
529:	20	20	14	15	19	16	24	17
537:	23	20	18	19	16	22	16	21
545:	20	18	18	12	14	18	15	21
553:	22	13	12	16	16	23	19	11
561:	16	7	22	26	18	18	18	18
569:	9	18	16	13	11	14	15	20
577:	12	12	21	25	31	66	78	84
585:	36	15	11	15	14	20	19	15
593:	9	23	20	18	19	18	18	18
601:	18	15	11	17	6	19	29	67
609:	102	108	41	24	16	10	15	11
617:	17	25	21	17	14	11	24	15
625:	21	15	9	18	16	12	21	17
633:	24	13	13	12	14	7	17	7
641:	17	17	16	12	14	9	10	15
649:	8	15	20	12	10	16	11	8
657:	14	14	10	13	25	23	27	11
665:	16	17	17	7	19	13	13	18
673:	18	15	18	14	17	13	10	12
681:	12	13	28	12	15	11	14	14
689:	15	19	13	15	12	16	13	17
697:	9	20	18	10	18	14	19	15
705:	16	14	10	10	18	14	13	15
713:	14	12	13	14	15	16	16	16
721:	17	14	13	10	7	12	26	22
729:	19	11	10	12	11	17	14	7
737:	14	10	8	7	11	17	12	14
745:	12	12	5	20	11	16	13	12
753:	9	9	14	9	9	17	9	22
761:	17	8	11	15	11	11	14	17
769:	24	15	10	13	10	7	11	11
777:	9	14	9	12	19	16	8	19
785:	16	10	11	13	9	9	12	7
793:	8	8	22	13	16	14	7	13

801:	8	16	8	11	12	9	10	16

Sample Title: J1V8X3 SAF: RC-189

Channel								
809:	13	14	7	7	6	12	10	6
817:	9	15	5	9	5	7	12	7
825:	9	12	8	10	9	14	10	9
833:	13	13	10	15	13	14	17	16
841:	10	12	10	10	9	6	9	13
849:	9	7	13	10	14	6	8	9
857:	9	12	13	14	8	9	12	5
865:	11	9	5	12	5	11	10	7
873:	13	11	9	7	4	6	12	8
881:	4	9	10	7	7	10	9	7
889:	11	11	12	11	9	8	7	5
897:	11	8	7	9	10	9	14	8
905:	14	8	7	7	15	36	54	58
913:	29	21	12	10	4	3	10	8
921:	3	11	10	15	7	9	8	11
929:	6	7	12	8	13	18	6	10
937:	9	9	4	12	7	6	11	8
945:	4	5	10	6	12	4	10	13
953:	9	9	8	11	13	7	7	10
961:	13	14	13	14	18	16	19	19
969:	29	32	13	7	15	14	15	8
977:	10	9	13	4	7	10	11	5
985:	14	7	10	11	7	7	7	4
993:	6	11	12	2	10	6	7	9
1001:	9	6	9	7	6	7	10	7
1009:	5	6	5	7	9	8	6	9
1017:	10	8	9	7	9	11	8	5
1025:	5	9	11	6	3	13	3	9
1033:	10	8	7	6	8	13	4	6
1041:	13	6	5	8	12	12	11	9
1049:	8	12	12	9	12	10	5	6
1057:	7	5	9	7	4	7	7	8
1065:	8	7	11	11	6	8	11	11
1073:	9	13	10	9	10	7	9	13
1081:	9	15	6	15	5	5	5	5
1089:	6	10	10	9	10	8	6	4
1097:	10	6	10	7	10	5	8	7
1105:	9	8	9	4	14	6	8	10
1113:	4	9	14	10	9	6	25	22
1121:	20	14	13	11	7	12	9	7
1129:	10	7	2	13	13	12	13	7
1137:	8	4	8	8	1	8	9	10
1145:	6	11	4	9	9	12	4	7
1153:	7	8	10	12	10	8	6	8
1161:	11	4	9	6	11	10	9	8
1169:	7	12	7	8	4	8	18	10
1177:	6	10	10	4	5	9	7	12
1185:	9	15	10	8	14	14	5	13
1193:	5	9	13	9	10	8	9	8
1201:	11	11	16	15	6	11	13	13
1209:	10	15	11	10	7	7	6	7
1217:	19	9	10	7	13	15	9	10
1225:	7	8	10	11	11	12	12	12

1233:	8	15	16	15	16	21	13	8

Sample Title: J1V8X3 SAF: RC-189

Channel								
1241:	10	14	14	10	14	11	7	7
1249:	5	6	12	9	6	6	10	6
1257:	9	9	4	7	10	5	6	6
1265:	6	4	10	5	11	8	7	11
1273:	8	8	8	8	14	9	6	5
1281:	13	5	4	4	7	10	2	12
1289:	7	4	7	15	6	7	7	7
1297:	6	10	5	7	3	7	6	4
1305:	2	8	7	4	6	5	13	6
1313:	4	6	6	5	3	4	4	3
1321:	8	6	7	3	2	5	6	8
1329:	2	7	3	6	2	10	2	3
1337:	4	10	6	6	6	4	2	4
1345:	3	2	7	5	6	3	5	6
1353:	0	5	8	3	2	6	7	6
1361:	5	1	7	5	2	3	3	7
1369:	2	2	6	6	8	3	1	4
1377:	6	5	8	6	3	2	2	5
1385:	4	4	3	5	1	1	1	7
1393:	5	5	7	0	5	5	3	5
1401:	4	5	3	3	3	4	6	2
1409:	9	6	4	9	5	4	3	2
1417:	1	4	4	2	7	8	2	0
1425:	4	6	7	2	4	4	1	4
1433:	1	3	7	2	1	6	4	0
1441:	6	2	5	3	2	5	1	5
1449:	2	3	1	3	5	4	4	0
1457:	3	4	26	91	159	190	99	30
1465:	5	1	1	2	1	3	2	6
1473:	1	2	2	1	4	4	3	1
1481:	1	2	2	2	0	1	2	6
1489:	3	3	4	1	7	2	2	2
1497:	3	6	4	2	2	7	2	3
1505:	3	0	4	4	7	2	5	4
1513:	6	3	0	0	1	2	1	1
1521:	2	1	4	3	1	0	1	0
1529:	1	3	4	0	1	3	2	0
1537:	1	0	1	1	0	1	0	1
1545:	4	0	2	0	4	2	0	1
1553:	3	2	1	0	3	0	2	1
1561:	0	2	4	1	3	1	0	1
1569:	4	4	2	2	4	4	0	2
1577:	0	0	2	1	1	3	3	5
1585:	1	2	2	4	4	3	5	7
1593:	10	7	1	3	2	0	1	1
1601:	2	1	1	3	2	2	5	3
1609:	3	1	2	2	4	1	1	1
1617:	4	4	1	2	4	2	4	1
1625:	1	2	1	2	2	3	3	0
1633:	0	2	0	1	3	1	6	1
1641:	1	1	1	1	2	2	4	1
1649:	1	1	3	4	2	2	1	1
1657:	2	0	5	1	3	2	3	2

1665:	2	2	4	1	0	0	2	0

Sample Title: J1V8X3 SAF: KC-189

Channel								
1673:	1	3	2	1	1	1	3	2
1681:	0	0	1	2	2	0	1	4
1689:	0	0	3	2	2	0	3	1
1697:	1	2	3	1	4	1	0	1
1705:	4	0	2	3	1	1	2	2
1713:	2	2	1	1	2	1	3	1
1721:	1	0	3	0	1	0	4	0
1729:	1	2	6	3	4	1	2	3
1737:	0	2	2	2	1	0	2	1
1745:	0	3	1	1	3	2	0	2
1753:	2	0	1	0	1	0	1	0
1761:	1	1	0	9	8	6	8	7
1769:	1	1	1	2	2	1	3	1
1777:	3	1	0	4	2	1	2	1
1785:	2	2	1	0	1	0	1	0
1793:	2	2	0	3	3	2	3	1
1801:	0	2	1	1	1	4	2	1
1809:	0	0	4	2	1	1	2	0
1817:	2	3	0	1	0	0	0	0
1825:	0	1	2	0	1	0	2	0
1833:	0	0	1	1	1	1	2	1
1841:	0	1	0	2	0	1	1	4
1849:	1	1	1	1	3	0	1	2
1857:	2	0	3	1	1	2	1	1
1865:	1	1	1	1	2	3	0	0
1873:	1	2	1	3	2	3	0	0
1881:	1	2	2	1	0	1	3	0
1889:	0	1	1	3	0	0	1	4
1897:	0	1	2	1	3	1	3	1
1905:	2	0	2	1	0	3	1	1
1913:	0	1	1	0	1	0	2	0
1921:	1	0	3	0	3	2	2	1
1929:	2	0	4	3	1	4	2	2
1937:	0	1	0	0	1	0	0	2
1945:	0	4	3	2	4	1	2	1
1953:	2	0	2	1	0	0	4	2
1961:	1	2	0	2	2	2	3	1
1969:	0	2	0	1	2	2	3	0
1977:	0	1	0	1	2	2	0	2
1985:	1	0	2	1	1	2	2	0
1993:	3	1	0	2	1	1	0	0
2001:	1	0	1	0	1	3	3	2
2009:	1	0	0	2	2	3	2	1
2017:	1	1	1	0	0	0	2	1
2025:	2	3	1	2	1	0	2	1
2033:	2	1	2	1	1	0	1	1
2041:	0	1	0	1	1	0	1	0
2049:	1	2	1	0	0	4	2	0
2057:	1	1	2	1	2	0	0	0
2065:	1	1	2	0	3	1	1	0
2073:	0	0	0	0	1	1	4	1
2081:	2	1	2	1	1	1	1	0
2089:	1	1	1	2	1	2	1	1

2097: 0 2 0 2 2 2 1 2

Sample Title: J1V8X3 SAF: RC-189

Channel								
2105:	6	1	2	0	1	2	0	1
2113:	1	2	2	3	1	1	3	0
2121:	3	2	2	2	0	1	1	1
2129:	2	1	2	0	1	3	2	0
2137:	2	1	1	0	1	1	0	1
2145:	3	0	1	1	1	1	2	1
2153:	1	2	2	0	2	0	0	0
2161:	1	0	0	2	2	1	1	1
2169:	0	2	4	1	0	0	1	0
2177:	1	2	0	1	0	2	1	1
2185:	2	0	2	0	2	0	0	0
2193:	5	3	1	1	0	1	0	0
2201:	1	1	1	0	2	3	4	0
2209:	1	0	2	0	0	1	4	0
2217:	1	1	0	1	1	1	2	1
2225:	1	0	0	1	3	0	1	3
2233:	0	4	2	1	0	0	2	2
2241:	2	0	2	1	0	0	1	1
2249:	1	2	1	2	2	1	2	1
2257:	0	1	0	3	1	0	1	5
2265:	2	0	0	0	1	3	0	1
2273:	2	0	0	1	3	2	1	1
2281:	1	1	2	0	2	4	0	3
2289:	3	1	1	1	0	2	0	1
2297:	0	1	2	1	0	2	2	2
2305:	2	0	3	0	2	1	0	1
2313:	1	0	1	2	1	1	2	1
2321:	1	1	1	0	1	1	1	3
2329:	1	2	0	1	2	2	0	2
2337:	1	2	0	0	2	2	0	0
2345:	0	0	0	4	3	0	2	1
2353:	4	1	2	1	0	1	1	1
2361:	3	3	1	0	2	2	1	2
2369:	0	2	0	1	2	1	3	2
2377:	2	1	3	3	2	1	0	0
2385:	1	1	2	2	0	0	6	0
2393:	0	1	2	0	2	0	2	1
2401:	0	1	0	0	0	0	1	0
2409:	1	0	3	3	0	1	1	3
2417:	1	2	1	0	0	3	0	1
2425:	1	0	1	1	0	2	0	0
2433:	2	1	0	1	0	0	0	0
2441:	0	0	1	2	0	0	0	2
2449:	1	2	2	1	1	1	1	0
2457:	2	2	1	0	0	1	0	1
2465:	5	1	0	0	0	0	1	0
2473:	0	1	3	2	0	0	0	0
2481:	0	1	0	3	1	0	0	1
2489:	1	0	2	0	1	0	1	0
2497:	1	0	0	0	0	0	0	2
2505:	1	1	1	1	0	2	4	1
2513:	2	0	0	0	0	1	1	1
2521:	1	0	0	0	0	0	0	0

2529:	0	0	0	1	1	1	0	1

Sample Title: J1V8X3 SAF: R0-189

Channel								
2537:	0	1	1	1	1	0	0	1
2545:	0	0	1	2	0	1	0	0
2553:	1	0	0	1	0	2	0	0
2561:	1	1	2	0	0	0	0	0
2569:	0	0	1	1	0	0	1	0
2577:	0	0	0	1	2	0	0	3
2585:	0	0	0	2	1	0	0	0
2593:	1	2	0	1	1	0	0	0
2601:	0	0	2	1	2	0	0	0
2609:	0	0	0	0	2	1	10	19
2617:	28	12	8	1	0	0	1	0
2625:	0	1	0	1	0	0	0	1
2633:	0	1	1	0	0	1	0	0
2641:	0	1	1	1	0	1	0	0
2649:	0	0	0	0	0	0	0	1
2657:	0	0	0	0	0	0	0	1
2665:	0	0	0	0	0	0	0	0
2673:	0	1	1	0	0	0	2	1
2681:	0	0	0	1	1	1	1	0
2689:	0	0	2	1	1	0	0	0
2697:	0	0	0	0	0	0	0	0
2705:	2	1	0	0	0	0	0	2
2713:	1	0	0	1	0	1	0	0
2721:	0	0	0	1	0	0	0	0
2729:	0	0	0	0	0	0	0	3
2737:	1	0	0	0	1	0	0	0
2745:	0	0	0	0	0	1	1	0
2753:	2	0	0	0	0	0	0	0
2761:	0	0	1	0	0	1	1	0
2769:	0	0	0	0	0	0	1	0
2777:	0	0	0	0	1	0	0	0
2785:	0	0	0	0	0	0	0	0
2793:	0	0	0	0	0	0	1	0
2801:	0	1	1	0	1	0	0	0
2809:	1	0	0	0	1	0	0	0
2817:	0	0	1	0	0	0	0	0
2825:	0	0	0	1	0	0	0	1
2833:	0	0	0	2	0	0	2	1
2841:	0	0	0	0	0	0	2	0
2849:	1	1	0	0	1	0	0	1
2857:	0	0	0	0	1	0	1	1
2865:	0	0	0	1	0	0	1	0
2873:	0	1	0	0	0	0	0	0
2881:	0	0	0	0	1	0	1	0
2889:	0	0	0	0	1	0	1	1
2897:	0	0	0	0	0	0	0	1
2905:	0	1	1	0	0	0	0	0
2913:	0	0	0	0	1	1	2	0
2921:	0	0	1	1	2	1	0	0
2929:	0	0	0	0	0	0	0	0
2937:	1	0	0	0	1	0	0	0
2945:	0	0	0	0	0	0	0	0
2953:	0	1	0	0	0	0	0	0

2961:	0	0	1	0	0	0	0	0

Sample Title: J1V8X3 SAF: RC-189

Channel								
2969:	0	0	0	0	0	1	1	2
2977:	0	1	0	0	0	0	1	0
2985:	0	2	0	0	2	0	0	1
2993:	1	1	1	0	0	0	1	1
3001:	0	1	0	0	0	1	0	0
3009:	0	0	0	1	1	0	0	1
3017:	1	0	0	1	0	0	1	0
3025:	0	1	0	0	0	0	0	0
3033:	0	0	0	2	0	1	0	1
3041:	0	1	1	0	0	1	0	0
3049:	0	0	0	1	0	0	0	1
3057:	1	0	0	1	0	0	0	1
3065:	1	0	0	1	0	1	0	0
3073:	1	0	0	1	0	0	0	0
3081:	0	0	0	0	1	0	2	0
3089:	0	1	0	0	0	1	0	0
3097:	0	0	0	1	2	1	0	1
3105:	0	0	2	1	0	0	0	0
3113:	0	0	0	0	1	0	2	0
3121:	0	0	0	0	0	0	0	1
3129:	0	0	1	0	0	0	0	0
3137:	1	0	1	0	0	0	1	1
3145:	0	0	0	0	0	1	1	0
3153:	0	0	0	0	0	0	0	0
3161:	1	1	0	1	1	0	0	0
3169:	0	1	0	1	0	0	1	0
3177:	0	1	1	1	0	1	1	0
3185:	0	0	0	0	0	0	0	0
3193:	0	0	0	0	0	0	0	0
3201:	1	0	0	0	1	0	0	0
3209:	0	0	1	0	0	1	0	0
3217:	1	0	0	0	0	0	0	4
3225:	1	0	2	0	0	0	0	0
3233:	0	0	0	0	0	0	0	0
3241:	1	0	0	0	0	1	0	0
3249:	0	0	0	0	0	0	0	0
3257:	1	0	1	1	1	0	1	0
3265:	0	0	0	0	0	1	0	0
3273:	1	0	0	0	0	1	0	2
3281:	0	0	0	1	0	0	0	1
3289:	0	0	1	0	0	0	0	0
3297:	0	0	0	0	1	0	1	1
3305:	0	0	1	0	0	0	0	0
3313:	0	0	0	0	0	0	0	0
3321:	0	0	1	0	0	0	1	0
3329:	0	0	0	0	0	0	0	0
3337:	1	0	0	0	0	0	0	0
3345:	0	1	0	0	0	0	0	0
3353:	1	1	1	0	0	1	1	1
3361:	0	0	1	0	0	0	0	1
3369:	1	1	0	1	1	1	0	0
3377:	0	1	0	0	0	0	1	0
3385:	0	0	0	0	0	0	1	0

3393:	0	1	0	0	0	0	0	0

Sample Title: J1V8X3 SAF: RC-189

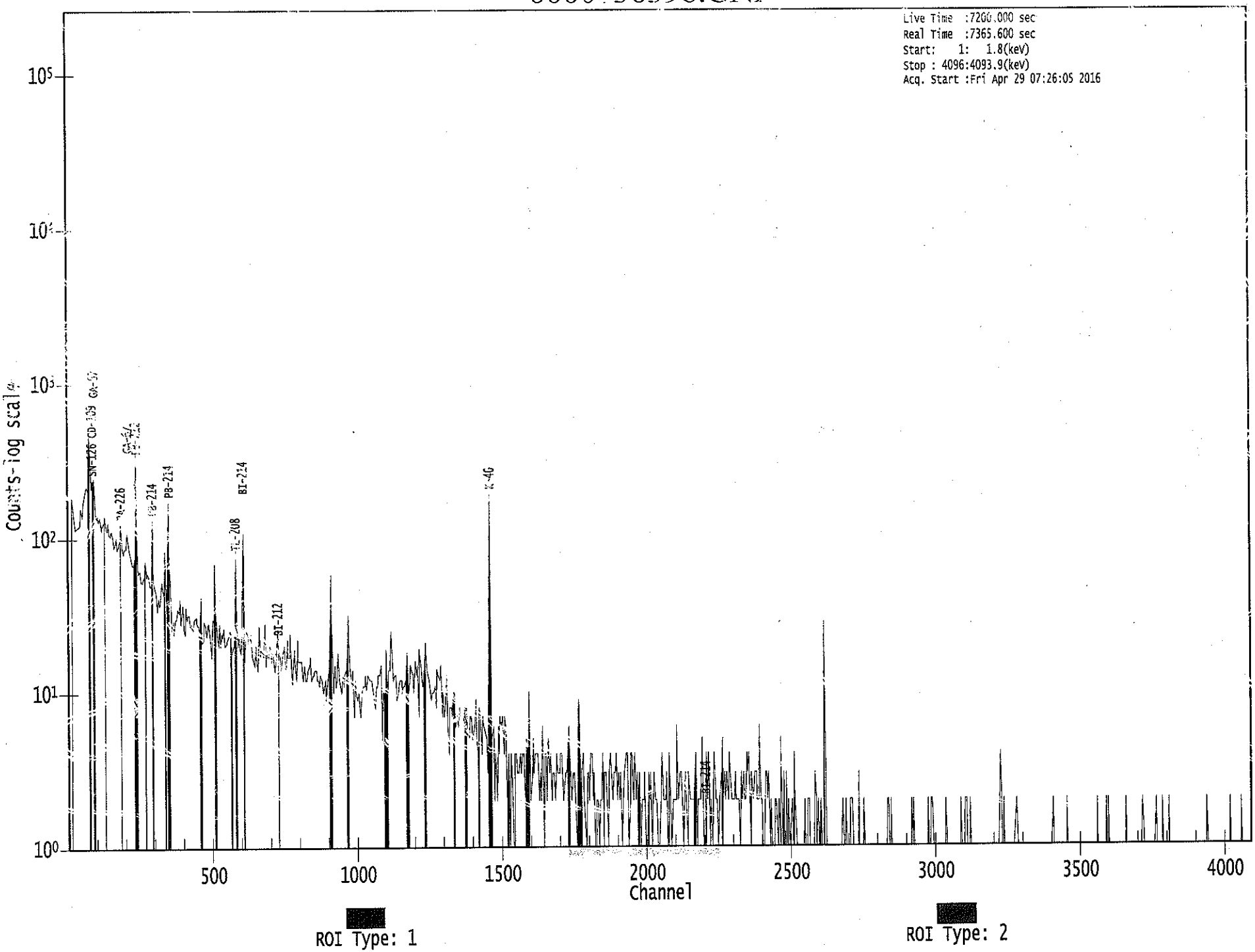
Channel								
3401:	1	0	0	0	0	2	2	0
3409:	0	0	0	0	0	0	0	0
3417:	0	0	1	0	0	0	0	0
3425:	0	0	0	0	0	0	0	1
3433:	1	0	0	1	0	1	0	0
3441:	0	0	0	0	0	0	1	0
3449:	0	0	0	0	0	2	0	1
3457:	1	0	0	0	0	0	0	0
3465:	0	0	0	0	0	0	1	0
3473:	1	0	0	1	0	0	1	1
3481:	0	0	0	0	0	0	0	0
3489:	0	0	0	0	0	0	1	1
3497:	0	0	1	1	0	0	0	0
3505:	0	1	0	0	0	0	0	0
3513:	0	0	0	0	0	0	0	0
3521:	1	1	0	0	0	0	0	1
3529:	1	0	0	1	0	0	0	1
3537:	1	0	0	0	0	1	0	0
3545:	0	0	0	1	0	1	0	1
3553:	0	0	0	0	0	0	2	0
3561:	0	0	0	0	0	1	0	1
3569:	0	0	0	0	0	0	1	0
3577:	0	0	0	0	1	0	0	0
3585:	0	0	0	0	0	0	0	2
3593:	0	0	0	0	2	0	0	0
3601:	1	0	0	0	0	0	0	0
3609:	0	0	0	0	0	0	0	0
3617:	0	0	0	0	0	0	0	0
3625:	0	0	0	0	0	0	0	0
3633:	1	0	0	0	1	0	1	0
3641:	0	0	0	0	0	0	0	0
3649:	0	0	0	1	0	0	0	0
3657:	0	1	2	0	0	0	0	0
3665:	0	0	0	0	0	0	0	1
3673:	0	0	0	0	1	0	0	0
3681:	0	0	0	0	0	0	0	0
3689:	1	0	0	0	0	0	0	0
3697:	1	1	0	0	0	0	1	0
3705:	0	0	0	0	1	0	0	1
3713:	0	0	1	0	2	1	1	1
3721:	0	1	0	0	0	0	0	1
3729:	0	0	0	0	1	0	0	1
3737:	0	0	0	1	0	0	0	0
3745:	0	0	0	0	0	0	0	0
3753:	0	0	0	0	0	1	0	0
3761:	0	0	0	0	0	0	0	0
3769:	0	0	0	0	0	0	0	0
3777:	0	0	0	0	0	0	0	0
3785:	2	0	0	0	0	0	0	0
3793:	1	0	0	1	0	0	0	0
3801:	0	0	0	0	0	1	0	2
3809:	0	0	0	0	0	0	0	0
3817:	0	1	0	0	0	0	1	0

3825:	0	1	0	0	0	0	0	0

Sample Title: J1V8X3 SAF: RC-189

Channel								
3833:	1	0	0	0	0	0	0	0
3841:	0	0	0	0	0	1	0	0
3849:	0	0	0	0	0	1	1	0
3857:	0	0	1	1	1	0	0	0
3865:	0	1	0	1	1	0	0	0
3873:	0	0	0	0	0	0	1	0
3881:	0	0	0	1	0	0	0	0
3889:	1	0	0	0	0	1	0	0
3897:	0	0	0	0	0	0	1	0
3905:	0	0	0	0	0	0	0	0
3913:	0	0	0	0	0	1	1	0
3921:	1	0	0	0	0	0	1	0
3929:	0	0	0	0	0	0	0	0
3937:	1	2	0	0	2	0	0	0
3945:	0	0	0	0	0	0	0	0
3953:	1	1	0	1	0	0	0	0
3961:	0	0	0	0	0	0	0	0
3969:	0	0	0	0	0	0	0	0
3977:	0	1	0	0	1	0	0	0
3985:	0	0	0	1	0	0	0	0
3993:	0	0	0	0	0	0	0	0
4001:	0	0	0	0	0	0	0	0
4009:	0	0	1	0	0	0	0	0
4017:	1	0	0	2	0	0	0	0
4025:	0	0	0	1	0	0	0	0
4033:	0	0	0	0	1	0	0	0
4041:	0	0	0	1	0	0	0	0
4049:	1	0	0	0	0	0	0	0
4057:	2	0	0	0	0	0	0	0
4065:	0	0	0	0	1	0	0	0
4073:	1	1	0	0	0	0	1	0
4081:	0	0	0	0	0	0	0	0
4089:	0	0	0	0	0	0	1	0

0000036398.CNF



Apex-Gamma

Analysis Report for 1604147-04
J1V8X3 SAF: RC-189

JLM

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1604147-04
Sample Description	: J1V8X3 SAF: RC-189
Sample Type	: SOIL
Sample Size	: 7.115E+02 grams
Facility	: Countroom
Sample Taken On	: 4/26/2016 7:30:05AM
Acquisition Started	: 4/29/2016 9:28:56AM
Procedure	: GAS-1402 pCi
Operator	: Administrator
Detector Name	: GE4
Geometry	: GAS-1402
Live Time	: 7200.0 seconds
Real Time	: 7457.7 seconds
Dead Time	: 3.46 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 15 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 10/25/2014
Efficiency Calibration Used Done On	: 11/8/2014
Efficiency Calibration Description	:
Sample Number	: 36896

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

PEAK LOCATE REPORT

Peak Locate Performed on : 5/11/2016 10:50:34AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096
Peak Search Sensitivity : 2.50

Peak No.	Energy (keV)	Centroid Channel	Centroid Uncertainty	Peak Significance
1	76.33	75.60	0.0000	0.00
2	87.07	86.34	0.0000	0.00
3	92.83	92.11	0.0000	0.00
4	129.89	129.18	0.0000	0.00
5	162.60	161.91	0.0000	0.00
6	169.66	168.97	0.0000	0.00
7	186.14	185.45	0.0000	0.00
8	239.21	238.54	0.0000	0.00
9	270.56	269.91	0.0000	0.00
10	295.62	294.98	0.0000	0.00
11	339.26	338.64	0.0000	0.00
12	352.35	351.74	0.0000	0.00
13	462.64	462.08	0.0000	0.00
14	510.87	510.33	0.0000	0.00
15	583.54	583.04	0.0000	0.00
16	609.36	608.87	0.0000	0.00
17	617.10	616.61	0.0000	0.00
18	770.96	770.55	0.0000	0.00
19	863.35	862.98	0.0000	0.00
20	911.28	910.94	0.0000	0.00
21	968.96	968.65	0.0000	0.00
22	1120.63	1120.41	0.0000	0.00
23	1270.01	1269.87	0.0000	0.00
24	1461.62	1461.59	0.0000	0.00
25	1582.79	1582.84	0.0000	0.00
26	1765.31	1765.47	0.0000	0.00
27	2060.19	2060.56	0.0000	0.00
28	2105.36	2105.76	0.0000	0.00
29	2143.08	2143.50	0.0000	0.00
30	2150.57	2151.00	0.0000	0.00
31	2205.03	2205.50	0.0000	0.00
32	2258.48	2258.98	0.0000	0.00
33	2267.53	2268.04	0.0000	0.00
34	2349.18	2349.75	0.0000	0.00
35	2424.64	2425.27	0.0000	0.00
36	2436.37	2437.00	0.0000	0.00
37	2476.52	2477.18	0.0000	0.00
38	2615.68	2616.46	0.0000	0.00

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/11/2016 10:50:34AM

Peak Analysis From Channel : 1

Peak Analysis To Channel : 4096

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	76.33	70 -	96	75.60	1.35E+03	172.99	3.44E+03	4.39
m	2	87.07	70 -	96	86.34	4.51E+02	175.02	3.38E+03	4.00
m	3	92.83	70 -	96	92.11	4.93E+02	150.77	2.66E+03	3.86
	4	129.89	126 -	132	129.18	1.24E+02	89.41	1.36E+03	3.50
	5	162.60	158 -	165	161.91	9.68E+01	88.63	1.24E+03	3.48
	6	169.66	166 -	171	168.97	6.06E+01	67.15	8.51E+02	1.80
	7	186.14	181 -	188	185.45	1.70E+02	92.00	1.29E+03	2.60
	8	239.21	232 -	244	238.54	8.88E+02	131.12	1.60E+03	2.55
	9	270.56	267 -	272	269.91	8.75E+01	53.95	5.11E+02	2.60
	10	295.62	291 -	299	294.98	2.15E+02	75.51	7.51E+02	2.17
	11	339.26	333 -	346	338.64	2.49E+02	88.25	7.50E+02	3.02
	12	352.35	347 -	357	351.74	3.55E+02	77.79	6.22E+02	2.34
	13	462.64	458 -	466	462.08	5.71E+01	48.69	3.32E+02	2.07
	14	510.87	502 -	518	510.33	2.14E+02	82.68	5.69E+02	3.28
	15	583.54	578 -	589	583.04	2.43E+02	58.17	3.06E+02	3.18
	16	609.36	601 -	614	608.87	3.09E+02	67.65	3.72E+02	2.73
	17	617.10	614 -	620	616.61	3.36E+01	30.17	1.43E+02	2.66
	18	770.96	766 -	777	770.55	4.45E+01	44.23	2.23E+02	3.63
	19	863.35	856 -	872	862.98	4.97E+01	48.27	1.99E+02	3.65
	20	911.28	904 -	918	910.94	1.52E+02	51.72	2.18E+02	2.78
	21	968.96	963 -	974	968.65	1.09E+02	44.41	1.91E+02	2.02
	22	1120.63	1112 -	1123	1120.41	4.30E+01	44.18	2.24E+02	2.73
	23	1270.01	1266 -	1274	1269.87	2.61E+01	25.15	8.19E+01	5.45
	24	1461.62	1454 -	1469	1461.59	5.79E+02	55.82	8.08E+01	2.99
	25	1582.79	1578 -	1587	1582.84	1.37E+01	15.13	2.47E+01	2.98
	26	1765.31	1760 -	1770	1765.47	3.40E+01	17.35	2.20E+01	2.41
	27	2060.19	2057 -	2063	2060.56	9.00E+00	6.00	0.00E+00	1.66
	28	2105.36	2102 -	2110	2105.76	1.35E+01	9.18	5.06E+00	3.35
	29	2143.08	2139 -	2147	2143.50	1.40E+01	7.48	0.00E+00	5.75
	30	2150.57	2148 -	2153	2151.00	8.00E+00	5.66	0.00E+00	1.16
	31	2205.03	2200 -	2210	2205.50	1.60E+01	8.00	0.00E+00	2.90
	32	2258.48	2253 -	2263	2258.98	9.13E+00	8.85	5.75E+00	2.72
	33	2267.53	2265 -	2270	2268.04	5.13E+00	7.07	5.75E+00	2.59
	34	2349.18	2347 -	2353	2349.75	1.07E+01	7.76	2.58E+00	1.38
	35	2424.64	2421 -	2428	2425.27	6.19E+00	6.93	3.63E+00	2.51
	36	2436.37	2432 -	2441	2437.00	1.20E+01	6.93	0.00E+00	3.50
	37	2476.52	2471 -	2482	2477.18	1.10E+01	6.63	0.00E+00	1.98
	38	2615.68	2612 -	2620	2616.46	5.88E+01	16.26	4.43E+00	2.40

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/11/2016 10:50:34AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
M	1	76.33	70 -	96	1.35E+03	172.99	3.44E+03	9.64E+01
m	2	87.07	70 -	96	4.51E+02	175.02	3.38E+03	9.56E+01
m	3	92.83	70 -	96	4.93E+02	150.77	2.66E+03	8.47E+01
	4	129.89	126 -	132	1.24E+02	89.41	1.36E+03	7.12E+01
	5	162.60	158 -	165	9.68E+01	88.63	1.24E+03	7.10E+01
	6	169.66	166 -	171	6.06E+01	67.15	8.51E+02	5.37E+01
	7	186.14	181 -	188	1.70E+02	92.00	1.29E+03	7.25E+01
	8	239.21	232 -	244	8.88E+02	131.12	1.60E+03	9.60E+01
	9	270.56	267 -	272	8.75E+01	53.95	5.11E+02	4.16E+01
	10	295.62	291 -	299	2.15E+02	75.51	7.51E+02	5.72E+01
	11	339.26	333 -	346	2.49E+02	88.25	7.50E+02	6.77E+01
	12	352.35	347 -	357	3.55E+02	77.79	6.22E+02	5.59E+01
	13	462.64	458 -	466	5.71E+01	48.69	3.32E+02	3.80E+01
	14	510.87	502 -	518	2.14E+02	82.68	5.69E+02	6.36E+01
	15	583.54	578 -	589	2.43E+02	58.17	3.06E+02	4.04E+01
	16	609.36	601 -	614	3.09E+02	67.65	3.72E+02	4.75E+01
	17	617.10	614 -	620	3.36E+01	30.17	1.43E+02	2.29E+01
	18	770.96	766 -	777	4.45E+01	44.23	2.23E+02	3.47E+01
	19	863.35	856 -	872	4.97E+01	48.27	1.99E+02	3.79E+01
	20	911.28	904 -	918	1.52E+02	51.72	2.18E+02	3.74E+01
	21	968.96	963 -	974	1.09E+02	44.41	1.91E+02	3.22E+01
	22	1120.63	1112 -	1123	4.30E+01	44.18	2.24E+02	3.47E+01
	23	1270.01	1266 -	1274	2.61E+01	25.15	8.19E+01	1.89E+01
	24	1461.62	1454 -	1469	5.79E+02	55.82	8.08E+01	2.33E+01
	25	1582.79	1578 -	1587	1.37E+01	15.13	2.47E+01	1.09E+01
	26	1765.31	1760 -	1770	3.40E+01	17.35	2.20E+01	1.06E+01
	27	2060.19	2057 -	2063	9.00E+00	6.00	0.00E+00	0.00E+00
	28	2105.36	2102 -	2110	1.35E+01	9.18	5.06E+00	4.53E+00
	29	2143.08	2139 -	2147	1.40E+01	7.48	0.00E+00	0.00E+00
	30	2150.57	2148 -	2153	8.00E+00	5.66	0.00E+00	0.00E+00
	31	2205.03	2200 -	2210	1.60E+01	8.00	0.00E+00	0.00E+00

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
32	2258.48	2253 -	2263	9.13E+00	8.85	5.75E+00	5.31E+00
33	2267.53	2265 -	2270	5.13E+00	7.07	5.75E+00	4.46E+00
34	2349.18	2347 -	2353	1.07E+01	7.76	2.58E+00	3.43E+00
35	2424.64	2421 -	2428	6.19E+00	6.93	3.63E+00	3.96E+00
36	2436.37	2432 -	2441	1.20E+01	6.93	0.00E+00	0.00E+00
37	2476.52	2471 -	2482	1.10E+01	6.63	0.00E+00	0.00E+00
38	2615.68	2612 -	2620	5.88E+01	16.26	4.43E+00	4.43E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

PEAK WITH NID REPORT

Peak Analysis Performed on : 5/11/2016 10:50:34AM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Tentative NID Library : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB
Peak Match Tolerance : 1.000 keV

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
M	1	76.33	70 -	96	75.60	1.35E+03	172.99	3.44E+03	.....
m	2	87.07	70 -	96	86.34	4.51E+02	175.02	3.38E+03	SN-126 NP-237 EU-155 CD-109
m	3	92.83	70 -	96	92.11	4.93E+02	150.77	2.66E+03	GA-67
	4	129.89	126 -	132	129.18	1.24E+02	89.41	1.36E+03	.....
	5	162.60	158 -	165	161.91	9.68E+01	88.63	1.24E+03	BA-140 U-235
	6	169.66	166 -	171	168.97	6.06E+01	67.15	8.51E+02	.....
	7	186.14	181 -	188	185.45	1.70E+02	92.00	1.29E+03	RA-226
	8	239.21	232 -	244	238.54	8.88E+02	131.12	1.60E+03	PB-212
	9	270.56	267 -	272	269.91	8.75E+01	53.95	5.11E+02	.....
	10	295.62	291 -	299	294.98	2.15E+02	75.51	7.51E+02	PB-214
	11	339.26	333 -	346	338.64	2.49E+02	88.25	7.50E+02	AC-228
	12	352.35	347 -	357	351.74	3.55E+02	77.79	6.22E+02	PB-214
	13	462.64	458 -	466	462.08	5.71E+01	48.69	3.32E+02	SB-125
	14	510.87	502 -	518	510.33	2.14E+02	82.68	5.69E+02	.....
	15	583.54	578 -	589	583.04	2.43E+02	58.17	3.06E+02	TL-208

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
16	609.36	601 -	614	608.87	3.09E+02	67.65	3.72E+02	BI-214
17	617.10	614 -	620	616.61	3.36E+01	30.17	1.43E+02	PM-144
18	770.96	766 -	777	770.55	4.45E+01	44.23	2.23E+02	.....
19	863.35	856 -	872	862.98	4.97E+01	48.27	1.99E+02	.....
20	911.28	904 -	918	910.94	1.52E+02	51.72	2.18E+02	AC-228
								LU-172
21	968.96	963 -	974	968.65	1.09E+02	44.41	1.91E+02	AC-228
22	1120.63	1112 -	1123	1120.41	4.30E+01	44.18	2.24E+02	SC-46
								BI-214
								TA-182
23	1270.01	1266 -	1274	1269.87	2.61E+01	25.15	8.19E+01	.....
24	1461.62	1454 -	1469	1461.59	5.79E+02	55.82	8.08E+01	K-40
25	1582.79	1578 -	1587	1582.84	1.37E+01	15.13	2.47E+01	.....
26	1765.31	1760 -	1770	1765.47	3.40E+01	17.35	2.20E+01	BI-214
27	2060.19	2057 -	2063	2060.56	9.00E+00	6.00	0.00E+00	.....
28	2105.36	2102 -	2110	2105.76	1.35E+01	9.18	5.06E+00	.....
29	2143.08	2139 -	2147	2143.50	1.40E+01	7.48	0.00E+00	.....
30	2150.57	2148 -	2153	2151.00	8.00E+00	5.66	0.00E+00	.....
31	2205.03	2200 -	2210	2205.50	1.60E+01	8.00	0.00E+00	BI-214
32	2258.48	2253 -	2263	2258.98	9.13E+00	8.85	5.75E+00	.....
33	2267.53	2265 -	2270	2268.04	5.13E+00	7.07	5.75E+00	.....
34	2349.18	2347 -	2353	2349.75	1.07E+01	7.76	2.58E+00	.....
35	2424.64	2421 -	2428	2425.27	6.19E+00	6.93	3.63E+00	.....
36	2436.37	2432 -	2441	2437.00	1.20E+01	6.93	0.00E+00	.....
37	2476.52	2471 -	2482	2477.18	1.10E+01	6.63	0.00E+00	.....
38	2615.68	2612 -	2620	2616.46	5.88E+01	16.26	4.43E+00	.....

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

PEAK EFFICIENCY REPORT

Peak Analysis Performed on : 5/11/2016 10:50:34AM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
M	1	76.33	1.35E+03	172.99	2.12E-02	1.69E-03
m	2	87.07	4.51E+02	175.02	1.97E-02	1.64E-03
m	3	92.83	4.93E+02	150.77	1.90E-02	1.62E-03
	4	129.89	1.24E+02	89.41	1.53E-02	1.47E-03

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
5	162.60	9.68E+01	88.63	1.29E-02	1.24E-03
6	169.66	6.06E+01	67.15	1.25E-02	1.20E-03
7	186.14	1.70E+02	92.00	1.16E-02	1.15E-03
8	239.21	8.88E+02	131.12	9.40E-03	9.85E-04
9	270.56	8.75E+01	53.95	8.43E-03	8.88E-04
10	295.62	2.15E+02	75.51	7.77E-03	8.43E-04
11	339.26	2.49E+02	88.25	6.84E-03	7.94E-04
12	352.35	3.55E+02	77.79	6.60E-03	7.80E-04
13	462.64	5.71E+01	48.69	5.08E-03	6.32E-04
14	510.87	2.14E+02	82.68	4.61E-03	5.61E-04
15	583.54	2.43E+02	58.17	4.04E-03	4.55E-04
16	609.36	3.09E+02	67.65	3.88E-03	4.17E-04
17	617.10	3.36E+01	30.17	3.83E-03	4.06E-04
18	770.96	4.45E+01	44.23	3.07E-03	2.79E-04
19	863.35	4.97E+01	48.27	2.75E-03	2.27E-04
20	911.28	1.52E+02	51.72	2.61E-03	2.06E-04
21	968.96	1.09E+02	44.41	2.46E-03	1.99E-04
22	1120.63	4.30E+01	44.18	2.14E-03	1.79E-04
23	1270.01	2.61E+01	25.15	1.91E-03	1.99E-04
24	1461.62	5.79E+02	55.82	1.68E-03	1.89E-04
25	1582.79	1.37E+01	15.13	1.57E-03	1.64E-04
26	1765.31	3.40E+01	17.35	1.43E-03	1.26E-04
27	2060.19	9.00E+00	6.00	1.27E-03	1.11E-04
28	2105.36	1.35E+01	9.18	1.25E-03	1.11E-04
29	2143.08	1.40E+01	7.48	1.23E-03	1.11E-04
30	2150.57	8.00E+00	5.66	1.23E-03	1.11E-04
31	2205.03	1.60E+01	8.00	1.21E-03	1.11E-04
32	2258.48	9.13E+00	8.85	1.19E-03	1.11E-04
33	2267.53	5.13E+00	7.07	1.18E-03	1.11E-04
34	2349.18	1.07E+01	7.76	1.15E-03	1.11E-04
35	2424.64	6.19E+00	6.93	1.13E-03	1.11E-04
36	2436.37	1.20E+01	6.93	1.12E-03	1.11E-04
37	2476.52	1.10E+01	6.63	1.11E-03	1.11E-04
38	2615.68	5.88E+01	16.26	1.07E-03	1.11E-04

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000 sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/11/2016 10:50:34AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000035909.CNF

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	76.33	1.35E+03	172.99			1.35E+03	1.73E+02
m	2	87.07	4.51E+02	175.02			4.51E+02	1.75E+02
m	3	92.83	4.93E+02	150.77	1.03E+02	1.79E+01	3.90E+02	1.52E+02
	4	129.89	1.24E+02	89.41			1.24E+02	8.94E+01
	5	162.60	9.68E+01	88.63			9.68E+01	8.86E+01
	6	169.66	6.06E+01	67.15			6.06E+01	6.71E+01
	7	186.14	1.70E+02	92.00	1.54E+01	2.37E+01	1.55E+02	9.50E+01
	8	239.21	8.88E+02	131.12	1.94E+01	1.18E+01	8.69E+02	1.32E+02
	9	270.56	8.75E+01	53.95			8.75E+01	5.40E+01
	10	295.62	2.15E+02	75.51			2.15E+02	7.55E+01
	11	339.26	2.49E+02	88.25			2.49E+02	8.82E+01
	12	352.35	3.55E+02	77.79			3.55E+02	7.78E+01
	13	462.64	5.71E+01	48.69			5.71E+01	4.87E+01
	14	510.87	2.14E+02	82.68	8.68E+01	1.02E+01	1.28E+02	8.33E+01
	15	583.54	2.43E+02	58.17			2.43E+02	5.82E+01
	16	609.36	3.09E+02	67.65	6.01E+00	6.33E+00	3.03E+02	6.79E+01
	17	617.10	3.36E+01	30.17			3.36E+01	3.02E+01
	18	770.96	4.45E+01	44.23			4.45E+01	4.42E+01
	19	863.35	4.97E+01	48.27			4.97E+01	4.83E+01
	20	911.28	1.52E+02	51.72			1.52E+02	5.17E+01
	21	968.96	1.09E+02	44.41			1.09E+02	4.44E+01
	22	1120.63	4.30E+01	44.18			4.30E+01	4.42E+01
	23	1270.01	2.61E+01	25.15			2.61E+01	2.51E+01
	24	1461.62	5.79E+02	55.82			5.79E+02	5.58E+01
	25	1582.79	1.37E+01	15.13			1.37E+01	1.51E+01
	26	1765.31	3.40E+01	17.35			3.40E+01	1.73E+01
	27	2060.19	9.00E+00	6.00			9.00E+00	6.00E+00
	28	2105.36	1.35E+01	9.18			1.35E+01	9.18E+00
	29	2143.08	1.40E+01	7.48			1.40E+01	7.48E+00
	30	2150.57	8.00E+00	5.66			8.00E+00	5.66E+00
	31	2205.03	1.60E+01	8.00			1.60E+01	8.00E+00
	32	2258.48	9.13E+00	8.85			9.13E+00	8.85E+00
	33	2267.53	5.13E+00	7.07			5.13E+00	7.07E+00
	34	2349.18	1.07E+01	7.76			1.07E+01	7.76E+00
	35	2424.64	6.19E+00	6.93			6.19E+00	6.93E+00
	36	2436.37	1.20E+01	6.93			1.20E+01	6.93E+00
	37	2476.52	1.10E+01	6.63			1.10E+01	6.63E+00
	38	2615.68	5.88E+01	16.26			5.88E+01	1.63E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 5/11/2016 10:50:34AM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000035909.CNF

Corrected Area is: Original * Peak Ratio - Background

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
M	1	76.33	1.35E+03	172.99			1.35E+03	1.73E+02
m	2	87.07	4.51E+02	175.02			4.51E+02	1.75E+02
m	3	92.83	4.93E+02	150.77	1.03E+02	1.79E+01	3.90E+02	1.52E+02
	4	129.89	1.24E+02	89.41			1.24E+02	8.94E+01
	5	162.60	9.68E+01	88.63			9.68E+01	8.86E+01
	6	169.66	6.06E+01	67.15			6.06E+01	6.71E+01
	7	186.14	1.70E+02	92.00	1.54E+01	2.37E+01	1.55E+02	9.50E+01
	8	239.21	8.88E+02	131.12	1.94E+01	1.18E+01	8.69E+02	1.32E+02
	9	270.56	8.75E+01	53.95			8.75E+01	5.40E+01
	10	295.62	2.15E+02	75.51			2.15E+02	7.55E+01
	11	339.26	2.49E+02	88.25			2.49E+02	8.82E+01
	12	352.35	3.55E+02	77.79			3.55E+02	7.78E+01
	13	462.64	5.71E+01	48.69			5.71E+01	4.87E+01
	14	510.87	2.14E+02	82.68	8.68E+01	1.02E+01	1.28E+02	8.33E+01
	15	583.54	2.43E+02	58.17			2.43E+02	5.82E+01
	16	609.36	3.09E+02	67.65	6.01E+00	6.33E+00	3.03E+02	6.79E+01
	17	617.10	3.36E+01	30.17			3.36E+01	3.02E+01
	18	770.96	4.45E+01	44.23			4.45E+01	4.42E+01
	19	863.35	4.97E+01	48.27			4.97E+01	4.83E+01
	20	911.28	1.52E+02	51.72			1.52E+02	5.17E+01
	21	968.96	1.09E+02	44.41			1.09E+02	4.44E+01
	22	1120.63	4.30E+01	44.18			4.30E+01	4.42E+01
	23	1270.01	2.61E+01	25.15			2.61E+01	2.51E+01
	24	1461.62	5.79E+02	55.82			5.79E+02	5.58E+01
	25	1582.79	1.37E+01	15.13			1.37E+01	1.51E+01
	26	1765.31	3.40E+01	17.35			3.40E+01	1.73E+01
	27	2060.19	9.00E+00	6.00			9.00E+00	6.00E+00
	28	2105.36	1.35E+01	9.18			1.35E+01	9.18E+00
	29	2143.08	1.40E+01	7.48			1.40E+01	7.48E+00
	30	2150.57	8.00E+00	5.66			8.00E+00	5.66E+00
	31	2205.03	1.60E+01	8.00			1.60E+01	8.00E+00
	32	2258.48	9.13E+00	8.85			9.13E+00	8.85E+00
	33	2267.53	5.13E+00	7.07			5.13E+00	7.07E+00
	34	2349.18	1.07E+01	7.76			1.07E+01	7.76E+00
	35	2424.64	6.19E+00	6.93			6.19E+00	6.93E+00
	36	2436.37	1.20E+01	6.93			1.20E+01	6.93E+00
	37	2476.52	1.10E+01	6.63			1.10E+01	6.63E+00
	38	2615.68	5.88E+01	16.26			5.88E+01	1.63E+01

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.900	1460.81	*	10.67	1.70E+01	2.54E+00
GA-67	0.575	93.31	*	35.70	5.88E-01	7.39E-01
		208.95		2.24		
		300.22		16.00		
CD-109	0.861	88.03	*	3.72	3.25E+00	1.31E+00
SN-126	0.960	87.57	*	37.00	3.26E-01	1.29E-01
EU-155	0.351	86.50	*	30.90	3.90E-01	1.55E-01
		105.30		20.70		
TL-208	0.312	583.14	*	30.22	1.05E+00	2.77E-01
		860.37		4.48		
		2614.66		35.85		
PB-212	0.848	238.63	*	44.60	1.09E+00	2.01E-01
		300.09		3.41		
BI-214	0.970	609.31	*	46.30	8.90E-01	2.22E-01
		1120.29	*	15.10	7.01E-01	7.23E-01
		1764.49	*	15.80	7.92E-01	4.10E-01
		2204.22	*	4.98	1.41E+00	7.14E-01
PB-214	0.972	295.21	*	19.19	7.59E-01	2.79E-01
		351.92	*	37.19	7.63E-01	1.90E-01
RA-226	0.999	186.21	*	3.28	2.14E+00	4.14E+00
AC-228	0.967	338.32	*	11.40	1.68E+00	6.28E-01
		911.07	*	27.70	1.11E+00	3.87E-01
		969.11	*	16.60	1.41E+00	5.85E-01
NP-237	0.950	86.50	*	12.60	9.57E-01	3.80E-01

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/11/2016 10:50:34AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	1	76.33	1.87922E-01	6.39		
	4	129.89	1.71576E-02	36.19		
	5	162.60	1.34394E-02	45.80	Tol.	BA-140 U-235
	6	169.66	8.41564E-03	55.41		
	9	270.56	1.21586E-02	30.82		
	13	462.64	7.92975E-03	42.64	Tol.	SB-125
	14	510.87	1.77233E-02	32.64		
	17	617.10	4.66468E-03	44.91	Tol.	PM-144
	18	770.96	6.18679E-03	49.64		
	19	863.35	6.90530E-03	48.54		
	23	1270.01	3.61940E-03	48.25		
	25	1582.79	1.89637E-03	55.42		
	27	2060.19	1.25000E-03	33.33	Sum	
	28	2105.36	1.87066E-03	34.07	Sum	
	29	2143.08	1.94444E-03	26.73		
	30	2150.57	1.11111E-03	35.36		
	32	2258.48	1.26736E-03	48.47		
	33	2267.53	7.11806E-04	68.99		
	34	2349.18	1.48727E-03	36.24	Sum	
	35	2424.64	8.59375E-04	55.99		
	36	2436.37	1.66667E-03	28.87		
	37	2476.52	1.52778E-03	30.15		
	38	2615.68	8.16485E-03	13.83		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.90	1460.81	*	10.67	1.70E+01	2.54E+00
GA-67	0.57	93.31	*	35.70	5.88E-01	7.39E-01
		208.95		2.24		
		300.22		16.00		
CD-109	0.86	88.03	*	3.72	3.25E+00	1.31E+00
SN-126	0.96	87.57	*	37.00	3.26E-01	1.29E-01
EU-155	0.35	86.50	*	30.90	3.90E-01	1.55E-01
		105.30		20.70		
TL-208	0.31	583.14	*	30.22	1.05E+00	2.77E-01
		860.37		4.48		
		2614.66		35.85		
PB-212	0.84	238.63	*	44.60	1.09E+00	2.01E-01
		300.09		3.41		
BI-214	0.97	609.31	*	46.30	8.90E-01	2.22E-01
		1120.29	*	15.10	7.01E-01	7.23E-01
		1764.49	*	15.80	7.92E-01	4.10E-01
		2204.22	*	4.98	1.41E+00	7.14E-01
PB-214	0.97	295.21	*	19.19	7.59E-01	2.79E-01
		351.92	*	37.19	7.63E-01	1.90E-01
RA-226	0.99	186.21	*	3.28	2.14E+00	4.14E+00
AC-228	0.96	338.32	*	11.40	1.68E+00	6.28E-01
		911.07	*	27.70	1.11E+00	3.87E-01
		969.11	*	16.60	1.41E+00	5.85E-01
NP-237	0.95	86.50	*	12.60	9.57E-01	3.80E-01

* = Energy line found in the spectrum.
\- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.900	1.70E+01	2.54E+00	
	GA-67	0.575	5.88E-01	7.39E-01	
?	CD-109	0.861	3.25E+00	1.31E+00	
?	SN-126	0.960	3.26E-01	1.29E-01	
?	EU-155	0.351	3.90E-01	1.55E-01	
	TL-208	0.312	1.05E+00	2.77E-01	
	PB-212	0.848	1.09E+00	2.01E-01	
	BI-214	0.970	8.92E-01	1.82E-01	
	PB-214	0.972	7.62E-01	1.57E-01	
	RA-226	0.999	2.14E+00	4.14E+00	
	AC-228	0.967	1.30E+00	2.87E-01	
?	NP-237	0.950	9.57E-01	3.80E-01	

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/11/2016 10:50:34AM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	1	76.33	1.87922E-01	6.39		
	4	129.89	1.71576E-02	36.19		
	5	162.60	1.34394E-02	45.80	Tol.	BA-140 U-235
	6	169.66	8.41564E-03	55.41		
	9	270.56	1.21586E-02	30.82		
	13	462.64	7.92975E-03	42.64	Tol.	SB-125
	14	510.87	1.77233E-02	32.64		
	17	617.10	4.66468E-03	44.91	Tol.	PM-144
	18	770.96	6.18679E-03	49.64		
	19	863.35	6.90530E-03	48.54		
	23	1270.01	3.61940E-03	48.25		
	25	1582.79	1.89637E-03	55.42		
	27	2060.19	1.25000E-03	33.33	Sum	
	28	2105.36	1.87066E-03	34.07	Sum	
	29	2143.08	1.94444E-03	26.73		
	30	2150.57	1.11111E-03	35.36		
	32	2258.48	1.26736E-03	48.47		
	33	2267.53	7.11806E-04	68.99		
	34	2349.18	1.48727E-03	36.24	Sum	
	35	2424.64	8.59375E-04	55.99		
	36	2436.37	1.66667E-03	28.87		
	37	2476.52	1.52778E-03	30.15		
	38	2615.68	8.16485E-03	13.83		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	BE-7	477.59		10.42	3.63E-01	7.14E-01	7.14E-01
+	NA-22	1274.54		99.94	-1.82E-02	1.09E-01	1.09E-01
+	NA-24	1368.53		99.99	-4.79E-01	1.20E+00	2.82E+00
		2754.09		99.86	5.44E-02		1.20E+00
+	AL-26	1808.65		99.76	3.12E-02	8.02E-02	8.02E-02
+	K-40	1460.81	*	10.67	1.70E+01	1.45E+00	1.45E+00
+	AR-41	1293.64		99.16	9.04E+10	2.26E+11	2.26E+11
+	TI-44	67.88		94.40	1.23E-02	4.78E-02	4.78E-02
		78.34		96.00	1.82E-01		6.20E-02
+	SC-46	889.25		99.98	4.83E-02	9.49E-02	9.49E-02
		1120.51		99.99	1.10E-01		1.39E-01
+	V-48	983.52		99.98	-1.34E-02	1.04E-01	1.04E-01
		1312.10		97.50	-4.01E-02		1.09E-01
+	CR-51	320.08		9.83	7.60E-02	6.91E-01	6.91E-01
+	MN-54	834.83		99.97	1.31E-02	9.33E-02	9.33E-02
+	CO-56	846.75		99.96	2.45E-02	9.30E-02	9.30E-02
		1037.75		14.03	-1.11E-01		6.98E-01
		1238.25		67.00	1.29E-01		2.09E-01
		1771.40		15.51	-1.02E-03		5.62E-01
		2598.48		16.90	-1.86E-01		3.21E-01
+	CO-57	122.06		85.51	-4.55E-02	5.57E-02	5.57E-02
		136.48		10.60	-9.31E-02		4.91E-01
+	CO-58	810.76		99.40	1.11E-02	8.90E-02	8.90E-02
+	FE-59	1099.22		56.50	-1.04E-02	1.92E-01	1.92E-01
		1291.56		43.20	-1.07E-01		2.29E-01
+	CO-60	1173.22		100.00	2.78E-02	9.80E-02	1.20E-01
		1332.49		100.00	5.93E-02		9.80E-02
+	ZN-65	1115.52		50.75	-2.30E-01	2.42E-01	2.42E-01
+	GA-67	93.31	*	35.70	5.88E-01	8.40E-01	8.40E-01
		208.95		2.24	1.56E+00		5.54E+00
		300.22		16.00	1.44E-01		8.43E-01
+	SE-75	121.11		16.70	-5.39E-02	8.87E-02	2.89E-01
		136.00		59.20	-2.96E-02		8.87E-02
		264.65		59.80	-1.22E-02		1.04E-01
		279.53		25.20	1.50E-01		2.56E-01
		400.65		11.40	-2.21E-01		6.00E-01
+	RB-82	776.52		13.00	-1.27E-01	6.96E-01	6.96E-01
+	RB-83	520.41		46.00	-3.73E-03	1.66E-01	1.66E-01
		529.64		30.30	-1.57E-01		2.42E-01
		552.65		16.40	-2.44E-01		4.51E-01
+	KR-85	513.99		0.43	4.04E+01	2.33E+01	2.33E+01
+	SR-85	513.99		99.27	1.83E-01	1.05E-01	1.05E-01

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	Y-88	898.02		93.40	-1.83E-02	8.08E-02	9.65E-02
		1836.01		99.38	1.56E-02		8.08E-02
+	NB-93M	16.57		9.43	7.14E-01	2.39E-01	2.39E-01
+	NB-94	702.63		100.00	1.89E-02	8.16E-02	8.93E-02
		871.10		100.00	2.15E-02		8.16E-02
+	NB-95	765.79		99.81	3.38E-03	9.44E-02	9.44E-02
+	NB-95M	235.69		25.00	1.72E+00	6.81E-01	6.81E-01
+	ZR-95	724.18		43.70	8.40E-02	1.49E-01	2.21E-01
		756.72		55.30	2.52E-02		1.49E-01
+	MO-99	181.06		6.20	-3.04E-01	1.54E+00	2.08E+00
		739.58		12.80	6.98E-02		1.54E+00
		778.00		4.50	-1.32E-01		4.17E+00
+	RU-103	497.08		89.00	-3.96E-02	8.07E-02	8.07E-02
+	RU-106	621.84		9.80	-1.03E-01	7.86E-01	7.86E-01
+	AG-108M	433.93		89.90	-2.90E-02	7.43E-02	7.43E-02
		614.37		90.40	2.19E-03		1.16E-01
		722.95		90.50	-1.34E-02		9.86E-02
+	CD-109	88.03	*	3.72	3.25E+00	4.03E+00	4.03E+00
+	AG-110M	657.75		93.14	2.96E-02	8.67E-02	8.67E-02
		677.61		10.53	-4.91E-01		7.23E-01
		706.67		16.46	2.90E-02		5.60E-01
		763.93		21.98	-5.36E-03		3.90E-01
		884.67		71.63	-2.23E-02		1.24E-01
		1384.27		23.94	8.51E-02		4.14E-01
+	CD-113M	263.70		0.02	-1.84E+01	2.64E+02	2.64E+02
+	SN-113	255.12		1.93	-1.13E+00	1.08E-01	3.11E+00
		391.69		64.90	1.16E-02		1.08E-01
+	TE123M	159.00		84.10	-3.66E-03	6.58E-02	6.58E-02
+	SB-124	602.71		97.87	-7.27E-03	8.68E-02	8.68E-02
		645.85		7.26	2.74E-01		1.21E+00
		722.78		11.10	-3.85E-01		7.98E-01
		1691.02		49.00	6.45E-02		1.41E-01
+	I-125	35.49		6.49	-4.00E-02	4.19E-01	4.19E-01
+	SB-125	176.33		6.89	-1.92E-01	2.27E-01	8.21E-01
		427.89		29.33	-3.29E-03		2.27E-01
		463.38		10.35	6.40E-01		7.41E-01
		600.56		17.80	2.90E-02		4.47E-01
		635.90		11.32	3.98E-01		7.21E-01
+	SB-126	414.70		83.30	-2.08E-02	9.42E-02	9.74E-02
		666.33		99.60	-2.51E-02		9.54E-02
		695.00		99.60	-2.38E-02		9.42E-02
		720.50		53.80	-1.47E-01		1.80E-01
+	SN-126	87.57	*	37.00	3.26E-01	4.03E-01	4.03E-01
+	SB-127	473.00		25.00	2.49E-02	4.08E-01	4.80E-01
		685.20		35.70	7.14E-02		4.08E-01
		783.80		14.70	3.90E-01		1.10E+00
+	I-129	29.78		57.00	-1.37E-02	4.50E-02	4.50E-02
		33.60		13.20	-2.86E-02		1.96E-01

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	I-129	39.58	7.52	-3.67E-01	4.50E-02	3.58E-01
+	I-131	284.30	6.05	1.33E-01	1.05E-01	1.34E+00
		364.48	81.20	-1.12E-02		1.05E-01
		636.97	7.26	1.16E+00		1.51E+00
		722.89	1.80	-3.00E+00		6.22E+00
+	TE-132	49.72	13.10	2.47E-01	1.39E-01	4.97E-01
		228.16	88.00	1.05E-02		1.39E-01
+	BA-133	81.00	33.00	-2.12E-01	1.56E-01	1.69E-01
		302.84	17.80	1.73E-01		3.59E-01
		356.01	60.00	2.84E-03		1.56E-01
+	I-133	529.87	86.30	-6.55E-01	1.01E+00	1.01E+00
+	XE-133	81.00	38.00	-2.79E-01	2.22E-01	2.22E-01
+	CS-134	563.23	8.38	5.50E-01	9.96E-02	9.22E-01
		569.32	15.43	2.75E-02		4.75E-01
		604.70	97.60	-2.70E-01		9.96E-02
		795.84	85.40	2.16E-02		1.08E-01
		801.93	8.73	1.57E-02		1.04E+00
+	CS-135	268.24	16.00	-6.85E-02	4.07E-01	4.07E-01
+	I-135	1131.51	22.50	7.93E+01	1.10E+03	1.27E+03
		1260.41	28.60	8.19E+02		1.10E+03
		1678.03	9.54	4.17E+02		1.81E+03
+	CS-136	153.22	7.46	3.45E-01	9.37E-02	8.57E-01
		163.89	4.61	2.71E-01		1.40E+00
		176.55	13.56	-1.15E-01		4.91E-01
		273.65	12.66	-1.92E-01		6.21E-01
		340.57	48.50	3.79E-01		1.95E-01
		818.50	99.70	-5.75E-02		9.37E-02
		1048.07	79.60	-6.30E-02		1.49E-01
		1235.34	19.70	2.38E-01		8.01E-01
+	CS-137	661.65	85.12	3.15E-02	9.60E-02	9.60E-02
+	LA-138	788.74	34.00	-7.81E-02	1.26E-01	2.60E-01
		1435.80	66.00	0.00E+00		1.26E-01
+	CE-139	165.85	80.35	4.05E-02	7.00E-02	7.00E-02
+	BA-140	162.64	6.70	2.93E-01	3.55E-01	9.66E-01
		304.84	4.50	-1.67E-01		1.66E+00
		423.70	3.20	-2.01E-01		2.46E+00
		437.55	2.00	-1.87E+00		3.96E+00
		537.32	25.00	2.51E-02		3.55E-01
+	LA-140	328.77	20.50	6.52E-02	1.05E-01	3.83E-01
		487.03	45.50	-1.14E-01		1.73E-01
		815.85	23.50	9.71E-02		4.17E-01
		1596.49	95.49	2.32E-02		1.05E-01
+	CE-141	145.44	48.40	-2.30E-02	1.18E-01	1.18E-01
+	CE-143	57.36	11.80	-2.44E+00	9.01E-01	1.53E+00
		293.26	42.00	-4.39E-02		9.01E-01
		664.55	5.20	-1.65E+00		7.49E+00
+	CE-144	133.54	10.80	1.80E-02	4.92E-01	4.92E-01
+	PM-144	476.78	42.00	3.52E-02	7.91E-02	1.67E-01
		618.01	98.60	-4.81E-02		7.91E-02

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	PM-144	696.49		99.49	-2.62E-02	7.91E-02	8.09E-02
+	PM-145	36.85		21.70	3.91E-03	6.65E-02	1.22E-01
		37.36		39.70	-1.89E-03		6.65E-02
		42.30		15.10	-6.32E-02		1.90E-01
		72.40		2.31	1.10E-01		2.43E+00
+	PM-146	453.90		39.94	-1.02E-02	1.67E-01	1.67E-01
		735.90		14.01	-2.26E-01		6.36E-01
		747.13		13.10	-1.13E-01		6.44E-01
+	ND-147	91.11		28.90	6.04E-01	2.42E-01	2.42E-01
		531.02		13.10	-3.25E-01		6.62E-01
+	PM-149	285.90		3.10	1.69E-01	5.33E+00	5.33E+00
+	EU-152	121.78		20.50	-1.88E-01	2.30E-01	2.30E-01
		244.69		5.40	-2.22E-01		1.33E+00
		344.27		19.13	-1.66E+00		3.43E-01
		778.89		9.20	-2.95E-02		9.29E-01
		964.01		10.40	-2.06E-01		1.07E+00
		1085.78		7.22	-7.85E-01		1.36E+00
		1112.02		9.60	3.94E-02		1.21E+00
		1407.95		14.94	9.32E-02		5.81E-01
+	GD-153	97.43		31.30	-2.57E-03	1.60E-01	1.60E-01
		103.18		22.20	5.40E-02		2.11E-01
+	EU-154	123.07		40.50	-7.48E-02	1.17E-01	1.17E-01
		723.30		19.70	-6.14E-02		4.53E-01
		873.19		11.50	2.10E-01		7.21E-01
		996.32		10.30	7.92E-02		9.97E-01
		1004.76		17.90	-1.29E-03		5.30E-01
		1274.45		35.50	-5.12E-02		3.07E-01
+	EU-155	86.50	*	30.90	3.90E-01	2.18E-01	4.83E-01
		105.30		20.70	-1.79E-01		2.18E-01
+	EU-156	811.77		10.40	-9.35E-02	9.33E-01	9.33E-01
		1153.47		7.20	6.13E-01		1.84E+00
		1230.71		8.90	7.73E-03		1.71E+00
+	HO-166M	184.41		72.60	9.92E-02	8.86E-02	8.86E-02
		280.45		29.60	6.17E-02		2.15E-01
		410.94		11.10	2.32E-01		6.42E-01
		711.69		54.10	8.62E-02		1.71E-01
+	TM-171	66.72		0.14	2.82E+01	3.23E+01	3.23E+01
+	HF-172	81.75		4.52	-4.56E+00	4.38E-01	1.17E+00
		125.81		11.30	-1.96E-01		4.38E-01
+	LU-172	181.53		20.60	-5.28E-02	2.32E-01	4.06E-01
		810.06		16.63	8.89E-02		7.12E-01
		912.12		15.25	2.34E+00		1.28E+00
		1093.66		62.50	4.08E-02		2.32E-01
+	LU-173	100.72		5.24	-3.52E-01	3.09E-01	8.80E-01
		272.11		21.20	-1.15E-01		3.09E-01
+	HF-175	343.40		84.00	-5.72E-02	8.68E-02	8.68E-02
+	LU-176	88.34		13.30	6.11E-01	6.49E-02	4.20E-01
		201.83		86.00	-7.43E-03		7.09E-02
		306.78		94.00	-2.22E-02		6.49E-02

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	TA-182	67.75		41.20	2.87E-02	1.12E-01	1.12E-01
		1121.30		34.90	-4.44E-02		3.92E-01
		1189.05		16.23	5.68E-02		7.53E-01
		1221.41		26.98	7.29E-02		4.91E-01
		1231.02		11.44	5.32E-03		1.17E+00
+	IR-192	308.46		29.68	-1.58E-03	1.44E-01	2.12E-01
		468.07		48.10	-4.39E-02		1.44E-01
+	HG-203	279.19		77.30	5.01E-02	8.59E-02	8.59E-02
+	BI-207	569.67		97.72	4.33E-03	7.48E-02	7.48E-02
		1063.62		74.90	-2.18E-02		1.32E-01
+	TL-208	583.14	*	30.22	1.05E+00	3.60E-01	3.60E-01
		860.37		4.48	9.46E-01		2.03E+00
		2614.66		35.85	-1.37E-02		5.40E-01
+	BI-210M	262.00		45.00	7.54E-02	1.35E-01	1.35E-01
		300.00		23.00	6.41E-02		3.35E-01
+	PB-210	46.50		4.25	3.40E-01	7.39E-01	7.39E-01
+	PB-211	404.84		2.90	-7.14E-02	2.43E+00	2.43E+00
		831.96		2.90	-3.64E-02		3.14E+00
+	BI-212	727.17		11.80	4.82E-01	8.15E-01	8.15E-01
		1620.62		2.75	1.11E+00		3.12E+00
+	PB-212	238.63	*	44.60	1.09E+00	2.47E-01	2.47E-01
		300.09		3.41	4.32E-01		2.26E+00
+	BI-214	609.31	*	46.30	8.90E-01	2.38E-01	2.90E-01
		1120.29	*	15.10	7.01E-01		1.18E+00
		1764.49	*	15.80	7.92E-01		5.55E-01
		2204.22	*	4.98	1.41E+00		2.38E-01
+	PB-214	295.21	*	19.19	7.59E-01	2.46E-01	4.14E-01
		351.92	*	37.19	7.63E-01		2.46E-01
+	RN-219	401.80		6.50	-4.69E-01	1.04E+00	1.04E+00
+	RA-223	323.87		3.88	-2.85E-01	1.66E+00	1.66E+00
+	RA-224	240.98		3.95	1.29E+01	2.55E+00	2.55E+00
+	RA-225	40.00		31.00	-1.03E-01	1.01E-01	1.01E-01
+	RA-226	186.21	*	3.28	2.14E+00	2.13E+00	2.13E+00
+	TH-227	50.10		8.40	1.99E-01	4.00E-01	4.00E-01
		236.00		11.50	2.05E+00		8.13E-01
		256.20		6.30	-5.04E-01		9.31E-01
+	AC-228	338.32	*	11.40	1.68E+00	5.66E-01	9.35E-01
		911.07	*	27.70	1.11E+00		5.66E-01
		969.11	*	16.60	1.41E+00		8.67E-01
+	TH-230	48.44		16.90	1.03E-01	1.93E-01	1.93E-01
		62.85		4.60	2.62E-01		9.22E-01
		67.67		0.37	3.14E+00		1.22E+01
+	PA-231	283.67		1.60	-4.17E-01	2.78E+00	3.90E+00
		302.67		2.30	1.33E+00		2.78E+00
+	TH-231	25.64		14.70	-5.73E-02	1.77E-01	1.77E-01
		84.21		6.40	-3.19E+00		8.01E-01
+	PA-233	311.98		38.60	-5.23E-02	1.68E-01	1.68E-01
+	PA-234	131.20		20.40	-1.28E-02	2.58E-01	2.58E-01

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	PA-234	733.99		8.80	-2.14E-01	2.58E-01	1.03E+00
		946.00		12.00	8.93E-02		8.47E-01
+	PA-234M	1001.03		0.92	5.35E+00	1.10E+01	1.10E+01
+	TH-234	63.29		3.80	6.51E-01	1.13E+00	1.13E+00
+	U-235	143.76		10.50	8.42E-02	5.07E-01	5.07E-01
		163.35		4.70	2.25E-01		1.16E+00
		205.31		4.70	6.28E-02		1.33E+00
+	NP-237	86.50	*	12.60	9.57E-01	1.18E+00	1.18E+00
+	NP-239	106.10		22.70	-4.11E-01	5.01E-01	5.01E-01
		228.18		10.70	1.62E-01		1.48E+00
		277.60		14.10	-4.69E-01		1.12E+00
+	AM-241	59.54		35.90	7.29E-02	1.12E-01	1.12E-01
+	AM-243	74.67		66.00	3.99E-01	9.06E-02	9.06E-02
+	CM-243	209.75		3.29	7.12E-01	4.49E-01	1.94E+00
		228.14		10.60	4.48E-02		5.94E-01
		277.60		14.00	-1.88E-01		4.49E-01

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\TMA2.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	BE-7	477.59		10.42	7.14E-01	7.14E-01	3.63E-01	3.42E-01
	NA-22	1274.54		99.94	1.09E-01	1.09E-01	-1.82E-02	5.09E-02
	NA-24	1368.53		99.99	2.82E+00	1.20E+00	-4.79E-01	1.28E+00
		2754.09		99.86	1.20E+00		5.44E-02	3.79E-01
	AL-26	1808.65		99.76	8.02E-02	8.02E-02	3.12E-02	3.50E-02
+	K-40	1460.81	*	10.67	1.45E+00	1.45E+00	1.70E+01	6.84E-01

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	AR-41	1293.64		99.16	2.26E+11	2.26E+11	9.04E+10	1.04E+11
	TI-44	67.88		94.40	4.78E-02	4.78E-02	1.23E-02	2.36E-02
		78.34		96.00	6.20E-02		1.82E-01	3.06E-02
	SC-46	889.25		99.98	9.49E-02	9.49E-02	4.83E-02	4.47E-02
		1120.51		99.99	1.39E-01		1.10E-01	6.60E-02
	V-48	983.52		99.98	1.04E-01	1.04E-01	-1.34E-02	4.88E-02
		1312.10		97.50	1.09E-01		-4.01E-02	4.98E-02
	CR-51	320.08		9.83	6.91E-01	6.91E-01	7.60E-02	3.35E-01
	MN-54	834.83		99.97	9.33E-02	9.33E-02	1.31E-02	4.41E-02
	CO-56	846.75		99.96	9.30E-02	9.30E-02	2.45E-02	4.39E-02
		1037.75		14.03	6.98E-01		-1.11E-01	3.26E-01
		1238.25		67.00	2.09E-01		1.29E-01	9.88E-02
		1771.40		15.51	5.62E-01		-1.02E-03	2.48E-01
		2598.48		16.90	3.21E-01		-1.86E-01	1.20E-01
	CO-57	122.06		85.51	5.57E-02	5.57E-02	-4.55E-02	2.73E-02
		136.48		10.60	4.91E-01		-9.31E-02	2.41E-01
	CO-58	810.76		99.40	8.90E-02	8.90E-02	1.11E-02	4.20E-02
	FE-59	1099.22		56.50	1.92E-01	1.92E-01	-1.04E-02	8.99E-02
		1291.56		43.20	2.29E-01		-1.07E-01	1.05E-01
	CO-60	1173.22		100.00	1.20E-01	9.80E-02	2.78E-02	5.68E-02
		1332.49		100.00	9.80E-02		5.93E-02	4.51E-02
	ZN-65	1115.52		50.75	2.42E-01	2.42E-01	-2.30E-01	1.14E-01
+	GA-67	93.31	*	35.70	8.40E-01	8.40E-01	5.88E-01	4.18E-01
		208.95		2.24	5.54E+00		1.56E+00	2.71E+00
		300.22		16.00	8.43E-01		1.44E-01	4.10E-01
	SE-75	121.11		16.70	2.89E-01	8.87E-02	-5.39E-02	1.42E-01
		136.00		59.20	8.87E-02		-2.96E-02	4.35E-02
		264.65		59.80	1.04E-01		-1.22E-02	5.05E-02
		279.53		25.20	2.56E-01		1.50E-01	1.25E-01
		400.65		11.40	6.00E-01		-2.21E-01	2.89E-01
	RB-82	776.52		13.00	6.96E-01	6.96E-01	-1.27E-01	3.28E-01
	RB-83	520.41		46.00	1.66E-01	1.66E-01	-3.73E-03	7.97E-02
		529.64		30.30	2.42E-01		-1.57E-01	1.15E-01
		552.65		16.40	4.51E-01		-2.44E-01	2.15E-01
	KR-85	513.99		0.43	2.33E+01	2.33E+01	4.04E+01	1.13E+01
	SR-85	513.99		99.27	1.05E-01	1.05E-01	1.83E-01	5.10E-02
	Y-88	898.02		93.40	9.65E-02	8.08E-02	-1.83E-02	4.53E-02
		1836.01		99.38	8.08E-02		1.56E-02	3.51E-02
	NB-93M	16.57		9.43	2.39E-01	2.39E-01	7.14E-01	1.17E-01
	NB-94	702.63		100.00	8.93E-02	8.16E-02	1.89E-02	4.25E-02
		871.10		100.00	8.16E-02		2.15E-02	3.82E-02
	NB-95	765.79		99.81	9.44E-02	9.44E-02	3.38E-03	4.48E-02
	NB-95M	235.69		25.00	6.81E-01	6.81E-01	1.72E+00	3.35E-01
	ZR-95	724.18		43.70	2.21E-01	1.49E-01	8.40E-02	1.05E-01
		756.72		55.30	1.49E-01		2.52E-02	7.04E-02
	MO-99	181.06		6.20	2.08E+00	1.54E+00	-3.04E-01	1.02E+00
		739.58		12.80	1.54E+00		6.98E-02	7.30E-01
		778.00		4.50	4.17E+00		-1.32E-01	1.97E+00
	RU-103	497.08		89.00	8.07E-02	8.07E-02	-3.96E-02	3.85E-02
	RU-106	621.84		9.80	7.86E-01	7.86E-01	-1.03E-01	3.74E-01
	AG-108M	433.93		89.90	7.43E-02	7.43E-02	-2.90E-02	3.57E-02
		614.37		90.40	1.16E-01		2.19E-03	5.57E-02
		722.95		90.50	9.86E-02		-1.34E-02	4.69E-02

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
+	CD-109	88.03	*	3.72	4.03E+00	4.03E+00	3.25E+00	2.00E+00
	AG-110M	657.75		93.14	8.67E-02	8.67E-02	2.96E-02	4.12E-02
		677.61		10.53	7.23E-01		-4.91E-01	3.42E-01
		706.67		16.46	5.60E-01		2.90E-02	2.67E-01
		763.93		21.98	3.90E-01		-5.36E-03	1.84E-01
		884.67		71.63	1.24E-01		-2.23E-02	5.83E-02
		1384.27		23.94	4.14E-01		8.51E-02	1.90E-01
	CD-113M	263.70		0.02	2.64E+02	2.64E+02	-1.84E+01	1.29E+02
	SN-113	255.12		1.93	3.11E+00	1.08E-01	-1.13E+00	1.51E+00
		391.69		64.90	1.08E-01		1.16E-02	5.23E-02
	TE123M	159.00		84.10	6.58E-02	6.58E-02	-3.66E-03	3.23E-02
	SB-124	602.71		97.87	8.68E-02	8.68E-02	-7.27E-03	4.14E-02
		645.85		7.26	1.21E+00		2.74E-01	5.77E-01
		722.78		11.10	7.98E-01		-3.85E-01	3.79E-01
		1691.02		49.00	1.41E-01		6.45E-02	6.05E-02
	I-125	35.49		6.49	4.19E-01	4.19E-01	-4.00E-02	2.06E-01
	SB-125	176.33		6.89	8.21E-01	2.27E-01	-1.92E-01	4.02E-01
		427.89		29.33	2.27E-01		-3.29E-03	1.09E-01
		463.38		10.35	7.41E-01		6.40E-01	3.57E-01
		600.56		17.80	4.47E-01		2.90E-02	2.13E-01
		635.90		11.32	7.21E-01		3.98E-01	3.44E-01
	SB-126	414.70		83.30	9.74E-02	9.42E-02	-2.08E-02	4.69E-02
		666.33		99.60	9.54E-02		-2.51E-02	4.53E-02
		695.00		99.60	9.42E-02		-2.38E-02	4.46E-02
		720.50		53.80	1.80E-01		-1.47E-01	8.52E-02
+	SN-126	87.57	*	37.00	4.03E-01	4.03E-01	3.26E-01	2.01E-01
	SB-127	473.00		25.00	4.80E-01	4.08E-01	2.49E-02	2.30E-01
		685.20		35.70	4.08E-01		7.14E-02	1.94E-01
		783.80		14.70	1.10E+00		3.90E-01	5.20E-01
	I-129	29.78		57.00	4.50E-02	4.50E-02	-1.37E-02	2.21E-02
		33.60		13.20	1.96E-01		-2.86E-02	9.60E-02
		39.58		7.52	3.58E-01		-3.67E-01	1.76E-01
	I-131	284.30		6.05	1.34E+00	1.05E-01	1.33E-01	6.53E-01
		364.48		81.20	1.05E-01		-1.12E-02	5.09E-02
		636.97		7.26	1.51E+00		1.16E+00	7.21E-01
		722.89		1.80	6.22E+00		-3.00E+00	2.95E+00
	TE-132	49.72		13.10	4.97E-01	1.39E-01	2.47E-01	2.45E-01
		228.16		88.00	1.39E-01		1.05E-02	6.80E-02
	BA-133	81.00		33.00	1.69E-01	1.56E-01	-2.12E-01	8.34E-02
		302.84		17.80	3.59E-01		1.73E-01	1.74E-01
		356.01		60.00	1.56E-01		2.84E-03	7.61E-02
	I-133	529.87		86.30	1.01E+00	1.01E+00	-6.55E-01	4.82E-01
	XE-133	81.00		38.00	2.22E-01	2.22E-01	-2.79E-01	1.09E-01
	CS-134	563.23		8.38	9.22E-01	9.96E-02	5.50E-01	4.41E-01
		569.32		15.43	4.75E-01		2.75E-02	2.26E-01
		604.70		97.60	9.96E-02		-2.70E-01	4.79E-02
		795.84		85.40	1.08E-01		2.16E-02	5.10E-02
		801.93		8.73	1.04E+00		1.57E-02	4.93E-01
	CS-135	268.24		16.00	4.07E-01	4.07E-01	-6.85E-02	1.98E-01
	I-135	1131.51		22.50	1.27E+03	1.10E+03	7.93E+01	5.94E+02
		1260.41		28.60	1.10E+03		8.19E+02	5.17E+02
		1678.03		9.54	1.81E+03		4.17E+02	7.76E+02
	CS-136	153.22		7.46	8.57E-01	9.37E-02	3.45E-01	4.20E-01

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
CS-136	163.89	4.61	1.40E+00	9.37E-02	2.71E-01	6.84E-01
	176.55	13.56	4.91E-01		-1.15E-01	2.41E-01
	273.65	12.66	6.21E-01		-1.92E-01	3.02E-01
	340.57	48.50	1.95E-01		3.79E-01	9.48E-02
	818.50	99.70	9.37E-02		-5.75E-02	4.39E-02
	1048.07	79.60	1.49E-01		-6.30E-02	6.99E-02
	1235.34	19.70	8.01E-01		2.38E-01	3.79E-01
CS-137	661.65	85.12	9.60E-02	9.60E-02	3.15E-02	4.57E-02
LA-138	788.74	34.00	2.60E-01	1.26E-01	-7.81E-02	1.23E-01
	1435.80	66.00	1.26E-01		0.00E+00	5.65E-02
CE-139	165.85	80.35	7.00E-02	7.00E-02	4.05E-02	3.43E-02
BA-140	162.64	6.70	9.66E-01	3.55E-01	2.93E-01	4.73E-01
	304.84	4.50	1.66E+00		-1.67E-01	8.03E-01
	423.70	3.20	2.46E+00		-2.01E-01	1.18E+00
	437.55	2.00	3.96E+00		-1.87E+00	1.90E+00
	537.32	25.00	3.55E-01		2.51E-02	1.70E-01
LA-140	328.77	20.50	3.83E-01	1.05E-01	6.52E-02	1.86E-01
	487.03	45.50	1.73E-01		-1.14E-01	8.26E-02
	815.85	23.50	4.17E-01		9.71E-02	1.96E-01
	1596.49	95.49	1.05E-01		2.32E-02	4.68E-02
CE-141	145.44	48.40	1.18E-01	1.18E-01	-2.30E-02	5.78E-02
CE-143	57.36	11.80	1.53E+00	9.01E-01	-2.44E+00	7.51E-01
	293.26	42.00	9.01E-01		-4.39E-02	4.40E-01
	664.55	5.20	7.49E+00		-1.65E+00	3.56E+00
CE-144	133.54	10.80	4.92E-01	4.92E-01	1.80E-02	2.42E-01
PM-144	476.78	42.00	1.67E-01	7.91E-02	3.52E-02	8.02E-02
	618.01	98.60	7.91E-02		-4.81E-02	3.76E-02
	696.49	99.49	8.09E-02		-2.62E-02	3.83E-02
PM-145	36.85	21.70	1.22E-01	6.65E-02	3.91E-03	5.98E-02
	37.36	39.70	6.65E-02		-1.89E-03	3.26E-02
	42.30	15.10	1.90E-01		-6.32E-02	9.34E-02
	72.40	2.31	2.43E+00		1.10E-01	1.20E+00
PM-146	453.90	39.94	1.67E-01	1.67E-01	-1.02E-02	8.02E-02
	735.90	14.01	6.36E-01		-2.26E-01	3.02E-01
	747.13	13.10	6.44E-01		-1.13E-01	3.05E-01
ND-147	91.11	28.90	2.42E-01	2.42E-01	6.04E-01	1.20E-01
	531.02	13.10	6.62E-01		-3.25E-01	3.16E-01
PM-149	285.90	3.10	5.33E+00	5.33E+00	1.69E-01	2.59E+00
EU-152	121.78	20.50	2.30E-01	2.30E-01	-1.88E-01	1.13E-01
	244.69	5.40	1.33E+00		-2.22E-01	6.50E-01
	344.27	19.13	3.43E-01		-1.66E+00	1.66E-01
	778.89	9.20	9.29E-01		-2.95E-02	4.39E-01
	964.01	10.40	1.07E+00		-2.06E-01	5.08E-01
	1085.78	7.22	1.36E+00		-7.85E-01	6.35E-01
	1112.02	9.60	1.21E+00		3.94E-02	5.68E-01
	1407.95	14.94	5.81E-01		9.32E-02	2.63E-01
GD-153	97.43	31.30	1.60E-01	1.60E-01	-2.57E-03	7.86E-02
	103.18	22.20	2.11E-01		5.40E-02	1.04E-01
EU-154	123.07	40.50	1.17E-01	1.17E-01	-7.48E-02	5.75E-02
	723.30	19.70	4.53E-01		-6.14E-02	2.16E-01
	873.19	11.50	7.21E-01		2.10E-01	3.38E-01
	996.32	10.30	9.97E-01		7.92E-02	4.70E-01
	1004.76	17.90	5.30E-01		-1.29E-03	2.48E-01

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	EU-154	1274.45		35.50	3.07E-01	1.17E-01	-5.12E-02	1.43E-01
+	EU-155	86.50	*	30.90	4.83E-01	2.18E-01	3.90E-01	2.40E-01
		105.30		20.70	2.18E-01		-1.79E-01	1.07E-01
	EU-156	811.77		10.40	9.33E-01	9.33E-01	-9.35E-02	4.40E-01
		1153.47		7.20	1.84E+00		6.13E-01	8.64E-01
		1230.71		8.90	1.71E+00		7.73E-03	8.05E-01
	HO-166M	184.41		72.60	8.86E-02	8.86E-02	9.92E-02	4.34E-02
		280.45		29.60	2.15E-01		6.17E-02	1.04E-01
		410.94		11.10	6.42E-01		2.32E-01	3.10E-01
		711.69		54.10	1.71E-01		8.62E-02	8.16E-02
	TM-171	66.72		0.14	3.23E+01	3.23E+01	2.82E+01	1.59E+01
	HF-172	81.75		4.52	1.17E+00	4.38E-01	-4.56E+00	5.76E-01
		125.81		11.30	4.38E-01		-1.96E-01	2.15E-01
	LU-172	181.53		20.60	4.06E-01	2.32E-01	-5.28E-02	1.99E-01
		810.06		16.63	7.12E-01		8.89E-02	3.36E-01
		912.12		15.25	1.28E+00		2.34E+00	6.16E-01
		1093.66		62.50	2.32E-01		4.08E-02	1.09E-01
	LU-173	100.72		5.24	8.80E-01	3.09E-01	-3.52E-01	4.33E-01
		272.11		21.20	3.09E-01		-1.15E-01	1.51E-01
	HF-175	343.40		84.00	8.68E-02	8.68E-02	-5.72E-02	4.21E-02
	LU-176	88.34		13.30	4.20E-01	6.49E-02	6.11E-01	2.07E-01
		201.83		86.00	7.09E-02		-7.43E-03	3.47E-02
		306.78		94.00	6.49E-02		-2.22E-02	3.14E-02
	TA-182	67.75		41.20	1.12E-01	1.12E-01	2.87E-02	5.50E-02
		1121.30		34.90	3.92E-01		-4.44E-02	1.86E-01
		1189.05		16.23	7.53E-01		5.68E-02	3.54E-01
		1221.41		26.98	4.91E-01		7.29E-02	2.32E-01
		1231.02		11.44	1.17E+00		5.32E-03	5.54E-01
	IR-192	308.46		29.68	2.12E-01	1.44E-01	-1.58E-03	1.03E-01
		468.07		48.10	1.44E-01		-4.39E-02	6.90E-02
	HG-203	279.19		77.30	8.59E-02	8.59E-02	5.01E-02	4.18E-02
	BI-207	569.67		97.72	7.48E-02	7.48E-02	4.33E-03	3.56E-02
		1063.62		74.90	1.32E-01		-2.18E-02	6.18E-02
+	TL-208	583.14	*	30.22	3.60E-01	3.60E-01	1.05E+00	1.74E-01
		860.37		4.48	2.03E+00		9.46E-01	9.57E-01
		2614.66		35.85	5.40E-01		-1.37E-02	2.52E-01
	BI-210M	262.00		45.00	1.35E-01	1.35E-01	7.54E-02	6.59E-02
		300.00		23.00	3.35E-01		6.41E-02	1.64E-01
	PB-210	46.50		4.25	7.39E-01	7.39E-01	3.40E-01	3.63E-01
	PB-211	404.84		2.90	2.43E+00	2.43E+00	-7.14E-02	1.17E+00
		831.96		2.90	3.14E+00		-3.64E-02	1.48E+00
	BI-212	727.17		11.80	8.15E-01	8.15E-01	4.82E-01	3.89E-01
		1620.62		2.75	3.12E+00		1.11E+00	1.39E+00
+	PB-212	238.63	*	44.60	2.47E-01	2.47E-01	1.09E+00	1.22E-01
		300.09		3.41	2.26E+00		4.32E-01	1.10E+00
+	BI-214	609.31	*	46.30	2.90E-01	2.38E-01	8.90E-01	1.41E-01
		1120.29	*	15.10	1.18E+00		7.01E-01	5.66E-01
		1764.49	*	15.80	5.55E-01		7.92E-01	2.46E-01
		2204.22	*	4.98	2.38E-01		1.41E+00	0.00E+00
+	PB-214	295.21	*	19.19	4.14E-01	2.46E-01	7.59E-01	2.02E-01
		351.92	*	37.19	2.46E-01		7.63E-01	1.20E-01
	RN-219	401.80		6.50	1.04E+00	1.04E+00	-4.69E-01	5.03E-01
	RA-223	323.87		3.88	1.66E+00	1.66E+00	-2.85E-01	8.05E-01

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	RA-224	240.98		3.95	2.55E+00	2.55E+00	1.29E+01	1.26E+00
	RA-225	40.00		31.00	1.01E-01	1.01E-01	-1.03E-01	4.95E-02
+	RA-226	186.21	*	3.28	2.13E+00	2.13E+00	2.14E+00	1.04E+00
	TH-227	50.10		8.40	4.00E-01	4.00E-01	1.99E-01	1.97E-01
		236.00		11.50	8.13E-01		2.05E+00	4.00E-01
		256.20		6.30	9.31E-01		-5.04E-01	4.53E-01
+	AC-228	338.32	*	11.40	9.35E-01	5.66E-01	1.68E+00	4.59E-01
		911.07	*	27.70	5.66E-01		1.11E+00	2.73E-01
		969.11	*	16.60	8.67E-01		1.41E+00	4.16E-01
	TH-230	48.44		16.90	1.93E-01	1.93E-01	1.03E-01	9.51E-02
		62.85		4.60	9.22E-01		2.62E-01	4.54E-01
		67.67		0.37	1.22E+01		3.14E+00	6.01E+00
	PA-231	283.67		1.60	3.90E+00	2.78E+00	-4.17E-01	1.89E+00
		302.67		2.30	2.78E+00		1.33E+00	1.35E+00
	TH-231	25.64		14.70	1.77E-01	1.77E-01	-5.73E-02	8.71E-02
		84.21		6.40	8.01E-01		-3.19E+00	3.95E-01
	PA-233	311.98		38.60	1.68E-01	1.68E-01	-5.23E-02	8.15E-02
	PA-234	131.20		20.40	2.58E-01	2.58E-01	-1.28E-02	1.26E-01
		733.99		8.80	1.03E+00		-2.14E-01	4.89E-01
		946.00		12.00	8.47E-01		8.93E-02	4.00E-01
	PA-234M	1001.03		0.92	1.10E+01	1.10E+01	5.35E+00	5.16E+00
	TH-234	63.29		3.80	1.13E+00	1.13E+00	6.51E-01	5.57E-01
	U-235	143.76		10.50	5.07E-01	5.07E-01	8.42E-02	2.49E-01
		163.35		4.70	1.16E+00		2.25E-01	5.68E-01
		205.31		4.70	1.33E+00		6.28E-02	6.53E-01
+	NP-237	86.50	*	12.60	1.18E+00	1.18E+00	9.57E-01	5.89E-01
	NP-239	106.10		22.70	5.01E-01	5.01E-01	-4.11E-01	2.46E-01
		228.18		10.70	1.48E+00		1.62E-01	7.24E-01
		277.60		14.10	1.12E+00		-4.69E-01	5.44E-01
	AM-241	59.54		35.90	1.12E-01	1.12E-01	7.29E-02	5.54E-02
	AM-243	74.67		66.00	9.06E-02	9.06E-02	3.99E-01	4.48E-02
	CM-243	209.75		3.29	1.94E+00	4.49E-01	7.12E-01	9.50E-01
		228.14		10.60	5.94E-01		4.48E-02	2.90E-01
		277.60		14.00	4.49E-01		-1.88E-01	2.19E-01

\+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
\> = MDA value not calculated
@ = Half-life too short to be able to perform the decay correction

No Action Level results available for reporting purposes.

Analysis Report for 1604147-04

J1V8X3 SAF: RC-189

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

No Data Review Comments Entered.

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: J1V8X3 SAF: RC-189

Elapsed Live time: 7200
Elapsed Real Time: 7458

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	21	165
17:	157	153	132	125	115	107	117	124
25:	107	96	109	107	101	98	90	105
33:	98	93	103	99	95	102	103	87
41:	95	114	88	91	138	152	137	115
49:	127	131	131	130	128	145	131	152
57:	154	159	145	135	167	219	238	190
65:	165	161	191	198	181	152	192	220
73:	252	376	408	440	392	243	173	187
81:	138	158	201	191	186	248	236	192
89:	202	213	214	249	239	185	158	120
97:	135	140	121	134	115	90	118	134
105:	150	96	97	107	102	125	109	130
113:	106	114	110	117	102	108	106	104
121:	84	95	109	99	101	98	108	136
129:	118	139	115	90	101	111	111	106
137:	107	104	83	114	93	114	102	101
145:	108	92	105	93	91	95	108	112
153:	96	101	105	66	85	80	90	81
161:	113	94	98	92	68	79	70	76
169:	102	91	68	70	88	86	89	86
177:	80	90	69	88	85	92	80	106
185:	129	143	108	73	79	84	93	65
193:	73	82	72	91	75	75	78	75
201:	72	97	73	73	79	78	71	81
209:	94	93	75	77	69	81	67	60
217:	67	55	67	73	67	61	68	69
225:	57	50	71	72	72	86	57	73
233:	60	62	71	90	197	358	302	164
241:	110	96	56	50	67	52	46	52
249:	61	50	55	44	68	41	33	42
257:	52	44	48	51	53	50	50	43
265:	48	47	41	49	67	79	69	38
273:	45	40	43	57	49	51	45	45
281:	46	57	30	41	43	37	53	40
289:	40	39	35	44	47	92	142	99
297:	57	39	35	56	46	41	38	34
305:	39	41	32	26	34	42	38	39
313:	28	28	39	33	38	37	27	33
321:	41	31	42	31	39	41	46	39
329:	41	42	40	21	36	38	30	36
337:	66	90	80	53	39	37	35	33
345:	29	22	29	27	30	54	153	156
353:	79	46	28	39	25	36	29	38
361:	26	31	27	24	33	29	32	30

369:	26	33	36	25	32	22	25	39

Sample Title: J1V8X3 SAF: RC-189

Channel								
377:	24	25	21	27	34	18	19	23
385:	31	30	27	35	29	22	30	32
393:	26	31	30	30	34	21	22	23
401:	31	29	21	26	34	35	20	37
409:	36	29	29	23	20	26	29	18
417:	25	29	26	18	28	22	26	12
425:	20	28	27	20	22	28	20	31
433:	19	18	25	16	21	25	25	26
441:	22	27	23	24	20	22	24	16
449:	23	22	20	17	22	23	16	22
457:	17	16	26	20	21	37	44	27
465:	17	15	25	24	16	17	20	13
473:	23	26	23	14	22	20	16	24
481:	21	21	16	16	12	14	21	15
489:	18	23	25	20	24	12	20	16
497:	18	18	14	17	18	16	16	26
505:	20	20	29	23	40	75	52	60
513:	29	20	18	20	20	15	18	22
521:	18	22	19	20	24	15	25	18
529:	14	18	12	16	11	22	26	18
537:	14	19	19	14	21	28	11	20
545:	17	22	17	13	14	16	17	18
553:	19	13	19	14	11	28	21	13
561:	16	17	21	14	15	19	22	6
569:	12	12	15	12	25	7	17	15
577:	8	13	13	21	34	59	82	76
585:	37	16	13	22	10	19	15	22
593:	16	14	17	16	21	17	11	14
601:	16	12	16	24	27	19	29	63
609:	112	95	52	13	10	7	16	22
617:	19	15	15	11	12	15	13	12
625:	15	21	13	13	12	12	8	14
633:	19	18	13	13	13	26	14	16
641:	9	9	17	20	17	18	16	22
649:	17	11	7	14	14	16	6	10
657:	11	19	15	15	18	17	7	14
665:	12	18	9	13	19	11	15	17
673:	10	7	14	10	12	10	17	12
681:	11	12	18	18	19	12	16	9
689:	8	14	12	11	7	12	11	13
697:	14	14	13	15	18	15	17	15
705:	16	13	14	18	12	21	11	25
713:	10	20	12	11	14	8	13	6
721:	14	16	16	8	22	14	19	25
729:	14	18	12	16	12	11	21	15
737:	13	10	13	11	14	15	11	10
745:	12	19	15	11	6	8	14	15
753:	9	13	5	12	10	9	10	9
761:	9	8	11	22	7	11	12	14
769:	18	19	18	12	13	6	14	12
777:	7	12	8	11	18	12	13	12
785:	16	19	6	11	6	16	8	11
793:	11	16	11	13	19	12	10	16

801:	8	10	12	10	17	12	13	5

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Channel								
809:	11	7	14	9	11	11	8	7
817:	6	12	7	13	10	3	10	12
825:	13	10	14	6	12	7	12	16
833:	9	5	12	21	12	9	9	10
841:	13	14	7	17	8	6	9	14
849:	10	10	10	5	9	6	7	7
857:	9	9	6	18	15	11	14	4
865:	8	8	9	6	8	8	7	2
873:	8	14	10	8	9	6	11	8
881:	11	8	11	8	13	9	9	5
889:	9	13	11	12	9	4	8	6
897:	15	6	14	5	10	12	10	3
905:	14	10	9	11	14	33	51	48
913:	18	9	12	13	7	9	7	8
921:	8	12	7	9	6	3	9	9
929:	7	5	9	5	12	12	10	7
937:	3	12	13	6	10	13	13	4
945:	11	8	14	8	13	13	12	12
953:	8	8	6	11	8	10	8	11
961:	8	7	10	12	18	16	14	17
969:	41	31	13	14	9	10	5	5
977:	7	9	7	9	8	7	6	8
985:	14	7	5	10	11	8	10	14
993:	10	4	11	10	12	12	5	11
1001:	9	12	7	10	7	4	8	6
1009:	6	7	9	0	12	12	6	10
1017:	5	5	6	11	6	4	7	10
1025:	6	3	9	12	10	5	10	9
1033:	6	4	7	12	7	9	7	5
1041:	13	11	9	7	14	10	7	12
1049:	6	9	6	6	13	6	12	9
1057:	12	7	14	6	5	7	5	11
1065:	5	9	10	12	8	5	4	8
1073:	7	7	11	6	5	9	10	15
1081:	5	8	8	6	10	10	5	7
1089:	8	6	11	9	11	6	9	11
1097:	6	6	12	6	6	7	11	7
1105:	12	6	14	13	7	8	17	9
1113:	12	12	4	10	9	14	15	24
1121:	26	17	3	8	8	7	12	10
1129:	10	11	7	9	3	8	9	9
1137:	10	8	8	8	13	11	6	12
1145:	4	8	7	9	6	9	10	10
1153:	5	10	13	14	7	8	6	8
1161:	7	8	11	7	2	6	7	11
1169:	12	13	8	11	10	13	10	6
1177:	7	11	9	8	12	6	9	10
1185:	15	6	6	13	10	12	7	5
1193:	13	9	10	11	10	9	9	9
1201:	15	12	14	11	13	10	10	13
1209:	9	10	13	12	7	14	8	13
1217:	14	6	10	11	10	9	10	11
1225:	17	7	12	7	11	10	11	8

1233:	8	18	14	8	12	11	12	13

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Channel								
1241:	8	9	10	6	7	6	8	9
1249:	9	8	7	14	4	8	8	13
1257:	11	12	14	5	8	8	5	3
1265:	5	3	5	10	12	11	6	7
1273:	9	4	6	5	8	6	6	10
1281:	10	9	6	7	4	10	6	3
1289:	4	3	9	7	4	6	2	4
1297:	8	7	2	3	6	9	5	5
1305:	5	8	8	6	5	6	1	4
1313:	2	8	2	7	4	7	4	6
1321:	2	6	5	5	4	5	4	7
1329:	6	5	3	5	8	5	3	3
1337:	0	5	0	2	7	1	6	3
1345:	6	2	3	3	5	1	3	4
1353:	4	3	8	1	0	4	6	1
1361:	5	3	4	3	1	4	5	4
1369:	4	3	8	2	10	2	2	2
1377:	4	7	4	4	6	3	3	3
1385:	9	4	9	1	4	4	1	6
1393:	2	1	4	5	1	2	4	4
1401:	4	4	6	3	2	3	4	2
1409:	5	7	1	4	0	3	1	5
1417:	2	4	2	1	2	2	4	5
1425:	3	2	3	2	2	4	3	1
1433:	4	6	0	3	6	1	3	3
1441:	4	0	5	3	1	1	3	5
1449:	4	3	3	4	1	3	4	4
1457:	2	5	17	82	168	180	104	32
1465:	6	2	3	5	2	4	2	0
1473:	1	3	2	2	1	3	1	0
1481:	1	1	1	1	3	1	0	3
1489:	2	2	2	0	2	6	4	0
1497:	3	3	2	2	2	2	2	4
1505:	1	3	3	3	4	3	3	5
1513:	4	3	4	2	4	3	1	4
1521:	5	2	0	2	2	2	3	2
1529:	0	5	3	0	1	1	2	3
1537:	3	1	3	0	0	3	0	3
1545:	1	3	2	2	3	2	2	3
1553:	3	1	0	2	2	0	1	3
1561:	2	3	2	2	2	1	2	0
1569:	1	2	1	2	3	4	1	1
1577:	3	0	1	4	1	7	3	5
1585:	3	2	0	2	2	8	2	3
1593:	5	5	3	0	2	3	0	2
1601:	3	1	0	1	0	3	4	3
1609:	2	2	1	3	3	0	3	0
1617:	3	1	3	0	4	6	5	1
1625:	0	1	3	2	5	1	3	4
1633:	1	0	2	4	1	1	2	2
1641:	4	0	0	2	0	2	1	1
1649:	2	2	1	0	3	1	0	2
1657:	1	2	2	0	2	2	0	3

1665:	3	1	2	2	0	1	0	0

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Channel								
1673:	4	4	1	2	1	1	1	1
1681:	1	0	1	0	1	2	1	2
1689:	2	1	1	2	3	0	0	0
1697:	0	0	1	1	1	2	2	1
1705:	2	0	3	0	1	0	0	1
1713:	0	2	1	1	1	1	2	1
1721:	3	0	4	1	2	2	0	3
1729:	3	4	2	3	1	3	2	1
1737:	2	4	2	1	0	3	1	2
1745:	2	2	1	1	1	2	1	0
1753:	0	2	1	1	0	2	2	0
1761:	1	3	4	3	10	13	7	2
1769:	2	0	2	2	0	0	0	1
1777:	3	2	1	0	3	3	2	0
1785:	1	1	1	0	0	1	1	1
1793:	2	1	0	2	1	1	5	2
1801:	1	2	0	0	1	1	1	2
1809:	2	2	1	2	2	2	1	0
1817:	0	0	1	1	0	0	0	0
1825:	2	1	2	2	0	1	2	0
1833:	1	1	0	3	0	3	0	2
1841:	3	1	1	1	2	1	0	3
1849:	0	0	1	2	0	3	0	1
1857:	2	0	1	3	2	2	1	0
1865:	0	1	3	2	2	1	1	1
1873:	2	1	2	0	0	1	3	0
1881:	4	0	1	3	1	1	2	1
1889:	0	0	1	0	3	0	0	0
1897:	1	2	2	2	1	2	0	2
1905:	1	0	2	0	2	1	1	1
1913:	2	0	0	4	1	1	2	0
1921:	1	2	0	1	1	0	1	4
1929:	0	2	1	1	2	1	2	3
1937:	1	2	0	2	1	1	1	3
1945:	0	2	3	3	1	0	2	4
1953:	2	0	2	0	0	0	1	0
1961:	1	0	2	1	2	1	1	0
1969:	1	2	1	2	0	1	1	0
1977:	0	1	0	2	1	1	0	2
1985:	0	1	0	1	0	1	1	1
1993:	0	2	0	0	2	0	2	0
2001:	1	1	1	2	0	1	0	0
2009:	0	3	3	0	0	0	1	1
2017:	2	1	0	0	0	1	0	1
2025:	0	0	0	3	2	3	0	1
2033:	2	0	0	1	0	2	1	1
2041:	0	0	1	2	1	1	2	0
2049:	1	0	2	0	0	2	0	0
2057:	0	1	1	1	4	2	0	0
2065:	2	0	1	0	1	1	2	0
2073:	0	1	2	0	2	1	3	1
2081:	0	1	1	2	0	0	0	2
2089:	1	1	1	0	2	0	1	2

2097:	1	2	0	3	0	0	1	2

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Channel								
2105:	4	2	5	1	1	0	1	1
2113:	0	0	0	0	0	2	1	2
2121:	2	1	3	1	2	1	0	1
2129:	4	0	2	0	1	1	0	0
2137:	1	0	0	1	2	3	0	2
2145:	3	3	0	0	1	2	1	4
2153:	0	0	2	1	1	1	0	1
2161:	1	1	2	2	3	1	1	1
2169:	1	2	2	0	0	1	1	0
2177:	1	0	1	2	0	2	2	2
2185:	2	3	2	1	2	2	1	0
2193:	1	0	1	0	1	1	0	0
2201:	1	1	0	2	3	3	5	0
2209:	1	0	0	0	2	0	1	0
2217:	0	2	2	2	1	0	1	1
2225:	1	0	2	0	0	0	1	2
2233:	1	1	0	2	0	0	2	1
2241:	3	1	2	2	1	2	1	0
2249:	0	0	0	0	1	0	0	0
2257:	0	5	1	3	1	1	0	0
2265:	0	0	2	3	3	0	2	3
2273:	1	0	4	4	0	1	1	3
2281:	2	1	1	1	0	3	1	4
2289:	1	2	2	0	2	1	0	0
2297:	4	3	2	1	0	1	1	1
2305:	0	0	0	0	0	1	1	1
2313:	0	0	0	1	2	2	2	0
2321:	0	0	2	1	2	0	0	1
2329:	2	1	1	2	0	1	3	1
2337:	2	2	0	1	1	1	4	3
2345:	2	0	1	1	5	2	1	2
2353:	0	0	1	2	1	1	1	1
2361:	1	1	2	0	0	2	2	0
2369:	1	1	0	0	1	2	1	0
2377:	2	1	0	2	2	0	1	2
2385:	0	1	0	1	0	1	0	0
2393:	1	2	1	0	1	1	0	1
2401:	0	1	0	1	0	0	1	2
2409:	1	1	1	0	1	0	2	0
2417:	2	0	0	0	0	1	0	0
2425:	3	2	2	0	1	1	0	0
2433:	1	1	1	1	3	1	3	1
2441:	0	0	3	1	1	1	2	1
2449:	2	2	1	1	3	0	1	1
2457:	0	0	3	1	2	2	1	0
2465:	1	1	0	1	0	0	0	1
2473:	1	1	0	1	0	2	3	1
2481:	1	0	0	1	0	2	0	2
2489:	0	0	2	0	1	0	1	1
2497:	2	2	1	1	1	1	1	2
2505:	0	1	0	0	1	0	1	1
2513:	0	0	1	0	0	1	0	2
2521:	0	0	0	0	0	0	0	0

2529:	0	0	0	0	2	0	0	1

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Channel								
2537:	2	0	1	0	0	1	0	0
2545:	0	2	0	0	0	1	0	1
2553:	2	2	2	1	0	2	0	0
2561:	1	0	1	0	0	0	0	1
2569:	0	0	0	0	1	0	1	1
2577:	0	0	1	0	1	0	1	0
2585:	1	1	1	1	0	1	0	1
2593:	2	1	0	0	0	0	0	0
2601:	1	0	0	1	2	0	0	0
2609:	1	0	1	0	0	5	7	18
2617:	21	8	2	0	0	0	0	0
2625:	0	1	0	0	0	0	1	1
2633:	0	0	0	0	1	0	0	1
2641:	0	1	0	1	0	1	0	0
2649:	0	1	0	1	0	0	1	0
2657:	0	0	0	1	0	0	0	0
2665:	1	1	1	1	0	0	0	0
2673:	2	0	0	1	0	1	0	0
2681:	1	0	1	1	0	0	0	1
2689:	1	0	1	0	0	0	0	0
2697:	0	0	0	0	1	1	0	0
2705:	1	0	0	0	1	0	0	0
2713:	1	0	0	1	0	1	0	0
2721:	0	0	0	0	0	1	1	0
2729:	0	0	0	0	0	1	0	0
2737:	0	2	1	0	0	0	0	0
2745:	0	0	0	0	0	0	0	0
2753:	0	0	0	0	0	0	1	0
2761:	0	0	1	1	1	1	0	1
2769:	0	0	1	1	1	0	1	0
2777:	0	1	0	0	0	0	1	0
2785:	0	0	0	2	0	1	0	1
2793:	0	1	0	1	0	0	0	0
2801:	0	0	0	0	0	0	0	0
2809:	0	0	0	0	0	0	0	1
2817:	0	1	1	0	0	0	0	0
2825:	0	1	0	1	0	3	0	1
2833:	1	0	1	0	0	0	0	1
2841:	0	0	0	1	1	0	0	0
2849:	0	0	1	0	0	1	0	1
2857:	0	1	0	0	0	0	0	0
2865:	1	0	0	0	1	0	0	0
2873:	0	1	0	0	0	0	2	0
2881:	1	0	0	1	0	0	0	0
2889:	1	1	0	0	0	1	0	0
2897:	1	0	1	0	0	0	0	0
2905:	0	1	1	0	0	0	1	1
2913:	1	1	0	0	0	0	1	2
2921:	0	0	0	0	0	1	1	1
2929:	1	0	1	0	0	0	0	1
2937:	2	0	0	0	1	1	0	0
2945:	0	0	0	0	1	1	0	0
2953:	0	0	0	1	0	0	0	0

2961:	0	0	0	0	0	0	1	0

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Channel								
2969:	0	1	0	0	0	0	0	0
2977:	0	0	0	1	1	0	1	0
2985:	0	0	1	0	1	0	0	0
2993:	0	0	0	0	0	0	0	1
3001:	1	0	0	0	0	0	0	0
3009:	3	0	0	0	0	1	0	1
3017:	0	0	1	0	0	0	0	0
3025:	2	0	0	0	0	0	1	0
3033:	0	1	0	0	0	0	0	0
3041:	0	0	1	0	0	1	1	0
3049:	0	0	0	0	0	0	1	0
3057:	0	1	1	0	0	0	0	0
3065:	0	0	0	1	0	0	1	1
3073:	0	0	0	1	0	1	0	0
3081:	0	1	0	0	0	0	0	0
3089:	1	1	1	0	0	0	1	0
3097:	0	1	0	0	0	0	0	2
3105:	0	2	1	0	0	0	0	0
3113:	0	1	0	0	0	0	1	0
3121:	0	0	1	0	0	0	1	1
3129:	0	0	0	1	0	0	0	0
3137:	0	1	1	0	0	1	1	1
3145:	1	0	0	0	0	0	0	0
3153:	0	1	0	0	0	1	0	0
3161:	0	0	0	0	1	0	0	0
3169:	0	0	1	0	0	1	0	0
3177:	0	0	0	0	0	0	0	0
3185:	1	0	0	0	0	0	0	0
3193:	0	0	0	0	1	0	0	1
3201:	0	0	0	0	0	0	0	0
3209:	1	0	1	0	0	0	0	0
3217:	0	0	0	0	0	0	0	1
3225:	1	0	0	0	0	0	1	0
3233:	0	1	0	0	1	0	0	1
3241:	0	1	0	0	1	0	0	0
3249:	0	0	0	0	0	1	0	0
3257:	0	0	0	0	0	0	0	0
3265:	0	1	0	0	1	0	0	0
3273:	1	0	0	0	0	0	0	0
3281:	0	0	1	0	0	0	0	1
3289:	0	1	0	0	0	0	0	0
3297:	1	0	0	0	1	0	0	0
3305:	0	0	0	1	0	0	0	0
3313:	0	0	0	0	0	0	0	0
3321:	0	0	0	1	0	0	1	0
3329:	0	0	0	0	0	0	0	0
3337:	0	0	0	1	1	0	0	0
3345:	1	1	0	0	0	0	0	1
3353:	0	0	0	0	0	0	0	0
3361:	0	0	0	0	0	0	0	0
3369:	0	0	0	1	0	2	0	0
3377:	0	0	0	0	0	0	0	0
3385:	0	0	0	1	0	1	0	0

3393:	0	0	0	1	0	2	0	0

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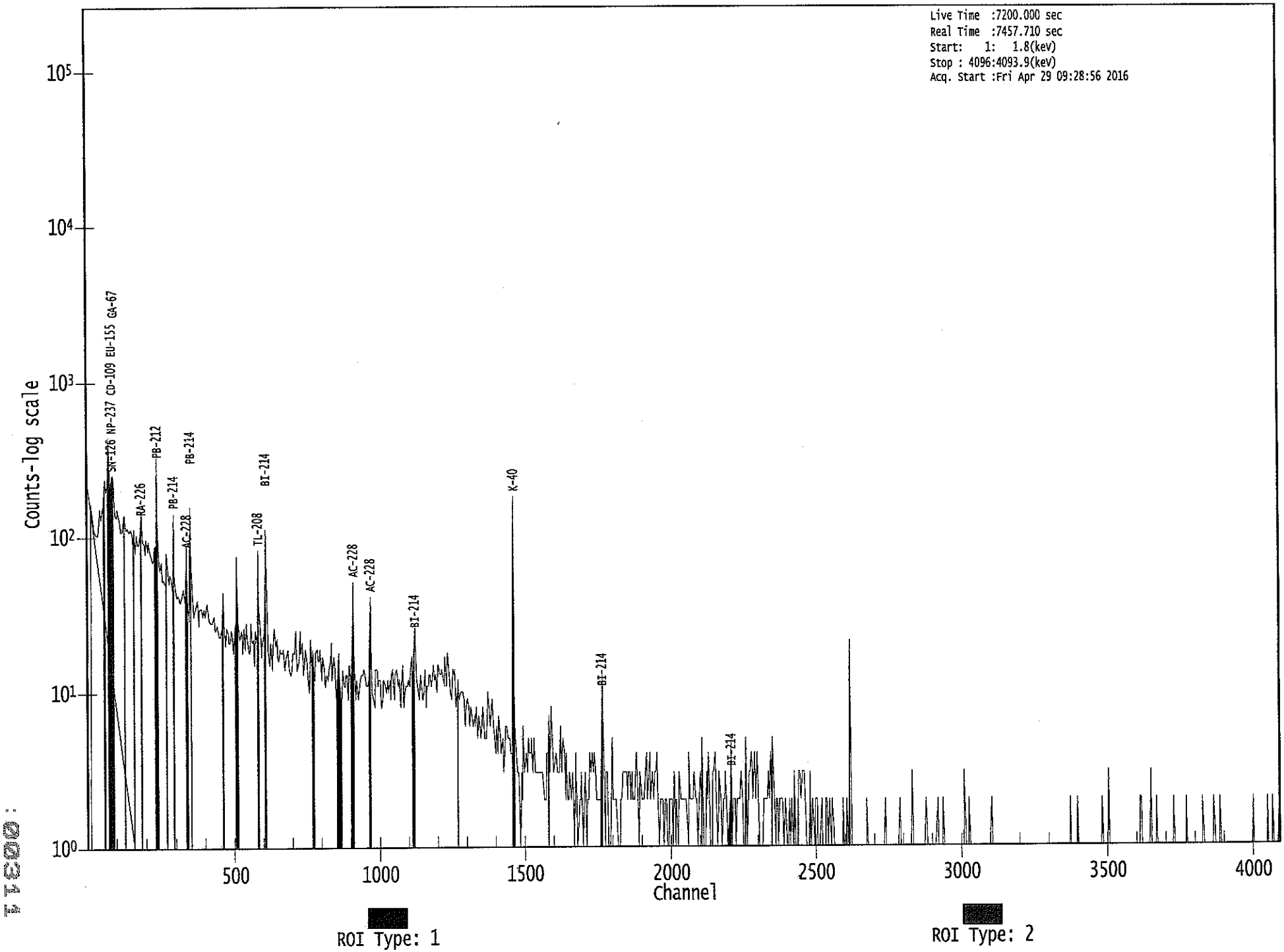
Channel								
3401:	0	0	0	0	1	0	0	0
3409:	0	0	0	0	0	0	1	1
3417:	1	0	0	0	0	0	1	0
3425:	0	0	1	0	0	0	0	0
3433:	0	0	0	0	0	0	1	0
3441:	0	0	0	1	1	0	1	0
3449:	1	0	0	0	0	0	0	0
3457:	0	0	1	1	0	0	0	0
3465:	0	0	0	0	0	0	0	1
3473:	0	1	0	0	0	1	1	0
3481:	0	2	1	0	1	1	0	0
3489:	1	0	0	0	1	1	0	0
3497:	0	0	0	0	0	0	3	0
3505:	0	0	1	0	0	0	0	1
3513:	1	1	0	0	0	0	0	0
3521:	1	0	0	0	0	0	0	0
3529:	0	0	1	0	0	1	0	0
3537:	1	0	0	1	0	0	0	0
3545:	0	1	1	0	0	1	0	1
3553:	0	0	0	0	0	1	1	0
3561:	0	0	1	0	0	0	1	0
3569:	1	0	0	0	0	0	0	0
3577:	0	0	0	0	1	0	0	0
3585:	0	0	0	0	0	0	1	0
3593:	0	0	0	0	0	1	0	0
3601:	0	0	0	0	0	0	0	0
3609:	2	0	2	0	0	0	2	0
3617:	0	1	0	0	0	0	0	0
3625:	1	0	0	0	0	0	0	0
3633:	0	1	0	0	0	0	0	0
3641:	0	0	1	0	0	2	0	3
3649:	0	0	0	0	0	1	0	0
3657:	0	0	0	0	0	0	0	0
3665:	0	0	2	0	0	1	0	0
3673:	0	0	0	0	0	0	0	0
3681:	0	0	0	0	0	0	0	0
3689:	0	0	0	0	0	0	0	1
3697:	0	0	0	0	1	0	0	0
3705:	1	0	0	0	0	0	0	0
3713:	0	0	0	1	1	0	0	0
3721:	0	0	0	0	2	0	0	0
3729:	0	0	1	0	0	0	0	0
3737:	1	0	0	0	0	1	0	0
3745:	0	1	0	0	1	0	1	0
3753:	0	0	0	0	0	1	0	0
3761:	0	0	0	0	0	0	0	0
3769:	2	0	1	0	1	0	0	0
3777:	1	1	0	0	0	0	0	1
3785:	0	0	0	0	0	1	0	0
3793:	0	0	0	0	0	0	0	0
3801:	0	0	1	0	0	0	0	0
3809:	0	0	1	0	0	0	0	0
3817:	0	0	0	0	0	0	0	0

3825:	2	0	0	0	0	0	0	1

Sample Title: J1V8X3 SAF: RC-189

Channel								
3833:	0	0	1	0	0	0	0	0
3841:	0	1	1	1	1	0	1	0
3849:	0	0	0	0	0	0	0	0
3857:	0	0	0	0	0	0	0	2
3865:	2	0	0	0	0	0	1	0
3873:	1	0	0	0	0	1	0	0
3881:	0	0	0	0	2	0	0	0
3889:	1	0	1	0	1	0	0	0
3897:	0	1	0	1	0	0	0	0
3905:	0	0	0	1	0	0	0	0
3913:	0	0	0	0	0	0	1	0
3921:	0	0	0	1	0	0	0	0
3929:	0	0	0	0	0	0	0	1
3937:	0	0	1	0	0	0	1	0
3945:	0	0	1	1	0	0	1	0
3953:	0	0	0	0	0	0	0	0
3961:	1	0	0	0	0	0	0	0
3969:	0	1	0	0	0	0	0	0
3977:	0	0	0	0	0	1	0	0
3985:	0	0	0	0	0	0	0	0
3993:	0	1	0	0	0	1	0	0
4001:	2	0	0	0	0	0	0	0
4009:	0	0	1	0	1	0	1	1
4017:	0	0	0	0	0	0	0	0
4025:	0	0	0	0	0	0	0	0
4033:	0	0	0	0	1	0	1	0
4041:	0	0	0	0	0	0	0	0
4049:	0	2	0	0	0	0	0	0
4057:	0	0	0	0	0	0	0	0
4065:	0	0	2	0	1	0	0	1
4073:	0	1	0	1	0	0	0	1
4081:	0	0	0	0	0	1	0	0
4089:	0	0	2	0	1	0	0	3

0000036896.CNF



****
***** GENIE QUALITY ASSURANCE *****
****

4/29

Last Results Report
4/29/16 5:55:33 AM

QA File: \\OR-GAMMA1\ApexRoot\Countroom\QA\D0000000004B.QCK

Detector: GE4
Geometry: <None>
Certificate: <None>
Sample ID: QA Background Ch
Sample Desc: QA Count
Sample Quantity: 1.0000E+000
Sample Date: 4/29/16 5:39:58 AM
Measurement Date: 4/29/16 5:40:00 AM
Elapsed Live Time: 900.0 seconds
Elapsed Real Time: 914.7 seconds

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
DAILY BKG CT RATE GE4	1.6633E+000	-5.1408E-002
[SD: 9.9449E+000+/-16].09]		< : : : >

Trend Test: The last 9 samples exhibit a bias trend.

Flags Key:
LU = Lower/Upper Bounds Test (Ab = Above, Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

****
***** GENIE QUALITY ASSURANCE *****
****

Last Results Report
4/29/16 5:34:11 AM

4/29

QA File: \\OR-GAMMA1\ApexRoot\Countroom\QA\D0000000004GAW-14C.QCK

Detector: GE4
Geometry: <None>
Certificate: GAW-14
Sample ID: QA Calibration C
Sample Desc: QA Count
Sample Quantity: 1.0000E+000
Sample Date: 10/1/14 12:00:00 AM
Measurement Date: 4/29/16 5:18:11 AM
Elapsed Live Time: 900.0 seconds
Elapsed Real Time: 950.2 seconds

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
Peak centroid 59.54 kev	5.8895E+001	
Boundary Limits: [5.800E+001, 6.100E+001]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
Peak centroid 661.65 kev	6.6141E+002	
Boundary Limits: [6.600E+002, 6.630E+002]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
Peak centroid 1332.49 ke	1.3329E+003	
Boundary Limits: [1.331E+003, 1.334E+003]		< : : : >
Peak centroid 1836.1 kev	1.8369E+003	
Boundary Limits: [1.834E+003, 1.838E+003]		< : : : >
Peak FWHM Am-241	2.2124E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
Peak FWHM Cs-137	2.6278E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Peak FWHM Co-60	2.9078E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Peak FWHM Y-88	3.0218E+000	
Boundary Limits: [5.000E-001, 3.500E+000]		< : : : >
Decay corrected activity	1.2450E+005	
Boundary Limits: [1.200E-001, 1.816E-001]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
Decay corrected activity	6.6562E+004	

Boundary Limits: [4.918E-002, 7.377E-002] < : : : >
Trend Test: The last 9 samples exhibit a bias trend.

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
Decay corrected activity	1.0411E+005	
Boundary Limits: [7.892E-002, 1.184E-001]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
Decay corrected activity	2.2262E+005	
Boundary Limits: [1.695E-001, 2.543E-001]		< : : : >

Flags Key:
LU = Lower/Upper Bounds Test (Ab = Above, Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

****
***** GENIE QUALITY ASSURANCE *****
****

Last Results Report
4/29/16 5:55:14 AM

4/29

QA File: \\OR-GAMMA1\ApexRoot\Countroom\QA\D0000000003B.QCK

Detector: GE3
Geometry: <None>
Certificate: <None>
Sample ID: QA Background Ch
Sample Desc: QA Count
Sample Quantity: 1.0000E+000
Sample Date: 4/29/16 5:39:50 AM
Measurement Date: 4/29/16 5:39:53 AM
Elapsed Live Time: 900.0 seconds
Elapsed Real Time: 913.3 seconds

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
DAILY BKG CT RATE GE3 [SD: 2.2597E+003+/-1392.1]	1.6270E+003	-4.5451E-001 < : : : >

Flags Key: LU = Lower/Upper Bounds Test (Ab = Above, Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

****
***** GENIE QUALITY ASSURANCE *****
****

Last Results Report
4/29/16 5:33:58 AM

QA File: \\OR-GAMMA1\ApexRoot\Countroom\QA\D0000000003GAS-1402C.QC

Detector: GE3
Geometry: <None>
Certificate: GAS-1402
Sample ID: QA Calibration C
Sample Desc: QA Count
Sample Quantity: 1.0000E+000
Sample Date: 10/1/14 12:00:00 AM
Measurement Date: 4/29/16 5:18:06 AM
Elapsed Live Time: 900.0 seconds
Elapsed Real Time: 939.3 seconds

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
Peak centroid 59.54 kev	6.0000E+001	
Boundary Limits: [5.800E+001, 6.100E+001]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
Peak centroid 661.65 kev	6.6218E+002	
Boundary Limits: [6.600E+002, 6.640E+002]		< : : : >
Peak centroid 1332.49 ke	1.3328E+003	
Boundary Limits: [1.331E+003, 1.334E+003]		< : : : >
Peak centroid 1836.1 kev	1.8365E+003	
Boundary Limits: [1.833E+003, 1.838E+003]		< : : : >
Peak FWHM Am-241	1.4436E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : >
Trend Test: The last 9 samples exhibit a bias trend.		
Peak FWHM Cs-137	1.8233E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Peak FWHM Co-60	2.2916E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Peak FWHM Y-88	2.4444E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Decay corrected activity	1.7640E+005	
Boundary Limits: [1.223E-001, 1.834E-001]		< : : : >
Decay corrected activity	6.4678E+004	
Boundary Limits: [4.969E-002, 7.453E-002]		< : : : >

Decay corrected activity 9.8034E+004
Boundary Limits: [7.972E-002, 1.120E-001] < : : : >
Trend Test: The last 9 samples exhibit a bias trend.

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
Decay corrected activity	2.0372E+005	
Boundary Limits: [1.713E-001, 2.569E-001]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		

Flags Key:
LU = Lower/Upper Bounds Test (Ab = Above, Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

May 05, 2016

Joan Kessner
WC-Hanford, Inc.
2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354

Re: RC-189 Soil
Work Order: 396196
SDG: XP0228

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 28, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4505.

Sincerely,

Heather Shaffer

Heather Shaffer
Project Manager

Purchase Order: 1510
Chain of Custody: RC-189-315
Enclosures

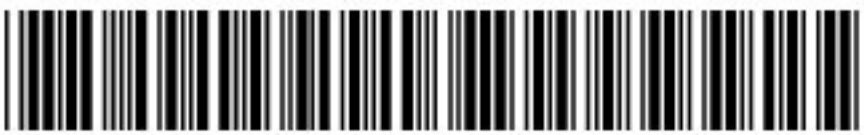


Table of Contents

Case Narrative

Receipt Narrative
for
Eberline
SDG: XP0228
Work Order: 396196

May 05, 2016

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on April 28, 2016 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following sample:

Laboratory ID	Client ID
396196001	J1V8X3

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: General Chemistry and Metals.

Heather Shaffer

Heather Shaffer
Project Manager

Chain of Custody and Supporting Documentation

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-189-315

Collector MARCHAND, EG	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Project Designation 100N Field Remediation	**Sampling Location** 100-N-83 Verification Sampling		**SAF No.** RC-189
Ice Chest No. ERC-96-082	**Field Logbook No.** EL-1652-12	**COA** 000N832000	**Method of Shipment** Commerical Carrier
Shipped To GEL Laboratories Charleston	**Offsite Property No.** A131415		**Bill of Lading/Air Bill No.** SEE OSPC

Price Code 8B

Data Turnaround 7 Day

Other Labs Shipped To
Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
N/A

Special Handling and/or Storage
Cool as required

Preservation	Cool <=6C	Cool <=6C	Cool <=6C									
Type of Container	G/P	G/P	G/P									
No. of Container(s)	1	1	1									
Volume	250mL	125mL	250mL									
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196 {Hexavalent Chromium}	See item (2) in Special Instructions									

Sample No.	Matrix	Sample Date	Sample Time										
J1V8X3	SOIL	4-26-16	1025	✓	✓	✓							

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Ed Marchand	26 APR 2016 1230	T.R. Edmundson J.R. Edmundson	4-26-16 1230
T.R. Edmundson J.R. Edmundson	4-26-16 1330	1060 Refer #3	4-26-16 1330
1060 Refer #3	4-27-16 1000	T.R. Edmundson J.R. Edmundson	4-27-16 1000
T.R. Edmundson J.R. Edmundson WCH	4-27-16 1500	Fed Ex	4-27-16 —
[illegible]		M. Lindow	4-28-16 0900

FINAL SAMPLE DISPOSITION — Disposal Method — Disposed By — Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV) {Mercury}
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045

396196

REVIEWED BY KWporter DATE 4-27-16

XP0228

WCH-EE-011

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: INCHN MK	**SDG/AR/COC/Work Order:** XP0228
Received By:	**Date Received:** 4-28-16

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): cpm 0
Classified Radioactive II or III by RSO?		✓	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?		✓	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		✓	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		✓	

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	✓			Preservation Method: (Ice bags) Blue ice Dry ice None Other (describe) *all temperatures are recorded in Celsius 3 C
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR30462862 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?			✓	Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6	Do Low Level Perchlorate samples have headspace as required?			✓	Sample ID's and containers affected:
7	VOA vials contain acid preservation?			✓	(If unknown, select No)
8	VOA vials free of headspace (defined as < 6mm bubble)?			✓	Sample ID's and containers affected:
9	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
10	Samples received within holding time?	✓			ID's and tests affected:
11	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
12	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
13	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
14	Are sample containers identifiable as GEL provided?			✓	
15	COC form is properly signed in relinquished/received sections?	✓			
16	Carrier and tracking number.				Circle Applicable: (FedEx Air) FedEx Ground UPS Field Services Courier Other 7762 1100 4918

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials DS Date 4/28/16 Page 1 of 1

GL-CHL-SR-001 Rev 3

Laboratory Certifications

List of current GEL Certifications as of 05 May 2016

State	Certification
Alaska	UST−0110
Arkansas	88−0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH−0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA160006
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122016−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−16−11
Utah NELAP	SC000122016−20
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Metals Analysis

Case Narrative

Metals
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0228
Work Order #: 396196

Sample ID	Client ID
396196001	J1V8X3
1203538078	Method Blank (MB)**ICP**
1203538079	Laboratory Control Sample (LCS)
1203538082	396196001(J1V8X3L) Serial Dilution (SD)
1203538080	396196001(J1V8X3D) Sample Duplicate (DUP)
1203538081	396196001(J1V8X3S) Matrix Spike (MS)
1203538169	Method Blank (MB)**ICP-MS**
1203538170	Laboratory Control Sample (LCS)
1203538173	396196001(J1V8X3L) Serial Dilution (SD)
1203538171	396196001(J1V8X3D) Sample Duplicate (DUP)
1203538172	396196001(J1V8X3S) Matrix Spike (MS)
1203538543	Method Blank (MB)**CVAA**
1203538544	Laboratory Control Sample (LCS)
1203538550	396196001(J1V8X3L) Serial Dilution (SD)
1203538548	396196001(J1V8X3D) Sample Duplicate (DUP)
1203538549	396196001(J1V8X3S) Matrix Spike (MS)

Sample Analysis

The samples in this SDG were analyzed on a "dry weight" basis.

Method/Analysis Information

Analytical Batch:	1563346, 1563383 and 1563519
Prep Batch :	1563345, 1563382 and 1563517
Standard Operating Procedures:	GL-MA-E-013 REV# 26, GL-MA-E-009 REV# 26, GL-MA-E-014 REV# 28 and GL-MA-E-010 REV# 31
Analytical Method:	SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B
Prep Method :	SW846 3050B and SW846 7471B Prep

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

System Configuration

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, cyclonic spray chamber, and yttrium or scandium internal standard.

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 9000 inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm.

Calibration Information

Instrument Calibration
All initial calibration requirements have been met for this sample delivery group (SDG).

CRDL/PQL Requirements
The PQL standard recoveries for SW846 6010C or 6010D met the control limits with the exception of potassium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 396196001 (J1V8X3)-ICP.

ICSA/ICSAB Statement
All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

Continuing Calibration Blanks (CCB) Requirements
All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

Continuing Calibration Verification (CCV) Requirements
All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement
The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement
The following samples were selected as the quality control (QC) samples for this SDG: 396196001 (J1V8X3)-ICP, ICP-MS and CVAA.

Matrix Spike (MS/MSD) Recovery Statement
The percent recoveries (%R) obtained from the MS/MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The matrix spike met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes.

Duplicate Relative Percent Difference (RPD) Statement
The RPD obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control of +/-RL is used to evaluate the DUP results. The relative percent differences (RPD) between the sample and its duplicate (DUP) were within acceptable limits for all applicable analytes.

Serial Dilution % Difference Statement
The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25x the

IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified.

Sample	Analyte	Value
1203538082 (J1V8X3SDILT)	Aluminum	11.6 *(0%-10%)
	Iron	10.2 *(0%-10%)
	Manganese	11.1 *(0%-10%)
	Silicon	10.9 *(0%-10%)

Technical Information

Holding Time Specifications
GEL assigns holding times based on the associated methodology. Holding time is measured by comparison of the date and time of sample collection to the date and time of sample preparation and analysis. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP. Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions
Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Sample was diluted for titanium in order to bring raw values within the linear range of the instrument, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for antimony, cadmium, cobalt, vanadium and zinc. 396196001 (J1V8X3)-ICP. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

Analyte	396196 001
Antimony	5X
Cadmium	5X
Cobalt	5X
Selenium	2X
Vanadium	5X
Zinc	5X

Preparation Information
The samples in this SDG were not diluted and prepared according to the cited SOP.

Miscellaneous Information

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation
A Data exception report (DER) was generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) 1516526 was generated for sample 1203538082 (J1V8X3SDILT) in this SDG/batch.

Additional Comments
Additional comments were not required for this SDG.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
03-MAY-16	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3050B/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1563346	See Below		

Potentially affected work order(s)(SDG): 396196(XP0228)

Application Issues:

Failed difference for SDILT

Specification and Requirements Exception Description:	**DER Disposition:**
1. Failed difference for SDILT: QC 1203538082SDILT	1. Not all the applicable analytes were within the established acceptance criteria. Matrix suppression may be suspected. The data has been qualified. 1203538082 (J1V8X3SDILT) Aluminum [11.6 *(0%-10%)], Iron [10.2 *(0%-10%)], Manganese [11.1 *(0%-10%)] and Silicon [10.9 *(0%-10%)].

Originator's Name:

Helen Camello 03-MAY-16

Data Validator/Group Leader:

Louise Smith 05-MAY-16

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report
for

WCHN001 Eberline

Client SDG: XP0228 GEL Work Order: 396196 Project: RC-189 Soil

The Qualifiers in this report are defined as follows:

* Duplicate analysis not within control limits

B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).

D Results are reported from a diluted aliquot of sample.

E Reported value is estimated due to interferences. See comment in narrative.

M Duplicate precision not met.

N Spike Sample recovery is outside control limits.

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: Nik-Cole A. Elmore **Name: Nik-Cole Elmore**

Date: 10 MAY 2016 **Title: Data Validator**

Sample Data Summary

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 10, 2016

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-189 Soil

Client SDG: XP0228

Client Sample ID: J1V8X3
Sample ID: 396196001
Matrix: SOIL
Collect Date: 26-APR-16 10:25
Receive Date: 28-APR-16
Collector: Client
Moisture: 5.72%

Project: WCHN00613
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.00416	0.00416	0.0124	mg/kg	1	MTM1	05/02/16	1120	1563519	1
Metals Analysis-ICP											
ICP METALS 6010TR Client List "Dry Weight Corrected"											
Aluminum	M	8070	7.14	21.0	mg/kg	1	HSC	04/29/16	1307	1563346	2
Arsenic	B	3.11	0.525	3.15	mg/kg	1					
Barium		77.7	0.105	0.525	mg/kg	1					
Beryllium		0.692	0.105	0.525	mg/kg	1					
Boron		6.55	1.05	5.25	mg/kg	1					
Calcium		3300	8.40	26.3	mg/kg	1					
Chromium		12.3	0.158	0.525	mg/kg	1					
Copper		14.4	0.315	1.05	mg/kg	1					
Iron	M	20400	8.40	26.3	mg/kg	1					
Lead		3.83	0.347	1.05	mg/kg	1					
Magnesium		4260	8.93	31.5	mg/kg	1					
Manganese	M	322	0.210	1.05	mg/kg	1					
Molybdenum	U	0.210	0.210	1.05	mg/kg	1					
Nickel		10.3	0.158	0.525	mg/kg	1					
Potassium		1950	6.72	26.3	mg/kg	1					
Silicon	M	1150	1.58	10.5	mg/kg	1					
Silver		1.14	0.105	0.525	mg/kg	1					
Sodium		116	7.35	26.3	mg/kg	1					
Antimony	DU	1.73	1.73	5.25	mg/kg	5	HSC	05/02/16	1307	1563346	3
Cadmium	DU	0.525	0.525	2.63	mg/kg	5					
Cobalt	D	6.81	0.788	2.63	mg/kg	5					
Vanadium	D	49.7	0.525	2.63	mg/kg	5					
Zinc	D	46.4	2.10	5.25	mg/kg	5					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.347	0.347	1.05	mg/kg	2	SKJ	05/03/16	0202	1563383	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JP1	04/28/16	2201	1563382
SW846 3050B	SW846 3050B Prep for 6010C	JP1	04/28/16	2325	1563345
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	04/29/16	1216	1563517

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 10, 2016

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0228
Project:	RC-189 Soil		

Client Sample ID:	J1V8X3	Project:	WCHN00613
Sample ID:	396196001	Client ID:	WCHN001

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7471B	
2	SW846 3050B/6010C	
3	SW846 3050B/6010C	
4	SW846 3050B/6020A	

Notes:

Quality Control Summary

QC Summary

Report Date: May 10, 2016

WC-Hanford, Inc.
2620 Fermi Avenue
MSIN H4-21
Richland, Washington

Contact: **Joan Kessner**

Workorder: **396196** **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS										
Batch 1563383										
QC1203538171 396196001 DUP										
Selenium	DU	0.347	DU	0.347	mg/kg	N/A			SKJ	05/03/16 02:06
QC1203538170 LCS										
Selenium	4.84		D	4.81	mg/kg		99.4	(80%-120%)		05/03/16 01:58
QC1203538169 MB										
Selenium			DU	0.320	mg/kg					05/03/16 01:54
QC1203538172 396196001 MS										
Selenium	5.25 DU	0.347	D	4.61	mg/kg		87.8	(75%-125%)		05/03/16 02:10
QC1203538173 396196001 SDILT										
Selenium	DU	-0.01	DU	1.74	ug/L	N/A		(0%-10%)		05/03/16 02:17
Metals Analysis-ICP										
Batch 1563346										
QC1203538080 396196001 DUP										
Aluminum	M	8070		7890	mg/kg	2.33		(0%-20%)	HSC	04/29/16 13:10
Antimony	DU	1.73	DU	1.68	mg/kg	N/A				05/02/16 13:10
Arsenic	B	3.11		3.19	mg/kg	2.48 ^		(+/-3.06)		04/29/16 13:10
Barium		77.7		78.4	mg/kg	0.843		(0%-20%)		
Beryllium		0.692		0.681	mg/kg	1.56 ^		(+/-0.510)		
Boron		6.55	B	4.59	mg/kg	35.3 ^		(+/-5.10)		
Cadmium	DU	0.525	DU	0.510	mg/kg	N/A				05/02/16 13:10
Calcium		3300		3220	mg/kg	2.63		(0%-20%)		04/29/16 13:10
Chromium		12.3		12.3	mg/kg	0.465		(0%-20%)		
Cobalt	D	6.81	D	6.77	mg/kg	0.694 ^		(+/-2.55)		05/02/16 13:10
Copper		14.4		14.6	mg/kg	1.41		(0%-20%)		04/29/16 13:10
Iron	M	20400		20100	mg/kg	1.21		(0%-20%)		

QC Summary

Workorder: 396196 **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1563346										
Lead		3.83		4.01	mg/kg	4.57 ^		(+/-1.02)	HSC	04/29/16 13:10
Magnesium		4260		4230	mg/kg	0.722		(0%-20%)		
Manganese	M	322		326	mg/kg	1.19		(0%-20%)		
Molybdenum	U	0.210	U	0.204	mg/kg	N/A				
Nickel		10.3		10.3	mg/kg	0.126		(0%-20%)		
Potassium		1950		1860	mg/kg	4.51		(0%-20%)		
Silicon	M	1150		1190	mg/kg	3.56		(0%-20%)		
Silver		1.14		0.994	mg/kg	14 ^		(+/-0.510)		
Sodium		116		132	mg/kg	12.5 ^		(+/-25.5)		
Vanadium	D	49.7	D	47.3	mg/kg	5.04		(0%-20%)		05/02/16 13:10
Zinc	D	46.4	D	41.7	mg/kg	10.7		(0%-20%)		
QC1203538079 LCS										
Aluminum	484			447	mg/kg		92.4	(80%-120%)		04/29/16 13:03
Antimony	48.4			47.7	mg/kg		98.7	(80%-120%)		05/02/16 13:00
Arsenic	48.4			42.7	mg/kg		88.4	(80%-120%)		04/29/16 13:03
Barium	48.4			43.7	mg/kg		90.3	(80%-120%)		
Beryllium	48.4			44.2	mg/kg		91.5	(80%-120%)		
Boron	48.4			44.7	mg/kg		92.5	(80%-120%)		
Cadmium	48.4			46.5	mg/kg		96.2	(80%-120%)		05/02/16 13:00
Calcium	484			455	mg/kg		94.1	(80%-120%)		04/29/16 13:03
Chromium	48.4			43.1	mg/kg		89.2	(80%-120%)		
Cobalt	48.4			46.8	mg/kg		96.8	(80%-120%)		05/02/16 13:00

QC Summary

Workorder: 396196 **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1563346										
Copper	48.4			44.4	mg/kg		91.9	(80%-120%)	HSC	04/29/16 13:03
Iron	484			453	mg/kg		93.8	(80%-120%)		
Lead	48.4			43.0	mg/kg		88.9	(80%-120%)		
Magnesium	484			456	mg/kg		94.3	(80%-120%)		
Manganese	48.4			43.5	mg/kg		89.9	(80%-120%)		
Molybdenum	48.4			43.0	mg/kg		88.9	(80%-120%)		
Nickel	48.4			42.7	mg/kg		88.3	(80%-120%)		
Potassium	484			427	mg/kg		88.4	(80%-120%)		
Silicon	484			417	mg/kg		86.2	(80%-120%)		
Silver	48.4			43.7	mg/kg		90.3	(80%-120%)		
Sodium	484			459	mg/kg		94.9	(80%-120%)		
Vanadium	48.4			47.9	mg/kg		99.1	(80%-120%)		05/02/16 13:00
Zinc	48.4			44.9	mg/kg		92.9	(80%-120%)		
QC1203538078 MB										
Aluminum			U	6.63	mg/kg					04/29/16 13:00
Antimony			U	0.322	mg/kg					05/02/16 12:56
Arsenic			U	0.487	mg/kg					04/29/16 13:00
Barium			U	0.0975	mg/kg					
Beryllium			U	0.0975	mg/kg					
Boron			U	0.975	mg/kg					
Cadmium			U	0.0975	mg/kg					05/02/16 12:56
Calcium			U	7.80	mg/kg					04/29/16 13:00

QC Summary

Workorder: 396196 **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1563346											
Chromium				U	0.146	mg/kg				HSC	04/29/16 13:00
Cobalt				U	0.146	mg/kg					05/02/16 12:56
Copper				U	0.292	mg/kg					04/29/16 13:00
Iron				U	7.80	mg/kg					
Lead				U	0.322	mg/kg					
Magnesium				U	8.28	mg/kg					
Manganese				U	0.195	mg/kg					
Molybdenum				U	0.195	mg/kg					
Nickel				U	0.146	mg/kg					
Potassium				U	6.24	mg/kg					
Silicon				U	1.46	mg/kg					
Silver				U	0.0975	mg/kg					
Sodium				U	6.82	mg/kg					
Vanadium				U	0.0975	mg/kg					05/02/16 12:56
Zinc				U	0.390	mg/kg					
QC1203538081 396196001 MS											
Aluminum	513	M	8070		9640	mg/kg		N/A	(75%-125%)		04/29/16 13:13
Antimony	51.3	DU	1.73	D	49.4	mg/kg		96.3	(75%-125%)		05/02/16 13:14
Arsenic	51.3	B	3.11		47.4	mg/kg		86.3	(75%-125%)		04/29/16 13:13
Barium	51.3		77.7		123	mg/kg		88.5	(75%-125%)		
Beryllium	51.3		0.692		46.7	mg/kg		89.8	(75%-125%)		
Boron	51.3		6.55		52.4	mg/kg		89.5	(75%-125%)		

QC Summary

Workorder: 396196 **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1563346											
Cadmium	51.3	DU	0.525	D	49.9	mg/kg		97.2	(75%-125%)	HSC	05/02/16 13:14
Calcium	513		3300		3830	mg/kg		N/A	(75%-125%)		04/29/16 13:13
Chromium	51.3		12.3		56.3	mg/kg		85.6	(75%-125%)		
Cobalt	51.3	D	6.81	D	57.0	mg/kg		97.8	(75%-125%)		05/02/16 13:14
Copper	51.3		14.4		63.3	mg/kg		95.4	(75%-125%)		04/29/16 13:13
Iron	513	M	20400		21200	mg/kg		N/A	(75%-125%)		
Lead	51.3		3.83		48.1	mg/kg		86.4	(75%-125%)		
Magnesium	513		4260		4760	mg/kg		N/A	(75%-125%)		
Manganese	51.3	M	322		363	mg/kg		N/A	(75%-125%)		
Molybdenum	51.3	U	0.210		44.7	mg/kg		87.2	(75%-125%)		
Nickel	51.3		10.3		54.5	mg/kg		86	(75%-125%)		
Potassium	513		1950		2440	mg/kg		95.4	(75%-125%)		
Silicon	513	M	1150		1590	mg/kg		84.9	(75%-125%)		
Silver	51.3		1.14		47.6	mg/kg		90.6	(75%-125%)		
Sodium	513		116		642	mg/kg		103	(75%-125%)		
Vanadium	51.3	D	49.7	D	100	mg/kg		98.5	(75%-125%)		05/02/16 13:14
Zinc	51.3	D	46.4	D	93.0	mg/kg		90.9	(75%-125%)		
QC1203538082 396196001 SDILT											
Aluminum		M	76900	DM	17200	ug/L	11.6*		(0%-10%)		04/29/16 13:16
Antimony		DU	-0.599	DU	8.66	ug/L	N/A		(0%-10%)		05/02/16 13:20
Arsenic		B	29.6	D	8.65	ug/L	46		(0%-10%)		04/29/16 13:16
Barium			740	D	162	ug/L	9.55		(0%-10%)		

QC Summary

Workorder: 396196 **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1563346										
Beryllium		6.59	D	1.52	ug/L	15.3		(0%-10%)	HSC	04/29/16 13:16
Boron		62.4	D	13.1	ug/L	4.82		(0%-10%)		
Cadmium	DU	-0.854	DU	2.63	ug/L	N/A		(0%-10%)		05/02/16 13:20
Calcium		31400	D	6670	ug/L	6.03		(0%-10%)		04/29/16 13:16
Chromium		118	D	25.7	ug/L	9.12		(0%-10%)		
Cobalt	D	13.0	D	2.46	ug/L	5.25		(0%-10%)		05/02/16 13:20
Copper		137	D	28.2	ug/L	3.19		(0%-10%)		04/29/16 13:16
Iron	M	194000	DM	42700	ug/L	10.2*		(0%-10%)		
Lead		36.4	D	6.40	ug/L	12.2		(0%-10%)		
Magnesium		40500	D	8850	ug/L	9.2		(0%-10%)		
Manganese	M	3060	DM	681	ug/L	11.1*		(0%-10%)		
Molybdenum	U	-0.0289	DU	1.05	ug/L	N/A		(0%-10%)		
Nickel		98.4	D	21.5	ug/L	9.01		(0%-10%)		
Potassium		18600	D	3990	ug/L	7.45		(0%-10%)		
Silicon	M	11000	DM	2430	ug/L	10.9*		(0%-10%)		
Silver		10.9	D	1.75	ug/L	19.7		(0%-10%)		
Sodium		1110	D	180	ug/L	18.7		(0%-10%)		
Vanadium	D	94.7	D	18.4	ug/L	2.69		(0%-10%)		05/02/16 13:20
Zinc	D	88.3	D	18.2	ug/L	2.8		(0%-10%)		
Metals Analysis-Mercury										
Batch 1563519										
QC1203538548 396196001 DUP										
Mercury	U	0.00416	U	0.0042	mg/kg	N/A			MTM1	05/02/16 11:25

QC Summary

Workorder: 396196 **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury										
Batch 1563519										
QC1203538544 LCS										
Mercury	0.117			0.119	mg/kg		101	(80%-120%)	MTM1	05/02/16 10:46
QC1203538543 MB										
Mercury			U	0.0039	mg/kg					05/02/16 10:45
QC1203538549 396196001 MS										
Mercury	0.126	U 0.00416		0.132	mg/kg		102	(80%-120%)		05/02/16 11:26
QC1203538550 396196001 SDILT										
Mercury		U 0.053	DU	0.0208	ug/L	N/A		(0%-10%)		05/02/16 11:28

Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Miscellaneous

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: **1563345**
Analyst: James Pressley
Method: SW846 3050B
Lab SOP: GL-MA-E-009 REV# 26
Instrument: BAL-893

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203538079	Metals Spike Mix I	UI2370891-01	.25	mL
LCS	1203538079	Metals Spike Mix II	UI2370894-02	.25	mL
MS	1203538081	Metals Spike Mix I	UI2370891-01	.25	mL
MS	1203538081	Metals Spike Mix II	UI2370894-02	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203538078 MB	28-APR-2016 22:01:00	Soil	0.513	50	97.46589
1203538079 LCS	28-APR-2016 22:01:00	Soil	0.517	50	96.7118
396196001	28-APR-2016 22:01:00	Soil	0.505	50	99.0099
1203538080 DUP (396196001)	28-APR-2016 22:01:00	Soil	0.52	50	96.15385
1203538081 MS (396196001)	28-APR-2016 22:01:00	Soil	0.517	50	96.7118
1203538082 SDILT (396196001)	28-APR-2016 22:01:00	Soil	0.505	50	99.0099

Reagent/Solvent Lot ID	Description	Amount
160321	Concentrated Nitric Acid	1.25 mL
2378698	HYDROCHLORIC ACID	10 mL

Comments:
Block Temperature (90-100C): 92 C
Temperature within limits (Y/N)?: Y
Thermometer ID: 119585
Hot Block ID: 10B
Prep Date: 28-APR-2016 23:25 BAL-893 James Pressley

Prep Logbook

Acid Digestion of Sediments, Sludges, and Soils

Batch ID: **1563382**
Analyst: James Pressley
Method: SW846 3050B
Lab SOP: GL-MA-E-009 REV# 26
Instrument: BAL-893

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203538170	ICP-MS spiking soluiton A	UI2370897-A	.25	mL
LCS	1203538170	ICP-MS spiking solution B	UI2370900-B	.25	mL
MS	1203538172	ICP-MS spiking soluiton A	UI2370897-A	.25	mL
MS	1203538172	ICP-MS spiking solution B	UI2370900-B	.25	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203538169 MB	28-APR-2016 22:01:00	Soil	0.516	50	96.89922
1203538170 LCS	28-APR-2016 22:01:00	Soil	0.517	50	96.7118
396196001	28-APR-2016 22:01:00	Soil	0.504	50	99.20635
1203538171 DUP (396196001)	28-APR-2016 22:01:00	Soil	0.504	50	99.20635
1203538172 MS (396196001)	28-APR-2016 22:01:00	Soil	0.505	50	99.0099
1203538173 SDILT (396196001)	28-APR-2016 22:01:00	Soil	0.504	50	99.20635

Reagent/Solvent Lot ID	Description	Amount
160321	Concentrated Nitric Acid	5 mL
160325	Hydrogen Peroxide 30%, from Bioassay (LIMS ID 2360034)	1.5 mL

Comments:
Block Temperature (90-100C): 90 C
Temperature within limits (Y/N)?: Y
Thermometer ID: 89095-622
Hot Block ID: 11

General Chem Analysis

Case Narrative

General Chemistry
Technical Case Narrative
Eberline (WCHN)
SDG #: XP0228
Work Order #: 396196

Method/Analysis Information

Product:	**Ion Chromatography**		
Analytical Batch:	1563250	**Method:**	SW846 9056A Anions
Prep Batch :	1563249	**Method:**	SW846 9056A

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9056A:

Sample ID	Client ID
396196001	J1V8X3
1203537830	Method Blank (MB)
1203537831	Laboratory Control Sample (LCS)
1203537832	396196001(J1V8X3) Sample Duplicate (DUP)
1203537833	396196001(J1V8X3) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-086 REV# 25.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Ion Chromatography analysis was performed on a Dionex ICS-3000 Ion Chromatograph.

Initial Calibration
All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks
All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

Calibration Verification Information (CCV)
All continuing calibration verification standards (CCVs) associated with reported data from this batch were within acceptance limits.

Y Intercept Rule
The absolute value of the intercept is less than 3 times the MDL.

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation
Sample 396196001 (J1V8X3) was selected for QC analysis.

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The MS/PS recovery for this sample set was within the required acceptance limits where applicable.

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
All samples in this SDG met the specified holding time.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-analysis
The samples in this SDG did not require re-analysis.

Miscellaneous Information

Data Exception (DER) Documentation
Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Manual Integrations
Samples 1203537832 (J1V8X3DUP) and 396196001 (J1V8X3) were manually integrated to correctly position the baseline as set in the calibration standards.

Additional Comments
Additional comments were not required for this SDG.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product:	**Nitrate + Nitrite**		
Analytical Batch:	1563188	**Method:**	EPA 353.2 Nitrogen, Nitrate/Nitrite
Prep Batch :	1563187	**Method:**	EPA 353.2 Modified

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 353.2 Modified:

Sample ID	Client ID
396196001	J1V8X3
1203537631	Method Blank (MB)
1203537632	Laboratory Control Sample (LCS)
1203537633	396196001(J1V8X3) Sample Duplicate (DUP)
1203537634	396196001(J1V8X3) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-128 REV# 8.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Nutrient analysis was performed on a Lachat QuickChem FIA+ 8500 Series.

Calibration Verification Information
All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria.

Continuing Calibration Blanks
All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

Y Intercept Rule
The absolute value of the intercept is less than 3 times the MDL.

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation
Sample 396196001 (J1V8X3) was selected for QC analysis.

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The MS/PS recovery for this sample set was within the required acceptance limits where applicable.

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
All samples in this SDG met the specified holding time.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-analysis
Sample1203537632 (LCS) was re-analyzed to verify the result.

Miscellaneous Information

Data Exception (DER) Documentation
Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Additional Comments
Additional comments were not required for this SDG.

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product:	**Hexavalent Chromium**		
Analytical Batch:	1563483	**Method:**	SW846_7196A Hexavalent Chromium
Prep Batch :	1563482	**Method:**	SW846 3060A

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 7196A:

Sample ID	Client ID
396196001	J1V8X3
1203538422	Method Blank (MB)
1203538423	Laboratory Control Sample (LCS)
1203538425	396196001(J1V8X3) Sample Duplicate (DUP)
1203538426	396196001(J1V8X3) Matrix Spike (MS)
1203538427	396196001(J1V8X3) Matrix Spike Duplicate (MSD)
1203538424	Insoluble Lab Control Sample (ILCS)

The samples in this SDG were analyzed on a "dry weight" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV# 21.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Spectrometric analysis was performed on a Spectronic 20D+ Digital Spectrophotometer.

Initial Calibration
All initial calibration requirements have been met for this SDG.

Continuing Calibration Blanks
All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

Calibration Verification Information (CCV)
All continuing calibration verification standards (CCVs) associated with reported data from this batch were within acceptance limits.

Y Intercept Rule
The absolute value of the intercept is less than 3 times the MDL.

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation
Sample 396196001 (J1V8X3) was selected for QC analysis.

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The MS/PS recovery for this sample set was within the required acceptance limits where applicable.

MS/MSD Relative Percent Difference (RPD) Statement
The RPD between the spike and spike duplicate met the acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
All samples in this SDG met the specified holding time.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-analysis
The samples in this SDG did not require re-analysis.

Miscellaneous Information

Data Exception (DER) Documentation
Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Additional Comments
Additional comments were not required for this SDG.

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages

electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Method/Analysis Information

Product: **pH**

Analytical Batch: 1563730 **Method:** SW9045D pH

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9045D:

Sample ID	Client ID
396196001	J1V8X3
1203539022	Laboratory Control Sample (LCS)
1203539023	396196001(J1V8X3) Sample Duplicate (DUP)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-008 REV# 21.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information

The Titration and Ion analysis was performed on a Thermo Orion Star A111. Immediates

Initial Standardization
The titrant was properly standardized

Quality Control (QC) Information

Laboratory Control Sample (LCS) Recovery
The LCS spike recovery met the acceptance limits.

Quality Control (QC) Designation
Sample 396196001 (J1V8X3) was selected for QC analysis.

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

Technical Information

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified.

Sample	Analyte	Value
1203539023 (J1V8X3DUP)	pH	Received 28-APR-16, out of holding 26-APR-16
396196001 (J1V8X3)	pH	Received 28-APR-16, out of holding 26-APR-16

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-analysis
The samples in this SDG did not require re-analysis.

Miscellaneous Information

Data Exception (DER) Documentation
A data exception report (DER) 1516838 was generated for samples 396196001 (J1V8X3) and 1203539023 (J1V8X3DUP) in this SDG/batch.

Additional Comments
Additional comments were not required for this SDG.

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:
Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

DATA EXCEPTION REPORT

Mo.Day Yr.	**Division:**	**Quality Criteria:**	**Type:**
03-MAY-16	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ELECTRODE	SW846 9045C/9045D, SW846 9045D	Solid	OLAB, WCHN
Batch ID:	**Sample Numbers:**		
1563730	See Below		

Potentially affected work order(s)(SDG): 396196(XP0228),396300(X604298),396303(X604308)

Application Issues:

Sample received out of holding

Specification and Requirements Exception Description:	**DER Disposition:**
1. Sample received out of holding: 396196 001 396300 001,002 396303 001 QC 1203539023DUP	1. Samples (See Below) were received by the laboratory outside of the method specified holding time. The data is qualified. 1203539023 (J1V8X3DUP) [Received 28-APR-16, out of holding 26-APR-16]. 396196001 (J1V8X3) [Received 28-APR-16, out of holding 26-APR-16]. 396300001 (X604298-01) [Received 29-APR-16, out of holding 27-APR-16]. 396300002 (X604298-02) [Received 29-APR-16, out of holding 27-APR-16]. 396303001 (X604308-01) [Received 29-APR-16, out of holding 28-APR-16].

Originator's Name:

Rachael Bell 03-MAY-16

Data Validator/Group Leader:

Elzbieta Szulc 04-MAY-16

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report
for

WCHN001 Eberline

Client SDG: XP0228 GEL Work Order: 396196 Project: RC-189 Soil

The Qualifiers in this report are defined as follows:

B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:  **Name: Thomas Lewis**

Date: 09 MAY 2016 **Title: Data Validator**

Sample Data Summary

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 9, 2016

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-189 Soil

Client SDG: XP0228

Client Sample ID: J1V8X3
Sample ID: 396196001
Matrix: SOIL
Collect Date: 26-APR-16 10:25
Receive Date: 28-APR-16
Collector: Client
Moisture: 5.72%

Project: WCHN00613
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.711	0.711	2.12	mg/kg	1	MAR1	04/29/16	1946	1563250	1
Chloride	B	1.14	0.711	2.12	mg/kg	1					
Fluoride	B	0.635	0.350	1.06	mg/kg	1					
Nitrate-N		1.92	0.350	1.06	mg/kg	1					
Nitrite-N	U	0.350	0.350	1.06	mg/kg	1					
O-Phosphate as P	B	1.80	0.711	2.12	mg/kg	1					
Sulfate	B	2.74	1.41	4.24	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite		1.79	0.178	0.524	mg/kg	1	KLP1	05/02/16	1305	1563188	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	B	0.191	0.126	0.422	mg/kg	1	AMB	05/02/16	0956	1563483	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 22.4C	X	8.00	0.010	0.100	pH	1	RXB5	04/29/16	1742	1563730	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	KLP1	05/02/16	1004	1563187
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	AMB	04/29/16	1205	1563482
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	04/29/16	1014	1563249

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

Quality Control Summary

QC Summary

Report Date: May 9, 2016

WC-Hanford, Inc.
2620 Fermi Avenue
MSIN H4-21
Richland, Washington

Contact: **Joan Kessner**

Workorder: **396196** **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 1563250										
QC1203537832 396196001 DUP										
Bromide	U	0.711	U	0.711	mg/kg	N/A			MAR1	04/29/16 20:18
Chloride	B	1.14	B	1.15	mg/kg	0.371 ^		(+/-2.12)		
Fluoride	B	0.635	B	0.538	mg/kg	16.6 ^		(+/-1.06)		
Nitrate-N		1.92		1.86	mg/kg	2.81 ^		(+/-1.06)		
Nitrite-N	U	0.350	U	0.350	mg/kg	N/A				
O-Phosphate as P	B	1.80	B	1.60	mg/kg	11.8 ^		(+/-2.12)		
Sulfate	B	2.74	B	2.32	mg/kg	16.5 ^		(+/-4.24)		
QC1203537831 LCS										
Bromide	12.5			12.4	mg/kg		99.3	(90%-110%)		04/29/16 19:15
Chloride	50.0			47.1	mg/kg		94.1	(90%-110%)		
Fluoride	25.0			24.7	mg/kg		98.8	(90%-110%)		
Nitrate-N	25.0			23.9	mg/kg		95.6	(90%-110%)		
Nitrite-N	25.0			23.7	mg/kg		94.9	(90%-110%)		
O-Phosphate as P	12.5			12.6	mg/kg		101	(90%-110%)		
Sulfate	100			96.0	mg/kg		96	(90%-110%)		
QC1203537830 MB										
Bromide			U	0.670	mg/kg					04/29/16 18:43
Chloride			U	0.670	mg/kg					
Fluoride			U	0.330	mg/kg					
Nitrate-N			U	0.330	mg/kg					
Nitrite-N			U	0.330	mg/kg					

QC Summary

Workorder: 396196 **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography											
Batch 1563250											
O-Phosphate as P				U	0.670	mg/kg				MAR1	04/29/16 18:43
Sulfate				U	1.33	mg/kg					
QC1203537833 396196001 MS											
Bromide	13.2	U	0.711		13.2	mg/kg		100	(74%-113%)		04/29/16 20:50
Chloride	52.9	B	1.14		50.0	mg/kg		92.4	(48%-145%)		
Fluoride	26.5	B	0.635		22.8	mg/kg		83.9	(30%-135%)		
Nitrate-N	26.5		1.92		26.5	mg/kg		93	(70%-125%)		
Nitrite-N	26.5	U	0.350		25.4	mg/kg		94.9	(70%-120%)		
O-Phosphate as P	13.2	B	1.80		14.0	mg/kg		92.2	(35%-134%)		
Sulfate	106	B	2.74		104	mg/kg		96	(45%-162%)		
Nutrient Analysis											
Batch 1563188											
QC1203537633 396196001 DUP											
Nitrogen, Nitrate/Nitrite			1.79		2.04	mg/kg	12.8 ^		(+/-0.530)	KLP1	05/02/16 13:06
QC1203537632 LCS											
Nitrogen, Nitrate/Nitrite	10.0				10.5	mg/kg		105	(90%-110%)		05/02/16 14:34
QC1203537631 MB											
Nitrogen, Nitrate/Nitrite				U	0.170	mg/kg					05/02/16 13:02
QC1203537634 396196001 MS											
Nitrogen, Nitrate/Nitrite	10.5		1.79		13.6	mg/kg		113	(75%-125%)		05/02/16 13:07
Spectrometric Analysis											
Batch 1563483											
QC1203538425 396196001 DUP											
Hexavalent Chromium		B	0.191	B	0.144	mg/kg	28.5 ^		(+/-0.422)	AMB	05/02/16 09:57
QC1203538424 ILCS											
Hexavalent Chromium	7.94				6.73	mg/kg		84.8	(80%-120%)		05/02/16 09:53
QC1203538423 LCS											
Hexavalent Chromium	3.96				3.88	mg/kg		97.9	(80%-120%)		05/02/16 09:53

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QC Summary

Workorder: 396196 **Client SDG:** XP0228 **Project Description:** RC-189 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Spectrometric Analysis											
Batch 1563483											
QC1203538422 MB											
Hexavalent Chromium				U	0.120	mg/kg				AMB	05/02/16 09:52
QC1203538426 396196001 MS											
Hexavalent Chromium	4.23	B	0.191		3.37	mg/kg		75.1	(75%-125%)		05/02/16 09:58
QC1203538427 396196001 MSD											
Hexavalent Chromium	4.21	B	0.191		3.55	mg/kg	5.09	79.6	(0%-30%)		05/02/16 09:59
Titration and Ion Analysis											
Batch 1563730											
QC1203539023 396196001 DUP											
pH		X	8.00	X	7.86	pH	1.77		(0%-10%)	RXB5	04/29/16 17:45
QC1203539022 LCS											
pH	7.00				7.03	pH		100	(99%-101%)		04/29/16 17:41

Notes:

The Qualifiers in this report are defined as follows:

- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Miscellaneous

Moisture LogBook

Batch: 1563169
Analyst: CXC1
Date/Time: 28-APR-2016
Procedure Code DRY WEIGHT
Procedure Description Dry Weight-Percent Moisture
Lab Sop: GL-OA-E-020

Sample St	Sample Id	Rpd(%)
DUP	1203537560	**13.854**

Sample Id	Sample Type	Original Hsn	Instrument	Run Time	Container Wt	Initial Wt	Final Wt (g)	Net Initial Wt (g)	Net Final Wt (g)	Moisture (%)
396194001	SAMPLE		SP-39020004	14:54	7.083	24.864	20.841	17.781	13.758	22.625
396196001	SAMPLE		SP-39020004	14:54	6.984	34.765	33.176	27.781	26.192	5.719
1203537560	DUP	396194001	SP-39020004	14:54	7.26	31.078	24.887	23.818	17.627	25.992

Comments:

A) Result = (Net Initial - Net Final) /Net Initial * 100

Note: Aliquot is used for the determination of the effective MDL and PQL in LIMS

Prep Logbook

Ion Chromatography (IC)

Batch ID: **1563249**
Analyst: Marcy Lamb
Method: SW846 9056A
Lab SOP: GL-GC-E-086 REV# 25
Instrument: Sartorius Balance B-001

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203537831	IC-LCS/CCV	WIC160429-02CCV	40	mL
MS	1203537833	Spiking Solution	UIC160425SPK	.4	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203537830 MB	29-APR-2016 10:14:46	Soil	4	40	10
1203537831 LCS	29-APR-2016 10:14:46	Soil	4	40	10
396196001	29-APR-2016 10:14:46	Soil	4	40	10
1203537832 DUP (396196001)	29-APR-2016 10:14:46	Soil	4	40	10
1203537833 MS (396196001)	29-APR-2016 10:14:46	Soil	4.01	40	9.97506

Reagent/Solvent Lot ID	Description	Amount

Comments:

Prep Logbook

Nitrate/Nitrite (NO3+NO2) Analysis Using the Lachat QuikChem FIA+ 8000 Series Instrument

Batch ID: **1563187**
Analyst: Kristen Mizzell
Method: EPA 353.2 Modified
Lab SOP: GL-GC-E-128 REV# 8
Instrument: Sartorius Balance B-700

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203537632	TRASPIKE2	UTR2351130-02	.4	mL
MS	1203537634	TRASPIKE2	UTR2351130-02	.4	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)
1203537631 MB	02-MAY-2016 10:04:55	Soil	4	40	10
1203537632 LCS	02-MAY-2016 10:04:55	Soil	4	40	10
396196001	02-MAY-2016 10:04:55	Soil	4.05	40	9.87654
1203537633 DUP (396196001)	02-MAY-2016 10:04:55	Soil	4	40	10
1203537634 MS (396196001)	02-MAY-2016 10:04:55	Soil	4.05	40	9.87654

Reagent/Solvent Lot ID	Description	Amount
2362236-C	0.04N H2SO4 Solution	40 mL

Comments:

Prep Logbook

Colorimetric Determination of Hexavalent Chromium

Batch ID: **1563482**
Analyst: Alyson Boltz
Method: SW846 3060A
Lab SOP: GL-GC-E-044 REV# 21
Instrument: OHAUS Balance BAL-032

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
ILCS	1203538424	100mg/kg for cr6	IMM151106-HVC	.08	g
LCS	1203538423	Cr6 LCS 10mg/L	WD160429-1	.4	mL
MS	1203538426	Cr6 Intermediate Spike 10mg/L	160429-Cr6	.4	mL
MS	1203538428	Cr6 Intermediate Spike 10mg/L	160429-Cr6	.4	mL
MSD	1203538427	Cr6 Intermediate Spike 10mg/L	160429-Cr6	.4	mL
MSD	1203538429	Cr6 Intermediate Spike 10mg/L	160429-Cr6	.4	mL

Sample ID	Run Date	Matrix	Initial Weight (g)	Final Volume (mL)	Prep Factor (mL/g)	pH Check
1203538422 MB	29-APR-2016 12:05:22	Soil	1.0011	40	39.95605	7.5
1203538423 LCS	29-APR-2016 12:05:22	Soil	1.0096	40	39.61965	7.5
1203538424 ILCS	29-APR-2016 12:05:22	Soil	1.0077	40	39.69435	7.5
396196001	29-APR-2016 12:05:22	Soil	1.0064	40	39.74563	7.5
1203538425 DUP (396196001)	29-APR-2016 12:05:22	Soil	1.005	40	39.801	7.5
1203538426 MS (396196001)	29-APR-2016 12:05:22	Soil	1.0028	40	39.88831	7.5
1203538427 MSD (396196001)	29-APR-2016 12:05:22	Soil	1.0075	40	39.70223	7.5
1203538428 MS (396196001)	29-APR-2016 12:05:22	Soil	0.9995	40	40.02001	7.5
1203538429 MSD (396196001)	29-APR-2016 12:05:22	Soil	0.9999	40	40.004	7.5

Reagent/Solvent Lot ID	Description	Amount
160329-C	MAGNESIUM CHLORIDE SOLUTION FOR CR+6	1 mL
IMM160225-HVCS	PHOSPHATE BUFFER SOLUTION FOR CR+6	.5 mL
IMM160413-HVC	5M Nitric Acid Solution for Cr+6	2 mL
IMM160429b-HVCS	DIGESTION SOLUTION FOR CR+6	20 mL

Comments:
Digestion Start Date: 29-APR-2016 12:29
Digestion End Date: 29-APR-2016 12:29
Block Temperature (90-95C): 95 C
Temperature within limits (Y/N)?: Y
Thermometer ID: 119015
Hot Block ID: 13