SAF-RC-155
618-10 & 618-11 Field Remediation – Other
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

No Distribution Required KW 3/30/16
INITIAL/DATE

COMMENTS:

SDG XP0227 **SAF-RC-155**

Rad only Chem only ☑ Rad & Chem

☑ Complete Partial

Sample Location: 618-10 grout batch, GR-309CP

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

March 16, 2016

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

Re: RC-155 Other
Work Order: 392939
SDG: XP0227

Dear Joan Kessner:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 11, 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-155-208
Enclosures

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Case Narrative

Receipt Narrative
for
Eberline
SDG: XP0227
Work Order: 392939

March 16, 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 March 11, 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
392939001	J1V8D3

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: Metals.

Heather Shaffer

Heather Shaffer
Project Manager

Chain of Custody and Supporting Documentation

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-155-208

Collector: D. Becker	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 9A	Data Turnaround: 3 days		
Project Designation: 618-10 & 618-11 Remediation	Sampling Location: 618-10 grout batch GR-309CP		SAF No.: RC-155
Ice Chest No.: WCH-11-068	Field Logbook No.: EL-1664-01	COA: R618102F20	Method of Shipment: Commercial Carrier
Shipped To: TRE 3-9-16 ~~TestAmerica Denver~~ GEL	Offsite Property No.: N/A TRE 3-9-16		Bill of Lading/Air Bill No.: SEE RSR
Other Labs Shipped To: TRE 3-9-16 ~~TestAmerica Richland~~ Eberline Oak Ridge			

POSSIBLE SAMPLE HAZARDS/REMARKS

Radioactive

Special Handling and/or Storage

Trans ship RCF to TA-DEN

Preservation	None	None										
Type of Container	G/P	G/P										
No. of Container(s)	1	0										
Volume	1000mL	1000mL										
Sample Analysis	See item (1) in Special Instructions	RCF GEA Screen Tranship DN										

Sample No.	Matrix	Sample Date	Sample Time											
J1V8D3	OTHER	03/07/16	1340	X	X	39842	119g							

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
DAVID BECKER [signature]	3/7/16 1345	RT COFFMAN / RT Coffman	1345 3/7/16
RT COFFMAN / RT Coffman	3-7-16 1445	D. Miller [signature] RCF	1445 3-7-16
D. Miller [signature] RCF	0830 3-9-16	T.R. Edmundson / T.R. Edmundson	3-9-16 0830
T.R. Edmundson / T.R. Edmundson WCH	3-9-16 1500	Fed Ex	3-9-16
Fed Ex		[signature]	3-11-16 1000

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

SPECIAL INSTRUCTIONS

~~Run RAD analyses off material in GEA container~~ TRE 3-9-16

(1) ICP Metals (TCLP) (Client List) - 1311/6010 {Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Lead, Nickel, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc}; Mercury (TCLP) - 1311/7470 (Client List) {Mercury}

392939

XP0227

REVIEWED BY Kwesterlo DATE 3-9-16

WCH-EE-011

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: HAND			**SDG/AR/COC/Work Order:** 392939 XP0227
Received By: MK			**Date Received:** 3-11-16
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): MR/HR = 5 open
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#: 2910
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 21 C
2a	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: 130532790 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 7758 3447 0987

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials BL Date 3-12-16 Page 1 of 1 GL-CHL-SR-001 Rev 2

Laboratory Certifications

List of current GEL Certifications as of 16 March 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 #: XP0227
Work Order #: 392939

Sample ID	Client ID
392939001	J1V8D3
1203507872	TCLP Blank (TB)
1203508313	Method Blank (MB)**ICP**
1203508314	Laboratory Control Sample (LCS)
1203508317	392939001(J1V8D3L) Serial Dilution (SD)
1203508315	392939001(J1V8D3D) Sample Duplicate (DUP)
1203507871	392939001(J1V8D3S) Matrix Spike (MS)
1203508201	Method Blank (MB)**CVAA**
1203508202	Laboratory Control Sample (LCS)
1203508205	392939001(J1V8D3L) Serial Dilution (SD)
1203508203	392939001(J1V8D3D) Sample Duplicate (DUP)
1203507871	392939001(J1V8D3S) Matrix Spike (MS)

Sample Analysis

The samples in this SDG were analyzed on an "as received" basis.

Method/Analysis Information

Analytical Batch:	1552277 and 1552240
Prep Batch :	1552276 and 1552239
TCLP Prep Batch :	1552065
Standard Operating Procedures:	GL-MA-E-013 REV# 25, GL-MA-E-008 REV# 18, GL-LB-E-006 REV# 19 and GL-MA-E-010 REV# 31
Analytical Method:	SW846 3010A/6010C and SW846 7470A
Prep Method :	SW846 3010A and SW846 7470A Prep
TCLP Prep Method :	SW846 1311

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 PE 7300 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-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 CRDL/PQL standard recoveries met the referenced advisory control limits.

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: 392939001 (J1V8D3)-ICP 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
All applicable analytes in the serial dilution (SDILT) demonstrated acceptable correlation to its associated sample and met the established acceptance percent difference criteria.

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.

Sample Dilutions
The samples in this SDG did not require dilutions.

Preparation Information
The samples and associated matrix QC were prepared at a ten times or greater dilution factor to minimize potential interferences arising from the high sodium content in the TCLP leaching solution. ICP and CVAA.

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) 1501630 was generated for sample 392939001 (J1V8D3)-ICP in this SDG/batch. A data exception report (DER) 1501630 was generated for sample 392939001 (J1V8D3)-CVAA 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:
14-MAR-16		SOP	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
BALANCE	SW846 1311	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1552065	392939001		

Potentially affected work order(s)(SDG): 392939(XP0227)

Application Issues:

<100 grams for TCLP tumbling

Specification and Requirements Exception Description:	DER Disposition:
1. <100 grams for TCLP tumbling	1. <100 grams for TCLP tumbling due to limited sample.

Originator's Name:

Richard Dollinger 14-MAR-16

Data Validator/Group Leader:

Edmund Frampton 15-MAR-16

GEL LABORATORIES LLC

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

Qualifier Definition Report
for

WCHN001 Eberline

Client SDG: XP0227 GEL Work Order: 392939 Project: RC-155 Other

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.

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: 16 MAR 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: March 16, 2016

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-155 Other

Client SDG: XP0227

Client Sample ID: J1V8D3
Sample ID: 392939001
Matrix: OTHERLIQ
Collect Date: 07-MAR-16 13:40
Receive Date: 11-MAR-16
Collector: Client

Project: WCHN00414
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
TCLP Hg in Solid "As Received"											
Mercury	B	0.00071	0.00067	0.002	mg/L	1	MTM1	03/16/16	1158	1552240	1
Metals Analysis-ICP											
TCLP ICP Metals - 1311/3010A/6010C "As Received"											
Aluminum	U	0.680	0.680	2.00	mg/L	1	TXT1	03/16/16	0947	1552277	2
Antimony	U	0.035	0.035	0.100	mg/L	1					
Arsenic	U	0.050	0.050	0.300	mg/L	1					
Barium		5.00	0.010	0.050	mg/L	1					
Beryllium	U	0.010	0.010	0.050	mg/L	1					
Cadmium	U	0.010	0.010	0.050	mg/L	1					
Chromium		0.130	0.010	0.050	mg/L	1					
Lead	U	0.033	0.033	0.100	mg/L	1					
Nickel	U	0.015	0.015	0.050	mg/L	1					
Selenium	U	0.060	0.060	0.300	mg/L	1					
Silver	U	0.010	0.010	0.050	mg/L	1					
Sodium		20.5	1.00	3.00	mg/L	1					
Thallium	U	0.050	0.050	0.200	mg/L	1					
Vanadium	U	0.010	0.010	0.050	mg/L	1					
Zinc	U	0.033	0.033	0.100	mg/L	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 1311	SW846 1311 TCLP Leaching	RXD2	03/14/16	1550	1552065
SW846 3010A	ICP-TRACE TCLP by SW846 3010A	JP1	03/15/16	1825	1552276
SW846 7470A Prep	EPA 7470A Mercury Prep TCLP Liquid	AXS5	03/15/16	1330	1552239

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 7470A	
2	SW846 3010A/6010C	

Notes:

Quality Control Summary

GEL LABORATORIES LLC

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

QC Summary

Report Date: March 16, 2016

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

Contact: **Joan Kessner**

Workorder: **392939** **Client SDG:** XP0227 **Project Description:** RC-155 Other

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1552277										
QC1203508315 392939001 DUP										
Aluminum	U	0.680	U	0.680	mg/L	N/A			TXT1	03/16/16 09:50
Antimony	U	0.035	U	0.035	mg/L	N/A				
Arsenic	U	0.050	U	0.050	mg/L	N/A				
Barium		5.00		5.04	mg/L	0.768		(0%-20%)		
Beryllium	U	0.010	U	0.010	mg/L	N/A				
Cadmium	U	0.010	U	0.010	mg/L	N/A				
Chromium		0.130		0.126	mg/L	3.18 ^		(+/-0.050)		
Lead	U	0.033	U	0.033	mg/L	N/A				
Nickel	U	0.015	U	0.015	mg/L	N/A				
Selenium	U	0.060	B	0.0606	mg/L	32 ^		(+/-0.300)		
Silver	U	0.010	U	0.010	mg/L	N/A				
Sodium		20.5		20.5	mg/L	0.112		(0%-20%)		
Thallium	U	0.050	U	0.050	mg/L	N/A				
Vanadium	U	0.010	U	0.010	mg/L	N/A				
Zinc	U	0.033	U	0.033	mg/L	N/A				
QC1203508314 LCS										
Aluminum	50.0			52.2	mg/L		104	(80%-120%)		03/16/16 09:45
Antimony	5.00			4.69	mg/L		93.8	(80%-120%)		
Arsenic	5.00			4.72	mg/L		94.4	(80%-120%)		
Barium	5.00			4.90	mg/L		97.9	(80%-120%)		

QC Summary

Workorder: 392939 **Client SDG:** XP0227 **Project Description:** RC-155 Other

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1552277										
Beryllium	5.00			4.74	mg/L		94.9	(80%-120%)		
Cadmium	5.00			4.77	mg/L		95.5	(80%-120%)	TXT1	03/16/16 09:45
Chromium	5.00			4.89	mg/L		97.7	(80%-120%)		
Lead	5.00			4.84	mg/L		96.9	(80%-120%)		
Nickel	5.00			4.82	mg/L		96.4	(80%-120%)		
Selenium	5.00			4.19	mg/L		83.8	(80%-120%)		
Silver	5.00			4.76	mg/L		95.1	(80%-120%)		
Sodium	50.0			49.5	mg/L		99	(80%-120%)		
Thallium	5.00			4.82	mg/L		96.3	(80%-120%)		
Vanadium	5.00			4.88	mg/L		97.7	(80%-120%)		
Zinc	5.00			4.64	mg/L		92.7	(80%-120%)		
QC1203508313 MB										
Aluminum			U	0.680	mg/L					03/16/16 09:39
Antimony			U	0.035	mg/L					
Arsenic			U	0.050	mg/L					
Barium			U	0.010	mg/L					
Beryllium			U	0.010	mg/L					
Cadmium			U	0.010	mg/L					
Chromium			U	0.010	mg/L					
Lead			U	0.033	mg/L					
Nickel			U	0.015	mg/L					
Selenium			U	0.060	mg/L					
Silver			U	0.010	mg/L					

QC Summary

Workorder: **392939** **Client SDG:** XP0227 **Project Description:** RC-155 Other

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1552277											
Sodium				U	1.00	mg/L				TXT1	03/16/16 09:39
Thallium				U	0.050	mg/L					
Vanadium				U	0.010	mg/L					
Zinc				U	0.033	mg/L					
QC1203507871 392939001 MS											
Aluminum	10.0	U	0.680		10.4	mg/L		98.4	(75%-125%)		03/16/16 09:53
Antimony	2.00	U	0.035		1.87	mg/L		92.8	(75%-125%)		
Arsenic	5.00	U	0.050		4.87	mg/L		97.4	(75%-125%)		
Barium	10.0		5.00		14.5	mg/L		95.3	(75%-125%)		
Beryllium	2.00	U	0.010		1.81	mg/L		90.2	(75%-125%)		
Cadmium	1.00	U	0.010		0.906	mg/L		90.5	(75%-125%)		
Chromium	5.00		0.130		4.82	mg/L		93.8	(75%-125%)		
Lead	5.00	U	0.033		4.72	mg/L		93.8	(75%-125%)		
Nickel	2.00	U	0.015		1.83	mg/L		91.3	(75%-125%)		
Selenium	1.00	U	0.060		0.896	mg/L		85.2	(75%-125%)		
Silver	0.503	U	0.010		0.423	mg/L		84.1	(75%-125%)		
Sodium	10.0		20.5		30.3	mg/L		97	(75%-125%)		
Thallium	2.00	U	0.050		1.85	mg/L		92.6	(75%-125%)		
Vanadium	2.00	U	0.010		1.90	mg/L		95	(75%-125%)		
Zinc	2.00	U	0.033		1.87	mg/L		92.7	(75%-125%)		
QC1203508317 392939001 SDILT											
Aluminum		U	61.0	DU	3.40	ug/L	N/A		(0%-10%)		03/16/16 09:54
Antimony		U	1.00	DU	0.175	ug/L	N/A		(0%-10%)		

QC Summary

Workorder: **392939** **Client SDG:** XP0227 **Project Description:** RC-155 Other

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1552277										
Arsenic	U	-0.204	DU	0.250	ug/L	N/A		(0%-10%)	TXT1	03/16/16 09:54
Barium		500	D	98.3	ug/L	1.82		(0%-10%)		
Beryllium	U	0.138	DU	0.050	ug/L	N/A		(0%-10%)		
Cadmium	U	0.0603	DU	0.050	ug/L	N/A		(0%-10%)		
Chromium		13.0	D	2.89	ug/L	11.5		(0%-10%)		
Lead	U	2.88	DU	0.165	ug/L	N/A		(0%-10%)		
Nickel	U	0.302	DU	0.075	ug/L	N/A		(0%-10%)		
Selenium	U	4.39	DU	0.300	ug/L	N/A		(0%-10%)		
Silver	U	-3.08	DU	0.050	ug/L	N/A		(0%-10%)		
Sodium		2050	D	402	ug/L	2.19		(0%-10%)		
Thallium	U	-1.9	DU	0.250	ug/L	N/A		(0%-10%)		
Vanadium	U	0.224	DU	0.050	ug/L	N/A		(0%-10%)		
Zinc	U	1.51	DU	0.165	ug/L	N/A		(0%-10%)		
QC1203507872 TB										
Aluminum			U	0.680	mg/L					03/16/16 09:42
Antimony			U	0.035	mg/L					
Arsenic			U	0.050	mg/L					
Barium			U	0.010	mg/L					
Beryllium			U	0.010	mg/L					
Cadmium			U	0.010	mg/L					
Chromium			U	0.010	mg/L					
Lead			U	0.033	mg/L					

QC Summary

Workorder: **392939** **Client SDG:** XP0227 **Project Description:** RC-155 Other

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%		REC%	Range	Anlst	Date Time
Metals Analysis-ICP												
Batch 1552277												
Nickel				U	0.015	mg/L					TXT1	03/16/16 09:42
Selenium				U	0.060	mg/L						
Silver				U	0.010	mg/L						
Sodium				U	1.00	mg/L						
Thallium				U	0.050	mg/L						
Vanadium				U	0.010	mg/L						
Zinc				U	0.033	mg/L						
Metals Analysis-Mercury												
Batch 1552240												
QC1203508203 392939001 DUP												
Mercury		B	0.00071	B	0.00077	mg/L	8.11	^		(+/-0.002)	MTM1	03/16/16 12:01
QC1203508202 LCS												
Mercury	0.020				0.0225	mg/L			112	(80%-120%)		03/16/16 11:56
QC1203508201 MB												
Mercury				U	0.00067	mg/L						03/16/16 11:49
QC1203507871 392939001 MS												
Mercury	0.020	B	0.00071		0.0197	mg/L			95	(75%-125%)		03/16/16 11:59
QC1203508205 392939001 SDILT												
Mercury		B	0.071	DU	0.00335	ug/L	N/A			(0%-10%)		03/16/16 12:03
QC1203507872 TB												
Mercury				U	0.00067	mg/L						03/16/16 11:54

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.

QC Summary

Workorder: **392939** **Client SDG:** XP0227 **Project Description:** RC-155 Other

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time

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 Total Metals in Aqueous Samples and Extracts for Analysis by ICP and ICP-MS

Batch ID: **1552276**
Analyst: James Pressley
Method: SW846 3010A
Lab SOP: GL-MA-E-008 REV# 18
Instrument: Metals Manual Instrument

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203508314	Metals Spike Mix I	UI2351278-01	.25	mL
LCS	1203508314	Metals Spike Mix II	UI2351281-02	.25	mL

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
1203508313 MB	15-MAR-2016 18:25:00	Solid	5	50	10	<2
1203507872 TB	15-MAR-2016 18:25:00	Solid	5	50	10	<2
1203508314 LCS	15-MAR-2016 18:25:00	Solid	5	50	10	<2
392939001	15-MAR-2016 18:25:00	Solid	5	50	10	<2
1203507871 MS (392939001)	15-MAR-2016 18:25:00	Solid	5	50	10	<2
1203508315 DUP (392939001)	15-MAR-2016 18:25:00	Solid	5	50	10	<2
1203508317 SDILT (392939001)	15-MAR-2016 18:25:00	Solid	5	50	10	<2

Reagent/Solvent Lot ID	Description	Amount
160205	HYDROCHLORIC ACID	2.5 mL
2351165	Concentrated Nitric Acid	3 mL

Comments:
Block Temperature (90-95C): 92 C
Temperature within limits (Y/N)?: Y
Thermometer ID: 89095-622
Hot Block ID: 11

Prep Logbook

Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer

Batch ID: **1552239**
Analyst: Alan Stanley
Method: SW846 7470A Prep
Lab SOP: GL-MA-E-010 REV# 31
Instrument: Metals Manual Instrument

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203508202	MHGLIQLCSMSSPIKE	WHG160315-13	.2	mL

Sample ID	Run Date	Matrix	Initial Volume (mL)	Final Volume (mL)	Prep Factor (mL/mL)	pH Check
1203508201 MB	15-MAR-2016 13:30:18	Solid	2	20	10	<2
1203507872 TB	15-MAR-2016 13:30:18	Solid	2	20	10	<2
1203508202 LCS	15-MAR-2016 13:30:18	Solid	2	20	10	<2
392939001	15-MAR-2016 13:30:18	Solid	2	20	10	<2
1203507871 MS (392939001)	15-MAR-2016 13:30:18	Solid	2	20	10	<2
1203508203 DUP (392939001)	15-MAR-2016 13:30:18	Solid	2	20	10	<2
1203508205 SDILT (392939001)	15-MAR-2016 13:30:18	Solid	2	20	10	<2

Reagent/Solvent Lot ID	Description	Amount
2347437-1	NITRIC ACID	.5 mL
2349143	Sulfuric Acid, Concentrated	1 mL
2364159-C	5% KMnO4 solution	3 mL
2366261-C	5% Potassium Persulfate	1.5 mL
2374218-C	Hg reducing agent	1 mL
WHG160315-01A	Mercury Working 1st Source CAL 0.2/CRA	20 uL
WHG160315-02	Mercury Working 1st Source CAL 0.5	50 uL
WHG160315-03	Mercury Working 1st Source CAL 2.0	200 uL
WHG160315-04	Mercury Working 1st Source CAL 5.0/CCV	500 uL
WHG160315-05	Mercury Working 1st Source CAL 10.0	1 mL
WHG160315-06	Mercury Working 2nd Source 5.0/ICV	500 uL

Comments:
Digestion Start Date: 15-MAR-2016 13:30
Digestion End Date: 15-MAR-2016 15:30
Block Temperature (90-95C): 94 C
Temperature within limits (Y/N)?: Y
Thermometer ID: 2126351
Hot Block ID: 12

Prep Logbook

Toxicity Characteristic Leaching Procedure Preparation

Batch ID: 1552065 **Verified by:** _____
Analyst: Richard Dollinger
Method: SW846 1311

Lab SOP: GL-LB-E-006 REV# 19
Instrument: TCLP Tumbler #106

Sample ID Analysis Start Date	1203507872 TB 14-MAR-2016 15:50:30	392939001 14-MAR-2016 15:50:30	1203507871 MS (392939001) 14-MAR-2016 15:50:30
100% Solid Y/N	y	y	y
(I) Sub Sample Aliquot I=G-H (g)		79	79
Initial pH (su)	2.88	12	12
pH Temperature (celsius)		50	50
Final pH (su)		11.51	11.51
Tumbler Speed	28	28	28
Sample Properties <>/= Water	TCLP 2	Solid	Solid
(J) 10X Wet Solid Weight 20XI (g)	2000	1580	1580
Filtrate Volume (mL)	100	100	100

Type	Sample Id	Description	Serial Number	Spike Amt	Units
MS	1203507871	TCLP Spiking Solution Hg	UI151209	.25	mL
MS	1203507871	TCLP Spiking Solution A/B	UI2343696	.25	mL
RGNT	All	1N HCl for pH testing	160217	3.5	mL
RGNT	All	TCLP EXTRACTION FLUID 2	T160310-2	2000	mL
REGNT	All	Concentrated Nitric Acid	160119-tclp	2	mL

Comments:

Extration End Date: 15-MAR-2016 08:00:00
Filtration End Date: 15-MAR-2016 09:31:45
Bottle Lot Number: 41021600
Filter Lot Number: 400105-5307
Extration Start Temperature: 23 C
Extration End Temperature: 23 C

WASHINGTON CLOSURE HANFORD

SAF: RC-155, SDG: XP0227

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #16-03050-OR

March 24, 2016

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN

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Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 16-03050

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

Date for Partial	Initials	Date	Initials	Checklist Items
		3/10/16	JEB	Sample Log-In
		3/17/16	KBS	Data Compilation
		3-21-16	[illegible]	First Technical Data Review
		3/23/16	[illegible]	Second Technical Data Review
		3/23/16	[illegible]	Data Entry/Electronic Deliverable
		3/23/16	[illegible]	Case Narrative
		3/24/16	KBS	Electronic Deliverable Proof
		3/24/16	[illegible]	Samples Analyzed within Holding Time Yes? [X] No? [ ]
		3/24/16	[illegible]	QA/QC Review
		3/17/16	[illegible]	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: [signature] 3/24/16

Laboratory Manager Date

Copy No. _____

SECTION I

CHAIN OF CUSTODY

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-155-208

Collector D. Becker	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Price Code 9A	**Data Turnaround** 3 days		
Project Designation 618-10 & 618-11 Remediation	**Sampling Location** 618-10 grout batch GR-309CP		**SAF No.** RC-155
Ice Chest No. WCH-11-~~068~~ 070 TRE 3-9-16	**Field Logbook No.** EL-1664-01	**COA** R618102F20	**Method of Shipment** ~~Local Delivery~~ Fed Ex TRE 3-9-16
Shipped To ~~TestAmerica Richland~~ TRE 3-9-16 Eberline Oak Ridge	**Offsite Property No.** N/A		**Bill of Lading/Air Bill No.** SEE RSR

Other Labs Shipped To ~~TestAmerica Denver~~ TRE 3-9-16 GEL

POSSIBLE SAMPLE HAZARDS/REMARKS

Radioactive

Special Handling and/or Storage

Trans ship RCF to TA-DEN

Preservation	None	None	None	None	None	None	None				
Type of Container	G/P	G/P	G/P	G/P	G/P	G/P	G/P				
No. of Container(s)	1	0	0	0	0	0	0				
Volume	1000mL	1000mL	1000mL	1000mL	1000mL	1000mL	1000mL				
Sample Analysis	See item (2) in Special Instructions	Isotopic Uranium	Isotopic Plutonium	Carbon-14	Nickel-63; Strontium-89,90 -- Total Sr	Technetium-99	Plutonium-241				

Sample No.	Matrix	Sample Date	Sample Time										
J1V8D3 4	OTHER	03/07/16	1340	X	X	X	X	X	X	X			

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
DAVID BECKER	3/7/16 1345	RT COFFMAN / RT Coffman	3/7/16 13:45
RT COFFMAN / RT Coffman	3/7/16 1500	T.R. Edmundson T.R. Edmundson	3-7-16 1500
T.R. Edmundson T.R. Edmundson	3-7-16 1500	1060 Refer #2A	3-7-16 1500
1060 Refer #2A	3-9-16 0700	T.R. Edmundson T.R. Edmundson	3-9-16 0700
T.R. Edmundson T.R. Edmundson (WCH)	3-9-16 1500	Fed Ex	3-9-16

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

SPECIAL INSTRUCTIONS

Run RAD analyses off material in GEA container

(2) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}

16-03050

REC'D MAR 10 2016

REVIEWED BY K Wperstele DATE 3-9-16

XP0227

WCH-EE-011

EBERLINE SERVICES Oak Ridge Laboratory	Internal Chain of Custody	Work Order #	16-03050
		Lab Deadline	3/16/2016
		Analysis	UUISO - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	9520	ESC1.5
	> 05 <	< NOT REQUESTED	<<<
	> 06 <	< NOT REQUESTED	<<<

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3/11/16 0410
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3/11/16 0415
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3-11-16 0415
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3/11/16 0800
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	AG	3/16/16 0800
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICD	3/16/16 1238
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 #	16-03050
		Lab Deadline	3/16/2016
		Analysis	PuISO - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Fraction 06 is Process Blank	04	9520	ESC1.5
	> 05 <	< NOT REQUESTED	<<<
	06	0	ESC1.5

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3/11/16 0940
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3/11/16 0946
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3/11/16 0940
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3/16/16 0932
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	3/16/16 0935
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	3/16/16 1527
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 #	16-03050
		Lab Deadline	3/16/2016
		Analysis	Pu241 - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Fraction 06 is Process Blank	04	9520	ESC1.5
	> 05 <	< NOT REQUESTED	<<<
	06	0	ESC1.5

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3/11/16 0940
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3/11/16 0940
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3-11-16 0940
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	3-16-16 0932
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	3/16/16 0935
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	3/16/16 1522
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JPD	3/16/16 1605
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JPD	3/16/16 1619
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	3/16/16 1620
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	AG	3/17/16 0645
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 #	16-03050
		Lab Deadline	3/16/2016
		Analysis	SrTOT - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	9520	ESC1.5
	> 05 <	< NOT REQUESTED	<<<
	> 06 <	< NOT REQUESTED	<<<

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MM	14MAR16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MM	15MAR16 0910
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		15MAR 0910
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	3/15/16 1400
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		
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 #	16-03050
		Lab Deadline	3/16/2016
		Analysis	Tc099 - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Run MS	04	9520	ESC1.5
	05	0	ESC1.5
	> 06 <	< NOT REQUESTED	<<<

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MU	14MAR16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MU	15MAR16 0645
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MU	0645
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MU	1208
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		
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 #	16-03050
		Lab Deadline	3/16/2016
		Analysis	C0014 - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Run MS	04	9520	ESC1.5
	05	0	ESC1.5
	> 06 <	< NOT REQUESTED	<<<

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1430	Kenyscij	3-10-16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1215	Kenyscij	3-11-16
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KCB	3/11/16 1217
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KCB	3/12/16 0810
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		
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 #	16-03050
		Lab Deadline	3/16/2016
		Analysis	Ni063 - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Run MS	04	9520	ESC1.5
	05	0	ESC1.5
	> 06 <	< NOT REQUESTED	<<<

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	900 [illegible]	3-14-16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1400 KC	3/14/16
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1CB 3/14/16	1414
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	8 [illegible]
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		
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 #	16-03050
		Lab Deadline	3/16/2016
		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, Th234, Tl208, U235 and positives.	04	9520	ESC1.5
	> 05 <	< NOT REQUESTED	<<<
	> 06 <	< NOT REQUESTED	<<<

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1430	Kenyscej	3-10-16
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1530	Kenyscej	3-10-16
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	3/10/16 1533
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	3/10/16 1811
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		
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	03/10/2016	7	16-03050
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
S00W235A01	SAF: RC-155; SDG: XP0227	H	03/16/2016	03/17/2016	03/17/2016

Internal ID	Client ID	Sample Date	Matrix	Storage	C0014	Gamma	Ni063	Pu241	PuISO	SrTOT	Tc099	UUISO	Ttl
01	LCS	03/10/16	SO	ESC1.5	X	X	X	X	X	X	X	X	8
02	BLANK	03/10/16	SO	ESC1.5	X	X	X	X	X	X	X	X	8
03	DUP	03/10/16	SO	ESC1.5	X	X	X	X	X	X	X	X	8
04	J1V8D3 SAF: RC-155	03/07/16 13:40	SO	ESC1.5	X	X	X	X	X	X	X	X	8
05	J1V8D3 SAF: RC-155 MS	03/07/16 13:40	SO	ESC1.5	X		X				X		3
06	PROCESS BLANK	03/10/16 00:00	SO	ESC1.5				X	X				2
													0
													0
													0
													0
													0
													0
													0
													0
													0
													0
													0
													0
													0
													0
				Totals Per Analysis (non QA samples)	2	1	2	2	2	1	2	1	

EBERLINE SERVICES

Sample Log In Report

Oak Ridge Laboratory
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Oak Ridge, TN 37830

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

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

Printed: 3/10/2016 12:10 PM

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 16-03050

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: 3-10-16

SECTION III

CASE NARRATIVE

EBERLINE SERVICES

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

EBS-OR-40453

March 24, 2016

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

CASE NARRATIVE
SAF: RC-155, SDG: XP0227
Work Order # 16-03050-OR

SAMPLE RECEIPT

This work order contains one other sample received 03/10/2016. Sample was analyzed for Isotopic Uranium, Isotopic Plutonium, Plutonium-241, Total Strontium, Technetium-99, Carbon-14, Nickel-63 and by Gamma Spectroscopy.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
J1V8D3	16-03050-04	J1V8D3 MS	16-03050-05

ANALYTICAL METHODS

Isotopic Uranium was analyzed using Method EML U-02 Modified. Isotopic Plutonium and Plutonium-241 were analyzed using Method EML Pu-02 Modified. Total Strontium was analyzed using EIChroM Method SRW01 Modified. Technetium-99 was analyzed using EIChroM Method TCS01 Modified. Carbon-14 was performed using EPA Method 520.0 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.

SPECIAL CIRCUMSTANCES

Sample contains positive activity and due to this condition, aliquots for most analytes are reduced to limit activity during the analysis process. Due to this condition, method detection limits are slightly high for some analytes.

ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM

Sample was prepared by removing a representative aliquot followed by mixed acid digestions and dilutions as appropriate. An aliquot from dilution was taken and Uranium was selectively extracted by ion exchange. Uranium 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 Uranium-234, Uranium-235 and Uranium-238. Chemical recovery was determined by the use of a Uranium-232 tracer. Activity of the Uranium-232 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Sample demonstrated acceptable results for all Uranium analyses. Chemical recovery was slightly high for all samples. The Uranium-233/234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. The Uranium-233/234 method blank is slightly greater than the method detection limit; however, result is within acceptable limits for the analytical technique considering the positive nature of the sample. Results for the Uranium-233/234 and Uranium-238 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-235 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-234 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

ISOTOPIC PLUTONIUM

Sample was prepared by removing a representative aliquot followed by mixed acid digestions and dilutions as appropriate. An aliquot from dilution was taken and 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. Method detection limits are slightly high; however, sample is positive making this condition moot. Chemical recovery was acceptable for all samples. The Plutonium-238 and Plutonium-239/240 method blank demonstrated acceptable results. Results for the Plutonium-238 and Plutonium-239/240 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Plutonium-238 and Plutonium-239 laboratory control sample demonstrated an acceptable percent recovery.

PLUTONIUM-241

Following sample analysis for Isotopic Plutonium, filter media used was dissolved. Dissolved sample was placed into a scintillation vial, scintillation cocktail was added and Plutonium-241 was determined by liquid scintillation counting. Analytical tracer recovery was determined by yields from the Isotopic Plutonium tracer.

Sample demonstrated acceptable results for all Plutonium-241 analyses. The presence of positive Plutonium-238 makes Plutonium-241 quantification problematic. The liquid scintillation demonstrated alpha activity in the 100 to 120 keV range which is greater than the Plutonium-241 energy window range; however, the possibility of spectral trailing into the lower energy range (window) is possible and may

ANALYTICAL RESULTS CONTINUED

PLUTONIUM-241 CONTINUED

have occurred. Due to this condition, qualification of Plutonium-241 results may be appropriate. Chemical recovery was acceptable for all samples. The Plutonium-241 method blank demonstrated an acceptable result. Results for the Plutonium-241 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Plutonium-241 laboratory control sample demonstrated an acceptable percent recovery.

TOTAL STRONTIUM

Sample was prepared by removing a representative aliquot followed by mixed acid digestions and dilutions as appropriate. An aliquot from dilution was taken and 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 an acceptable relative percent difference and normalized difference. Results for the Total Strontium laboratory control sample demonstrated an acceptable percent recovery.

TECHNETIUM-99

Sample was prepared by removing a representative aliquot followed by mixed acid digestions and dilutions as appropriate. An aliquot from dilution was taken and was prepared by oxidative reactions with Nitric acid and Hydrogen Peroxide. After complete oxidization, Technetium was selectively extracted by the use of EIChroM stabilized resins. Special cleanup chemistry was conducted for complete removal of interferences associated with Uranium. Processed resins were then transferred to liquid scintillation vials, scintillation cocktail was added and sample was counted by beta liquid scintillation.

Sample demonstrated acceptable results for all Technetium-99 analyses. The Technetium-99 method blank demonstrated acceptable results. Results for the Technetium-99 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Technetium-99 laboratory control sample demonstrated an acceptable percent recovery. Results for the Technetium-99 matrix spike demonstrated an acceptable percent recovery.

CARBON-14

A representative aliquot of the sample was placed into a 1-liter reaction vessel. A carbonate solution was added. Sample was oxidized using Potassium Permanganate. Carbon dioxide was evolved and Carbon-14 was captured into Harvey brand, Carb-Sorb cocktail. Carbon-14 beta emissions were then determined by beta liquid scintillation using an energy selective region.

ANALYTICAL RESULTS CONTINUED

CARBON-14 CONTINUED

Sample demonstrated acceptable results for all Carbon-14 analyses. The Carbon-14 method blank demonstrated an acceptable result. Results for the Carbon-14 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Carbon-14 laboratory control sample demonstrated an acceptable percent recovery. Results for the Carbon-14 matrix spike demonstrated an acceptable percent recovery.

NICKEL-63

Sample was prepared by removing a representative aliquot followed by mixed acid digestions and dilutions as appropriate. An aliquot from dilution was taken and 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 a high relative percent difference and normalized difference. In this case Nickel-63 duplicate variations were most likely caused by the somewhat heterogeneous sample nature. 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. Sample results demonstrated slightly high method detection limits. In several instances, due to significant Compton scatter, results demonstrated negative values. This is directly related to positive Cesium-137 activity within this sample. Quantification of non-positive radionuclides is not possible. In the case of Europium-152, Europium-154, Europium-155, Potassium-40, Protactinium-234m, Lead-214, Thorium-234 and Thallium-208, all results were reported from the Canberra Gamma Apex "Nuclide MDA Report". The Potassium-40 method blank demonstrated a result slightly greater than the method detection limit. The method blank demonstrated acceptable results for all other radionuclides as reported. Results for the Americium-241 and Cesium-137 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Europium-152 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: 3/24/2016

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-155
SDG: XP0227
Work Order: 16-03050
Date Received: 03/10/2016
Matrix: Other

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	16-03050-01	LCS	3/11/2016	C14_CHEM_LSC	14762-75-5	Carbon-14	1403.530	14.07	195.93	5.31		pCi/g
		LCS	3/10/2016	GAMMA_GS	10198-40-0	Cobalt-60	2659.058	154.68	206.25	9.02		pCi/g
		LCS	3/10/2016	GAMMA_GS	10045-97-3	Cesium-137	1724.833	157.23	180.43	7.74		pCi/g
		LCS	3/14/2016	NI63_LSC	13981-37-8	Nickel-63	1470.390	9.44	86.97	2.39		pCi/g
		LCS	3/16/2016	PU241_IE_LSC	14119-32-5	Plutonium-241	238.454	7.42	20.73	6.70		pCi/g
		LCS	3/16/2016	PUISO_EIE_PRECIP_AEA	13981-16-3	Plutonium-238	3.881	1.05	1.11	0.18		pCi/g
		LCS	3/16/2016	PUISO_EIE_PRECIP_AEA	PU-239/240	Plutonium-239/240	7.333	1.74	1.88	0.17		pCi/g
		LCS	3/15/2016	SRTOT_SEP_PRECIP_GPC	SR-RAD	Total beta radiostrontium	42.050	1.71	14.73	0.69		pCi/g
		LCS	3/15/2016	TC99_ETVDSK_LSC	14133-76-7	Technetium-99	987.576	5.56	98.67	1.38		pCi/g
		LCS	3/16/2016	UISO_IE_PRECIP_AEA	U-233/234	Uranium-233/234	6.148	0.85	0.96	0.06		pCi/g
		LCS	3/16/2016	UISO_IE_PRECIP_AEA	15117-96-1	Uranium-235	0.366	0.15	0.16	0.09		pCi/g
		LCS	3/16/2016	UISO_IE_PRECIP_AEA	U-238	Uranium-238	6.257	0.86	0.97	0.06		pCi/g
NA	16-03050-02	BLK	3/11/2016	C14_CHEM_LSC	14762-75-5	Carbon-14	2.946	2.97	3.00	4.97	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	14596-10-2	Americium-241	-0.664	1.11	1.11	1.58	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	10198-40-0	Cobalt-60	0.150	0.34	0.34	1.00	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	10045-97-3	Cesium-137	-0.341	0.58	0.58	0.78	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	14683-23-9	Europium-152	-0.014	1.36	1.36	1.65	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	15585-10-1	Europium-154	0.456	1.25	1.25	0.81	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	14391-16-3	Europium-155	1.159	1.85	1.85	2.52	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	13966-00-2	Potassium-40	28.609	10.55	10.65	10.98		pCi/g
		BLK	3/10/2016	GAMMA_GS	15100-28-4	Protactinium-234m	19.855	48.25	48.26	93.06	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	15092-94-1	Lead-212	1.172	0.61	0.62	2.04	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	15067-28-4	Lead-214	1.469	1.01	1.01	1.55	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	15065-10-8	Thorium-234	-0.035	11.16	11.16	16.47	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	14913-50-9	Thallium-208	1.808	1.38	1.38	3.37	U	pCi/g
		BLK	3/10/2016	GAMMA_GS	15117-96-1	Uranium-235	0.063	2.59	2.59	3.31	U	pCi/g
		BLK	3/14/2016	NI63_LSC	13981-37-8	Nickel-63	0.278	1.40	1.40	2.39	U	pCi/g
		BLK	3/16/2016	PU241_IE_LSC	14119-32-5	Plutonium-241	-5.699	10.60	10.61	18.35	U	pCi/g
		BLK	3/16/2016	PUISO_EIE_PRECIP_AEA	13981-16-3	Plutonium-238	-0.008	0.09	0.09	0.29	U	pCi/g
		BLK	3/16/2016	PUISO_EIE_PRECIP_AEA	PU-239/240	Plutonium-239/240	0.073	0.12	0.13	0.21	U	pCi/g
		BLK	3/15/2016	SRTOT_SEP_PRECIP_GPC	SR-RAD	Total beta radiostrontium	1.263	0.51	0.67	0.76		pCi/g
		BLK	3/15/2016	TC99_ETVDSK_LSC	14133-76-7	Technetium-99	0	0.80	0.80	1.36	U	pCi/g
		BLK	3/16/2016	UISO_IE_PRECIP_AEA	U-233/234	Uranium-233/234	0.272	0.12	0.12	0.08		pCi/g
		BLK	3/16/2016	UISO_IE_PRECIP_AEA	15117-96-1	Uranium-235	0.106	0.08	0.08	0.08		pCi/g
		BLK	3/16/2016	UISO_IE_PRECIP_AEA	U-238	Uranium-238	0.085	0.07	0.07	0.06		pCi/g

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Joan Kessner
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2620 Fermi Avenue
Richland, WA 99354

SAF: RC-155
SDG: XP0227
Work Order: 16-03050
Date Received: 03/10/2016
Matrix: Other

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
J1V8D3	16-03050-03	DUP	3/11/2016	C14_CHEM_LSC	14762-75-5	Carbon-14	6.898	4.23	4.34	6.99	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	14596-10-2	Americium-241	1274.458	93.42	114.04	37.84		pCi/g
		DUP	3/10/2016	GAMMA_GS	10198-40-0	Cobalt-60	-2.379	3.93	3.93	10.86	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	10045-97-3	Cesium-137	95674.917	8700.42	9989.81	98.15		pCi/g
		DUP	3/10/2016	GAMMA_GS	14683-23-9	Europium-152	23.543	67.49	67.50	39.82	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	15585-10-1	Europium-154	-13.766	25.59	25.60	20.22	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	14391-16-3	Europium-155	-7.831	29.82	29.82	24.95	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	13966-00-2	Potassium-40	16.141	57.07	57.07	82.58	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	15100-28-4	Protactinium-234m	-383.619	1189.29	1189.45	1693.94	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	15092-94-1	Lead-212	-29.151	22.44	22.49	27.78	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	15067-28-4	Lead-214	-9.330	35.47	35.47	44.39	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	15065-10-8	Thorium-234	-204.897	118.90	119.36	171.44	U	pCi/g
		DUP	3/10/2016	GAMMA_GS	14913-50-9	Thallium-208	11.763	3.31	3.37	3.63		pCi/g
		DUP	3/10/2016	GAMMA_GS	15117-96-1	Uranium-235	-22.354	65.50	65.51	81.86	U	pCi/g
		DUP	3/14/2016	NI63_LSC	13981-37-8	Nickel-63	2253.072	39.01	138.10	23.73		pCi/g
		DUP	3/16/2016	PU241_IE_LSC	14119-32-5	Plutonium-241	1818.883	1649.01	1655.60	2755.71	U	pCi/g
		DUP	3/16/2016	PUISO_EIE_PRECIP_AEA	13981-16-3	Plutonium-238	117.833	57.41	58.52	43.79		pCi/g
		DUP	3/16/2016	PUISO_EIE_PRECIP_AEA	PU-239/240	Plutonium-239/240	6725.970	1284.44	1437.73	38.54		pCi/g
		DUP	3/15/2016	SRTOT_SEP_PRECIP_GPC	SR-RAD	Total beta radiostrontium	64858.307	423.22	22571.28	13.64		pCi/g
		DUP	3/15/2016	TC99_ETVDSK_LSC	14133-76-7	Technetium-99	41.415	8.34	9.31	12.96		pCi/g
		DUP	3/16/2016	UISO_IE_PRECIP_AEA	U-233/234	Uranium-233/234	37.830	5.56	6.18	0.89		pCi/g
		DUP	3/16/2016	UISO_IE_PRECIP_AEA	15117-96-1	Uranium-235	0.998	0.83	0.84	1.07	U	pCi/g
		DUP	3/16/2016	UISO_IE_PRECIP_AEA	U-238	Uranium-238	8.767	2.12	2.21	0.82		pCi/g

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2620 Fermi Avenue
Richland, WA 99354

SAF: RC-155
SDG: XP0227
Work Order: 16-03050
Date Received: 03/10/2016
Matrix: Other

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
J1V8D3	16-03050-04		3/11/2016	C14_CHEM_LSC	14762-75-5	Carbon-14	2.710	3.40	3.42	5.72	U	pCi/g
			3/10/2016	GAMMA_GS	14596-10-2	Americium-241	1282.828	94.02	114.77	37.87		pCi/g
			3/10/2016	GAMMA_GS	10198-40-0	Cobalt-60	12.823	9.53	9.55	10.89		pCi/g
			3/10/2016	GAMMA_GS	10045-97-3	Cesium-137	96193.336	8747.59	10043.97	47.80		pCi/g
			3/10/2016	GAMMA_GS	14683-23-9	Europium-152	-25.283	67.48	67.49	39.73	U	pCi/g
			3/10/2016	GAMMA_GS	15585-10-1	Europium-154	17.974	25.48	25.49	20.18	U	pCi/g
			3/10/2016	GAMMA_GS	14391-16-3	Europium-155	18.026	29.88	29.89	24.91	U	pCi/g
			3/10/2016	GAMMA_GS	13966-00-2	Potassium-40	19.930	56.68	56.69	82.24	U	pCi/g
			3/10/2016	GAMMA_GS	15100-28-4	Protactinium-234m	-119.118	629.29	629.32	1692.39	U	pCi/g
			3/10/2016	GAMMA_GS	15092-94-1	Lead-212	27.695	20.39	20.44	33.93	U	pCi/g
			3/10/2016	GAMMA_GS	15067-28-4	Lead-214	22.391	35.53	35.55	44.60	U	pCi/g
			3/10/2016	GAMMA_GS	15065-10-8	Thorium-234	-33.039	117.72	117.73	171.79	U	pCi/g
			3/10/2016	GAMMA_GS	14913-50-9	Thallium-208	48.319	38.73	38.81	6.61		pCi/g
			3/10/2016	GAMMA_GS	15117-96-1	Uranium-235	-53.306	66.24	66.30	81.87	U	pCi/g
			3/14/2016	NI63_LSC	13981-37-8	Nickel-63	4052.763	52.10	243.93	24.85		pCi/g
			3/16/2016	PU241_IE_LSC	14119-32-5	Plutonium-241	856.105	2166.25	2167.36	3674.97	U	pCi/g
			3/16/2016	PUISO_EIE_PRECIP_AEA	13981-16-3	Plutonium-238	103.867	62.21	63.00	52.21		pCi/g
			3/16/2016	PUISO_EIE_PRECIP_AEA	PU-239/240	Plutonium-239/240	5913.004	1311.33	1429.02	36.40		pCi/g
			3/15/2016	SRTOT_SEP_PRECIP_GPC	SR-RAD	Total beta radiostrontium	52780.780	362.99	18368.55	12.94		pCi/g
			3/15/2016	TC99_ETVDSK_LSC	14133-76-7	Technetium-99	40.466	8.31	9.24	12.94		pCi/g
			3/16/2016	UISO_IE_PRECIP_AEA	U-233/234	Uranium-233/234	40.560	6.17	6.81	0.63		pCi/g
			3/16/2016	UISO_IE_PRECIP_AEA	15117-96-1	Uranium-235	1.474	0.97	0.98	0.88		pCi/g
			3/16/2016	UISO_IE_PRECIP_AEA	U-238	Uranium-238	10.349	2.46	2.57	0.71		pCi/g
J1V8D3	16-03050-05	MS	3/11/2016	C14_CHEM_LSC	14762-75-5	Carbon-14	1743.069	19.04	243.44	7.76		pCi/g
		MS	3/14/2016	NI63_LSC	13981-37-8	Nickel-63	5157.802	57.82	308.74	24.47		pCi/g
		MS	3/15/2016	TC99_ETVDSK_LSC	14133-76-7	Technetium-99	8904.547	51.05	889.69	12.87		pCi/g

EBERLINE SERVICES
EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

SECTION V

ANALYTICAL STANDARD

QA/QC REVIEWED
Date 1/16/95 Initials [illegible]

U-8

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Radionuclide:	U-238NAT	Customer:	TMA EBERLINE
Half Life:	(4.468 ± 0.005) x 10^9 years	P.O.No.:	OR2778
Catalog No.:	7338	Reference Date:	January 1 1995 12:00 PST.
Source No.:	479-50	Contained Radioactivity:	(Total U) 8.016 μCi
		Contained Radioactivity:	(Total U) 297 kBq

Description of Solution

a. Mass of solution: 65.2896 g in a 50 ml flame sealed ampoule

b. Chemical form: Uranyl Nitrate in H2O

c. Carrier content: None

d. Density: Approximately 1.3202 g/ml @ 20°C.

Radioimpurities

Refer to attached technical data sheet

Radioactive Daughters

Refer to attached technical data sheet

Radionuclide Concentration

(Total U) 0.1228 μCi/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration: ±3.0%

b. Random uncertainty in assay: ±0.0%

c. Random uncertainty in weighing(s): ±2.0%

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. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. 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).

ERIC ALLAS
QUALITY CONTROL

29 DECEMBER 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
3017 N. SAN FERNANDO BLVD.
BURBANK, CALIFORNIA 91504
818·843·7000 FAX 818·843·6168

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
MP-009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

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

CURRENT DATE: 10/1/2015 0:00

SOLUTION REFERENCE #: IPL 479-50

SOLUTION #: U-8

Principal Radionuclide	Half Life, Years	Half Life, Days
$^{234,235,238}U$	4.468E+09	1.632E+12

Radionuclide: $^{234,235,238}U$

Reference Date: 1/1/1995 0:00

Certified Activity: 8.016E+00 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross	97.6400	Weight, Grams
Empty Ampoule	32.5020	Weight, Grams
Solution Net	65.1380	Weight, Grams
Total Activity in Ampoule	8.0160	µCi

Chemical Composition of Standard Solution

Uranyl nitrate in dilute HNO_3

Dilution Instructions:

Dilution Solvent Used: 1M HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 8.0160 µCi Which Equals 1.780E+07 dpm at the date listed above

And after dilution the activity of this solution is 1.77955E+04 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: July 27, 2016

Verified & Approved By _____ Date: 10/1/2015 0:00

QC Approval _____ Date: 10/1/15

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
MP-009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

MP-009
Solution Reference # IPL 479-50

Date 10/1/2015 0:00
Solution # U-8a

Principal Radionuclide	Half Life, Years	Half Life, Days
$^{234, 235, 238}U$	4.468E+09	1.632E+12

Radionuclide of Interest $^{234, 235, 238}U$
Parent Solution Conc. 1.7796E+04 dpm/ml

Reference Date 1/1/1995 0:00

Chemical Composition of Standard Solution
Uranly Nitrate in 1M HNO_3

Dilution Instructions:

Dilution Solvent Used 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 4.0000 ml
Total Activity: 7.1182E+04 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 7.1182E+01 dpm/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.

Isotopic Distribution as:
U-238 Atom % = 48.239 U-238 = 71.182 dpm/ml X 0.48249 = 34.345 dpm/ml
U-235 Atom % = 2.25 U-235 = 71.182 dpm/ml X 0.0225 = 1.602 dpm/ml
U-234 Atom % = 49.501 U-238 = 71.182 dpm/ml X 0.49501 = 35.236 dpm/ml
All values +/- 3.6%

Isotopic ratios from manufacturer's data sheet

Expiration Date: July 27, 2016

Verified & Approved By _____ Date: 10/1/2015 0:00

QC Approval _____ Date: 10/1/15

RECORD COPY

Tracer Solution for Environmental Analysis & Disequilibrium Studies

Product Description & Measurement Certificate

Description	Principal radionuclide:	**uranium 232** (U-232)	Product code: **UDP10050**
	Daughter Nuclide:	Th-228	Batch Number: 92/232/67
Measurement	Reference date:		01 March 2000
	Radioactive concentration U-232		6.739E+03 becquerels per gram of solution
	which is equivalent to		1.821E-01 microcuries per gram of solution
	Mass of solution		5.356 grams
	Volume of solution		5.035 millilitres
	Total activity of U-232		3.61E+04 becquerels
	which is equivalent to		9.76E-01 microcuries

Method of measurement (see reverse of this certificate)

Accuracy Random uncertainty is: ± 0.7% Systematic uncertainty: ± 0.5%
Overall uncertainty in the radioactive concentration quoted above: ± 1.7%
Overall uncertainty is defined on the reverse of this certificate.

Radionuclidic Purity Any radioactive impurities measured are listed below, expressed as percentages of the activity of the principle radionuclide at the reference date .

Th-228 and daughter activity removed 2 Feb 2000
U-232 daughters activity will increase with time. By alpha 88% U-232, 12% daughters on 1/3/00

Isotopic Purity The isotopic composition, expressed as atom per cent at the reference date .

Not measured

Chemical Composition Calculated weight of U-232, 4.42E-08 grams, as 2M HNO3 solution in a flame sealed glass vial.
This Tracer solution has been produced 'carrier free'.

Physical Data Recommended half life of uranium 232: 6.980E+01 years
Principle energies of alpha emissions (MeV): 5.263 31.7%, 5.320 68.0%
Branching ratio for alpha emission: 100%
Calculated specific activity of uranium 232: 8.167E+05 Bq per microgram U-232.

Remarks For safety information and notes to ensure correct usage by all persons handling this radioactive Tracer solution please read the instructions accompanying the package.

AEA Technology operates a quality management system which has been independently audited and approved to ISO 9001.

Approved Signatory

Roger Wiltshire

Project Ref. AE2315

Roger Wiltshire

Prepared and characterised in the UK, for world wide distribution by **Isotrak, AEA Technology, QSA.**

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

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

CURRENT DATE: 10/27/2015 0:00

SOLUTION REFERENCE #: AEA/Amersham 92/232/67

SOLUTION #: U-10

Principal Radionuclide	Half Life, Years	Half Life, Days
^{232}U	7.200E+01	2.630E+04

Radionuclide: ^{232}U

Reference Date: 3/1/2000 0:00

Certified Activity: 9.760E-01 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross: Weight, Grams

Empty Ampoule: Weight, Grams

Solution Net: Weight, Grams

Total Activity in Ampoule: 0.9760 µCi

Chemical Composition of Standard Solution

$^{232}U(NO_3)_6$ in 2M HNO_3

Dilution Instructions:

Dilution Solvent Used: 2M HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.9760 µCi Which Equals 2.167E+06 dpm at the date listed above

And after dilution the activity of this solution is 2.167E+03 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: October 26, 2016

Verified & Approved By _____ Date: 10/27/2015 0:00

QC Approval _____ Date: 10/28/15

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
MP-009

Rev.6; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

MP-009
Solution Reference # AEA/Amersham 92/232/67

Date 10/27/2015 0:00
Solution # U-10a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{232}U	7.200E+01	2.630E+04

Radionuclide of Interest ^{232}U
Parent Solution Conc. 2.167E+03 dpm/ml

Reference Date 3/1/2000 0:00

Chemical Composition of Standard Solution
$^{232}U(NO_3)_6$ in 2M HNO_3

Dilution Instructions:

Dilution Solvent Used 2M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 10.0000 ml
Total Activity: 2.1670E+04 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 2.1670E+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.

NOTES:

Expiration Date: October 26, 2016

Verified & Approved By _____ Date: 10/27/2015 0:00

QC Approval _____ Date: 10/28/15

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.

: 00034

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

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

Certified Activity: µCi

Certified Concentration: 7.111E-04 µCi per gram

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 MH

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

QC Approval: [signature] 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

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

CERTIFICATE OF CALIBRATION
BETA STANDARD SOLUTION

Radionuclide:	Pu-241	**Customer:**	EBERLINE SERVICES
Half-life:	14.4 ± 0.2 years	**P.O. No.:**	10462
Catalog No.:	7341	**Reference Date:**	1-Sep-02 12:00 PST
Source No.:	943-70	**Contained Radioactivity: (Pu-241 only)**	112.1 µCi 4148 kBq

Physical Description:

A. Mass of solution: 5.31119 g in 5 mL V-Vial
B. Chemical form: $Pu(NO_3)_4$ in 4M HNO_3
C. Carrier content: None
D. Density: 1.1296 g/mL @ 20°C.

ORIGINAL Received 9/3/02

Radioimpurities:

See Technical Data Sheet

Radionuclide Concentration: 21.11 µCi/g, 781.1 kBq/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in µCi/g was determined using a liquid scintillation counter.

Uncertainty of Measurement:

A. Type A (random) uncertainty: ± 2.2 %
B. Type B (systematic) uncertainty: ± 4.0 %
C. Uncertainty in aliquot weighing: ± 0.6 %
D. Total uncertainty at the 99% confidence level: ± 4.6 %

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a 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).
- Nuclear data was taken from NCRP Report No. 58, 1985.
- This solution has a working life of 5 years.

Allan Rabon — Quality Control
28 AUG 02 — Date Signed

IPL Ref. No.: 943-70

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

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

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
QCP 009-1

CURRENT DATE: 1/19/2016 0:00

SOLUTION REFERENCE #: IPL 943-70

SOLUTION #: Pu-17

Principal Radionuclide	Half Life, Years	Half Life, Days
^{241}Pu	1.440E+01	5.260E+03

Radionuclide: ^{241}Pu

Reference Date: 9/1/2002 0:00

Certified Activity: 1.121E+02 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross: Weight, Grams

Empty Ampoule: Weight, Grams

Solution Net: Weight, Grams

Total Activity in Ampoule: 112.1000 µCi

Chemical Composition of Standard Solution

$Pu(NO_3)_4$ in 4M HNO_3

Dilution Instructions:

Dilution Solvent Used: 1M HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 112.1000 µCi Which Equals 2.489E+08 dpm at the date listed above

And after dilution the activity of this solution is 2.489E+05 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.

This standard recertification is based on the recertification or the secondary dilution (Pu-17a)

Expiration Date: December 7, 20~~15~~ 16 [illegible] 1/26/16

Recertified By: _____ Date: 1/18/2016 0:00

QC Approval _____ Date: 1/26/16

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

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

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

QCP-009-1-A

Solution Reference # IPL 943-70 | Date 1/18/2016 0:00
Solution # Pu-17a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{241}Pu	1.440E+01	5.260E+03

Radionuclide of Interest ^{241}Pu
Parent Solution Conc. 2.49E+05 dpm/ml

Reference Date 9/1/2002 0:00

Chemical Composition of Standard Solution
$^{241}Pu(NO_3)_4$ in 1.0 M HNO_3

Dilution Instructions:

Dilution Solvent Used 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 5.0000 ml
Total Activity: 1.2445E+06 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 1.2445E+03 dpm/g

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.

Density Check:

ml Aliquoted	Final Mass,g	Density, g/cc
25.0000	25.007	1.00028

Expiration Date: December 7, 2016 (~~2015~~) 1/26/16

Recertified By _____ Date: 1/18/16

QC Approval _____ Date: 1/26/16

Sr-90
13 uCi

National Institute of Standards & Technology

Certificate

Standard Reference Material 4234A
Strontium-90 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive strontium-90 chloride, non-radioactive strontium chloride, non-radioactive yttrium chloride, and hydrochloric 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 beta-particle counting instruments and for the monitoring of radiochemical procedures.

Radiological Hazard

The SRM ampoule contains strontium-90 with a total activity of approximately 13 MBq. Strontium-90 decays by beta-particle emission to yttrium-90, which also decays by beta-particle emission. None of the beta particles escape from the SRM ampoule. The beta particles emitted from strontium-90 and yttrium-90 produce bremsstrahlung photons with energies up to 2 MeV. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole 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 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least March 2005.

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, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
May 1995 (Text only revised November 1997)

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

00043

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

QCP-009

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

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
QCP 009-1

CURRENT DATE: 7/4/15

SOLUTION REFERENCE #: NIST 4234A

SOLUTION #: Sr-13

Principal Radionuclide	Half Life, Years	Half Life, Days
^{90}Strontium	2.870E+01	1.048E+04

Radionuclide: ^{90}Strontium

Reference Date: 3/13/1995 0:00

Certified Activity: µCi

Certified Concentration: 6.7405E+01 µCi per gram

Ampoule /Solution Gross	9.2400	Weight, Grams
Empty Ampoule	4.1769	Weight, Grams
Solution Net	5.0631	Weight, Grams
Total Activity in Ampoule	341.2803	µCi

Chemical Composition of Standard Solution

$^{90}SrCl_2$ in 1M HCl

Dilution Instructions:

Dilution Solvent Used: 1M HCl

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 341.2803 µCi Which Equals 7.576E+08 dpm at the date listed above

And after dilution the activity of this solution is 7.576E+05 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 9, 2016

Recertified By _____ Date: 7/4/15

Verified & QC Approved By _____ Date: 7-6-15

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

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

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

QCP-009-1-A

Solution Reference # NIST 4234A

Date 07/04/15

Solution # Sr-13a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{90}Sr	2.878E+01	1.051E+04

Radionuclide of Interest ^{90}Sr

Parent Solution Conc. 7.58E+05 dpm/ml

Reference Date 3/13/1995 0:00

Chemical Composition of Standard Solution

$^{90}SrCl_2$ in 1M HCl

Dilution Instructions:

Dilution Solvent Used 1M HCl

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 3.5558 ml

Total Activity: 2.6939E+06 dpm

Final Volume: 1000.00 ml

Final Activity Concentration: 2.6939E+03 dpm/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: June 9, 2016

Recertified By _____ Date: 7/4/15

Verified & QC Approved By _____ Date: 7-6-15

Tc-2

CERTIFICATE OF CALIBRATION
BETA STANDARD SOLUTION

Radionuclide	Tc-99	Customer:	TMA EBERLINE (NEW MEXICO)	
Half Life:	(2.13 ± 0.05) x 10^5 years	P.O.No.:	LQ 9724	
Catalog No.:	7099-100U	Reference Date:	July 1 1995	12:00 PST.
Source No.:	499-15	Contained Radioactivity:	99.3	µCi.
		Contained Radioactivity:	3670	kBq

Description of Solution

a. Mass of solution: 5.06314 g in a 5 ml flame sealed ampoule

b. Chemical form: NH4TcO4 in H2O

c. Carrier content: None

d. Density: Approximately 0.9982 g/ml @ 20°C.

Radioimpurities None detected

Radioactive Daughters None

Radionuclide Concentration 19.61 µCi/g.

Method of Calibration

The 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: ± 2.1%

b. Random uncertainty in assay: ± 0.7%

c. Random uncertainty in weighing(s): ± 0.1%

d. Total uncertainty at the 99% confidence level: ± 2.2%

NIST Traceability

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

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).

QA/QC REVIEWED
Date 1/24/96 Initials

ERIC ALLAS
QUALITY CONTROL

29 JUNE 1995
Date Signed

ISOTOPE PRODUCTS LABORATORIES
3017 N. SAN FERNANDO BLVD.
BURBANK, CALIFORNIA 91504
818·843·7000 FAX 818·843·6168

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: October 1, 2015
SOLUTION REFERENCE #: IPL 499-15
SOLUTION #: Tc-2

Principal Radionuclide	Half Life, Years	Half Life, Days
^{99}Tc	2.130E+05	7.780E+07

Radionuclide: ^{99}Tc
Reference Date: 7/1/1995 0:00
Certified Activity: 9.930E+01 µCi
Certified Concentration: µCi per gram

Ampoule /Solution Gross	9.6308	Weight, Grams
Empty Ampoule	4.3700	Weight, Grams
Solution Net	5.2608	Weight, Grams
Total Activity in Ampoule	99.3000	µCi

Chemical Composition of Standard Solution
$NH_4{}^{99}TcO_4$ in 1% NH_4OH

Dilution Instructions:

Dilution Solvent Used: 1% NH_4OH

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 99.3000 µCi Which Equals 2.204E+08 dpm at the date listed above

And after dilution the activity of this solution is 2.204E+05 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: September 18, 2016

Recertified & Approved By _____ Date: 10/1/2015 0:00

QC Approval _____ Date: 10/1/15

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 STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

Solution Reference # QCP-009-1-A IPL 499-15 **Date** 10/1/2015 0:00 **Solution #** Tc-2a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{99}Tc	2.130E+05	7.780E+07

Radionuclide of Interest ^{99}Tc **Reference Date** 7/1/1995 0:00
Parent Solution Conc. 2.20E+05 dpm/ml

Chemical Composition of Standard Solution
$NH_4{}^{99}TcO_4$ in 1% NH_4OH

Dilution Instructions: **Dilution Solvent Used** 1% NH_4OH

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 100.0000 ml
Total Activity: 2.2040E+07 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 2.2040E+04 dpm/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: September 18, 2016

Recertified & Approved By _____ Date: 10/1/2015 0:00

QC Approval _____ Date: 10/1/15

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

CERTIFICATE OF CALIBRATION
BETA STANDARD SOLUTION

Radionuclide:	C-14	**Customer:**	EBERLINE SERVICES
Half-life:	5730 ± 40 years	**P.O. No.:**	00009439
Catalog No.:	7014	**Reference Date:**	1-Nov-01 12:00 PST
Source No.:	841-40	**Contained Radioactivity:**	72.54 µCi 2684 kBq

Physical Description:

A. Mass of solution: 5.10940 g in 5 mL flame-sealed ampoule
B. Chemical form: Sodium Benzoate in 0.1M NaOH
C. Carrier content: None
D. Density: 1.002 g/mL @ 20°C.

Radioimpurities:

None detected

Radionuclide Concentration: 14.20 µCi/g, 525.4 kBq/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in µCi/g was determined using a liquid scintillation counter.

Uncertainty of Measurement:

A. Type A (random) uncertainty: ± 2.0 %
B. Type B (systematic) uncertainty: ± 2.0 %
C. Uncertainty in aliquot weighing: ± 0.0 %
D. Total uncertainty at the 99% confidence level: ± 2.8 %

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a 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).
- Nuclear data was taken from NCRP Report No. 58, 1985.
- This solution has a working life of 5 years.

Quality Control — Date Signed: 12-Nov-01 — IPL Ref. No.: 841-40

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 REVERIFICATION
MP 009

CURRENT DATE: 10/1/2015 0:00

SOLUTION REFERENCE #: IPL 841-40

SOLUTION #: C-3

Principal Radionuclide	Half Life, Years	Half Life, Days
^{14}Carbon	5.730E+03	2.093E+06

Radionuclide: ^{14}Carbon

Reference Date: 11/1/2001 0:00

Certified Activity: 7.254E+01 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross: Weight, Grams

Empty Ampoule: Weight, Grams

Solution Net: Weight, Grams

Total Activity in Ampoule: 72.5400 µCi

Chemical Composition of Standard Solution
Sodium Benzoate in 0.1M NaOH

Dilution Instructions:

Dilution Solvent Used: 0.1M NaOH

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 72.5400 µCi Which Equals 1.610E+08 dpm at the date listed above

And after dilution the activity of this solution is 1.610E+05 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: August 13, 2016

Verified & Approved By _____ Date: 10/1/2015 0:00

QC Approval _____ Date: 10/1/15

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

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

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION REVERIFICATION

MP-009-1-A

Solution Reference # IPL 841-40

Date 10/1/2015 0:00

Solution # C-3a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{14}Carbon	5.730E+03	2.093E+06

Radionuclide of Interest ^{14}Carbon

Parent Solution Conc. 1.61E+05 dpm/ml

Reference Date 11/1/2001 0:00

Chemical Composition of Standard Solution
Sodium Benzoate in 0.1M NaOH

Dilution Instructions:

Dilution Solvent Used 0.1 M NaOH

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 20.0000 ml
Total Activity: 3.2208E+06 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 3.2208E+03 dpm/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: August 13, 2016

Verified & Approved By _____ Date: 10/1/2015 0:00

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.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Ni-63	3.686E+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, Counting Room Manager

Date: 29 JAN 13

ANA Form/05 Rev ---

Single Isotope Certificate Rev 3, 23 August 2012

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1955

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
Total Activity in Ampoule	10.0892	µCi

Mass checks certificate

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 ~~01/25~~/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-1407
LPGAS-14

98500

Sand in Falcon Petri Filled to Capacity

Customer: Eberline Analytical Corporation
P.O. No.: OR-1405030, Item 3 Product Code: 8401-EG-SAN
Reference Date: 01-Oct-2014 12:00 PM EST **Grams of Master Source:** 0.016774

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	———	1.948E+03	0.1	1.8	3.6	4π LS
Cd-109	88.0	4.614E+02	1.663E+05	2.790E+03	0.5	2.0	4.1	HPGe
Co-57	122.1	2.717E+02	8.913E+04	1.495E+03	0.4	1.7	3.5	HPGe
Ce-139	165.9	1.376E+02	1.241E+05	2.081E+03	0.4	1.7	3.5	HPGe
Hg-203	279.2	4.659E+01	2.675E+05	4.487E+03	0.3	1.7	3.5	HPGe
Sn-113	391.7	1.151E+02	1.796E+05	3.013E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.099E+04	1.111E+05	1.863E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.223E+05	7.083E+03	0.7	1.7	3.7	HPGe
Co-60	1173.2	1.925E+03	2.091E+05	3.508E+03	0.7	1.8	3.9	HPGe
Co-60	1332.5	1.925E+03	2.094E+05	3.513E+03	0.7	1.8	3.9	HPGe
Y-88	1836.1	1.066E+02	4.471E+05	7.499E+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)

ANA Form005 Rev. —

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

00054

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	UUISO	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)
U-234		83.86%	15.57%	100.00%	3.60%	7.33E+00	2.64E-01	6.15E+00	9.57E-01	U-8a	3.20E+01	3.60E+00	5.09E-01
U-238		88.10%	15.51%	100.00%	3.60%	7.10E+00	2.56E-01	6.26E+00	9.71E-01	U-8a	3.10E+01	3.60E+00	5.09E-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
U-234	0.58	6.96	4.06E+01	6.81E+00	3.78E+01	6.18E+00
U-238	0.92	16.56	1.03E+01	2.57E+00	8.77E+00	2.21E+00
U-235	0.73	38.53	1.47E+00	9.77E-01	9.98E-01	8.37E-01

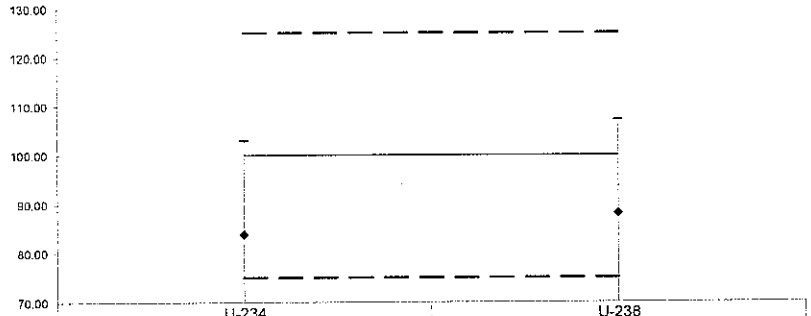
QC Summary

LCS Relative Bias	LCS % R		MS % R	MS ND	Rep RPD	Rep ND
0.84	OK				OK	OK
0.88	OK				OK	OK
	OK				NA	OK

00055

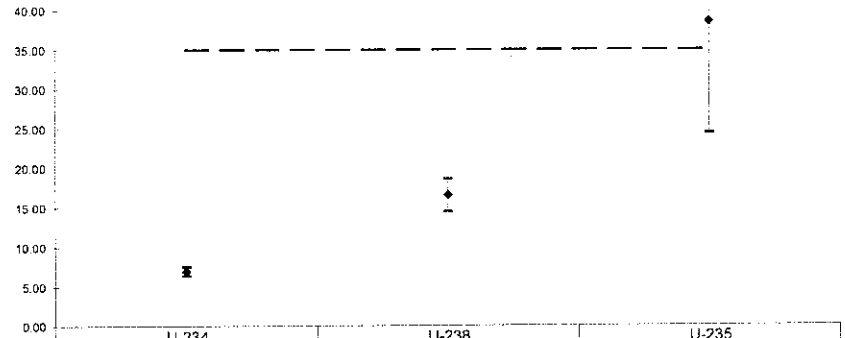
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	UUISO	1	pCi	g	Washington Closure Hanford

LCS % Recovery



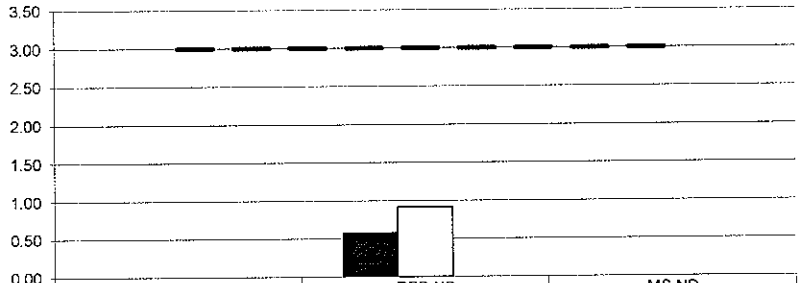
	U-234	U-238
Lower Error	64.69	68.99
Upper Error	103.03	107.21
%R	83.86	88.10
LCL	75	75
Mean	100	100
UCL	125	125

Replicate Sample RPD



	U-234	U-238	U-235
Lower Error	7.54	18.63	52.68
Upper Error	6.39	14.49	24.39
RPD	6.96	16.56	38.53
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
U-234	0.00	0.58	0.00
U-238	0.00	0.92	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

000057

Eberline Analytical
Analysis Control Chart

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	PulSO	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		86.06%	28.65%	100.00%	0.68%	4.51E+00	3.07E-02	3.88E+00	1.11E+00	Pu-21	1.10E+01	6.80E-01	9.14E-01
PU-239		100.62%	25.64%	100.00%	3.20%	7.29E+00	2.33E-01	7.33E+00	1.88E+00	Pu-22	1.56E+02	3.20E+00	1.04E-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	0.32	12.60	1.04E+02	6.30E+01	1.18E+02	5.85E+01
PU-239	0.79	12.86	5.91E+03	1.43E+03	6.73E+03	1.44E+03

QC Summary

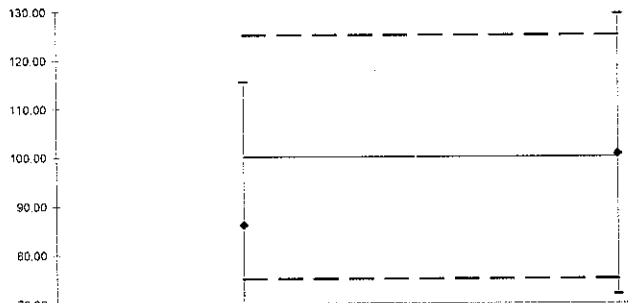
LCS Relative Bias	LCS % R		MS % R	MS ND	Rep RPD	Rep ND
0.86	OK				NA	OK
1.01	OK				NA	OK

00058

Version

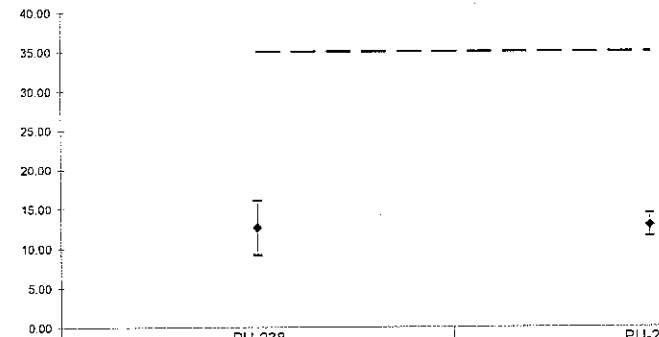
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	PuISO	1	pCi	g	Washington Closure Hanford

LCS % Recovery



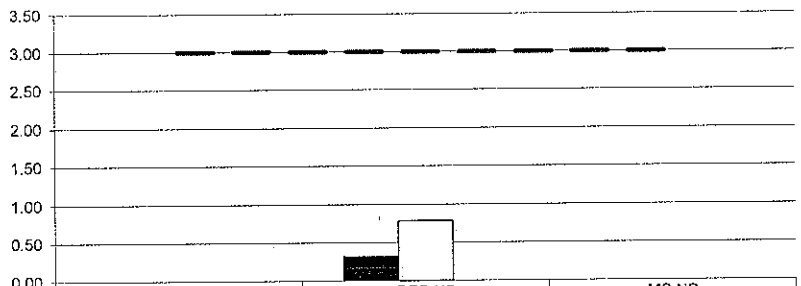
	PU-238	PU-239
Lower Error	56.73	71.78
Upper Error	115.40	129.45
%R	86.06	100.62
LCL	75	75
Mean	100	100
UCL	125	125

Replicate Sample RPD



	PU-238	PU-239
Lower Error	16.05	14.32
Upper Error	9.15	11.41
RPD	12.60	12.86
CL	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
PU-238	0.00	0.32	0.00
PU-239	0.00	0.79	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

00059

Eberline Analytical
Analysis Control Chart

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	Pu241	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-241		85.32%	8.69%	100.00%	4.60%	2.79E+02	1.29E+01	2.38E+02	2.07E+01	Pu-17a	6.50E+02	4.60E+00	9.54E-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-241	0.69	71.98	8.56E+02	2.17E+03	1.82E+03	1.66E+03

QC Summary

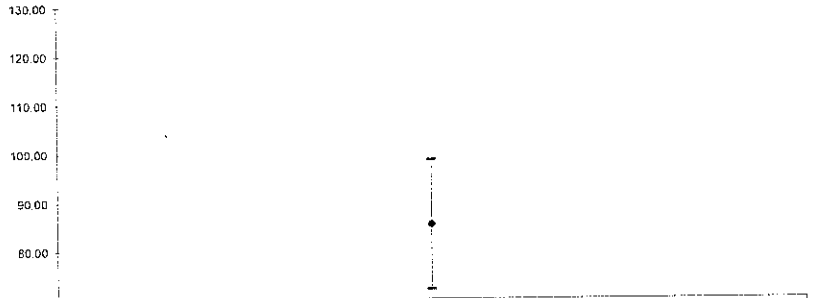
LCS Relative Bias	LCS % R		MS % R	MS ND	Rep RPD	Rep ND
0.85	OK				NA	OK

00050

Version

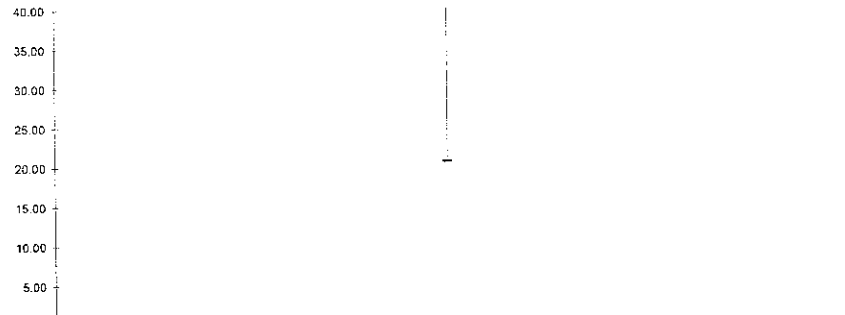
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	Pu241	1	pCi	g	Washington Closure Hanford

LCS % Recovery



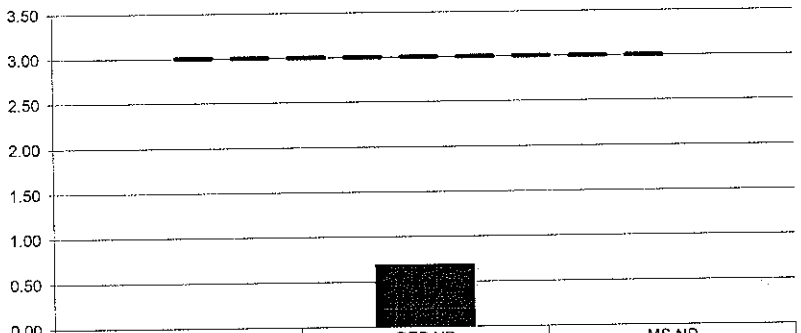
	PU-241
Lower Error	72.03
Upper Error	98.62
%R	85.32
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



	PU-241
Lower Error	123.42
Upper Error	20.55
RPD	71.98
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
PU-241	0.00	0.69	0.00
UCL	3	3	3

No Matrix Spike

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	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		80.75%	35.03%	100.00%	0.56%	5.21E+01	2.92E-01	4.21E+01	1.47E+01	Sr-13a	1.62E+03	5.60E-01	7.14E-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	0.81	20.53	5.28E+04	1.84E+04	6.49E+04	2.26E+04

QC Summary

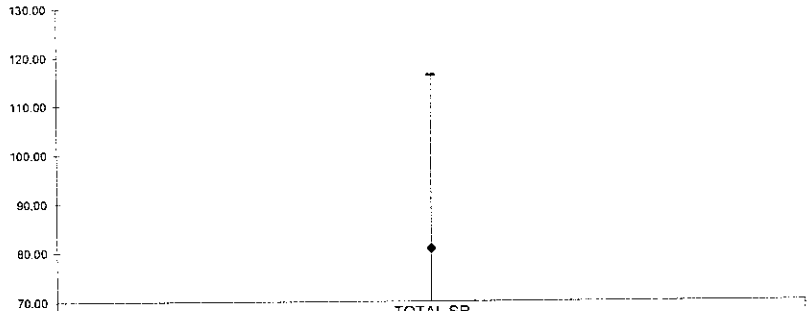
LCS Relative Bias	LCS % R		MS % R	MS ND	Rep RPD	Rep ND
0.81	OK				OK	OK

00062

Version

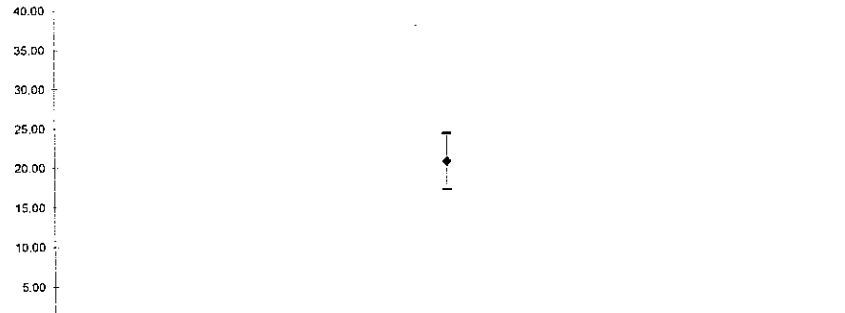
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	SrTOT	1	pCi	g	Washington Closure Hanford

LCS % Recovery



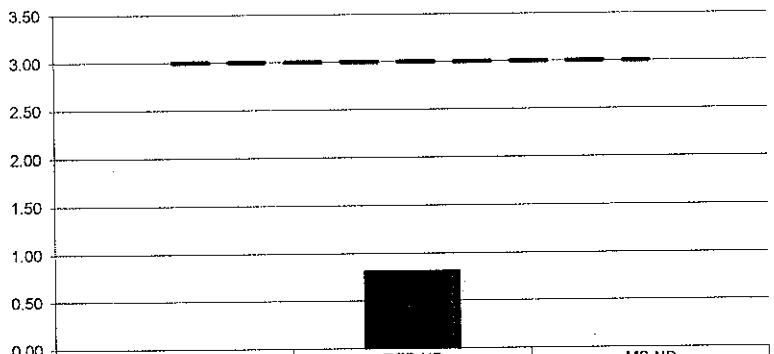
	TOTAL SR
Lower Error	45.16
Upper Error	116.34
%R	80.75
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



	TOTAL SR
Lower Error	24.11
Upper Error	16.96
RPD	20.53
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
TOTAL SR	0.00	0.81	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	Tc099	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)
TC-99		96.66%	9.99%	100.00%	2.20%	1.02E+03	2.25E+01	9.88E+02	9.87E+01	Tc-2a	2.20E+04	2.20E+00	1.03E-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)
TC-99	1.27	93.81%	9.45E+03	2.08E+02	8.90E+03	8.90E+02	4.05E+01	9.24E+00	1.07E-01	Tc-2a	2.20E+04	2.20	1.01E-01

Replicate Sample

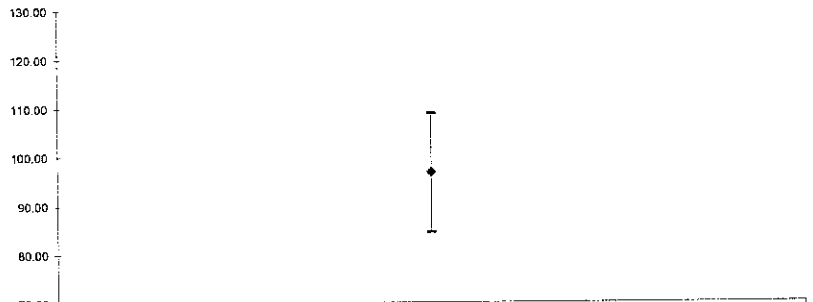
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU
TC-99	0.14	2.32	4.05E+01	9.24E+00	4.14E+01	9.31E+00

QC Summary

LCS Relative Bias	LCS % R		MS % R	MS ND	Rep RPD	Rep ND
0.97	OK			OK	OK	OK

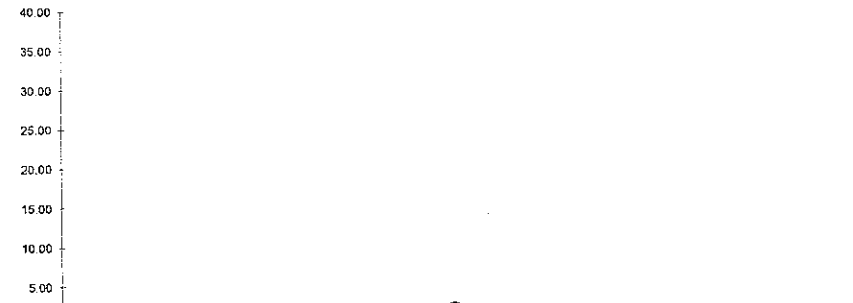
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	Tc099	1	pCi	g	Washington Closure Hanford

LCS % Recovery



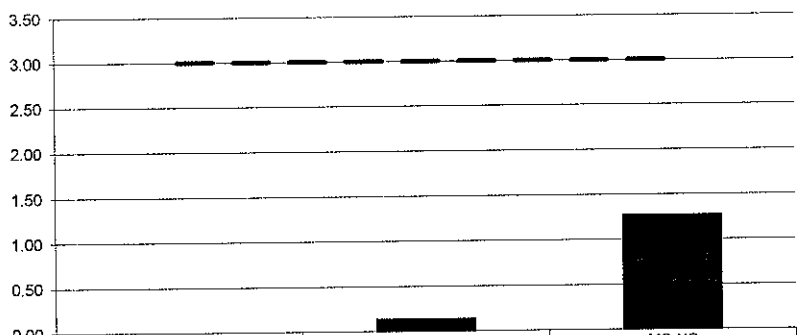
	TC-99
Lower Error	84.46
Upper Error	108.85
%R	96.66
LCL	75
Mean	100
UCL	125

Replicate Sample RPD



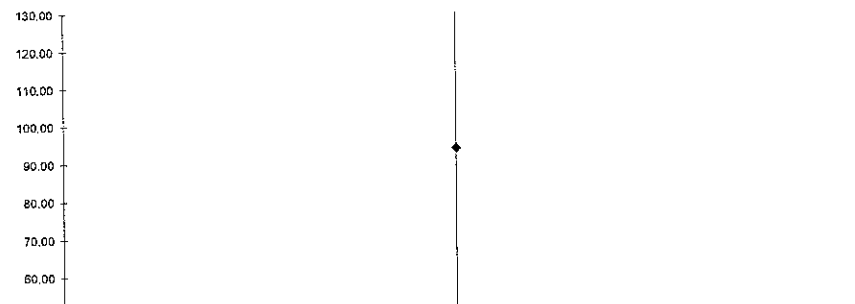
	TC-99
Lower Error	2.58
Upper Error	2.06
RPD	2.32
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
TC-99	0.00	0.14	1.27
UCL	3	3	3

Matrix Spike % Recovery



	TC-99
Lower Error	-1003.75
Upper Error	1191.38
%R	93.81
LCL	65
Mean	100
UCL	135

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	C0014	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)
C-14		101.91%	13.96%	100.00%	2.80%	1.38E+03	3.86E+01	1.40E+03	1.96E+02	C-3a	3.00E+03	2.80E+00	1.02E+00

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)
C-14	2.42	85.10%	2.05E+03	5.73E+01	1.74E+03	2.43E+02	2.71E+00	3.42E+00	6.80E-01	C-3a	3.00E+03	2.80	1.03E+00

Replicate Sample

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU
C-14	1.49	87.19	2.71E+00	3.42E+00	6.90E+00	4.34E+00

QC Summary

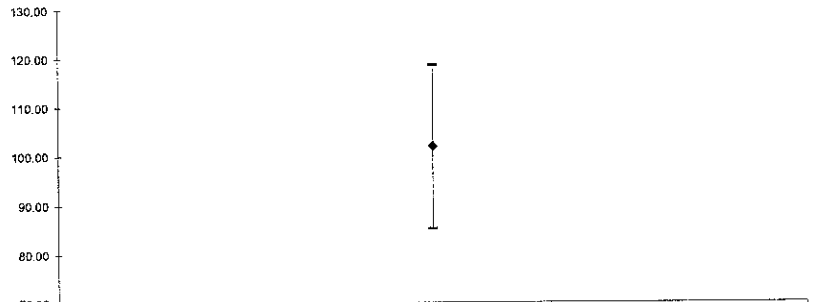
LCS Relative Bias	LCS % R		MS % R	MS ND	Rep RPD	Rep ND
1.02	OK			OK	INV	OK

00055

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	C0014	1	pCi	g	Washington Closure Hanford

LCS % Recovery

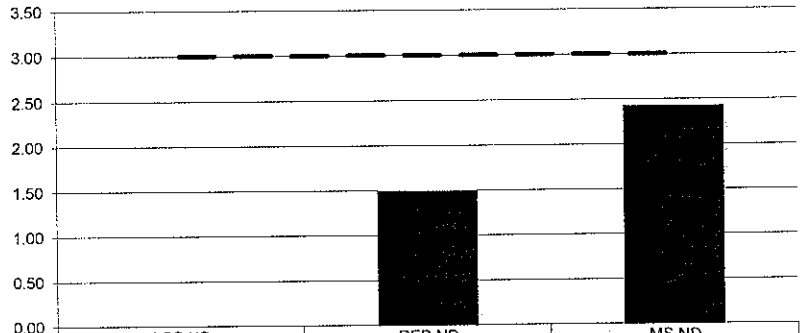


	C-14
Lower Error	85.15
Upper Error	118.67
%R	101.91
LCL	75
Mean	100
UCL	125

Replicate Sample RPD

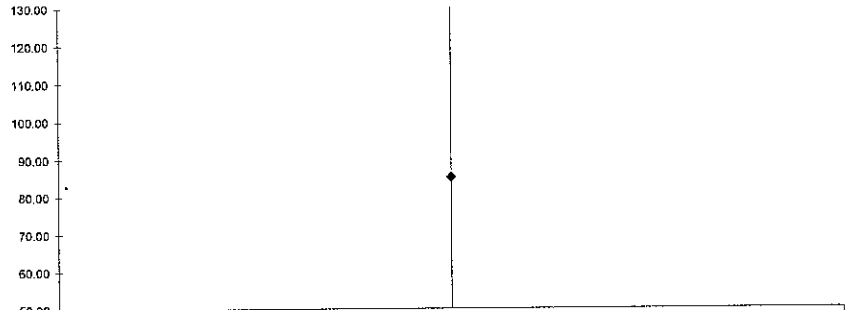
	C-14
Lower Error	122.39
Upper Error	51.99
RPD	87.19
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
C-14	0.00	1.49	2.42
UCL	3	3	3

Matrix Spike % Recovery



	C-14
Lower Error	-215.61
Upper Error	385.81
%R	85.10
LCL	65
Mean	100
UCL	135

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	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		95.70%	5.91%	100.00%	3.00%	1.54E+03	4.61E+01	1.47E+03	8.70E+01	Ni-3	2.19E+04	3.00E+00	1.56E-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	1.25	129.51%	8.53E+02	2.56E+01	5.16E+03	3.09E+02	4.05E+03	2.44E+02	1.02E-01	Ni-3	2.19E+04	3.00	8.82E-03

Replicate Sample

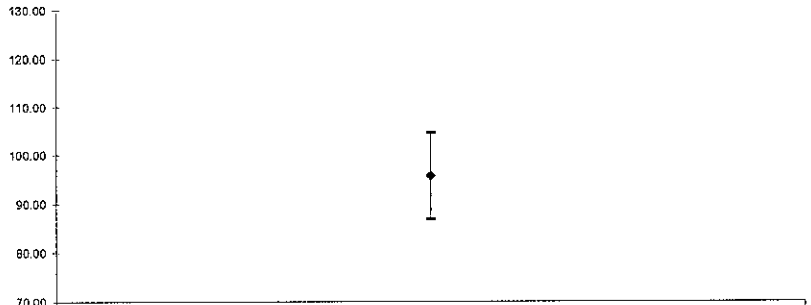
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU
NI-63	12.58	57.08	4.05E+03	2.44E+02	2.25E+03	1.38E+02

QC Summary

LCS Relative Bias	LCS % R		MS % R	MS ND	Rep RPD	Rep ND
0.96	OK			OK	INV	INV

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	Ni063	1	pCi	g	Washington Closure Hanford

LCS % Recovery

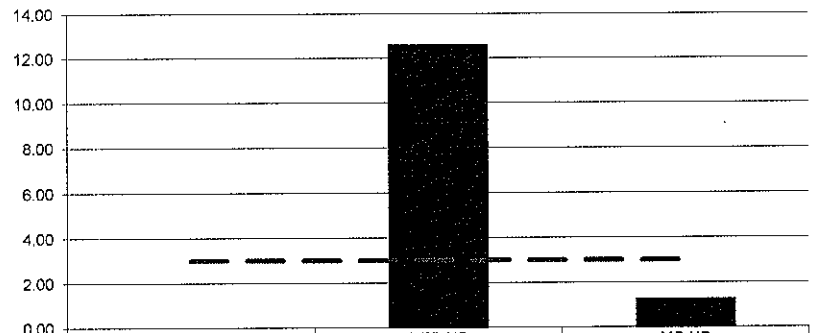


	NI-63
Lower Error	86.79
Upper Error	104.62
%R	95.70
LCL	75
Mean	100
UCL	125

Replicate Sample RPD

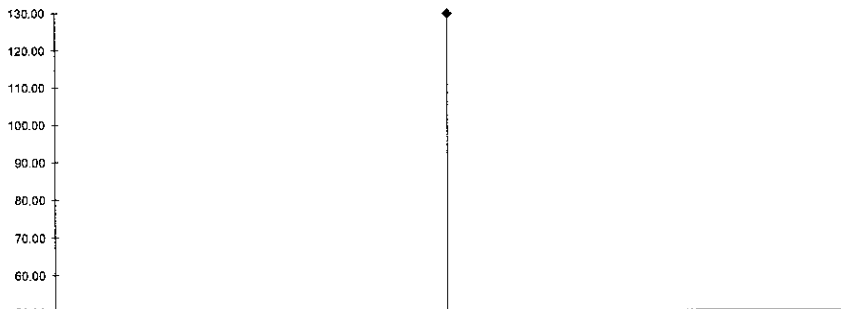
	NI-63
Lower Error	58.81
Upper Error	55.35
RPD	57.08
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
NI-63	0.00	12.58	1.25
UCL	3	3	3

Matrix Spike % Recovery



	NI-63
Lower Error	-204.83
Upper Error	463.84
%R	129.51
LCL	65
Mean	100
UCL	135

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	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		100.34%	7.76%	100.00%	4.00%	2.65E+03	1.06E+02	2.66E+03	2.06E+02	GAS-1307	2.65E+03	1.06E+02	3.90E+01
CS-137		102.59%	10.46%	100.00%	4.00%	1.68E+03	6.73E+01	1.72E+03	1.80E+02	GAS-1307	1.68E+03	6.73E+01	3.90E+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

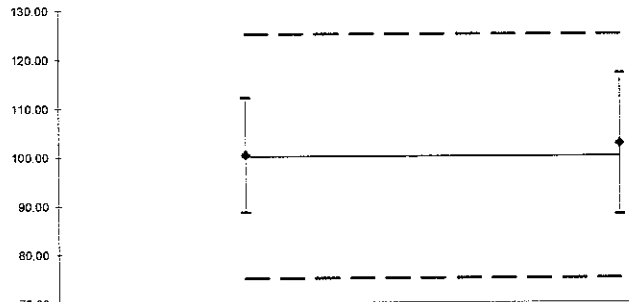
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU
AM-241	0.10	0.65	1.28E+03	1.15E+02	1.27E+03	1.14E+02
CS-137	0.07	0.54	9.62E+04	1.00E+04	9.57E+04	9.99E+03
EU-152	1.00	5612.98	-2.53E+01	6.75E+01	2.35E+01	6.75E+01

QC Summary

LCS Relative Bias	LCS % R		MS % R	MS ND	Rep RPD	Rep ND
1.00	OK		<CS-137	AM-241>	NA	
1.03	OK		<CO-60	CS-137>	NA	OK
				EU-152>	NA	OK

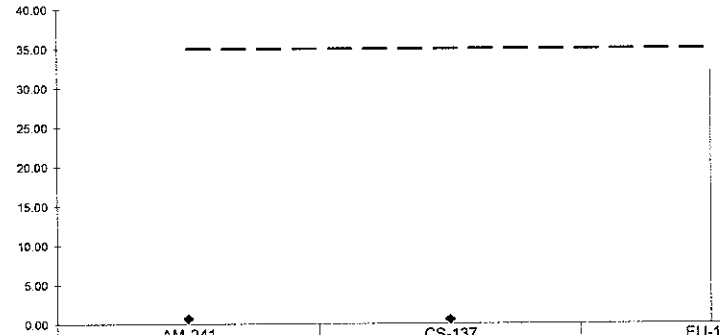
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
16-03050	Gamma	1	pCi	g	Washington Closure Hanford

LCS % Recovery



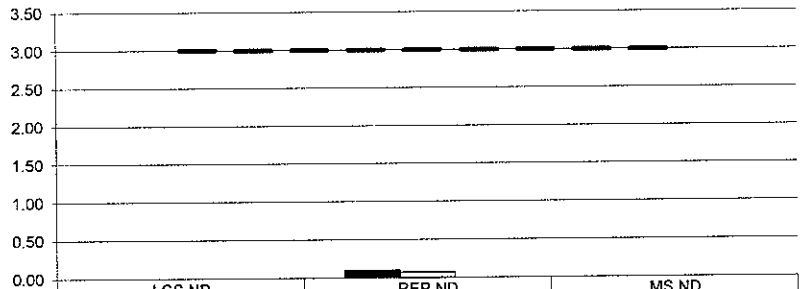
	CO-60	CS-137
Lower Error	88.58	88.13
Upper Error	112.10	117.06
%R	100.34	102.59
LCL	75	75
Mean	100	100
UCL	125	125

Replicate Sample RPD



	AM-241	CS-137	EU-152
Lower Error	0.68	0.57	-212146.97
Upper Error	0.63	0.51	223372.93
RPD	0.65	0.54	5612.98
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
CO-60	0.00	0.10	0.00
CS-137	0.00	0.07	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

SECTION VII

LABORATORY TECHNICIAN'S NOTES

ISO-U 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	16-03050
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS

JWolfe
3/11/16

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	16-03050
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS
2	03/15/16 16:54	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to ~35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl – 0.1N NH4I, 35 ml of 6.5N HCl – 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.

3/15/16

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	16-03050
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS
2	03/15/16 16:54	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to ~35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl – 0.1N NH4I, 35 ml of 6.5N HCl – 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.
3	03/16/16 05:10	CHEM	TSMITH	Followed steps 12.1.7 to 12.4.5 in AP-005 . (Preciptiated and filtered samples for Uranium)

3-16-16

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-03050	
Analysis Code	Run
UUISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
017151P	Hydrochloric Acid	Reagent Grade	JWOLFE	3/11/2016
017258P	Nitric Acid	Reagent Grade	JWOLFE	3/11/2016
017115P	Anion Exchange Resin	Reagent Grade	JDEMELAS	3/15/2016
017034D01	Hydrochloric Acid	0.5N	JDEMELAS	3/15/2016
017305S	Hydrochloric Acid	6.5N	JDEMELAS	3/15/2016
017035P	Hydrochloric Acid	Reagent Grade	JDEMELAS	3/15/2016
017394S	Hydrochloric Acid	8N	JDEMELAS	3/15/2016
017395S	HCl - NH4I	8N - 0.1M	JDEMELAS	3/15/2016
017364S	HCl - HF	6.5N - 0.04N	JDEMELAS	3/15/2016
016949P	Ethanol	Reagent Grade	TSMITH	3/16/2016
017047P	Hydrofluoric Acid	Reagent Grade	TSMITH	3/16/2016
016973S	Neodymium Carrier	1 mg/ml	TSMITH	3/16/2016
016606P	Titanous Chloride	Reagent Grade	TSMITH	3/16/2016
017390S	Carbon substrate	Solution	TSMITH	3/16/2016

Alphabetical

Date	Sample #	Client	Sampled Time	C1 Time	Analyzed	Tech
3/14/16	1602060A (1-8)	MCL	1142	5hr35 –	ISO-Th	KB
3/14/16	1602030A (4)	Unitech	1356	2hr50 –	UU	KB
3/14/16	1602070A (1-4)	CalEnergy	1359	2hr50 –	UU	KB
3/14/16	1602060A (1,9-17)	MCL	1724	5hr35 –	ISO-Th	KB
3/14/16	1602061A (1-17)	MCL	1725	5hr35 –	ISO-Th	KB
3/15	Daily Pulse	LAB	0823	–	NA	–
3/15	1602119A (4)	UCON	0823	2hr50	AH2B	–
3/15	1602070A (1-4)	CalEnergy	0823	2hr50	Th ISO	–
3/15	1602076A (1-9)	Searcy	0824	2hr50	UU ISO	–
3/15	1602062A (1-11)	MCL	0825	5hr35	Th ISO	–
3/15	~~R-7~~ Regen PANT-Pul (1)	LAB	0824	2hr50	PLANT	–
3/15/16	1602062A (12-15)	MCL	1010	5hr35 –	ISO-Th	KB
3/15/16	1602063A (1-5)	MCL	1012	5hr35 –	ISO-Th	KB
3/15/16	1602097A (4)	Accutest	1120	2hr50 –	Rub	KB
3/15/16	1602136A (1-4)	Access	1121	2hr50 –	Rub	KB
3/15/16	1602063A (6-15)	MCL	1122	5hr35 –	ISO-Th	KB
3/15/16	1602094A (1-20)	MCL	1703	5hr35 –	Rub	KB
3/16/16	Daily Pulse	Lab	0643	10min	NA	AC
3/16/16	1602119A (1-4)	UCON	0916	2hr50 –	ISO-Th	KB
3/16/16	1603050A (1-4)	Wash-Closure	0917	2hr50 –	UU	KB
3/16/16	1603051A (1-13)	Auxier	0919	5hr35 –	ISO-Th	KB
3/16/16	RegenTest R-10	Lab	0919	2hr50 –	PLANT	KB
3/16/16	1602098A (1-5)	Accutest	0920	2hr50 –	Rub	KB

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	16-03050
		Analysis Code	PulSO
		Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS

JWolfe
3/11/16

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	16-03050
		Analysis Code	PulSO
		Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS
2	03/15/16 16:56	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and hot-transferred to C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed; loaded samples onto columns; Rinsed C-Tubes with 20 ml 8N HNO3, centrifuged as needed and loaded onto columns; Rinsed columns once with 30 ml 8N HNO3, followed by 35 ml of 8N HCL; Eluted Plutonium with 50 ml 8N HCL/0.1M NH4I into clean, labeled 100 ml beakers; Added 1 ml concentrated HNO3 and dried down samples on hotplate; Dissolved samples in 10 ml concentrated HCL; Transferred samples to new, labeled C-Tubes using DI H2O, bringing volume to ~15 ml; Set samples aside for later precipitation and filtering.

3/15/16

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	16-03050
Analysis Code	PulSO
Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS
2	03/15/16 16:56	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and hot-transferred to C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed; loaded samples onto columns; Rinsed C-Tubes with 20 ml 8N HNO3, centrifuged as needed and loaded onto columns; Rinsed columns once with 30 ml 8N HNO3, followed by 35 ml of 8N HCL; Eluted Plutonium with 50 ml 8N HCL/0.1M NH4I into clean, labeled 100 ml beakers; Added 1 ml concentrated HNO3 and dried down samples on hotplate; Dissolved samples in 10 ml concentrated HCL; Transferred samples to new, labeled C-Tubes using DI H2O, bringing volume to ~15 ml; Set samples aside for later precipitation and filtering.
3	03/16/16 05:14	CHEM	TSMITH	Followed steps 12.3.7 to 12.4.5 in AP-005 . (Preciptiated and filtered samples for Plutonium)

3-16-16
JM

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-03050	
Analysis Code	Run
PuISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
017151P	Hydrochloric Acid	Reagent Grade	JWOLFE	3/11/2016
017258P	Nitric Acid	Reagent Grade	JWOLFE	3/11/2016
017230P	Anion Exchange Resin	Reagent Grade	JDEMELAS	3/15/2016
017395S	HCl - NH4I	8N - 0.1M	JDEMELAS	3/15/2016
017394S	Hydrochloric Acid	8N	JDEMELAS	3/15/2016
017035P	Hydrochloric Acid	Reagent Grade	JDEMELAS	3/15/2016
017397S	Nitric Acid	8N	JDEMELAS	3/15/2016
017152P	Nitric Acid	Reagent Grade	JDEMELAS	3/15/2016
016949P	Ethanol	Reagent Grade	TSMITH	3/16/2016
017047P	Hydrofluoric Acid	Reagent Grade	TSMITH	3/16/2016
016973S	Neodymium Carrier	1 mg/ml	TSMITH	3/16/2016
016606P	Titanous Chloride	Reagent Grade	TSMITH	3/16/2016

000832A

Alphabetical

Date	Sample #	Client	Sample Time	C/T Time	Analysis	Tech
3/14/16	1602060A (1-8)	MCL	1142	5hr35	ISO-Th	KB
3/14/16	1602030A (4)	Unitech	1356	2hr50	UU	KB
3/14/16	1602070A (1-4)	CalEnergy	1359	2hr50	UU	KB
3/14/16	1602060A (1,9-17)	MCL	1724	5hr35	ISO-Th	KB
3/14/16	1602061A (1-17)	MCL	1725	5hr35	ISO-Th	KB
3/15	Daily Pulse	LAB	0823		NA	
3/15	1602119A (4)	UCON	0823	2hr50	Alk2B	
3/15	1602070A (1-4)	CalEnergy	0823	2hr50	TLISO	
3/15	1602076A (1-9)	Searcy	0824	2hr50	UUISO	
3/15	1602062A (1-11)	MCL	0825	5hr35	TLISO	
3/15	~~R-9~~ R09 Regen 9 ANT-PULS	LAB	0824	2hr50	PUNT	
3/15/16	1602062A (12-15)	MCL	1010	5hr35	ISO-Th	KB
3/15/16	1602063A (1-5)	MCL	1012	5hr35	ISO-Th	KB
3/15/16	1602097A (4)	Accutest	1120	2hr50	Rad	KB
3/15/16	1602136A (1-4)	Access	1121	2hr50	Rad	KB
3/15/16	1602063A (6-15)	MCL	1122	5hr35	ISO-Th	KB
3/15/16	1602094A (1-20)	MCL	1703	5hr35	Rad	KB
3/16/16	Daily Pulse	Lab	0643	10min	NA	AC
3/16/16	1602119A (1-4)	UCON	0916	2hr50	ISO-Th	KB
3/16/16	1603050A (1-4)	Wash-Closure	0917	2hr50	UU	KB
3/16/16	1603051A (1-13)	Auxier	0919	5hr35	ISO-Th	KB
3/16/16	Regen Test R-10	Lab	0919	2hr50	PUNT	KB
3/16/16	1602098A (1-5)	Accutest	0920	2hr50	Rad	KB
3/16/16	1602098A (6-9)	Accutest	1214	2hr50	Rad	KB
3/16/16	1603050A (1-4,6)	Wash-Closure	1217	2hr50	ISO-PU	KB
3/16/16	1602076A (1-9)	Searcy	1218	2hr50	ISO-PU	KB
3/16/16	1602091A (1-9)	MCL	1219	5hr35		KB

PU-241 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	16-03050
		Analysis Code	Pu241
		Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS

JWolfe
3/11/16

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	16-03050
		Analysis Code	Pu241
		Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS
2	03/15/16 16:56	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and hot-transferred to C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed; loaded samples onto columns; Rinsed C-Tubes with 20 ml 8N HNO3, centrifuged as needed and loaded onto columns; Rinsed columns once with 30 ml 8N HNO3, followed by 35 ml of 8N HCL; Eluted Plutonium with 50 ml 8N HCL/0.1M NH4I into clean, labeled 100 ml beakers; Added 1 ml concentrated HNO3 and dried down samples on hotplate; Dissolved samples in 10 ml concentrated HCL; Transferred samples to new, labeled C-Tubes using DI H2O, bringing volume to ~15 ml; Set samples aside for later precipitation and filtering.

3/15/16

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	16-03050
Analysis Code	Pu241
Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS
2	03/15/16 16:56	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and hot-transferred to C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed; loaded samples onto columns; Rinsed C-Tubes with 20 ml 8N HNO3, centrifuged as needed and loaded onto columns; Rinsed columns once with 30 ml 8N HNO3, followed by 35 ml of 8N HCL; Eluted Plutonium with 50 ml 8N HCL/0.1M NH4I into clean, labeled 100 ml beakers; Added 1 ml concentrated HNO3 and dried down samples on hotplate; Dissolved samples in 10 ml concentrated HCL; Transferred samples to new, labeled C-Tubes using DI H2O, bringing volume to ~15 ml; Set samples aside for later precipitation and filtering.
3	03/16/16 05:15	CHEM	TSMITH	Followed steps 12.3.7 to 12.4.5 in AP-005 . (Preciptiated and filtered samples for Plutonium)

3/16/16
JMW

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	16-03050
		Analysis Code	Pu241
		Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:09	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED- ALIQUOTED FROM DILUTION AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED SAMPLES TO SEPARATIONS
2	03/15/16 16:56	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and hot-transferred to C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed; loaded samples onto columns; Rinsed C-Tubes with 20 ml 8N HNO3, centrifuged as needed and loaded onto columns; Rinsed columns once with 30 ml 8N HNO3, followed by 35 ml of 8N HCL; Eluted Plutonium with 50 ml 8N HCL/0.1M NH4I into clean, labeled 100 ml beakers; Added 1 ml concentrated HNO3 and dried down samples on hotplate; Dissolved samples in 10 ml concentrated HCL; Transferred samples to new, labeled C-Tubes using DI H2O, bringing volume to ~15 ml; Set samples aside for later precipitation and filtering.
3	03/16/16 05:15	CHEM	TSMITH	Followed steps 12.3.7 to 12.4.5 in AP-005 . (Preciptiated and filtered samples for Plutonium)
4	03/16/16 16:15	CHEM	JDEMELAS	Received filters in Petridishes from Count Room; Transferred filters to labeled 20 ml glass scintillation vials; Added 10 ml Ultima Gold XR Scintillation Cocktail; Added ~9.1 ml DI H2O to spike sample and 10 ml DI H2O to remainder of set; Added ~0.96 ml Pu241 Tracer (Pu 17A) to spike sample; Mixed samples, completed documentation and submitted set to Count Room.

John DeMelas
3/16/16

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-03050	
Analysis Code	Run
Pu241	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
017258P	Nitric Acid	Reagent Grade	JWOLFE	3/11/2016
017151P	Hydrochloric Acid	Reagent Grade	JWOLFE	3/11/2016
017230P	Anion Exchange Resin	Reagent Grade	JDEMELAS	3/15/2016
017035P	Hydrochloric Acid	Reagent Grade	JDEMELAS	3/15/2016
017152P	Nitric Acid	Reagent Grade	JDEMELAS	3/15/2016
017394S	Hydrochloric Acid	8N	JDEMELAS	3/15/2016
017397S	Nitric Acid	8N	JDEMELAS	3/15/2016
017395S	HCl - NH4I	8N - 0.1M	JDEMELAS	3/15/2016
016949P	Ethanol	Reagent Grade	TSMITH	3/16/2016
017047P	Hydrofluoric Acid	Reagent Grade	TSMITH	3/16/2016
016973S	Neodymium Carrier	1 mg/ml	TSMITH	3/16/2016
016606P	Titanous Chloride	Reagent Grade	TSMITH	3/16/2016
016805P	Ultima Gold XR	Reagent Grade	JDEMELAS	3/16/2016

DATE	Sample #	Protocol	Client	Log Time	CT. Time	Analysis	Tech
3/1/16	1602016A(1-5)	24	Unitech	1636	5 hrs	Pu241	KB
3/2/16	1602053A(1-4,6,B)	13	UCOR	1401	6hrs	Tc99	KB
3/3/16	1602012A(1-5,B)	13	UCOR	0658	6hrs	Tc99	C
3/3/16	1602044A(1-4,6,7,10,12,15)	24	UCOR	1127	9hrs	Pu241	KB
3/3/16	1602017A(1-5)	25	Unitech	1653	5hrs	Pu241	KB
3/4	1602018A(1-4,6,B)	13	UCOR	0550	6hrs	Tc99	C
3/4/16	1603015A(1-3,5,B,R)	7	UCOR	1116	3hrs	C14	KB
3/4	1603019A(1-3,5,B,R)	6	UCOR	1236	3hrs	C14	C
3/4/16	1602043A(1-15,17)	24	UCOR	1500	16hrs	Pu241	KB
3/4/16	1603018A(1-3,5,B)	2	UCOR	1503	10hrs	H3	KB
3/7/16	1602080A(1-3,7,B)	2	UCOR	1507	10hrs	H3	KB
3/8	1602057A(1-4,7)	24	UCOR	0952	5h	Pu241	C
~~3/8/16~~	~~1602080A(1-3,6,B,R)~~	11	KB 3/9/16 ~~UCOR~~	~~1208~~	~~1hr15~~	~~Ni63~~	~~KB~~
3/8/16	1602083A(1-4,B)	12	UCOR	1211	1hr15-	Ni63	KB
3/8/16	1602080A(1-3,6,B)	11	UCOR	1208	1hr15-	Ni63	KB
3/8	1602058A(1-4,7)	25	UCOR	1241	5h	Pu241	C
3/9	1602080A(1-3,6)	11	UCOR	0956	1h	Ni63	C
3/9	1602083A(1-4)	12	UCOR	0956	1h	Ni63	C
3/9/16	1602116A(1-3,9,B)	2	NYC Dept of EP	1523	24hr	H3	KB
3/10	1602015A(1-4,6,B)	13	UCOR	0417	6h	Tc99	C
3/10	1602015A(1-4,6,B)	16	UCOR	0417	6h	Tc99	C
3/10/16	1602080A(1-3,6,9)	24	UCOR	1642	5hrs	Pu241	KB
3/11	1602100A(1-5,8-11,B)	13	TNRCPL	0674	10hr	Tc99	C
3/11/16	1602083A(1-4,7)	24	UCOR	1424	5hrs	Pu241	KB
3/14/16	1602119A(1-4,B)	11	UCOR	1420	1hr15-	Ni63	KB
3/14/16	1603050A(1-5,B,R)	12	Wash. Closure	1424	7hrs	Ni63	KB
3/14/16	1602030A(1-5)	24	Unitech	1708	5hrs	Pu241	KB
3/14/16	1602050A(1-5,B)	13	Washington	0646	6hr	Tc99	C
3/15	1602119A(1-4)	11	UCOR	0727	7h	Ni63	C
3/15	1602056A(1-5,B,R)	6	TLOPC	1126	7h	C14	C
3/15/16	1602103A(1-4,B)	1	Unitech	1346	5hrs	H3	KB
3/16/16	1603050A(1-4,6)	24	Wash. Closure	1624	5hrs	Pu241	KB

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	16-03050
Analysis Code	SrTOT
Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:10	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED

JWolfe
3/11/16

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	16-03050
Analysis Code	SrTOT
Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:10	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED
2	03/15/16 06:18	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 15MAR16

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-03050	
Analysis Code	Run
SrTOT	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
017151P	Hydrochloric Acid	Reagent Grade	JWOLFE	3/11/2016
017258P	Nitric Acid	Reagent Grade	JWOLFE	3/11/2016
016080P	Hydrogen Peroxide	0.3	MHIGHTOWER	3/15/2016
016886D01	Nitric Acid	0.05N	MHIGHTOWER	3/15/2016
016886D04	Nitric Acid	8N	MHIGHTOWER	3/15/2016
016886P	Nitric Acid	Reagent Grade	MHIGHTOWER	3/15/2016

LB4100 RED

Date	Sample	Client	Rec'd Time	C Time	Analyst	Test
3/12/16	Weekly Blksd	Lab	0803	12hrs	ap	ICB
3/14	GFF-2C	LAB	0506	30	LB	C
3/14	Phenol	LAB	0542	6	LB	—
3/14	1602096AB(2-5)	Univ. Labs	0720	2	LB	—
3/14	1602096AB(1)	Univ. Labs	0720	30	LB	C
3/14	1602114AB(2-5)	Miss. Dept.	0720	2	LB	
3/14	1602725Y(1)	UCOR	0752	2	SPGOLY	C
3/14	1602127S4(1)	Searcy	0828	30	SPGOLY	—
3/14	1602127S4(2-4)	Searcy	0805	2	SPGOLY	C
3/14	1602022A4(2,3,4,6)	CLP	0946	2	MB	—
3/14	1602127S42(9)	Searcy	1107	2	SPGOLY	C
3/15	GFF-2C	LAB	0502	30	LB	C
3/15	Phenol	LAB	0546	6	LB	C
3/15	1602076Pb(2-9)	Searcy	0709	2	Pb210	C
3/15	1602076Pb1(1)	Searcy	0709	30	Pb210	C
3/15	1602119NP(1-2)	UCOR	0806	1	NP237	C
3/15	1602119NP(4)	UCOR	0828	10	NP237	C
3/15	1602062AU(1-11)	MCL	0955	2	MB	—
3/15/16	1602115RA(1-4)	ND	1236	2hrs	RaB	ICB
3/15/16	1603023RA(8-11)	USA	1241	2hrs	RaB	ICB
3/15/16	1603050SR(3-4)	Wash. Closure	1243	1hr	TOTSR	ICB
3/15/16	1603050SR(1,2)	Wash. Closure	1259	1	TOTSR	C

TC-99 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	16-03050
Analysis Code	Tc099
Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:10	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED

JWolfe
3/11/16

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	16-03050
Analysis Code	Tc099
Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:10	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED
2	03/15/16 03:41	PREP	MHIGHTOWER	Aliquoted samples into c-tubes and added 1M HNO3. Leached in hot water bath. Samples were vented, allowed to cool, then to shake for fifteen minutes. Decanted into clean beakers. Prepared spike and blank and aliquoted samples. HNO3 and H2O2 were added and samples were heated for two hours. Set-up columns and conditioned with .1M HNO3. After samples passed through columns, they were rinsed with 0.5M HF/.02M HNO3, 1M HNO3 and .1M HNO3. Added TC resin from columns, LS cocktail, and .1M HNO3 to labeled LS vials, and submitted to countroom

MH 15 MAR16

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-03050	
Analysis Code	Run
Tc099	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
017258P	Nitric Acid	Reagent Grade	JWOLFE	3/11/2016
017151P	Hydrochloric Acid	Reagent Grade	JWOLFE	3/11/2016
016080P	Hydrogen Peroxide	0.3	MHIGHTOWER	3/15/2016
016516D04	Nitric Acid	0.1N	MHIGHTOWER	3/15/2016
016886D02	Nitric Acid	1N	MHIGHTOWER	3/15/2016
016886P	Nitric Acid	Reagent Grade	MHIGHTOWER	3/15/2016
016764S	Nitric Acid/Hydrofluoric Acid	0.02M - 0.5M	MHIGHTOWER	3/15/2016
016329P	Ultima Gold XR	Reagent Grade	MHIGHTOWER	3/15/2016

TRICARB 3100 (B)

DATE	SAMPLE #	Protocol	Client	Log Time	CT Time	Analysis	Tech
3/1/16	1602016A(1-5)	24	Unitech	1636	5 hrs	Pu241	KB
3/2/16	1602053A(1-4,6,B)	13	UCOR	1401	6 hrs	Tc99	KB
7/3/16	1607012A(1-5,BS)	13	UCOR	0658	6 hrs	Tc99	C
3/3/16	1602044A(1-4,6,7,10,12,15)	24	UCOR	1127	9 hrs	Pu241	KB
3/3/16	1602017A(1-5)	25	Unitech	1653	5 hrs	Pu241	KB
7/4	1607018A(1-4,6,B)	13	UCOR	0550	6 hrs	Tc99	C
3/4/16	1603015A(1-3,6,B,R)	7	UCOR	1116	3 hrs	C14	KB
7/4	1603018A(1-3,5,B,R)	6	UCOR	1236	3 hrs	C14	C
3/4/16	1602043A(1-15,17)	24	UCOR	1500	16 hrs	Pu241	KB
3/4/16	1603018A(1-3,5,B)	2	UCOR	1503	10 hrs	H3	KB
3/7/16	1602080A(1-3,7,B)	2	UCOR	1507	10 hrs	H3	KB
7/8	1602057A(1-4,7)	24	UCOR	0852	5 hr	Pu241	C
~~3/8/16~~	~~1602080A(1-3,6,B,A)~~	11	KB 3/9/16 UCOR	~~1208~~	~~1 hr 15~~	~~Ni63~~	~~KB~~
3/8/16	1602083A(1-4,B)	12	UCOR	1211	1 hr 15	Ni63	KB
3/8/16	1602080A(1-3,6,B)	11	UCOR	1208	1 hr 15	Ni63	KB
7/8	1607018A(1-4,7)	25	UCOR	1241	5 hr	Pu241	C
7/9	1602080A(1-3,6)	11	UCOR	0836	1 hr	Ni63	C
7/9	1602083A(1-4)	12	UCOR	0836	1 hr	Ni63	C
3/9/16	1602116A(1-3,9,B)	2	NYC Dept of EP	1523	2 hrs	H3	KB
7/10	1607015A(1-4,6,B)	13	UCOR	0417	6 hr	Tc99	C
7/10	1607015A(1-4,6,B)	16	UCOR	0417	6 hr	Tc99	C
3/10/16	1602080A(1-3,6,9)	24	UCOR	1642	5 hrs	Pu241	KB
7/11	1602100A(1-5,8-11,B)	13	TN Dept	0674	10 hr	Tc99	C
3/11/16	1602083A(1-4,7)	24	UCOR	1424	5 hrs	Pu241	KB
3/14/16	1602119A(1-4,B)	11	UCOR	1420	1 hr 15	Ni63	KB
3/14/16	1603050A(1-5,B,R)	12	Wash. Closure	1424	7 hrs	Ni63	KB
3/14/16	1602030A(1-5)	24	Unitech	1709	5 hrs	Pu241	KB
7/15/16	1607050A(1-5,B)	13	Washington	0646	6 hr	Tc99	C

C-14 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	16-03050
Analysis Code	C0014
Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 09:15	PREP	KSALLINGS KS	1st Step Samples were aliquoted and placed into 600ml beakers. Carbonate was added and samples were then oxidized using potassium permanganate. Samples were left unattended for carbonate conversions. 2nd Step Samples were placed into 1liter reaction vessels. Carbon dioxide was evolved and Carbon-14 was captured in Harvey. Samples were taken to the for counting by beta LSC.

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-03050	
Analysis Code	Run
C0014	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
016885P	Harvey carbon14 cocktail	Reagent Grade	KSALLINGS	3/10/2016
016127D05	Nitric Acid	6N	KSALLINGS	3/10/2016
016343S	Potassium Permanganate	0.5M	KSALLINGS	3/10/2016
016940D01	Sodium Carbonate	0.25M	KSALLINGS	3/10/2016
016679D03	Sulfuric acid	9M	KSALLINGS	3/10/2016

TriCARB 3100 (A)

DATE	Sample #	Protocol	Client	Load Time	CT Time	Analysis	Tech
3/8/16	1603025A(1-6,B,R)	6	Unitech	1101	8hrs	C14	KB
3/8/16	1602083A(1-3,5,B)	1	LICOR	1450	10hrs	H3	KB
3/8/16	1602043A(7)	22	LICOR	1651	15hrs	Ni63	KB
3/15	1602115A(1-4,6,B)	16	LICOR	0757	6hr	Tc99	C
3/15	1602132A(1-4,6,B)	18	LICOR	0757	6hr	Tc99	C
3/10	1607044A(1-3,5,B,R)	6	LICOR	0931	3hr	C14	C
3/10	1603045A(1-3,5,B,R)	7	LICOR	0931	3hr	C14	C
3/10/16	1602084A(1-6,B)	1	Unitech	1350	7hrs	H3	KB
3/11/16	1603050A(1-5,B,R)	6	Wash. Closure	1223	7hrs	C14	KB

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	16-03050
Analysis Code	Ni063
Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:10	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED

JWolfe
3/11/16

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	16-03050
Analysis Code	Ni063
Run Number	1

#	Date	Dept	User	Notes
1	03/11/16 08:10	PREP	JWOLFE	ALIQUOTED AND DIGESTED SAMPLE WITH HNO3 AND HCL- CENTRIFUGED AND DILUTED
2	03/14/16 11:50	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 3/14/16

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
16-03050	
Analysis Code	Run
Ni063	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
017151P	Hydrochloric Acid	Reagent Grade	JWOLFE	3/11/2016
017258P	Nitric Acid	Reagent Grade	JWOLFE	3/11/2016
016370P	Ammonium Hydroxide	Reagent Grade	KCOULSTON	3/14/2016
016468S	Citric Acid	1M	KCOULSTON	3/14/2016
016469S	Dimethylglyoxime	1%	KCOULSTON	3/14/2016
016467S	Nickel Chloride	10 mg/ml	KCOULSTON	3/14/2016

TRICARB 3200 (B)

DATE	Sample #	Protocol	Client	Lot Time	CT. Time	Analysis	Tech
3/1/16	1602016A(1-5)	24	Unitech	1636	5 hrs	Pu241	KB
3/2/16	1602053A(1-4,6,B)	13	UCOR	1401	6hrs	Tc99	KB
7/3/16	1607012A(1-5,B)	13	UCOR	0658	6hrs	Tc99	C
3/3/16	1602044A(1-4,6,7,10,12,15)	24	UCOR	1127	9hrs	Pu241	KB
3/3/16	1602017A(1-5)	25	Unitech	1653	5hrs	Pu241	KB
7/4	1607018A(1-4,6,B)	13	UCOR	0550	6hrs	Tc99	C
3/4/16	1603015A(1-3,5,B,R)	7	UCOR	1116	3hrs	C14	KB
7/4	1607019A(1-3,5,B,R)	6	UCOR	1236	3hrs	C14	C
3/4/16	1602043A(1-15,17)	24	UCOR	1500	16hrs	Pu241	KB
3/4/16	1603018A(1-3,5,B)	2	UCOR	1503	10hrs	H3	KB
3/7/16	1602080A(1-3,7,B)	2	UCOR	1507	10hrs	H3	KB
7/8	1602057A(1-4,7)	24	UCOR	0952	5h	Pu241	C
~~3/8/16~~	~~1602080A(1-3,6,B,R)~~	~~11~~	~~KB 3/8/16 UCOR~~	~~1208~~	~~1hr15-~~	~~Ni63~~	~~KB~~
3/8/16	1602083A(1-4,B)	12	UCOR	1211	1hr15-	Ni63	KB
3/8/16	1602080A(1-3,6,B)	11	UCOR	1208	1hr15-	Ni63	KB
7/8	1607018A(1-4,7)	25	UCOR	1241	5h	Pu241	C
7/9	1602080A(1-3,6)	11	UCOR	0956	7h	Ni63	C
7/9	1602083A(1-4)	12	UCOR	0956	7h	Ni63	C
3/9/16	1602116A(1-3,9,B)	2	NYC Dept of EP	1523	7hrs	H3	KB
7/10	1607015A(1-4,6,B)	13	UCOR	0417	6h	Tc99	C
7/10	1603015A(1-4,6,B)	16	UCOR	0417	6h	Tc99	C
3/10/16	1602080A(1-3,6,9)	24	UCOR	1642	5hrs	Pu241	KB
7/11	1602100A(1-5,8-11,D)	13	TNRCPL	0674	10hr	Tc99	C
3/11/16	1602083A(1-4,7)	24	UCOR	1424	5hrs	Pu241	KB
3/14/16	1602119A(1-4,B)	11	UCOR	1420	1hr15-	Ni63	KB
3/14/16	1603050A(1-5,B,R)	12	Wash. Closure	1424	7hrs	Ni63	KB

GAMMA NOTES

GE 2

DATE	Sample #	Client	Load Time	CT Time	Analysis	Tech
7/10	1602091-02	MCL	0852	15	Ba	—
7/10	1602091-06	MCL	0911	15	Ba	—
7/10	1602091-10	MCL	0927	15	Ba	—
7/10	1602091-14	MCL	0945	15	Ba	—
7/10	1602091-18	MCL	0959	15	Ba	—
3/10/16	1602092-02	MCL	1238	15 mins	Ba	KB
3/10/16	1602092-06	MCL	1254	15 mins	Ba	KB
3/10/16	1602092-08	MCL	1313	15 mins	Ba	KB
3/10	1602092-11	MCL	1328	15	Ba	C
3/10	1602092-14	MCL	1345	15	Ba	C
3/10/16	1602092-18	MCL	1404	15	Ba	KB
3/10/16	1602093-02	MCL	1424	15 mins	Ba	KB
3/10/16	1602093-06	MCL	1442	15 mins	Ba	KB
3/10/16	1602093-10	MCL	1502	15 mins	Ba	KB
3/10/16	1602093-14	MCL	1514	15 mins	Ba	KB
3/10/16	1603050-03	WASH. CLOSURE	1544	30 mins	Y	KB
3/10/16	1603050-04	WASH. CLOSURE	1625	30 mins	Y	KB
3/10/16	1603050-01	WASH. CLOSURE	1707	30 mins	Y	KB
3/10/16	1603050-02	WASH. CLOSURE	1738	30 mins	Y	KB

SECTION VIII

ANALYTICAL DATA (ISOTOPIC URANIUM)

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
UUISO
Run 1

Work Order	16-03050
Analysis Code	UUISO
Run	1
Date Received	3/10/2016
Lab Deadline	3/16/2016
Client	Washington Closure Hanford
Project	S00W235A01
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	EML U-02 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	U-232
Radiometric Sol#	U-10a
Tracer Act (dpm/g)	18.57
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		03/10/16 00:00	1.0000E+00
02	MBL	BLANK		03/10/16 00:00	1.0000E+00
03	DUP	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	1.0656E-01
04	DO	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	1.0656E-01

* 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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
UUISO
Run 1

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	0.6102	11.3		0.00								
02	MBL	0.6077	11.3		0.00								
03	DUP	0.6068	11.3		0.00								
04	DO	0.6041	11.2		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.

001114

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
UUISO
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			03/11/16 04:57	JWOLFE				
02	MBL			03/11/16 04:57	JWOLFE				
03	DUP			03/11/16 04:57	JWOLFE				
04	DO			03/11/16 04:57	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.

Eberline Analytical
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Analytical Work Order: 16-03050
Client: 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	U-234	LCS	LCS	pCi/g	6.15E+00	8.50E-01	5.91E-02	7.33E+00	83.86	OK		OK	
02	U-234	MBL	BLANK	pCi/g	2.72E-01	1.22E-01	7.69E-02					OK	OK
03	U-234	DUP	J1V8D3 SAF: RC-155	pCi/g	3.78E+01	5.56E+00	8.90E-01				OK	OK	
04	U-234	DO	J1V8D3 SAF: RC-155	pCi/g	4.06E+01	6.17E+00	6.27E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-UUISO-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: UUISO

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	U-234	LCS	03/10/16 00:00	1.00E+00	130.65	0.00	0.00			
02	U-234	MBL	03/10/16 00:00	1.00E+00	129.14	0.00	0.00			
03	U-234	DUP	03/07/16 13:40	1.07E-01	126.06	0.00	0.00			
04	U-234	DO	03/07/16 13:40	1.07E-01	112.86	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-UUISO-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: UUISO

Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	03/16/16 09:17		A_Spec	Alpha_037	170	4.98 E+02	2.00 E-03	16.5
02	U-234	MBL	03/16/16 09:17		A_Spec	Alpha_038	170	2.11 E+01	5.00 E-03	16
03	U-234	DUP	03/16/16 09:17		A_Spec	Alpha_039	170	3.56 E+02	1.50 E-02	18.6
04	U-234	DO	03/16/16 09:17		A_Spec	Alpha_040	170	3.39 E+02	3.00 E-03	18.5

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-UUISO-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: UUISO
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	U-238	LCS	LCS	pCi/g	6.26E+00	8.62E-01	5.88E-02	7.10E+00	88.10	OK		OK	
02	U-238	MBL	BLANK	pCi/g	8.52E-02	6.72E-02	6.11E-02					OK	OK
03	U-238	DUP	J1V8D3 SAF: RC-155	pCi/g	8.77E+00	2.12E+00	8.23E-01				OK	OK	
04	U-238	DO	J1V8D3 SAF: RC-155	pCi/g	1.03E+01	2.46E+00	7.13E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-UUISO-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: UUISO

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	U-238	LCS	03/10/16 00:00	1.00E+00	130.65	0.00	0.00			
02	U-238	MBL	03/10/16 00:00	1.00E+00	129.14	0.00	0.00			
03	U-238	DUP	03/07/16 13:40	1.07E-01	126.06	0.00	0.00			
04	U-238	DO	03/07/16 13:40	1.07E-01	112.86	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-UUISO-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-03050	UUISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	03/16/16 09:17		A_Spec	Alpha_037	170	5.09 E+02	2.00 E-03	16.5
02	U-238	MBL	03/16/16 09:17		A_Spec	Alpha_038	170	6.66 E+00	2.00 E-03	16
03	U-238	DUP	03/16/16 09:17		A_Spec	Alpha_039	170	8.30 E+01	1.20 E-02	18.6
04	U-238	DO	03/16/16 09:17		A_Spec	Alpha_040	170	8.70 E+01	0.00 E+00	18.5

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-UUISO-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: UUISO
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	U-235	LCS	LCS	pCi/g	3.66E-01	1.54E-01	9.14E-02					OK	
02	U-235	MBL	BLANK	pCi/g	1.06E-01	8.33E-02	7.58E-02					OK	OK
03	U-235	DUP	J1V8D3 SAF: RC-155	pCi/g	9.98E-01	8.34E-01	1.07E+00				NA	INV	
04	U-235	DO	J1V8D3 SAF: RC-155	pCi/g	1.47E+00	9.71E-01	8.84E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-UUISO-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: UUISO

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	U-235	LCS	03/10/16 00:00	1.00E+00	130.65	0.00	0.00			
02	U-235	MBL	03/10/16 00:00	1.00E+00	129.14	0.00	0.00			
03	U-235	DUP	03/07/16 13:40	1.07E-01	126.06	0.00	0.00			
04	U-235	DO	03/07/16 13:40	1.07E-01	112.86	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-UUISO-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-03050	UUISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	03/16/16 09:17		A_Spec	Alpha_037	170	2.40 E+01	0.00 E+00	16.5
02	U-235	MBL	03/16/16 09:17		A_Spec	Alpha_038	170	6.66 E+00	2.00 E-03	16
03	U-235	DUP	03/16/16 09:17		A_Spec	Alpha_039	170	7.62 E+00	1.40 E-02	18.6
04	U-235	DO	03/16/16 09:17		A_Spec	Alpha_040	170	1.00 E+01	0.00 E+00	18.5

Count Room Report
Client: Washington Closure Hanfor

16-03050-UUISO-1 (pCi/g) in
Tracer ID: U-10a

37-40

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	03/10/16 00:00	1.0000	0.6102	11.3314		0.00		
02	MBL	BLANK	03/10/16 00:00	1.0000	0.6077	11.2850		0.00		
03	DUP	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1066	0.6068	11.2683		0.00		
04	DO	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1066	0.6041	11.2181		0.00		

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Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 3/11/2016 4:57 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-03050	1	UUISO	3/11/2016 4:53	JWOLFE	JW	

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
U-234	U-8a	32.000	3/11/2016	0.550	0.5086				7.33	0.264	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	31.000	3/11/2016	0.550	0.5086				7.10	0.256	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	U-232	U-10a	18.570	3/11/2016	0.6102	0.6500
02	U-232	U-10a	18.570	3/11/2016	0.6077	0.6500
03	U-232	U-10a	18.570	3/11/2016	0.6068	0.6500
04	U-232	U-10a	18.570	3/11/2016	0.6041	0.6500

Balance Printer Tapes

Tracer

0.6102 g
0.6077 g
0.6068 g
0.6041 g

LCS

0.5086 g

Matrix Spike

Version 2.0 08/99

001125

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-03050	1	UUISO	grams	3/16/2016	JWOLFE

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	J1V8D3 SAF: RC-155	DUP		1	22.52	4.44E-02	2.4000E+00	1.0656E-01				
04	J1V8D3 SAF: RC-155	DO		1	22.52	4.44E-02	2.4000E+00	1.0656E-01				

Comments	

Technician: JWolfe Date: 3/11/16

00125

EBERLINE SERVICES	Internal Work Order	16-03050
	Fraction	> 03 <
Dilution Worksheet	Analysis Code	UUISO
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: JW Date: 3/11/16

00127

EBERLINE SERVICES

Dilution Worksheet

Internal Work Order	16-03050
Fraction	**> 04 <**
Analysis Code	**UUISO**
Run Number	**1**
Analyst	**JWOLFE**

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: JW Date: 3/11/16

KB
3/16/16

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001455
Batch Identification: 1603050A-UU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_037
Chamber Serial Number: 04026478A
Detector Serial Number: 91133
Env. Background: System Bkgd 146790
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 3/16/2016 8:34:09 AM
Acquisition Date/Time: 3/16/2016 9:17:03 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.610 mL
Effective Efficiency: 0.2149 +/- 0.0117
Counting Efficiency: 0.1645 +/- 0.0029 on 12/11/2015 8:20:53 AM
Chem. Recovery Factor: 1.3065 +/- 0.0748

Control Certificate Name: NatU_U-8A
Chem. Recov. of Control: U-238 0.775036 +/- 0.059205
Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.274	411.15	9.68	0.85	0.00E+000	14.3
U-234		4.729	497.66	8.79	0.34	0.00E+000	35.2
U-235		4.391	24.00	40.83	0.00	0.00E+000	3.8
U-238		4.152	508.66	8.69	0.34	0.00E+000	34.5

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
U-232	0.994	5302.50*	5.08E+000 +/- 5.42E-001	7.40E-002 +/- 7.90E-003
U-234	0.992	4761.50*	6.15E+000 +/- 8.50E-001	5.91E-002 +/- 6.31E-003
U-235	1.000	4385.50*	3.66E-001 +/- 1.54E-001	9.14E-002 +/- 9.76E-003
U-238	0.993	4184.40*	6.26E+000 +/- 8.62E-001	5.88E-002 +/- 6.28E-003

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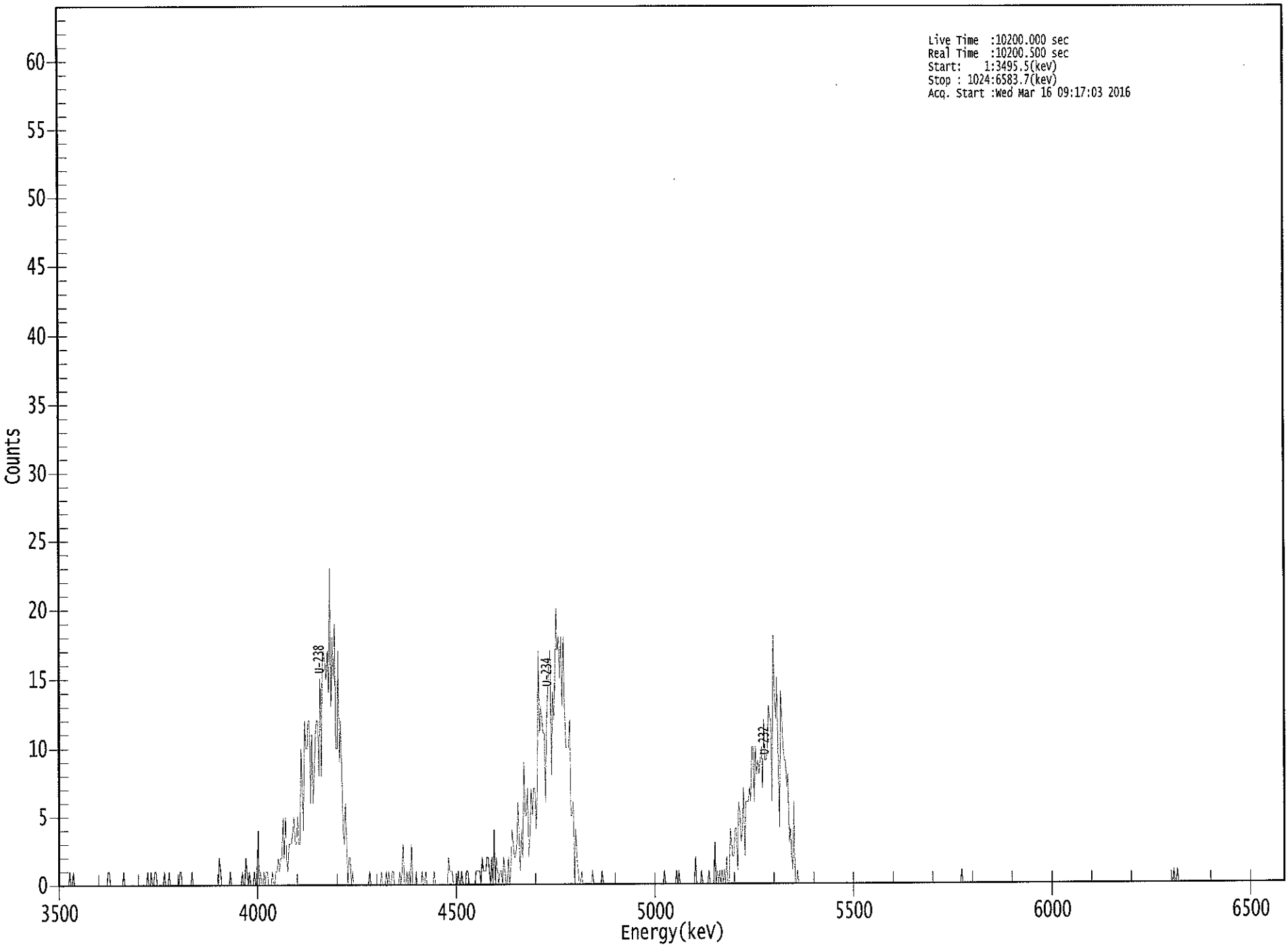
3/16/16

0000145599.CNF



00130

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

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	1	0	0	1	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	1	1	0	0	0	0	0
49:	0	0	0	0	0	0	1	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	1	0	0	1	0	0
81:	1	1	0	0	0	0	0	0
89:	1	0	0	0	1	0	0	0
97:	0	0	0	0	0	1	1	0
105:	0	0	0	0	0	0	0	1
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	2	1
137:	0	0	0	0	0	0	0	1
145:	0	0	0	0	0	0	0	0
153:	0	1	0	0	2	1	0	1
161:	0	0	0	1	0	0	4	0
169:	1	0	0	1	0	1	1	0
177:	0	0	1	0	0	1	1	2
185:	1	2	2	5	2	5	2	1
193:	3	3	3	4	5	3	3	5
201:	3	3	10	7	4	12	10	10
209:	12	12	6	11	6	8	11	12
217:	12	8	15	8	17	17	16	15
225:	17	14	23	13	18	15	19	10
233:	10	17	9	12	8	4	3	6
241:	3	0	2	2	0	1	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	1	0	0	0	0
265:	0	0	0	0	0	1	0	0
273:	0	1	0	1	0	0	1	1
281:	0	0	0	0	1	0	1	3
289:	0	0	1	0	1	0	3	0
297:	0	0	1	0	0	0	0	1
305:	0	0	1	0	0	0	0	0
313:	0	1	0	0	0	0	0	0
321:	0	0	0	0	0	2	1	1
329:	1	0	0	0	0	1	0	0
337:	1	0	0	0	1	1	0	0
345:	0	0	0	0	1	1	1	1
353:	0	2	1	1	1	2	2	1
361:	0	2	0	4	0	2	1	0

369:	1	1	0	2	1	0	0	2

Sample Title: 01

Channel								
377:	0	1	4	3	2	2	3	6
385:	3	1	4	2	9	5	5	7
393:	2	4	7	5	7	7	4	7
401:	17	11	13	12	11	11	6	12
409:	14	16	17	8	14	12	15	20
417:	17	18	15	18	13	18	13	10
425:	10	10	12	5	5	6	0	4
433:	2	1	0	0	1	0	0	0
441:	0	0	0	0	0	1	0	0
449:	0	0	0	0	0	1	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	1	0	0	0	0	0	0
513:	0	0	0	1	0	1	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	2	0	0	0	0
537:	1	0	0	0	0	0	1	0
545:	0	0	0	3	0	1	0	1
553:	0	1	0	1	0	2	0	0
561:	4	3	2	2	4	4	1	6
569:	5	3	4	7	2	6	6	6
577:	7	6	10	10	6	10	8	9
585:	8	9	10	7	12	9	9	10
593:	13	12	12	6	18	14	12	15
601:	9	4	14	12	10	9	9	7
609:	8	3	4	2	1	6	0	0
617:	1	0	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	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	1	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: 01

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	1	0	0	1	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	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:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB
3/16/16

Apex-Alpha™

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001456
Batch Identification: 1603050A-UU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_038
Chamber Serial Number: 04026478B
Detector Serial Number: 91134
Env. Background: System Bkgd 146791
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 3/16/2016 8:34:09 AM
Acquisition Date/Time: 3/16/2016 9:17:04 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.608 mL
Effective Efficiency: 0.2067 +/- 0.0115
Counting Efficiency: 0.1601 +/- 0.0028 on 12/11/2015 8:20:51 AM
Chem. Recovery Factor: 1.2914 +/- 0.0751

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.277	393.83	9.88	0.17	0.00E+000	17.1
U-234		4.705	21.15	43.61	0.85	0.00E+000	6.0
U-235		4.359	6.66	78.18	0.34	0.00E+000	3.0
U-238		4.145	6.66	78.18	0.34	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)
U-232	0.995	5302.50*	5.06E+000 +/- 5.49E-001	5.36E-002 +/- 5.82E-003
U-234	0.978	4761.50*	2.72E-001 +/- 1.22E-001	7.69E-002 +/- 8.35E-003
U-235	0.995	4385.50*	1.06E-001 +/- 8.33E-002	7.58E-002 +/- 8.23E-003
U-238	0.989	4184.40*	8.52E-002 +/- 6.72E-002	6.11E-002 +/- 6.64E-003

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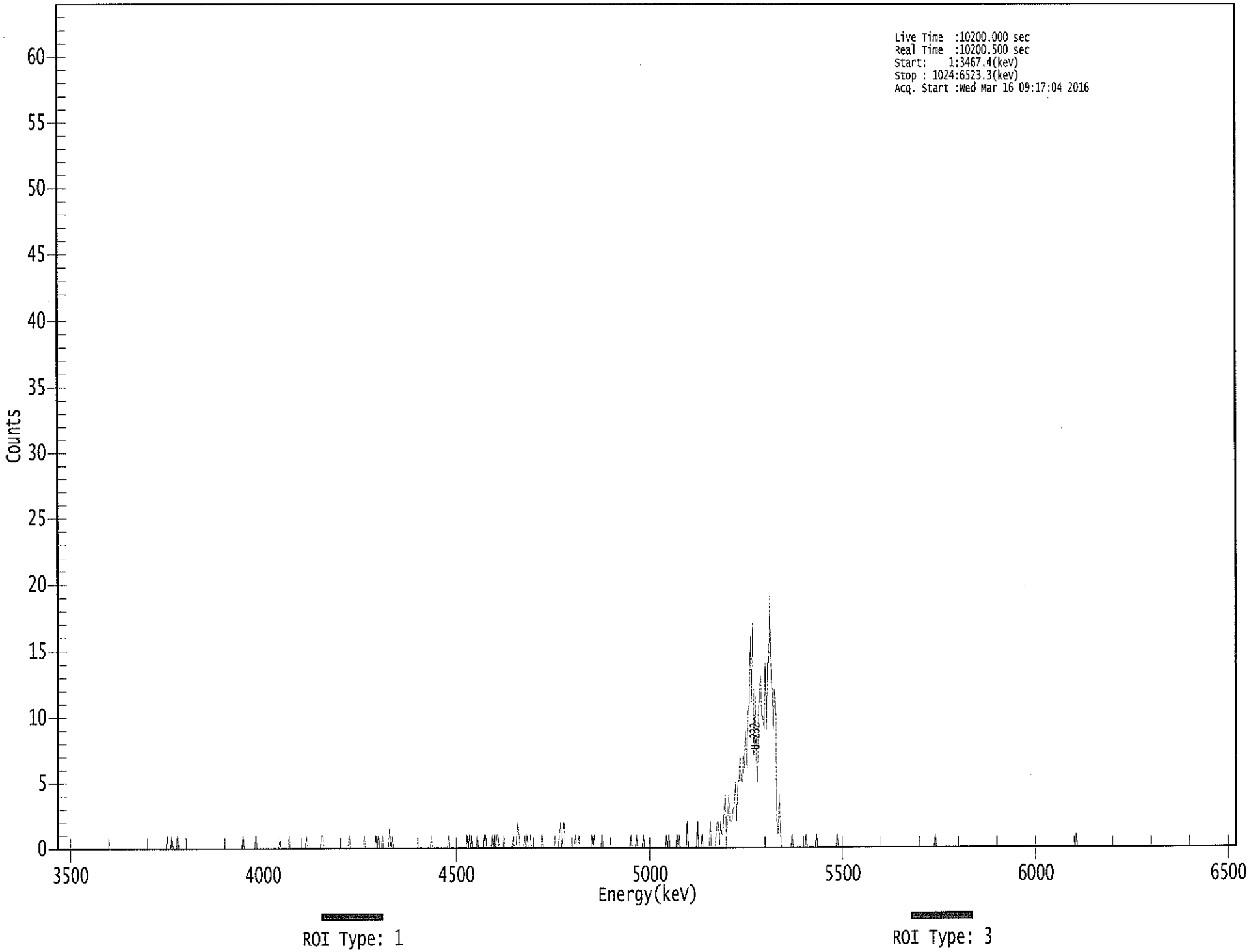
3/16/16

0000145600.CNF



: 00135

****
***** 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: 10201

Channel								
1:	0	0	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	1
97:	0	0	0	1	0	0	0	0
105:	1	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	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	1	0	0	0	0	0	0
169:	0	0	0	0	1	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	1	0	0	0	0	0	0
201:	0	1	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	1	0	0	0	0	0	0	0
225:	0	0	0	0	0	1	1	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	1	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	0	0	0	1	0	1	0
281:	0	0	1	0	0	0	0	0
289:	2	0	1	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	1	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	1	0	1	0	1
361:	0	0	0	0	1	0	0	0

369:	0	0	1	1	0	0	0	0

Sample Title: 02

Channel								
377:	0	1	0	1	0	1	1	0
385:	0	0	0	1	0	0	0	0
393:	0	0	0	1	0	0	1	2
401:	1	0	0	0	0	1	0	1
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	1
433:	0	0	0	1	2	0	1	2
441:	0	0	0	0	0	0	0	0
449:	0	1	0	0	1	0	0	0
457:	0	0	0	0	0	0	0	1
465:	0	1	0	0	0	0	0	0
473:	1	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	1	0	0	0	0	1	0
505:	0	0	0	0	1	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	1	0	1	0	0	0	0	0
537:	0	1	0	1	0	0	0	0
545:	0	0	2	0	0	0	0	0
553:	0	0	0	2	0	0	0	1
561:	0	0	0	0	0	0	2	0
569:	0	0	0	1	2	2	0	2
577:	1	1	3	4	1	2	4	2
585:	2	2	3	3	5	2	5	5
593:	7	5	5	7	6	9	6	10
601:	11	16	11	17	7	12	7	5
609:	10	12	13	10	10	9	14	9
617:	14	14	19	13	12	9	12	11
625:	2	1	4	1	0	0	0	0
633:	0	0	0	0	0	1	0	0
641:	0	0	0	0	0	0	0	0
649:	0	1	0	0	0	0	0	0
657:	0	0	1	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	1	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	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	1	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	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	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:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB
3/16/16

Apex-Alpha™

Sample Description: J1V8D3 SAF: RC-155 DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001456
Batch Identification: 1603050A-UU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_039
Chamber Serial Number: 06027396A
Detector Serial Number: 83109
Env. Background: System Bkgd 146792
Reagent Blank: <not performed>

Sample Size: 1.066E-001 +/- 0.000E+000 gram
Sample Date/Time: 3/7/2016 8:34:09 AM
Acquisition Date/Time: 3/16/2016 9:17:06 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.607 mL
Effective Efficiency: 0.2347 +/- 0.0124
Counting Efficiency: 0.1862 +/- 0.0032 on 12/11/2015 8:20:49 AM
Chem. Recovery Factor: 1.2606 +/- 0.0701

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.281	446.45	9.31	2.55	0.00E+000	54.4
U-234		4.773	356.45	10.42	2.55	0.00E+000	22.5
U-235		4.423	7.62	82.97	2.38	0.00E+000	3.0
U-238		4.154	82.96	21.83	2.04	0.00E+000	5.2

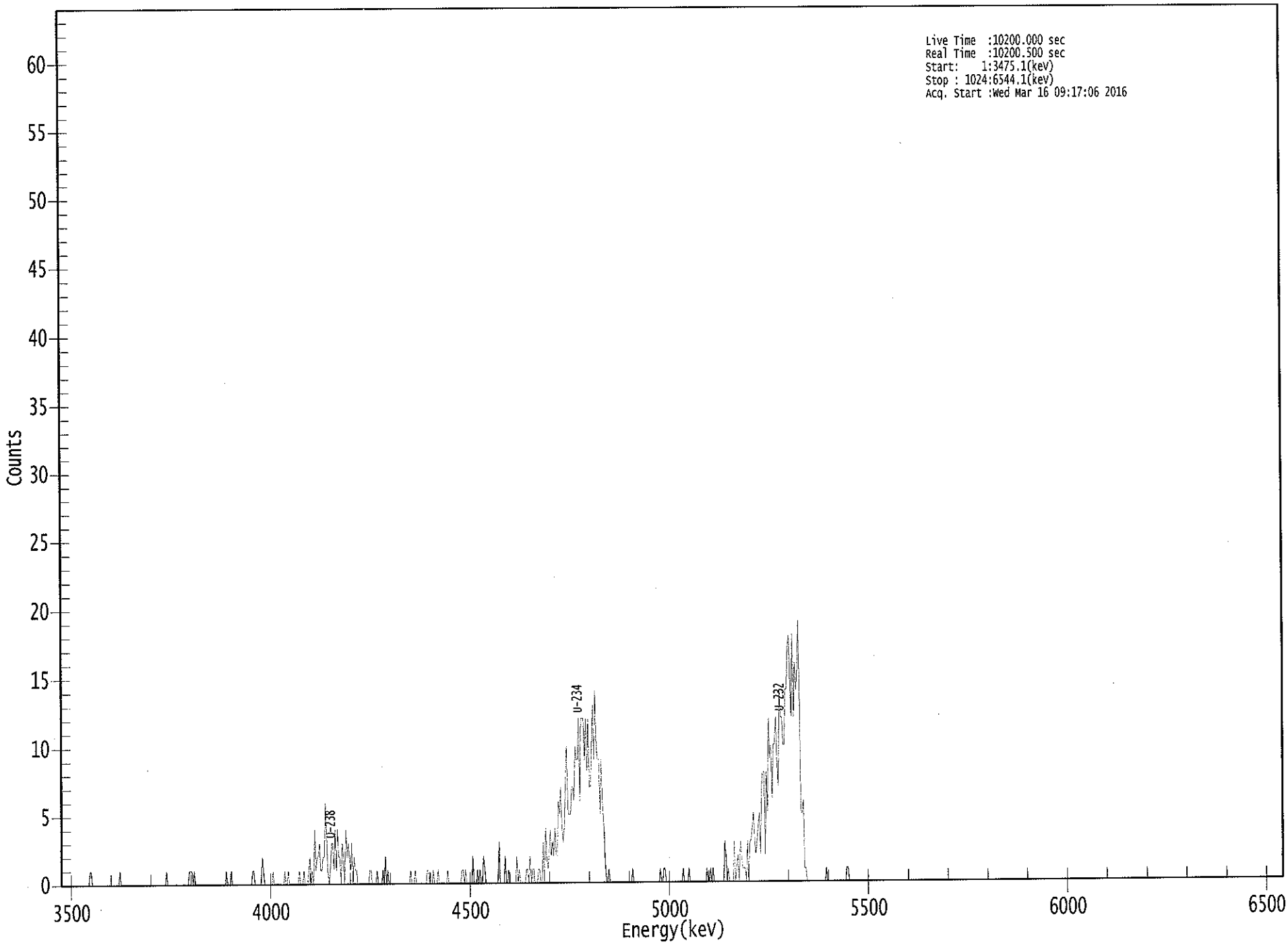
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
U-232	0.997	5302.50*	4.74E+001 +/- 4.90E+000	8.91E-001 +/- 9.21E-002
U-234	0.999	4761.50*	3.78E+001 +/- 5.56E+000	8.90E-001 +/- 9.21E-002
U-235	0.990	4385.50*	9.98E-001 +/- 8.34E-001	1.07E+000 +/- 1.11E-001
U-238	0.994	4184.40*	8.77E+000 +/- 2.12E+000	8.23E-001 +/- 8.51E-002

AG
3/16/16

0000145601.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: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	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:	1	1	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	1	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:	1	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	1	1	1	0	1
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	1	0	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	1	1	0	0	0	0	0	0
169:	2	1	0	0	0	0	0	0
177:	0	1	0	0	0	0	0	0
185:	0	0	0	1	0	0	1	0
193:	0	0	0	0	0	0	0	1
201:	0	0	0	1	0	0	0	1
209:	2	0	1	0	4	1	2	2
217:	3	1	1	2	2	6	3	1
225:	0	1	3	3	1	4	1	4
233:	2	2	0	3	2	0	4	2
241:	3	2	1	3	0	2	1	1
249:	0	0	0	0	0	0	0	0
257:	0	0	1	1	0	0	0	0
265:	1	0	0	0	0	1	0	2
273:	0	1	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	1	0	0	0
297:	1	0	0	0	0	0	0	0
305:	0	0	1	1	0	0	0	1
313:	0	0	0	1	0	0	0	0
321:	0	0	0	1	0	0	0	0
329:	0	0	0	0	0	0	0	1
337:	1	0	1	0	0	0	0	0
345:	2	0	0	0	1	0	1	0
353:	0	2	1	0	0	0	0	0
361:	0	0	0	0	0	0	3	0

369:	0	0	0	2	0	0	1	0

Sample Title: 03

Channel								
377:	0	0	0	0	0	2	0	1
385:	0	0	0	0	0	1	1	0
393:	2	0	1	1	0	0	0	1
401:	1	0	0	3	0	4	2	1
409:	2	4	2	3	2	4	2	2
417:	6	5	7	4	3	4	7	10
425:	5	5	5	7	7	6	10	9
433:	9	12	6	12	12	12	9	12
441:	8	12	7	7	10	13	9	14
449:	10	9	9	5	9	6	4	2
457:	0	0	1	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	1	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	1	0	0
505:	1	1	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	1	0	0	0	0	1	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	1	0	0	1
545:	0	1	0	0	0	0	0	0
553:	0	0	0	3	2	0	1	0
561:	0	0	0	3	0	1	2	0
569:	3	2	1	1	1	0	3	0
577:	3	3	4	5	3	2	3	4
585:	5	2	7	8	8	2	8	5
593:	12	9	10	6	10	10	12	9
601:	7	14	12	12	10	10	14	14
609:	17	18	15	12	18	12	16	14
617:	15	19	14	5	5	6	1	1
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	1	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	1	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	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	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	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	0	0	0
945:	0	0	0	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:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

XB 3/16/16

Apex-Alpha™

Sample Description: J1V8D3 SAF: RC-155
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001456
Batch Identification: 1603050A-UU
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 146793
Reagent Blank: <not performed>

Sample Size: 1.066E-001 +/- 0.000E+000 gram
Sample Date/Time: 3/7/2016 8:34:09 AM
Acquisition Date/Time: 3/16/2016 9:17:08 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.604 mL
Effective Efficiency: 0.2085 +/- 0.0115
Counting Efficiency: 0.1847 +/- 0.0032 on 12/11/2015 8:20:48 AM
Chem. Recovery Factor: 1.1286 +/- 0.0655

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.234	394.83	9.87	0.17	0.00E+000	4.2
U-234		4.734	339.49	10.65	0.51	0.00E+000	49.0
U-235		4.414	10.00	65.01	0.00	0.00E+000	3.0
U-238		4.129	87.00	21.13	0.00	0.00E+000	11.0

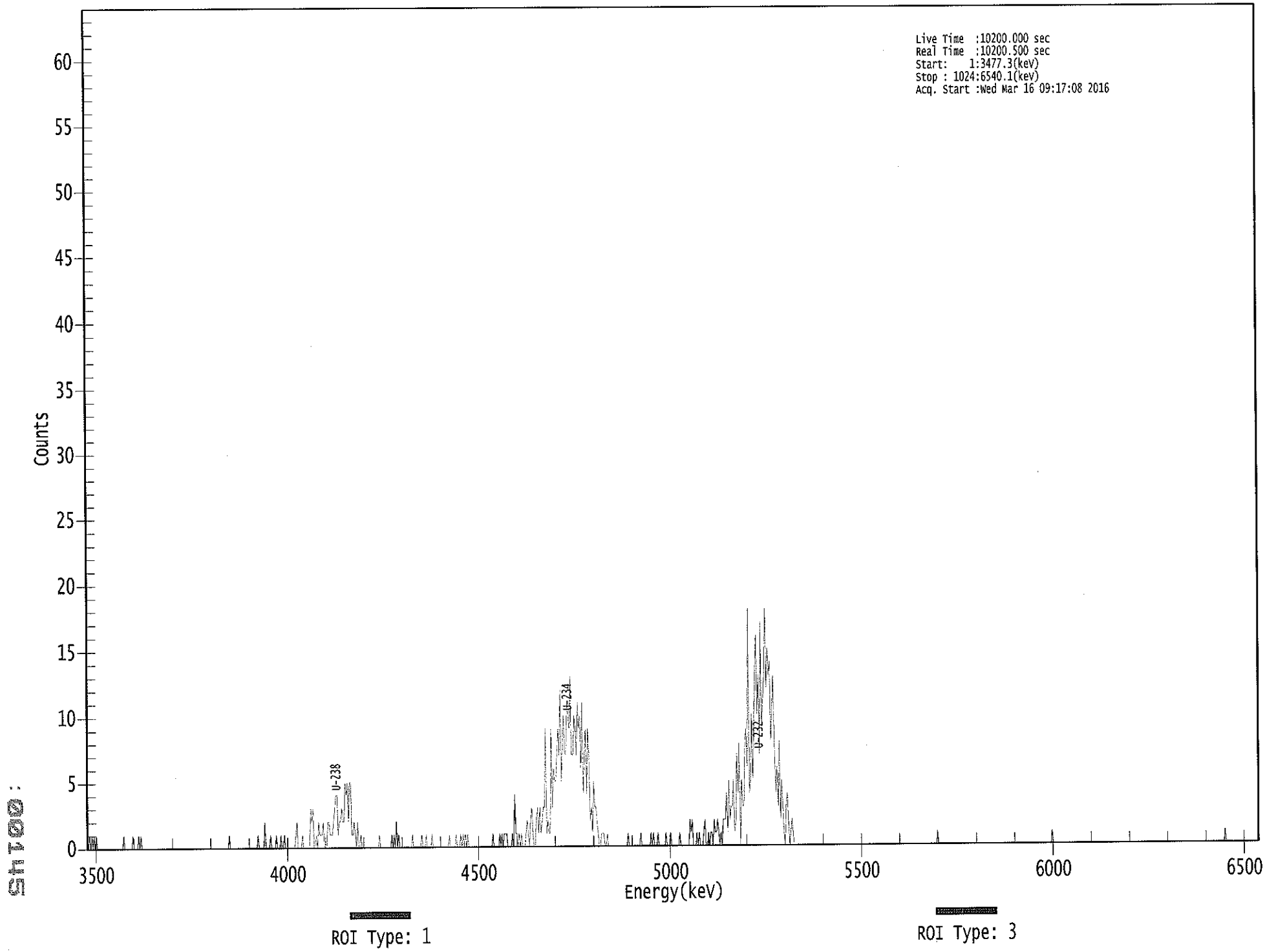
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
U-232	0.967	5302.50*	4.72E+001 +/- 5.12E+000	4.99E-001 +/- 5.41E-002
U-234	0.994	4761.50*	4.06E+001 +/- 6.17E+000	6.27E-001 +/- 6.80E-002
U-235	0.994	4385.50*	1.47E+000 +/- 9.71E-001	8.84E-001 +/- 9.59E-002
U-238	0.978	4184.40*	1.03E+001 +/- 2.46E+000	7.13E-001 +/- 7.74E-002

AG 3/16/16

0000145602.CNF



Ch100 : 0015

****
***** 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:	0	0	1	0	1	0	1	0
9:	1	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:	1	0	0	0	0	0	0	0
41:	1	0	0	0	0	1	0	1
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	1	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	1	0	0
153:	0	0	0	2	0	0	0	0
161:	1	0	0	0	0	1	0	0
169:	0	1	0	0	1	0	0	0
177:	0	0	0	0	0	0	1	2
185:	0	0	0	0	1	0	0	0
193:	0	0	0	3	2	3	0	0
201:	1	0	2	1	1	1	2	0
209:	0	0	2	2	1	1	1	2
217:	3	4	4	1	2	2	3	2
225:	2	5	4	5	2	5	5	1
233:	1	2	1	0	2	0	0	1
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	1
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	1	0	2	0
273:	1	0	0	0	0	0	0	0
281:	0	0	0	0	1	0	0	0
289:	0	0	0	0	1	0	0	0
297:	1	0	0	0	0	1	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	1	0	0	0
321:	0	0	1	0	0	0	1	0
329:	1	0	1	0	1	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	1	0	0	0	0	0
361:	1	0	1	0	1	1	1	0

369:	0	0	0	1	0	4	1	1

Sample Title: 04

Channel								
377:	0	1	0	1	0	0	0	1
385:	2	1	0	2	3	1	0	0
393:	2	3	1	3	1	2	3	3
401:	9	1	2	1	1	9	3	6
409:	5	5	7	9	7	12	5	8
417:	10	7	7	11	10	9	13	7
425:	7	10	9	7	11	9	10	6
433:	11	4	7	9	4	9	7	2
441:	3	1	5	3	3	2	1	0
449:	0	1	1	1	0	0	1	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	1	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	0	0	0	1	0	1	0
497:	0	0	1	0	0	0	0	0
505:	0	1	0	0	0	1	0	0
513:	0	0	0	0	0	1	0	0
521:	0	0	0	0	0	0	2	1
529:	2	0	0	0	1	0	1	0
537:	0	0	1	2	0	0	1	0
545:	1	1	0	2	1	1	2	1
553:	0	1	0	2	2	2	4	1
561:	5	2	3	3	5	1	2	7
569:	4	8	0	5	3	3	8	9
577:	6	18	4	5	10	5	9	13
585:	16	10	13	7	17	9	11	13
593:	18	12	15	13	14	8	11	13
601:	7	4	6	3	8	2	5	3
609:	1	0	3	4	2	0	1	2
617:	1	0	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	0	0	0	0
737:	0	0	0	0	0	0	1	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	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: 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:	0	0	1	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	0	0	0
945:	0	0	0	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	1	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	0

3/16/2016 6:56:24 AM

Apex-Alpha™

QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 3/16/2016
Time : 6:56:24 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	3/16/2016 6:41:48 AM
Alpha_004	21f	ALL	Passed	3/16/2016 6:41:49 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	3/16/2016 6:41:49 AM
Alpha_011	21f	ALL	Passed	3/16/2016 6:41:50 AM
Alpha_012	21f	ALL	Passed	3/16/2016 6:41:51 AM
Alpha_013	21f	ALL	Not Done	
Alpha_014	21f	ALL	Passed	3/16/2016 6:41:52 AM
Alpha_015	21f	ALL	Passed	3/16/2016 6:41:53 AM
Alpha_016	21f	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:41:54 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:41:56 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:41:57 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:41:59 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:00 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:02 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:03 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:05 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:07 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:08 AM
Alpha_043	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:10 AM
Alpha_044	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:12 AM
Alpha_045	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:14 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:15 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:17 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:19 AM
Alpha_049	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:21 AM
Alpha_050	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:23 AM
Alpha_051	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:25 AM
Alpha_052	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:27 AM
Alpha_053	Alpha Analyst100DC	Peak FWHM	Action	3/14/2016 4:57:07 AM
Alpha_054	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:29 AM
Alpha_055	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:31 AM
Alpha_056	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:33 AM
Alpha_057	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:36 AM
Alpha_058	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:39 AM

Review of QA Results - Pulser Check

3/16/2016 6:56:24 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_059	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:42 AM
Alpha_060	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:45 AM

APPROVED BY: AG

APPROVAL DATE: 3/16/16

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

Nuclide Library Title: Uranium

Nuclide Library Description: U-232,-234,-235,-238

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert.(Abs.+-)
U-232	2.174E+009	5302.500*	0.000	99.8000	0.0000
U-234	7.731E+012	4761.500*	0.000	99.8000	0.0000
U-235	2.221E+016	4385.500*	0.000	80.9000	0.0000
U-238	1.410E+017	4184.400*	0.000	100.2300	0.0000

* = key line

TOTALS: 4 Nuclides 4 Energy Lines

SECTION IX

ANALYTICAL DATA (ISOTOPIC PLUTONIUM)

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
PulSO
Run 1

Work Order	16-03050
Analysis Code	PulSO
Run	1
Date Received	3/10/2016
Lab Deadline	3/16/2016
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		03/10/16 00:00	1.0000E+00
02	MBL	BLANK		03/10/16 00:00	1.0000E+00
03	DUP	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	5.3280E-03
04	DO	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	5.3280E-03
06	TRG	PROCESS BLANK		03/10/16 00:00	1.0000E+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.

00153

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
PulSO
Run 1

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	0.9051	7.9		0.00								
02	MBL	0.9078	7.9		0.00								
03	DUP	0.9021	7.8		0.00								
04	DO	0.9017	7.8		0.00								
06	TRG	0.9008	7.8		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.

15 1 09:

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
PuISO
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			03/11/16 05:03	JWOLFE				
02	MBL			03/11/16 05:03	JWOLFE				
03	DUP			03/11/16 05:03	JWOLFE				
04	DO			03/11/16 05:03	JWOLFE				
06	TRG			03/11/16 05:03	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: 16-03050-PulSO-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: PulSO
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	3.88E+00	1.05E+00	1.83E-01	4.51E+00	86.06	OK		OK	
02	PU-238	MBL	BLANK	pCi/g	-8.37E-03	9.47E-02	2.90E-01					OK	OK
03	PU-238	DUP	J1V8D3 SAF: RC-155	pCi/g	1.18E+02	5.74E+01	4.38E+01				NA	INV	
04	PU-238	DO	J1V8D3 SAF: RC-155	pCi/g	1.04E+02	6.22E+01	5.22E+01					INV	
06	PU-238	TRG	PROCESS BLANK	pCi/g	-3.99E-02	5.26E-02	1.72E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-PulSO-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-03050	PulSO	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-238	LCS	03/10/16 00:00	1.00E+00	46.32	0.00	0.00			
02	PU-238	MBL	03/10/16 00:00	1.00E+00	37.61	0.00	0.00			
03	PU-238	DUP	03/07/16 13:40	5.33E-03	47.83	0.00	0.00			
04	PU-238	DO	03/07/16 13:40	5.33E-03	35.59	0.00	0.00			
06	PU-238	TRG	03/10/16 00:00	1.00E+00	59.53	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-PulSO-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: PulSO
Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	PU-238	LCS	03/16/16 12:16		A_Spec	Alpha_037	170	1.11 E+02	3.00 E-03	16.5	
02	PU-238	MBL	03/16/16 12:16		A_Spec	Alpha_038	170	-1.90 E-01	7.00 E-03	16	
03	PU-238	DUP	03/16/16 12:16		A_Spec	Alpha_039	170	2.10 E+01	1.20 E-02	18.6	
04	PU-238	DO	03/16/16 12:16		A_Spec	Alpha_040	170	1.36 E+01	8.00 E-03	18.5	
06	PU-238	TRG	03/16/16 12:16		A_Spec	Alpha_041	170	-1.70 E+00	1.00 E-02	19	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-PulSO-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: PulSO

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	7.33E+00	1.74E+00	1.66E-01	7.29E+00	100.62	OK		OK	
02	PU-239	MBL	BLANK	pCi/g	7.31E-02	1.25E-01	2.11E-01					OK	OK
03	PU-239	DUP	J1V8D3 SAF: RC-155	pCi/g	6.73E+03	1.28E+03	3.85E+01				NA	INV	
04	PU-239	DO	J1V8D3 SAF: RC-155	pCi/g	5.91E+03	1.31E+03	3.64E+01					INV	
06	PU-239	TRG	PROCESS BLANK	pCi/g	3.89E-02	6.62E-02	1.12E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-PulSO-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: PulSO

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	03/10/16 00:00	1.00E+00	46.32	0.00	0.00			
02	PU-239	MBL	03/10/16 00:00	1.00E+00	37.61	0.00	0.00			
03	PU-239	DUP	03/07/16 13:40	5.33E-03	47.83	0.00	0.00			
04	PU-239	DO	03/07/16 13:40	5.33E-03	35.59	0.00	0.00			
06	PU-239	TRG	03/10/16 00:00	1.00E+00	59.53	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-PuISO-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: PuISO

Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	PU-239	LCS	03/16/16 12:16		A_Spec	Alpha_037	170	2.11 E+02	2.00 E-03	16.5	
02	PU-239	MBL	03/16/16 12:16		A_Spec	Alpha_038	170	1.66 E+00	2.00 E-03	16	
03	PU-239	DUP	03/16/16 12:16		A_Spec	Alpha_039	170	1.20 E+03	8.00 E-03	18.6	
04	PU-239	DO	03/16/16 12:16		A_Spec	Alpha_040	170	7.77 E+02	2.00 E-03	18.5	
06	PU-239	TRG	03/16/16 12:16		A_Spec	Alpha_041	170	1.66 E+00	2.00 E-03	19	

Count Room Report
Client: Washington Closure Hanfor

16-03050-PuISO-1 (pCi/g) in
Tracer ID: Pu-20

2.5 hrs

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	03/10/16 00:00	1.0000	0.9051	7.8744		0.00		
02	MBL	BLANK	03/10/16 00:00	1.0000	0.9078	7.8979		0.00		
03	DUP	J1V8D3 SAF: RC-155	03/07/16 13:40	0.0053	0.9021	7.8483		0.00		
04	DO	J1V8D3 SAF: RC-155	03/07/16 13:40	0.0053	0.9017	7.8448		0.00		
06	TRG	PROCESS BLANK	03/10/16 00:00	1.0000	0.9008	7.8370		0.00		

37-41

001152

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 3/11/2016 5:03 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-03050	1	PuISO	3/11/2016 4:57	JWOLFE	JW	

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	10.950	3/11/2016	0.950	0.9142				4.51	0.031	0.00	0.000	0.00	0.000	0.00	0.000
Pu-239	Pu-22	155.720	3/11/2016	0.080	0.1039				7.29	0.233	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	3/11/2016	0.9051	1.2600
02	Pu242	Pu-20	8.700	3/11/2016	0.9078	1.2600
03	Pu242	Pu-20	8.700	3/11/2016	0.9021	1.2600
04	Pu242	Pu-20	8.700	3/11/2016	0.9017	1.2600
06	Pu242	Pu-20	8.700	3/11/2016	0.9008	1.2600

Balance Printer Tapes

Tracer

0.9051 g
0.9078 g
0.9021 g
0.9017 g
0.9008 g

LCS

0.9142 g
0.1039 g

Matrix Spike

Version 2.0 08/99

09163

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-03050	1	PulSO	grams	3/16/2016	JWOLFE

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	J1V8D3 SAF: RC-155	DUP		1	22.52	4.44E-02	1.2000E-01	5.3280E-03				
04	J1V8D3 SAF: RC-155	DO		1	22.52	4.44E-02	1.2000E-01	5.3280E-03				
06	PROCESS BLANK	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: JWolfe Date: 3/11/16

001515

EBERLINE SERVICES	Internal Work Order	16-03050
	Fraction	> 03 <
Dilution Worksheet	Analysis Code	PuISO
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: JW Date: 3/11/16

00195

EBERLINE SERVICES	Internal Work Order	16-03050
	Fraction	> 04 <
Dilution Worksheet	Analysis Code	PuISO
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: JW Date: 3/11/16

00166

KB 3/16/14

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001456
Batch Identification: 1603050A-PU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: Pu iso

Detector Name: Alpha_037
Chamber Serial Number: 04026478A
Detector Serial Number: 91133
Env. Background: System Bkgd 146790
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 3/16/2016 10:18:13 AM
Acquisition Date/Time: 3/16/2016 12:16:48 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Pu242_PU-20
Tracer Quantity: 0.905 mL
Effective Efficiency: 0.0762 +/- 0.0076
Counting Efficiency: 0.1645 +/- 0.0029 on 12/11/2015 8:20:53 AM
Chem. Recovery Factor: 0.4632 +/- 0.0469

Control Certificate Name: Pu238_PU-01
Chem. Recov. of Control: PU-238 0.082457 +/- 0.011624
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		5.738	-0.51	400.63	0.51	0.00E+000	0.0
PU-238		5.468	111.49	18.61	0.51	0.00E+000	18.9
PU-239		5.124	210.66	13.52	0.34	0.00E+000	11.2
PU-242	T	4.863	102.00	19.50	0.00	0.00E+000	4.4
PU-244		4.572	3.49	113.53	0.51	0.00E+000	3.0

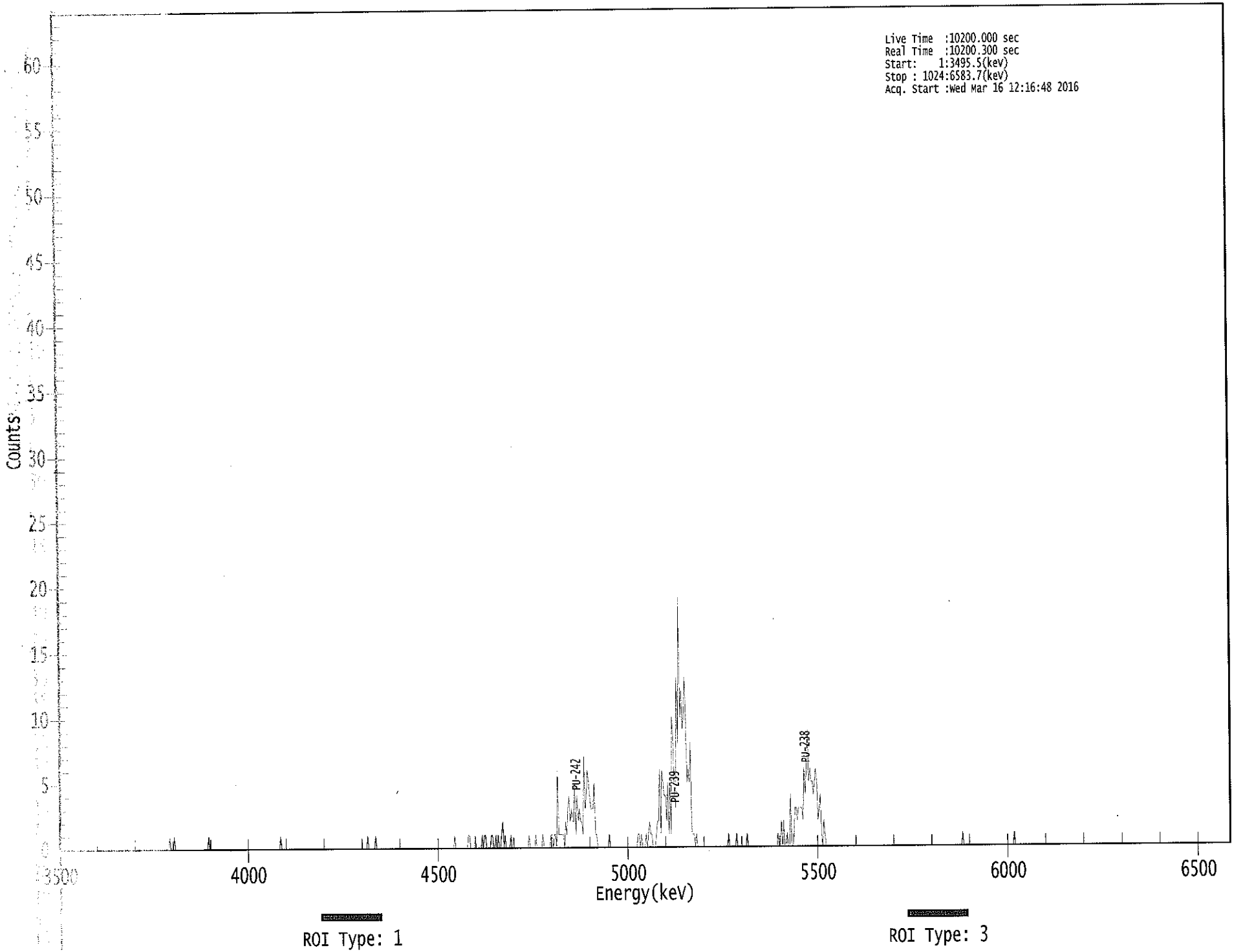
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
PU-236	0.999	5755.00*	-1.77E-002 +/- 7.11E-002	1.82E-001 +/- 3.57E-002
PU-238	0.998	5487.10*	3.88E+000 +/- 1.05E+000	1.83E-001 +/- 3.57E-002
PU-239	0.997	5147.70*	7.33E+000 +/- 1.74E+000	1.66E-001 +/- 3.25E-002
PU-242	0.996	4890.70*	3.53E+000 +/- 6.91E-001	2.08E-001 +/- 4.06E-002
PU-244	1.000	4580.60*	1.21E-001 +/- 1.40E-001	1.83E-001 +/- 3.57E-002

AG 3/17/16

0000145612.CNF



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

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	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	1	0	0	0	1	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	1	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	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	1	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	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	1	0
273:	0	0	0	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	0
337:	0	0	0	0	0	0	0	0
345:	0	0	1	0	0	0	0	0
353:	0	0	0	0	0	0	1	1
361:	0	0	0	0	1	0	0	0

369:	0	0	1	0	1	1	0	0

Sample Title: 01

Channel								
377:	0	0	1	1	0	0	1	0
385:	1	0	0	1	2	0	1	0
393:	0	0	0	1	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	1	0	0	0	0
417:	0	1	0	0	0	0	0	1
425:	0	0	0	0	0	0	1	1
433:	0	1	1	0	6	1	1	1
441:	1	1	0	2	1	3	4	2
449:	3	2	2	5	1	4	2	3
457:	2	2	1	7	3	4	6	5
465:	4	3	3	3	5	1	1	0
473:	0	0	0	0	0	0	0	0
481:	0	1	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	1	1	0	1	0	0
513:	0	1	0	1	2	1	1	0
521:	0	0	1	2	2	6	1	6
529:	5	4	4	2	5	1	5	1
537:	10	8	4	3	13	8	19	10
545:	12	9	10	13	10	5	6	5
553:	8	1	1	1	0	1	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	1	0	0	0	0	0	0
593:	1	0	0	0	0	0	0	0
601:	0	1	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	1	0	0	2
633:	0	2	0	0	1	0	0	4
641:	0	0	1	3	3	2	3	3
649:	3	3	2	6	4	6	9	5
657:	6	5	5	4	5	6	5	2
665:	3	4	1	0	2	1	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	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	0	0
785:	0	0	0	0	0	1	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:	0	0	0	0	0	0	0	0
833:	0	0	1	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	0	0	0
945:	0	0	0	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:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

VLB 3/16/16

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001456
Batch Identification: 1603050A-PU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: Pu iso

Detector Name: Alpha_038
Chamber Serial Number: 04026478B
Detector Serial Number: 91134
Env. Background: System Bkgd 146791
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 3/16/2016 10:18:13 AM
Acquisition Date/Time: 3/16/2016 12:16:50 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Pu242_PU-20
Tracer Quantity: 0.908 mL
Effective Efficiency: 0.0602 +/- 0.0067
Counting Efficiency: 0.1601 +/- 0.0028 on 12/11/2015 8:20:51 AM
Chem. Recovery Factor: 0.3761 +/- 0.0425

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		5.666	0.49	416.98	0.51	0.00E+000	3.0
PU-238		5.433	-0.19	1131.1	1.19	0.00E+000	3.0
PU-239		5.113	1.66	169.38	0.34	0.00E+000	3.0
PU-242	T	4.880	80.83	21.83	0.17	0.00E+000	11.2
PU-244		4.522	-0.34	592.90	0.34	0.00E+000	0.0

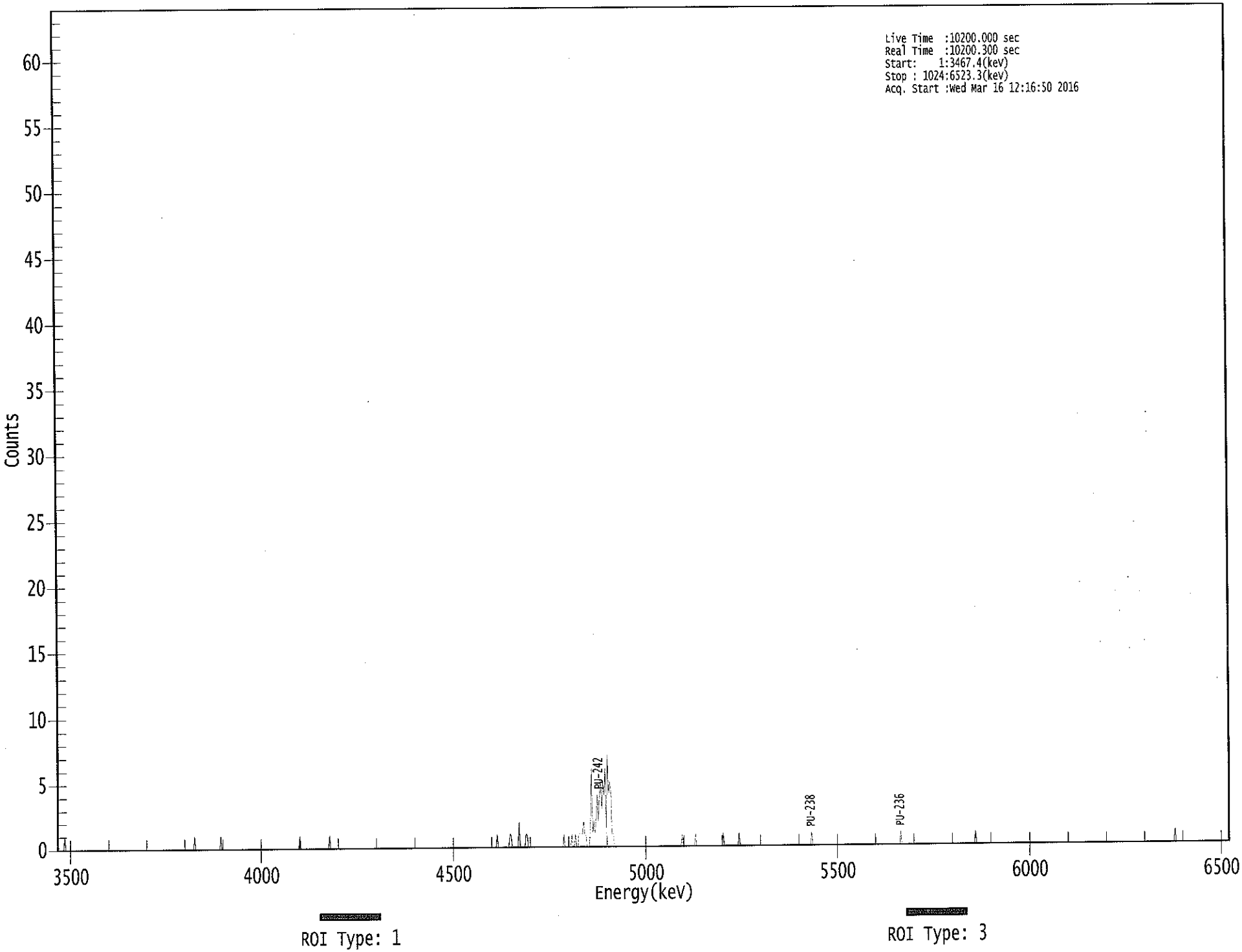
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
PU-236	0.959	5755.00*	2.16E-002 +/- 9.01E-002	2.31E-001 +/- 5.05E-002
PU-238	0.985	5487.10*	-8.37E-003 +/- 9.47E-002	2.90E-001 +/- 6.35E-002
PU-239	0.994	5147.70*	7.31E-002 +/- 1.25E-001	2.11E-001 +/- 4.61E-002
PU-242	0.999	4890.70*	3.54E+000 +/- 7.75E-001	1.83E-001 +/- 4.00E-002
PU-244	0.982	4580.60*	-1.50E-002 +/- 8.89E-002	2.11E-001 +/- 4.61E-002

AG 3/17/16

0000145613.CNF



: 00173

****
***** 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:	0	0	0	0	0	0	1	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	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	1	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	1
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	1	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	1	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	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	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	1	0	0	0	0	0	0	0
393:	0	0	0	1	1	0	0	0
401:	0	0	0	2	0	0	0	0
409:	0	1	1	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	0	0	0	0	0
441:	0	0	1	0	0	0	0	0
449:	0	1	0	0	1	0	0	1
457:	1	1	1	2	1	1	0	0
465:	0	2	6	1	2	1	2	4
473:	2	4	5	3	5	4	6	1
481:	7	4	5	4	1	1	0	0
489:	0	0	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	1	0	0	0	0	0	0
553:	0	0	0	0	0	1	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	1	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	1	0	0	0	0
601:	0	0	0	0	0	0	0	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:	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	1	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	0	0	0	0
737:	1	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	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	1	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	0	0	0
945:	0	0	0	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	1
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:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

LCB 3/14/16

Apex-Alpha™

Sample Description: J1V8D3 SAF: RC-155 DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001456
Batch Identification: 1603050A-PU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: Pu iso

Detector Name: Alpha_039
Chamber Serial Number: 06027396A
Detector Serial Number: 83109
Env. Background: System Bkgd 146792
Reagent Blank: <not performed>

Sample Size: 5.300E-003 +/- 0.000E+000 gram
Sample Date/Time: 3/7/2016 10:18:13 AM
Acquisition Date/Time: 3/16/2016 12:16:53 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Pu242_PU-20
Tracer Quantity: 0.902 mL
Effective Efficiency: 0.0890 +/- 0.0083
Counting Efficiency: 0.1862 +/- 0.0032 on 12/11/2015 8:20:49 AM
Chem. Recovery Factor: 0.4783 +/- 0.0453

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		5.748	1.64	214.83	1.36	0.00E+000	6.0
PU-238		5.480	20.96	45.18	2.04	0.00E+000	4.5
PU-239		5.139	1196.64	5.67	1.36	0.00E+000	35.6
PU-242	T	4.881	118.79	18.18	2.21	0.00E+000	6.8
PU-244		4.524	0.28	1302.5	2.72	0.00E+000	3.0

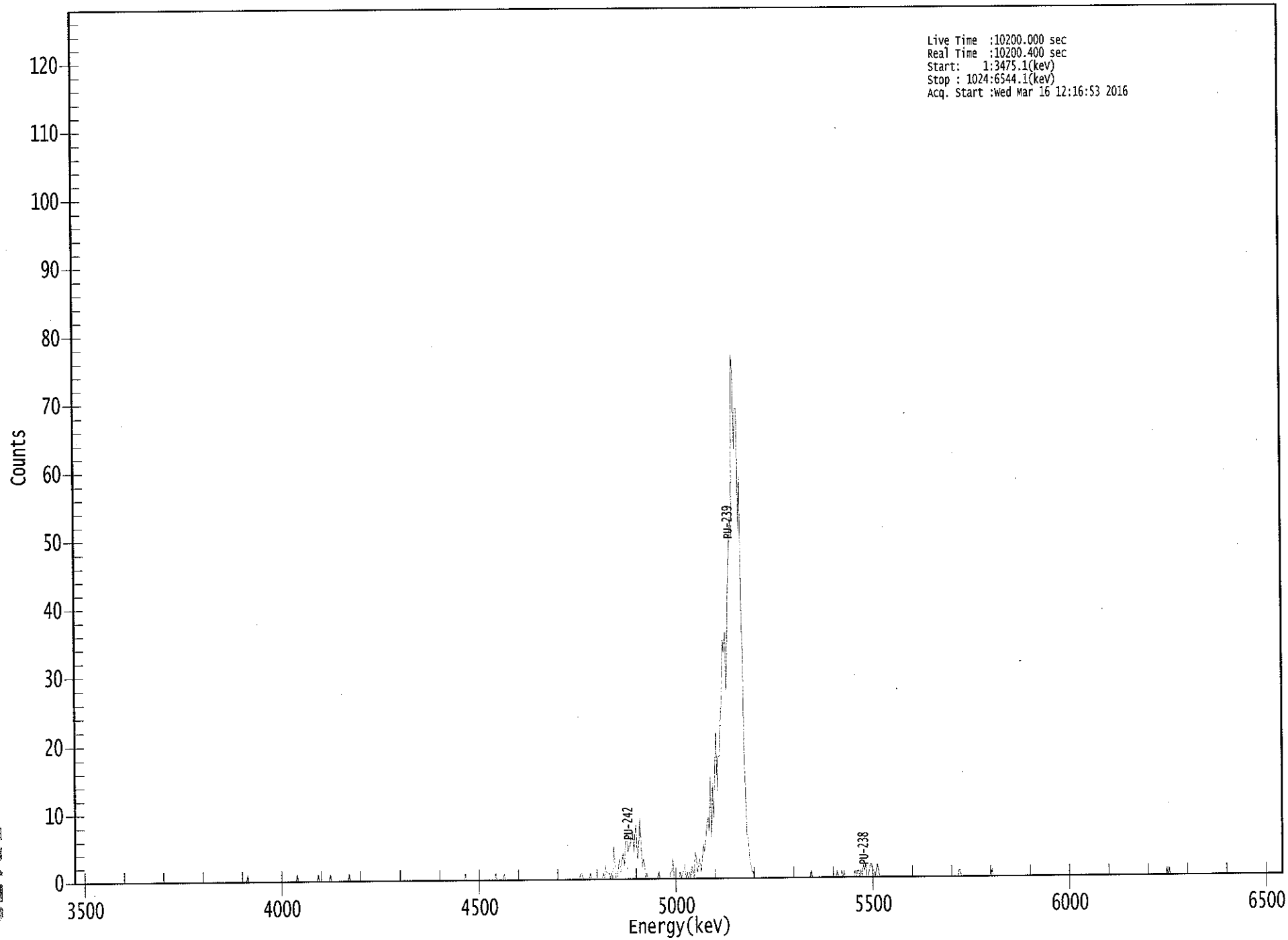
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
PU-236	1.000	5755.00*	9.26E+000 +/- 2.00E+001	3.87E+001 +/- 7.06E+000
PU-238	1.000	5487.10*	1.18E+002 +/- 5.74E+001	4.38E+001 +/- 7.98E+000
PU-239	1.000	5147.70*	6.73E+003 +/- 1.28E+003	3.85E+001 +/- 7.03E+000
PU-242	1.000	4890.70*	6.64E+002 +/- 1.21E+002	4.47E+001 +/- 8.16E+000
PU-244	0.983	4580.60*	1.57E+000 +/- 2.05E+001	4.82E+001 +/- 8.79E+000

AG 3/17/16

0000145617.CNF



ROI Type: 1

ROI Type: 3

: 00178

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

Sample Title: 03

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	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	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	1	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	1	0
209:	0	0	0	0	0	0	0	0
217:	1	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	1	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	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	1	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	1	0	0	0
361:	0	0	0	1	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	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	1	1	0	0
433:	0	0	0	0	1	0	0	0
441:	0	0	0	0	0	0	0	1
449:	0	2	1	1	1	0	1	0
457:	5	2	0	0	2	3	1	3
465:	4	2	5	7	4	5	5	7
473:	7	4	7	8	3	4	9	6
481:	2	3	2	0	1	0	0	0
489:	0	0	0	0	0	0	1	0
497:	0	0	0	0	0	0	0	0
505:	1	1	3	0	0	0	0	0
513:	1	0	1	1	2	0	1	0
521:	1	0	2	1	0	4	3	1
529:	2	3	1	3	5	4	6	8
537:	9	7	15	6	14	9	16	22
545:	13	18	18	23	27	35	33	36
553:	27	37	44	49	53	50	77	74
561:	63	69	69	51	59	39	33	17
569:	13	6	6	3	2	1	1	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	0	0	0	0	0	0	1
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	1	0	0
649:	0	1	0	1	0	0	0	0
657:	0	0	0	0	1	0	1	1
665:	0	1	0	2	1	2	0	0
673:	1	2	2	1	1	0	1	2
681:	1	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	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	1	1	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:	1	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	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	1	0	1	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	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:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

VCB 3/16/16

Apex-Alpha™

Sample Description: J1V8D3 SAF: RC-155
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001456
Batch Identification: 1603050A-PU
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Pu iso

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 146793
Reagent Blank: <not performed>

Sample Size: 5.300E-003 +/- 0.000E+000 gram
Sample Date/Time: 3/7/2016 10:18:13 AM
Acquisition Date/Time: 3/16/2016 12:16:55 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Pu242_PU-20
Tracer Quantity: 0.902 mL
Effective Efficiency: 0.0657 +/- 0.0071
Counting Efficiency: 0.1847 +/- 0.0032 on 12/11/2015 8:20:48 AM
Chem. Recovery Factor: 0.3559 +/- 0.0387

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		5.714	0.15	1397.8	0.85	0.00E+000	3.0
PU-238		5.471	13.64	56.08	1.36	0.00E+000	3.0
PU-239		5.132	776.66	7.03	0.34	0.00E+000	32.4
PU-242	T	4.867	87.66	20.98	0.34	0.00E+000	11.4
PU-244		4.519	1.66	169.38	0.34	0.00E+000	3.0

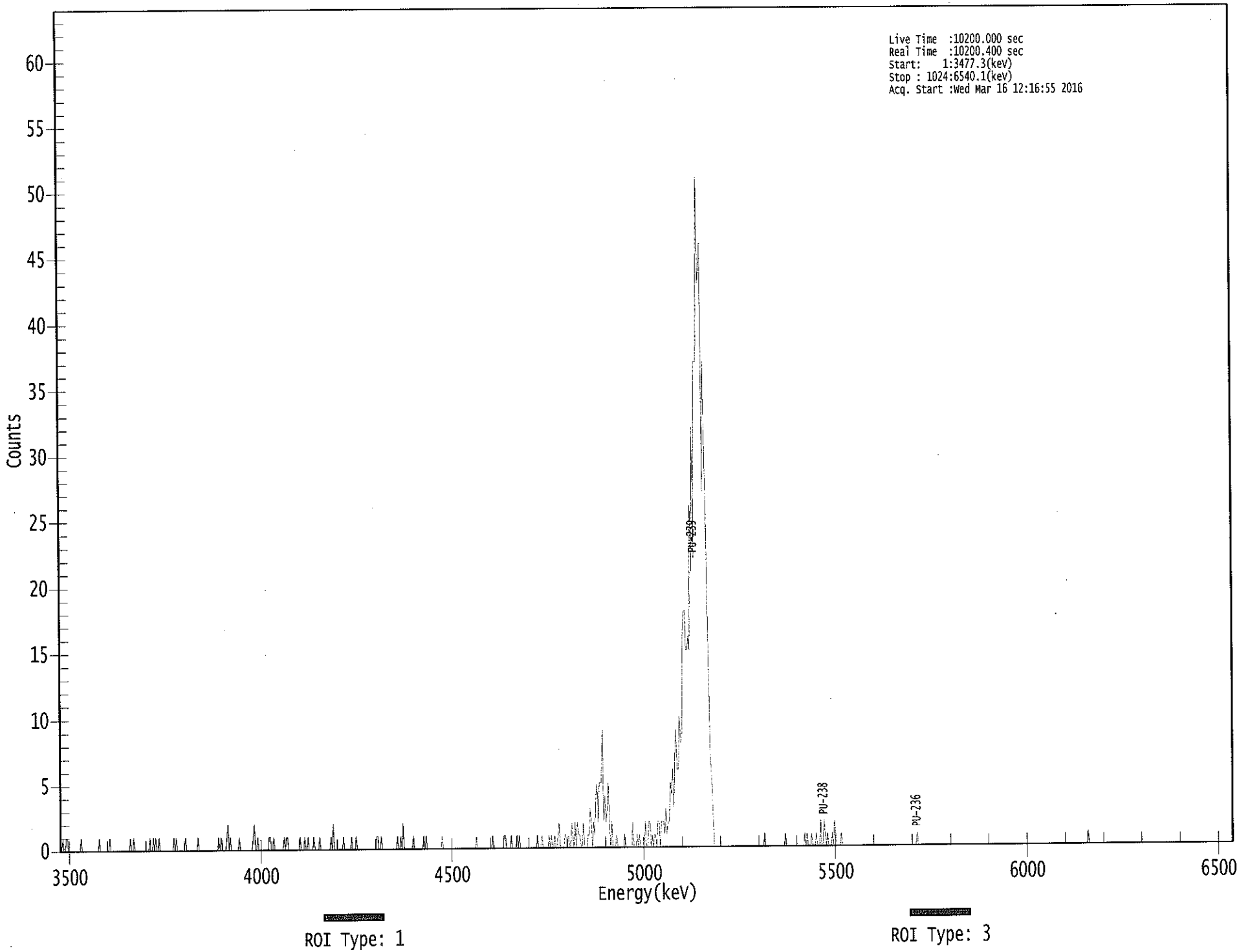
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
PU-236	0.991	5755.00*	1.15E+000 +/- 1.60E+001	4.58E+001 +/- 9.63E+000
PU-238	0.999	5487.10*	1.04E+002 +/- 6.22E+001	5.22E+001 +/- 1.10E+001
PU-239	0.999	5147.70*	5.91E+003 +/- 1.31E+003	3.64E+001 +/- 7.66E+000
PU-242	0.997	4890.70*	6.64E+002 +/- 1.40E+002	3.62E+001 +/- 7.62E+000
PU-244	0.980	4580.60*	1.26E+001 +/- 2.16E+001	3.64E+001 +/- 7.66E+000

AG 3/17/16

0000145618.CNF



: 00183

****
***** 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: 10200

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

369:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
377:	0	1	0	0	0	0	0	0
385:	0	0	0	1	1	0	0	0
393:	0	1	0	0	0	0	1	0
401:	1	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	1	0	0	0	1	0	0	0
425:	0	0	1	0	1	0	0	1
433:	0	0	1	2	0	0	0	0
441:	1	1	1	1	0	0	2	1
449:	0	2	0	2	1	1	0	0
457:	2	0	0	0	1	1	3	2
465:	0	2	1	4	5	2	5	5
473:	5	9	2	4	2	3	5	2
481:	0	2	0	0	0	1	0	0
489:	0	0	0	0	1	0	0	0
497:	0	0	0	2	0	0	0	1
505:	0	1	0	0	0	0	2	0
513:	0	2	2	0	1	0	1	1
521:	0	2	2	0	2	2	2	1
529:	3	1	2	2	5	4	6	3
537:	7	9	6	6	10	8	8	16
545:	18	18	15	15	16	15	26	21
553:	32	22	37	37	37	51	43	44
561:	46	27	37	30	26	18	11	7
569:	5	3	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	1	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	1	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	1	0	1	0	0	0	1
657:	0	0	0	1	0	0	0	2
665:	0	0	2	1	0	1	0	0
673:	0	1	0	2	1	0	0	0
681:	0	1	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	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	1	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	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: 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:	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:	1	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	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:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB 3/16/16

Apex-Alpha™

Sample Description: PROCESS BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001456
Batch Identification: 1603050A-PU
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: Pu iso

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 146794
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 3/10/2016 10:18:13 AM
Acquisition Date/Time: 3/16/2016 12:16:51 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Pu242_PU-20
Tracer Quantity: 0.901 mL
Effective Efficiency: 0.1131 +/- 0.0093
Counting Efficiency: 0.1900 +/- 0.0033 on 12/11/2015 8:21:11 AM
Chem. Recovery Factor: 0.5953 +/- 0.0498

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	0.64	457.45	1.36	0.00E+000	3.0
PU-238		5.490	-1.70	130.90	1.70	0.00E+000	0.0
PU-239		5.001	1.66	169.38	0.34	0.00E+000	3.0
PU-242	T	4.875	150.66	15.99	0.34	0.00E+000	4.4
PU-244		4.521	0.49	416.98	0.51	0.00E+000	3.0

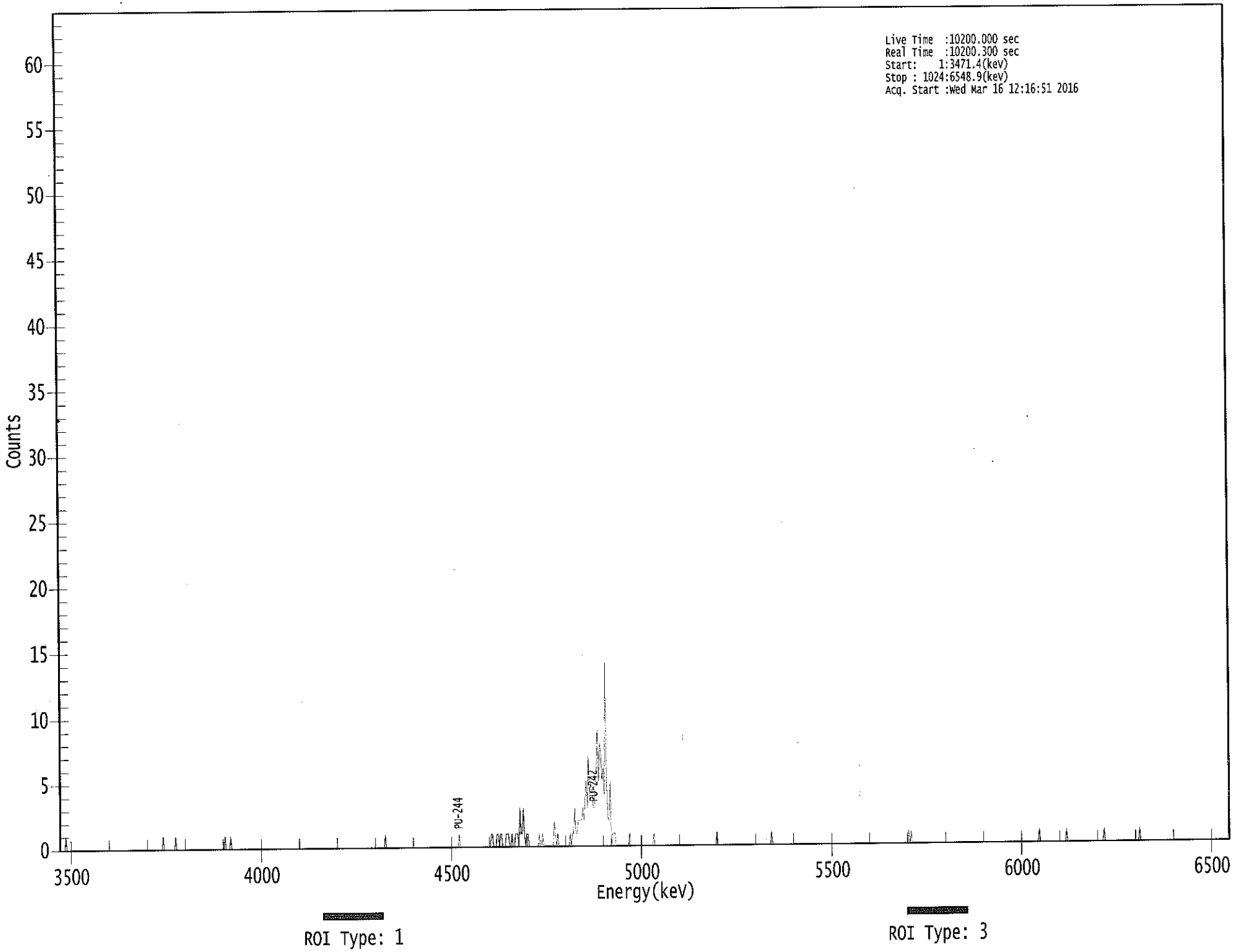
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
PU-236	0.988	5755.00*	1.51E-002 +/- 6.89E-002	1.61E-001 +/- 2.59E-002
PU-238	1.000	5487.10*	-3.99E-002 +/- 5.26E-002	1.72E-001 +/- 2.77E-002
PU-239	0.894	5147.70*	3.89E-002 +/- 6.62E-002	1.12E-001 +/- 1.80E-002
PU-242	0.999	4890.70*	3.52E+000 +/- 5.64E-001	1.12E-001 +/- 1.79E-002
PU-244	0.982	4580.60*	1.15E-002 +/- 4.80E-002	1.23E-001 +/- 1.98E-002

AG 3/17/16

0000145626.CNF



: 00168

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

Sample Title: 06

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	1	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	1	0	0	0	0	0
97:	0	0	0	0	0	1	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:	1	0	0	0	0	1	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	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	1	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	1	0	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: 06

Channel								
377:	0	1	1	0	0	0	1	1
385:	0	1	1	0	0	0	1	1
393:	1	0	0	1	0	0	1	1
401:	1	0	3	1	1	3	1	0
409:	1	1	0	0	0	0	0	0
417:	0	0	0	1	0	0	1	0
425:	0	0	0	0	0	0	0	0
433:	2	1	0	1	0	0	0	0
441:	0	0	0	0	0	0	1	0
449:	1	1	3	1	1	2	2	2
457:	2	3	2	4	5	3	7	4
465:	5	4	3	3	5	6	9	5
473:	8	7	5	6	4	14	5	2
481:	2	5	0	1	1	1	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	1	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	1
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	1	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	0	0	0	0	0	1	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	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	1	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	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: 06

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:	1	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:	1	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	1	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:	1	0	0	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:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

3/16/2016 6:56:24 AM

Apex-Alpha™

QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 3/16/2016
Time : 6:56:24 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	3/16/2016 6:41:48 AM
Alpha_004	21f	ALL	Passed	3/16/2016 6:41:49 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	3/16/2016 6:41:49 AM
Alpha_011	21f	ALL	Passed	3/16/2016 6:41:50 AM
Alpha_012	21f	ALL	Passed	3/16/2016 6:41:51 AM
Alpha_013	21f	ALL	Not Done	
Alpha_014	21f	ALL	Passed	3/16/2016 6:41:52 AM
Alpha_015	21f	ALL	Passed	3/16/2016 6:41:53 AM
Alpha_016	21f	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:41:54 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:41:56 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:41:57 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:41:59 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:00 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:02 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:03 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:05 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:07 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:08 AM
Alpha_043	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:10 AM
Alpha_044	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:12 AM
Alpha_045	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:14 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:15 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:17 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:19 AM
Alpha_049	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:21 AM
Alpha_050	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:23 AM
Alpha_051	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:25 AM
Alpha_052	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:27 AM
Alpha_053	Alpha Analyst100DC	Peak FWHM	Action	3/14/2016 4:57:07 AM
Alpha_054	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:29 AM
Alpha_055	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:31 AM
Alpha_056	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:33 AM
Alpha_057	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:36 AM
Alpha_058	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:39 AM

Review of QA Results - Pulser Check

3/16/2016 6:56:24 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_059	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:42 AM
Alpha_060	Alpha Analyst100DC	ALL	Passed	3/16/2016 6:42:45 AM

APPROVED BY: AG

APPROVAL DATE: 3/16/16

****
***** 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 X

ANALYTICAL DATA (PLUTONIUM-241)

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Pu241
Run 1

Work Order	16-03050
Analysis Code	Pu241
Run	1
Date Received	3/10/2016
Lab Deadline	3/16/2016
Client	Washington Closure Hanford
Project	S00W235A01
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	EML Pu-02 Modified
Instrument Type	Beta LSC
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		03/10/16 00:00	1.0000E+00
02	MBL	BLANK		03/10/16 00:00	1.0000E+00
03	DUP	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	5.3280E-03
04	DO	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	5.3280E-03
06	TRG	PROCESS BLANK		03/10/16 00:00	1.0000E+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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Pu241
Run 1

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	0.9051	7.9		0.00								
02	MBL	0.9078	7.9		0.00								
03	DUP	0.9021	7.8		0.00								
04	DO	0.9017	7.8		0.00								
06	TRG	0.9008	7.8		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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Pu241
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			03/16/16 16:17	JDEMELAS	03/16/16 16:16	JDEMELAS		
02	MBL			03/16/16 16:17	JDEMELAS	03/16/16 16:16	JDEMELAS		
03	DUP			03/16/16 16:17	JDEMELAS	03/16/16 16:16	JDEMELAS		
04	DO			03/16/16 16:17	JDEMELAS	03/16/16 16:16	JDEMELAS		
06	TRG			03/16/16 16:17	JDEMELAS	03/16/16 16:16	JDEMELAS		

* 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: 16-03050-Pu241-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: Pu241
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-241	LCS	LCS	pCi/g	2.38E+02	7.42E+00	6.70E+00	2.79E+02	85.32	OK		OK	
02	PU-241	MBL	BLANK	pCi/g	-5.70E+00	1.06E+01	1.83E+01					INV	OK
03	PU-241	DUP	J1V8D3 SAF: RC-155	pCi/g	1.82E+03	1.65E+03	2.76E+03				NA	INV	
04	PU-241	DO	J1V8D3 SAF: RC-155	pCi/g	8.56E+02	2.17E+03	3.67E+03					INV	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-Pu241-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: Pu241

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-241	LCS	03/10/16 00:00	1.00E+00	100.00	0.00	0.00		3/16/2016 16:16	
02	PU-241	MBL	03/10/16 00:00	1.00E+00	37.61	0.00	0.00		3/16/2016 16:16	
03	PU-241	DUP	03/07/16 13:40	5.33E-03	47.83	0.00	0.00		3/16/2016 16:16	
04	PU-241	DO	03/07/16 13:40	5.33E-03	35.59	0.00	0.00		3/16/2016 16:16	

Work Order: 16-03050-Pu241-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: Pu241

Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	PU-241	LCS	03/16/16 16:23	5215.77	3100B	1	60	6558	17.7	0.173174464	
02	PU-241	MBL	03/16/16 17:26	5215.77	3100B	2	60	1014	17.7	0.16826683	
03	PU-241	DUP	03/16/16 18:28	5215.77	3100B	3	60	1164	17.7	0.165411384	
04	PU-241	DO	03/16/16 19:30	5215.77	3100B	4	60	1098	17.7	0.166700287	

Count Room Report
Client: Washington Closure Hanfor

16-03050-Pu241-1 (pCi/g) in
Tracer ID: Pu-20

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	03/10/16 00:00	1.0000	0.9051	7.8744		0.00		
02	MBL	BLANK	03/10/16 00:00	1.0000	0.9078	7.8979		0.00		
03	DUP	J1V8D3 SAF: RC-155	03/07/16 13:40	0.0053	0.9021	7.8483		0.00		
04	DO	J1V8D3 SAF: RC-155	03/07/16 13:40	0.0053	0.9017	7.8448		0.00		
06	TRG	PROCESS BLANK	03/10/16 00:00	1.0000	0.9008	7.8370		0.00		

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 3/16/2016 4:17 PM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-03050	1	Pu241	3/16/2016 16:16	JDEMELAS		

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-241	Pu-17a	650.330	3/16/2016	0.960	0.9540				279.47	12.855	0.00	0.000	0.00	0.000	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	Pu242	Pu-20	8.700	3/16/2016	0.9051	1.2600
02	Pu242	Pu-20	8.700	3/16/2016	0.9078	1.2600
03	Pu242	Pu-20	8.700	3/16/2016	0.9021	1.2600
04	Pu242	Pu-20	8.700	3/16/2016	0.9017	1.2600
06	Pu242	Pu-20	8.700	3/16/2016	0.9008	1.2600

Balance Printer Tapes

Tracer	LCS

Matrix Spike

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 3/11/2016 5:13 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-03050	1	Pu241	3/11/2016 5:12	JWOLFE	JW	

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-241	Pu-17a	650.760	3/11/2016	0.960	0.0000				0.00	0.000	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	3/11/2016	0.9051	1.2600
02	Pu242	Pu-20	8.700	3/11/2016	0.9078	1.2600
03	Pu242	Pu-20	8.700	3/11/2016	0.9021	1.2600
04	Pu242	Pu-20	8.700	3/11/2016	0.9017	1.2600
06	Pu242	Pu-20	8.700	3/11/2016	0.9008	1.2600

Balance Printer Tapes

Tracer	LCS

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-03050	1	Pu241	grams	3/16/2016	JWOLFE

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	J1V8D3 SAF: RC-155	DUP		1	22.52	4.44E-02	1.2000E-01	5.3280E-03				
04	J1V8D3 SAF: RC-155	DO		1	22.52	4.44E-02	1.2000E-01	5.3280E-03				
06	PROCESS BLANK	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: JWolfe Date: 3/11/16

00285

EBERLINE SERVICES	Internal Work Order	16-03050
	Fraction	> 03 <
Dilution Worksheet	Analysis Code	Pu241
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: JW Date: 3/11/16

002205

EBERLINE SERVICES	Internal Work Order	16-03050
	Fraction	> 04 <
Dilution Worksheet	Analysis Code	Pu241
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: JW Date: 3/11/16

AG 3/17/16 (B)

Assay Definition-

Assay Description:
Pu241

Assay Type: CPM
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\Default\Pu241_cpm.24\20160316_1621
Raw Results Path: C:\Packard\Tricarb\Results\Default\Pu241_cpm.24\20160316_1621\20160316_1621.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Default\Pu241_cpm.24\20160316_1621\1603050 pu241a.csv
Assay File Name: C:\Packard\TriCarb\Assays\Pu241_cpm.24.lsa

Count Conditions-

Nuclide: 241Pu
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	2.0	20.0
B	0.0	20.0
C	2.0	250.0

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-

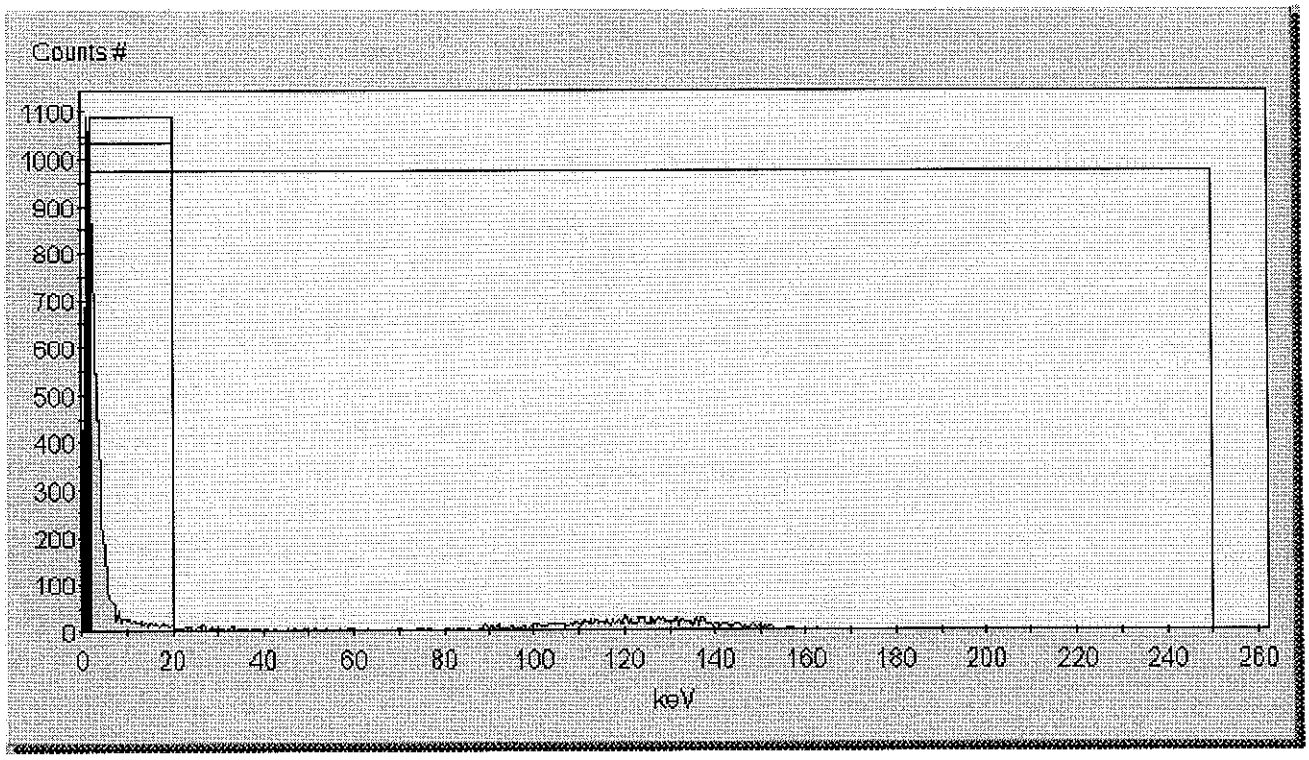
Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				
B				
C				

Cycle 1 Results

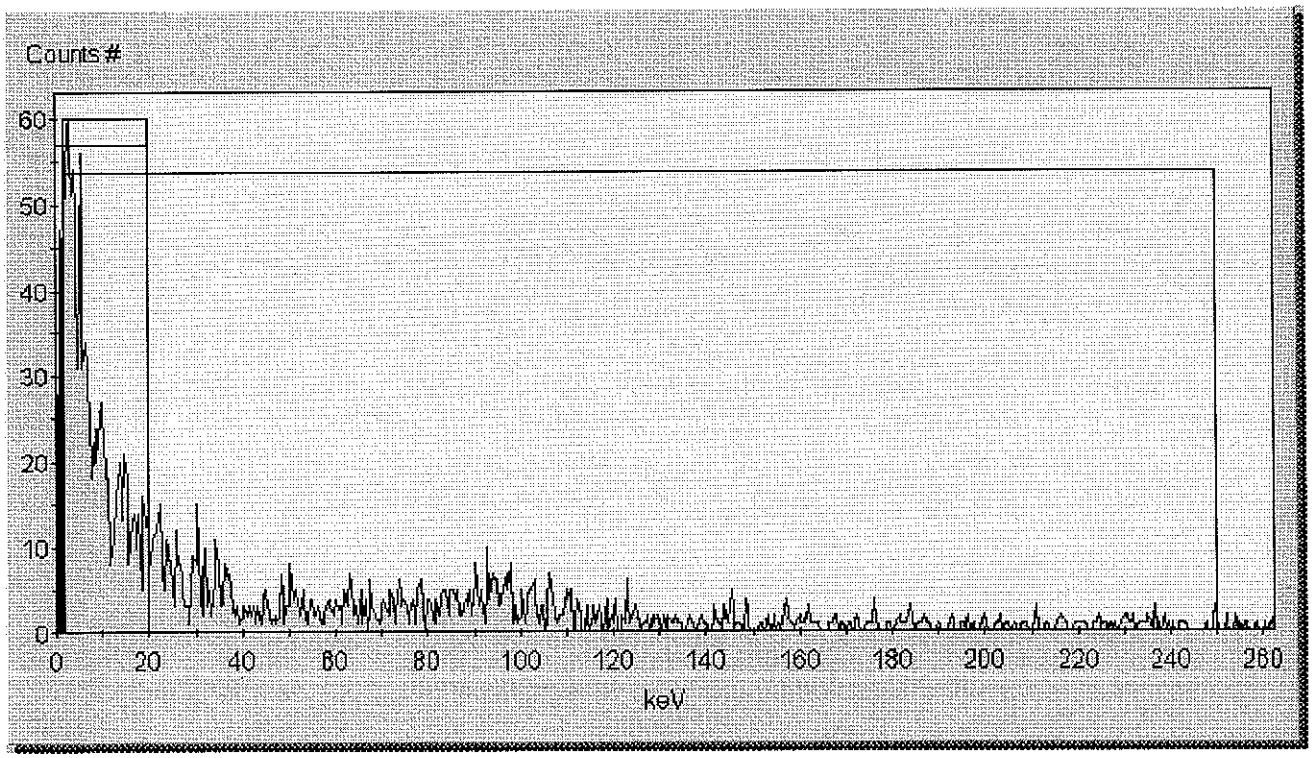
DATE	TIME	SMPL_ID	P#	PID	S#	CPMA	CPMB	CPMC	tSIE	Count Time
		16-03050-1-241-01S	24	29	1	72.3	109.3	115.7	265.85	60.00
3/16/2016	4:23:08 PM									

SpectraView Block Data



16-03050-1-241-02S 24 29 2 15.2 16.9 32.1 255.30 60.00
3/16/2016 5:26:02 PM

SpectraView Block Data



16-03050-1-241-03S 24 29 3 17.0 19.4 67.6 249.00 60.00
3/16/2016 6:28:17 PM

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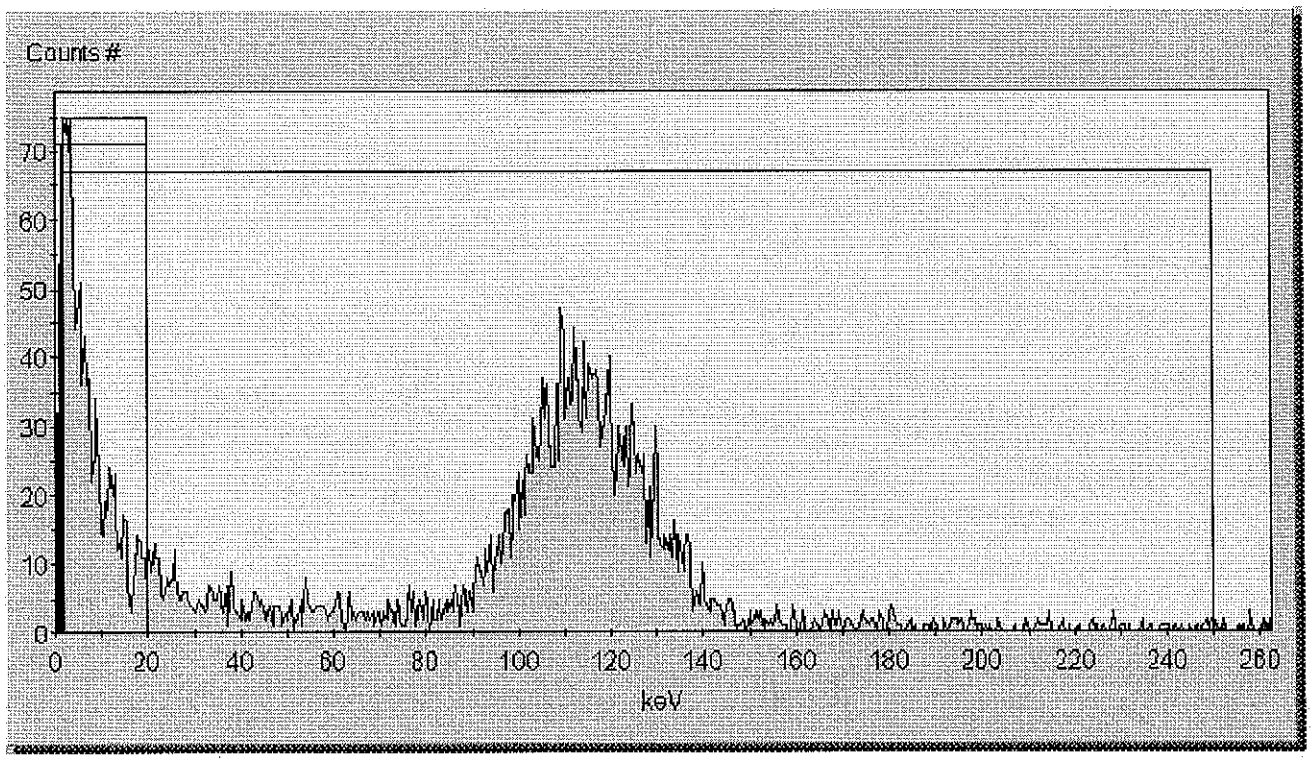
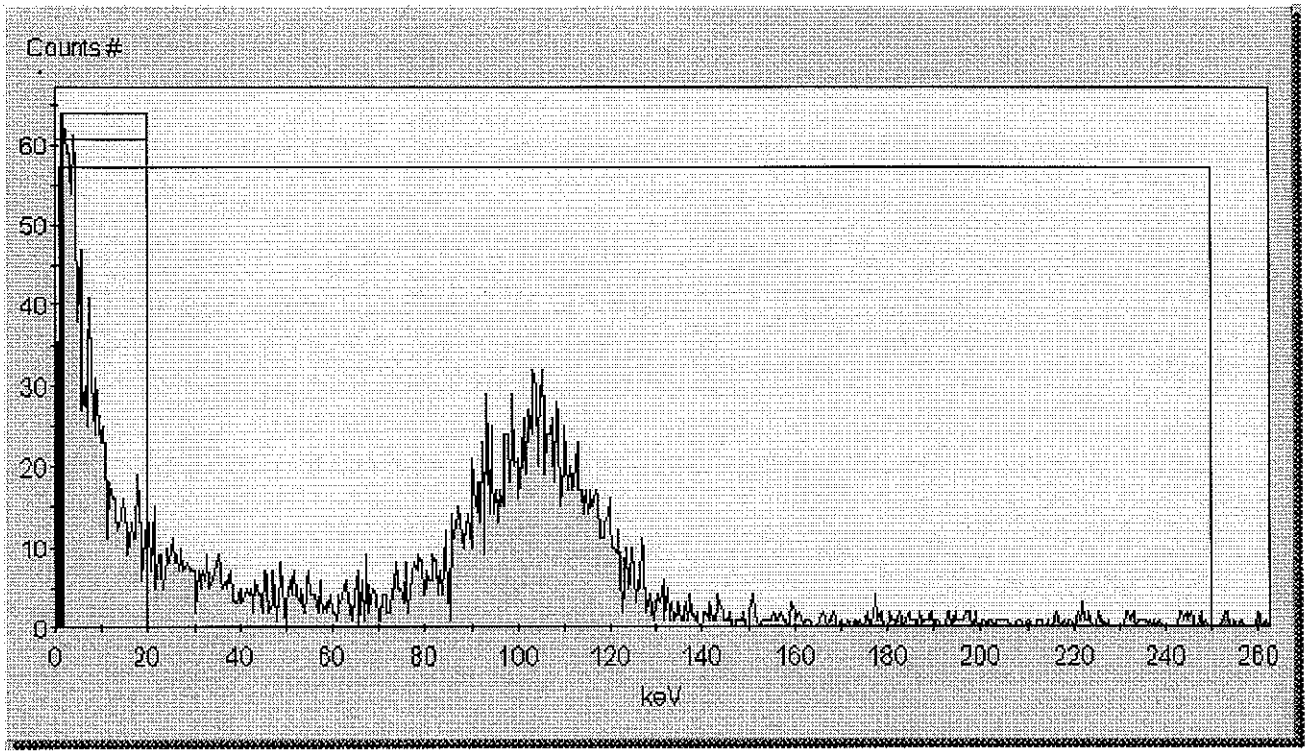


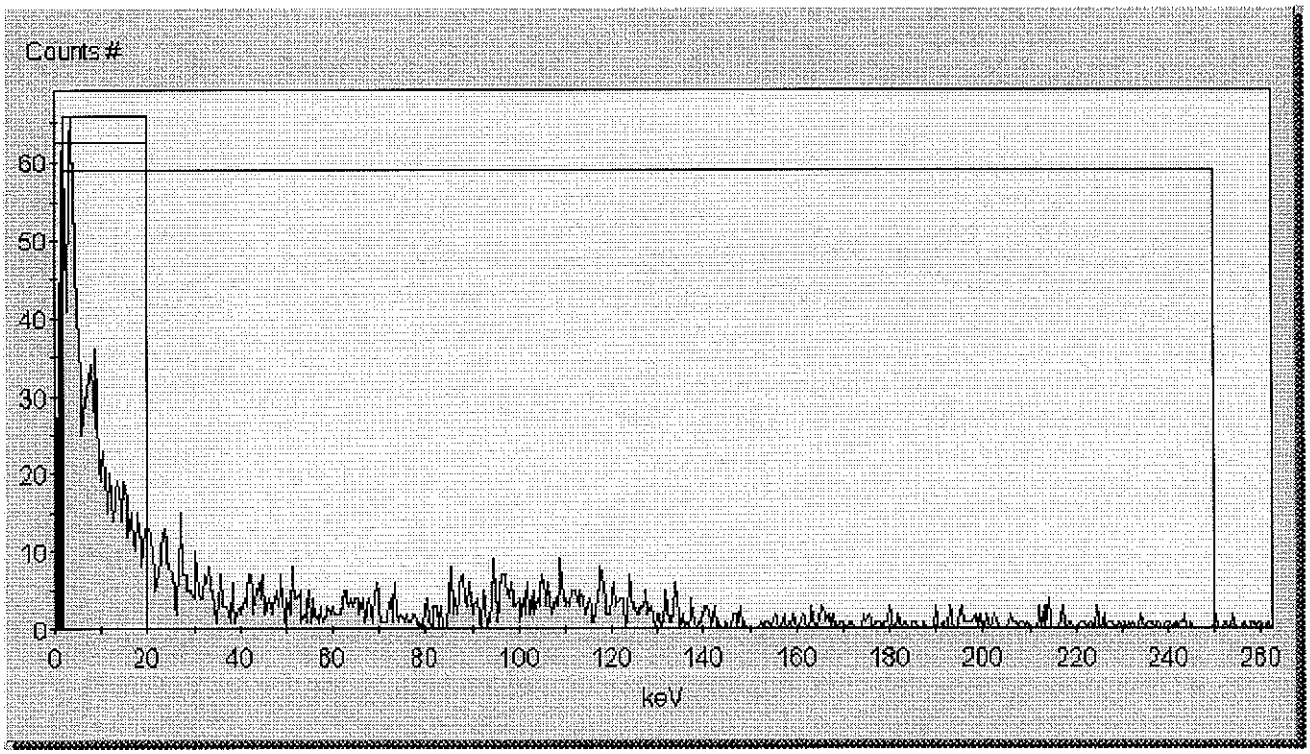
16-03050-1-241-04S 24 29 4 15.9 18.3 55.3 251.86 60.00
3/16/2016 7:30:29 PM

SpectraView Block Data



16-03050-1-241-06S 24 29 5 15.7 17.7 33.2 257.56 60.00
3/16/2016 8:32:43 PM

SpectraView Block Data



SNC Protocol

AG
3/16/16
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: 21.05 Date Processed: 3/16/2016 7:40:36 AM
14C Chi Square: 28.44 Date Processed: 3/16/2016 7:40:36 AM
3H E^2/B (1-18.6 keV): 276.98 Date Processed: 3/16/2016 7:40:36 AM
14C E^2/B (4-156 keV): 519.06 Date Processed: 3/16/2016 7:40:36 AM
3H Efficiency (0-18.6 keV): 62.14 Date Processed: 3/16/2016 7:40:36 AM
14C Efficiency (0-156 keV): 95.41 Date Processed: 3/16/2016 7:40:36 AM
IPA Background Date Processed: 3/16/2016 7:40:36 AM
3H Background CPM (0-18.6 keV): 13.88 Date Processed: 3/16/2016 7:40:36 AM
14C Background CPM (0-156 keV): 21.63 Date Processed: 3/16/2016 7:40:36 AM
3H Calibration DPM: 207400
3H Reference Date: 10/29/2007
14C Calibration DPM: 120521

SECTION XI

ANALYTICAL DATA (TOTAL STRONTIUM)

16-03050
SrTOT
Run 1

Work Order	16-03050
Analysis Code	SrTOT
Run	1
Date Received	3/10/2016
Lab Deadline	3/16/2016
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		03/10/16 00:00	1.0000E+00
02	MBL	BLANK		03/10/16 00:00	1.0000E+00
03	DUP	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	1.0656E-01
04	DO	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	1.0656E-01

* 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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
SrTOT
Run 1

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	7.5818	7.5946	0.0128	107.63	107.63	1.00	1.00
02	MBL				0.00	0.100	7.5912	7.6045	0.0133	111.83	110.00	1.00	1.00
03	DUP				0.00	0.100	7.6001	7.6125	0.0124	104.26	104.26	1.00	1.00
04	DO				0.00	0.100	7.5893	7.6016	0.0123	103.42	103.42	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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
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			03/14/16 09:01	MHIGHTOWER	03/15/16 06:15	MHIGHTOWER		
02	MBL			03/14/16 09:01	MHIGHTOWER	03/15/16 06:15	MHIGHTOWER		
03	DUP			03/14/16 09:01	MHIGHTOWER	03/15/16 06:15	MHIGHTOWER		
04	DO			03/14/16 09:01	MHIGHTOWER	03/15/16 06:15	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: 16-03050-SrTOT-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: SrTOT
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	TOTAL SR	LCS	LCS	pCi/g	4.21E+01	1.71E+00	6.88E-01	5.21E+01	80.75	OK		OK	
02	TOTAL SR	MBL	BLANK	pCi/g	1.26E+00	5.10E-01	7.60E-01					OK	OK
03	TOTAL SR	DUP	J1V8D3 SAF: RC-155	pCi/g	6.49E+04	4.23E+02	1.36E+01				OK	INV	
04	TOTAL SR	DO	J1V8D3 SAF: RC-155	pCi/g	5.28E+04	3.63E+02	1.29E+01					INV	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-SrTOT-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: SrTOT
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	TOTAL SR	LCS	03/10/16 00:00	1.00E+00	0.00	107.63	107.63	1.00	3/15/2016 6:15	
02	TOTAL SR	MBL	03/10/16 00:00	1.00E+00	0.00	111.83	110.00	1.00	3/15/2016 6:15	
03	TOTAL SR	DUP	03/07/16 13:40	1.07E-01	0.00	104.26	104.26	1.00	3/15/2016 6:15	
04	TOTAL SR	DO	03/07/16 13:40	1.07E-01	0.00	103.42	103.42	1.00	3/15/2016 6:15	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-SrTOT-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: SrTOT

Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TOTAL SR	LCS	03/15/16 12:58		LB4110A	G1	60	2505	1.05	0.3768
02	TOTAL SR	MBL	03/15/16 12:58		LB4110A	G2	60	157	1.366666667	0.3771
03	TOTAL SR	DUP	03/15/16 12:43		LB4110A	G2	14	90279	1.366666667	0.3771
04	TOTAL SR	DO	03/15/16 12:43		LB4110A	G4	14	81286	1.533333333	0.4206

Count Room Report
Client: Washington Closure Hanfor

16-03050-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	03/10/16 00:00	1.0000				0.00	1.00	1.00
02	MBL	BLANK	03/10/16 00:00	1.0000				0.00	1.00	1.00
03	DUP	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1066				0.00	1.00	1.00
04	DO	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1066				0.00	1.00	1.00

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 3/14/2016 9:01 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-03050	1	SrTOT	3/14/2016 9:01	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	1619.170	3/14/2016	0.070	0.0714				52.08	0.292	0.00	0.000	0.00	0.000	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

Balance Printer Tapes

Tracer	LCS

Matrix Spike

00221

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-03050	1	SrTOT	grams	3/16/2016	MHIGHTOWER

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	J1V8D3 SAF: RC-155	DUP		1	22.52	**4.44E-02**	2.4000E+00	1.0656E-01				
04	J1V8D3 SAF: RC-155	DO		1	22.52	**4.44E-02**	2.4000E+00	1.0656E-01				

Comments	

00222

Technician: Mu Date: 3/14/16

EBERLINE SERVICES

Dilution Worksheet

Internal Work Order	16-03050
Fraction	**> 03 <**
Analysis Code	**SrTOT**
Run Number	**1**
Analyst	**MHIGHTOWER**

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: Mh Date: 14MAR16

00223

EBERLINE SERVICES

Dilution Worksheet

Internal Work Order	16-03050
Fraction	**> 04 <**
Analysis Code	**SrTOT**
Run Number	**1**
Analyst	**MHIGHTOWER**

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: MG Date: 14MAR16

Eberline Services - Oak Ridge
Version 1.0 9/1999

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
16-03050	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	7.5818	7.5946	0.0128	107.63
02	BLANK	MBL	0.1000	7.5912	7.6045	0.0133	111.83
03	DUP	DUP	0.1000	7.6001	7.6125	0.0124	104.26
04	J1V8D3 SAF: RC-155	DO	0.1000	7.5893	7.6016	0.0123	103.42

Technician: Mn Date: 3 / 15 / 16

00225

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
G1	1603050-01	46	2505	60	1410	3/15/2016 12:58:54 PM
G2	1603050-02	8	157	60	1410	3/15/2016 12:58:54 PM
G2	1603050-03	1524	90279	13.77	1410	3/15/2016 12:43:26 PM
G4	1603050-04	1578	81286	14.05	1410	3/15/2016 12:43:26 PM

R
3/15/16
ICB

00229

GPC Detector Report
(ALL Backgrounds)

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	10/20/2015	3/15/2016	2.17E-01	P	-8.14E-02	1.13E-01	3.08E-01
LB4110A - A2	Alpha	10/20/2015	3/15/2016	3.33E-02	P	-6.14E-02	7.92E-02	2.20E-01
LB4110A - A3	Alpha	10/20/2015	3/15/2016	1.33E-01	P	-4.66E-02	1.09E-01	2.64E-01
LB4110A - A4	Alpha	10/20/2015	3/15/2016	1.00E-01	P	-7.26E-02	9.38E-02	2.60E-01
LB4110A - B1	Alpha	10/20/2015	3/15/2016	1.00E-01	P	-9.24E-02	1.23E-01	3.38E-01
LB4110A - B2	Alpha	10/20/2015	3/15/2016	1.67E-01	P	-3.04E-02	1.22E-01	2.74E-01
LB4110A - B3	Alpha	10/20/2015	3/15/2016	1.00E-01	P	-5.98E-02	1.05E-01	2.70E-01
LB4110A - B4	Alpha	10/20/2015	3/15/2016	6.67E-02	P	-5.00E-02	8.52E-02	2.20E-01
LB4110A - C1	Alpha	10/20/2015	3/15/2016	6.67E-02	P	-1.40E-01	1.04E-01	3.49E-01
LB4110A - C2	Alpha	10/20/2015	3/15/2016	8.33E-02	P	-8.92E-02	7.51E-02	2.39E-01
LB4110A - C3	Alpha	10/20/2015	3/15/2016	1.00E-01	P	-8.81E-02	1.05E-01	2.98E-01
LB4110A - C4	Alpha	10/20/2015	3/15/2016	2.17E-01	P	-6.56E-02	9.05E-02	2.47E-01
LB4110A - D1	Alpha	10/20/2015	2/16/2016	3.17E-01	F	1.95E-03	2.10E-01	4.19E-01
LB4110A - D2	Alpha	10/20/2015	2/16/2016	2.00E-01	P	-2.93E-02	1.83E-01	3.96E-01
LB4110A - D3	Alpha	10/20/2015	2/16/2016	5.00E-02	P	-8.27E-02	7.92E-02	2.41E-01
LB4110A - D4	Alpha	10/20/2015	2/16/2016	1.83E-01	P	-8.87E-03	1.04E-01	2.18E-01
LB4110A - E1	Alpha	10/20/2015	3/15/2016	1.50E-01	P	-1.58E-01	1.60E-01	4.78E-01
LB4110A - E2	Alpha	10/20/2015	3/15/2016	6.67E-02	P	-7.31E-02	6.40E-02	2.01E-01
LB4110A - E3	Alpha	10/20/2015	3/15/2016	1.33E-01	P	-7.32E-02	1.54E-01	3.80E-01
LB4110A - E4	Alpha	10/20/2015	3/15/2016	0.00E+00	P	-7.11E-02	8.44E-02	2.40E-01
LB4110A - F1	Alpha	10/20/2015	3/15/2016	8.33E-02	P	-7.05E-02	1.13E-01	2.97E-01
LB4110A - F2	Alpha	10/20/2015	3/15/2016	5.00E-02	P	-3.51E-01	8.49E-02	5.21E-01
LB4110A - F3	Alpha	10/20/2015	3/15/2016	1.17E-01	P	-8.03E-02	1.55E-01	3.90E-01
LB4110A - F4	Alpha	10/20/2015	3/15/2016	1.17E-01	P	-4.96E-02	8.93E-02	2.28E-01
LB4110A - G1	Alpha	10/20/2015	3/15/2016	6.67E-02	P	-6.98E-02	1.19E-01	3.07E-01
LB4110A - G2	Alpha	10/20/2015	3/15/2016	1.67E-02	P	-9.59E-02	8.84E-02	2.73E-01
LB4110A - G3	Alpha	10/20/2015	3/15/2016	2.00E-01	P	-7.29E-02	1.57E-01	3.87E-01
LB4110A - G4	Alpha	10/20/2015	3/15/2016	1.83E-01	P	-3.41E-02	9.60E-02	2.26E-01

GPC Detector Report
(ALL Backgrounds)

7/11

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	10/20/2015	3/15/2016	1.52E+00	P	9.42E-01	1.52E+00	2.09E+00
LB4110A - A2	Beta	10/20/2015	3/15/2016	1.67E+00	P	1.03E+00	1.48E+00	1.92E+00
LB4110A - A3	Beta	10/20/2015	3/15/2016	1.52E+00	P	1.05E+00	1.64E+00	2.23E+00
LB4110A - A4	Beta	10/20/2015	3/15/2016	1.55E+00	P	-1.24E+00	1.89E+00	5.03E+00
LB4110A - B1	Beta	10/20/2015	3/15/2016	1.78E+00	P	1.06E+00	1.66E+00	2.26E+00
LB4110A - B2	Beta	10/20/2015	3/15/2016	1.55E+00	P	8.74E-01	1.49E+00	2.10E+00
LB4110A - B3	Beta	10/20/2015	3/15/2016	1.50E+00	P	9.30E-01	1.51E+00	2.09E+00
LB4110A - B4	Beta	10/20/2015	3/15/2016	1.35E+00	P	9.06E-01	1.50E+00	2.10E+00
LB4110A - C1	Beta	10/20/2015	3/15/2016	1.27E+00	P	9.19E-01	1.40E+00	1.89E+00
LB4110A - C2	Beta	10/20/2015	3/15/2016	1.08E+00	P	7.07E-01	1.19E+00	1.67E+00
LB4110A - C3	Beta	10/20/2015	3/15/2016	1.60E+00	P	7.23E-01	1.69E+00	2.66E+00
LB4110A - C4	Beta	10/20/2015	3/15/2016	1.22E+00	P	7.79E-01	1.29E+00	1.81E+00
LB4110A - D1	Beta	10/20/2015	2/16/2016	6.07E+00	F	1.83E+00	5.38E+00	8.93E+00
LB4110A - D2	Beta	10/20/2015	2/16/2016	4.12E+00	F	3.96E+00	4.83E+00	5.70E+00
LB4110A - D3	Beta	10/20/2015	2/16/2016	2.63E+00	F	1.27E+00	3.38E+00	5.50E+00
LB4110A - D4	Beta	10/20/2015	2/16/2016	4.32E+00	F	1.20E+00	4.91E+00	8.63E+00
LB4110A - E1	Beta	10/20/2015	3/15/2016	1.82E+00	P	8.98E-01	1.47E+00	2.04E+00
LB4110A - E2	Beta	10/20/2015	3/15/2016	8.83E-01	P	4.93E-01	9.17E-01	1.34E+00
LB4110A - E3	Beta	10/20/2015	3/15/2016	1.42E+00	P	6.39E-01	1.26E+00	1.88E+00
LB4110A - E4	Beta	10/20/2015	3/15/2016	1.05E+00	P	6.39E-01	1.06E+00	1.48E+00
LB4110A - F1	Beta	10/20/2015	3/15/2016	1.80E+00	P	1.01E+00	1.52E+00	2.03E+00
LB4110A - F2	Beta	10/20/2015	3/15/2016	1.02E+00	P	-6.90E+02	4.62E+01	7.83E+02
LB4110A - F3	Beta	10/20/2015	3/15/2016	1.37E+00	P	6.43E-01	1.32E+00	2.00E+00
LB4110A - F4	Beta	10/20/2015	3/15/2016	1.10E+00	P	6.29E-01	1.10E+00	1.56E+00
LB4110A - G1	Beta	10/20/2015	3/15/2016	1.05E+00	P	7.39E-01	1.27E+00	1.79E+00
LB4110A - G2	Beta	10/20/2015	3/15/2016	1.37E+00	P	1.11E+00	1.64E+00	2.18E+00
LB4110A - G3	Beta	10/20/2015	3/15/2016	1.37E+00	P	7.69E-01	1.37E+00	1.98E+00
LB4110A - G4	Beta	10/20/2015	3/15/2016	1.53E+00	P	8.80E-01	1.35E+00	1.82E+00

GPC Detector Report
(ALL Efficiencies)

3/15

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	10/20/2015	3/15/2016	0.2338	P	0.2257	0.2332	0.2408
LB4110A - A2	Alpha	10/20/2015	3/15/2016	0.2098	P	0.2037	0.2112	0.2188
LB4110A - A3	Alpha	10/20/2015	3/15/2016	0.2026	P	0.1927	0.2024	0.2121
LB4110A - A4	Alpha	10/20/2015	3/15/2016	0.2375	W	0.2212	0.2302	0.2392
LB4110A - B1	Alpha	10/20/2015	3/15/2016	0.2118	P	0.1988	0.2108	0.2228
LB4110A - B2	Alpha	10/20/2015	3/15/2016	0.2146	P	0.2030	0.2157	0.2283
LB4110A - B3	Alpha	10/20/2015	3/15/2016	0.2408	P	0.2215	0.2359	0.2503
LB4110A - B4	Alpha	10/20/2015	3/15/2016	0.2236	P	0.2138	0.2251	0.2364
LB4110A - C1	Alpha	10/20/2015	3/15/2016	0.2143	P	0.2043	0.2122	0.2201
LB4110A - C2	Alpha	10/20/2015	3/15/2016	0.2261	P	0.2119	0.2223	0.2326
LB4110A - C3	Alpha	10/20/2015	3/15/2016	0.2495	P	0.2383	0.2484	0.2586
LB4110A - C4	Alpha	10/20/2015	3/15/2016	0.2196	P	0.2132	0.2216	0.2300
LB4110A - D1	Alpha	10/20/2015	2/16/2016	0.2230	P	0.2123	0.2210	0.2298
LB4110A - D2	Alpha	10/20/2015	2/16/2016	0.2503	P	0.2377	0.2478	0.2580
LB4110A - D3	Alpha	10/20/2015	2/16/2016	0.2538	P	0.2457	0.2566	0.2675
LB4110A - D4	Alpha	10/20/2015	2/16/2016	0.1853	P	0.1822	0.1920	0.2019
LB4110A - E1	Alpha	10/20/2015	3/15/2016	0.2413	P	0.2253	0.2356	0.2460
LB4110A - E2	Alpha	10/20/2015	3/15/2016	0.2111	P	0.2013	0.2137	0.2260
LB4110A - E3	Alpha	10/20/2015	3/15/2016	0.2131	P	0.2020	0.2116	0.2212
LB4110A - E4	Alpha	10/20/2015	3/15/2016	0.2410	P	0.2357	0.2452	0.2548
LB4110A - F1	Alpha	10/20/2015	3/15/2016	0.1933	P	0.1452	0.1956	0.2460
LB4110A - F2	Alpha	10/20/2015	3/15/2016	0.2061	P	0.1487	0.2006	0.2524
LB4110A - F3	Alpha	10/20/2015	3/15/2016	0.2431	P	0.1780	0.2402	0.3024
LB4110A - F4	Alpha	10/20/2015	3/15/2016	0.2220	P	0.1607	0.2165	0.2723
LB4110A - G1	Alpha	10/20/2015	3/15/2016	0.2082	P	0.2013	0.2073	0.2133
LB4110A - G2	Alpha	10/20/2015	3/15/2016	0.2082	P	0.2032	0.2104	0.2175
LB4110A - G3	Alpha	10/20/2015	3/15/2016	0.2324	P	0.2253	0.2311	0.2369
LB4110A - G4	Alpha	10/20/2015	3/15/2016	0.2045	P	0.1984	0.2048	0.2112

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	10/20/2015	3/15/2016	0.5463	P	0.5337	0.5488	0.5639
LB4110A - A2	Beta	10/20/2015	3/15/2016	0.4758	P	0.4653	0.4792	0.4931
LB4110A - A3	Beta	10/20/2015	3/15/2016	0.4770	P	0.4607	0.4782	0.4958
LB4110A - A4	Beta	10/20/2015	3/15/2016	0.5579	P	0.5365	0.5544	0.5722
LB4110A - B1	Beta	10/20/2015	3/15/2016	0.5280	P	0.5007	0.5241	0.5475
LB4110A - B2	Beta	10/20/2015	3/15/2016	0.5250	P	0.4948	0.5187	0.5426
LB4110A - B3	Beta	10/20/2015	3/15/2016	0.5957	P	0.5550	0.5817	0.6085
LB4110A - B4	Beta	10/20/2015	3/15/2016	0.5510	P	0.5297	0.5521	0.5745
LB4110A - C1	Beta	10/20/2015	3/15/2016	0.4914	P	0.4790	0.4963	0.5136
LB4110A - C2	Beta	10/20/2015	3/15/2016	0.5324	P	0.5107	0.5297	0.5487
LB4110A - C3	Beta	10/20/2015	3/15/2016	0.6258	P	0.5949	0.6174	0.6400
LB4110A - C4	Beta	10/20/2015	3/15/2016	0.5284	P	0.5183	0.5417	0.5652
LB4110A - D1	Beta	10/20/2015	2/16/2016	0.6528	P	0.6315	0.6527	0.6740
LB4110A - D2	Beta	10/20/2015	2/16/2016	0.6341	P	0.6210	0.6393	0.6576
LB4110A - D3	Beta	10/20/2015	2/16/2016	0.6200	P	0.6116	0.6354	0.6592
LB4110A - D4	Beta	10/20/2015	2/16/2016	0.4556	W	0.4550	0.4752	0.4954
LB4110A - E1	Beta	10/20/2015	3/15/2016	0.5652	P	0.5468	0.5627	0.5786
LB4110A - E2	Beta	10/20/2015	3/15/2016	0.5125	P	0.4934	0.5146	0.5358
LB4110A - E3	Beta	10/20/2015	3/15/2016	0.5155	P	0.5005	0.5153	0.5300
LB4110A - E4	Beta	10/20/2015	3/15/2016	0.6005	P	0.5925	0.6100	0.6275
LB4110A - F1	Beta	10/20/2015	3/15/2016	0.4776	P	0.3596	0.4775	0.5954
LB4110A - F2	Beta	10/20/2015	3/15/2016	0.4887	P	0.3520	0.4751	0.5981
LB4110A - F3	Beta	10/20/2015	3/15/2016	0.5979	P	0.4435	0.5976	0.7518
LB4110A - F4	Beta	10/20/2015	3/15/2016	0.5432	P	0.3934	0.5295	0.6655
LB4110A - G1	Beta	10/20/2015	3/15/2016	0.4679	P	0.4594	0.4717	0.4841
LB4110A - G2	Beta	10/20/2015	3/15/2016	0.5014	P	0.4933	0.5053	0.5173
LB4110A - G3	Beta	10/20/2015	3/15/2016	0.5610	P	0.5470	0.5621	0.5771
LB4110A - G4	Beta	10/20/2015	3/15/2016	0.5089	P	0.4930	0.5062	0.5193

00230

SECTION XII

ANALYTICAL DATA (TECHNETIUM-99)

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Tc099
Run 1

Work Order	16-03050
Analysis Code	Tc099
Run	1
Date Received	3/10/2016
Lab Deadline	3/16/2016
Client	Washington Closure Hanford
Project	S00W235A01
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	ElChroM TCS01 Modified
Instrument Type	Beta LSC
Radiometric Tracer	Tc-99MS
Radiometric Sol#	Tc-2a
Tracer Act (dpm/g)	22043.51
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		03/10/16 00:00	1.0000E+00
02	MBL	BLANK		03/10/16 00:00	1.0000E+00
03	DUP	J1V8D3 SAF: RC-155		03/07/16 13:40	1.0656E-01
04	DMSO	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	1.0656E-01
05	MS	J1V8D3 SAF: RC-155		03/07/16 13:40	1.0656E-01

* 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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Tc099
Run 1

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	22043.5		0.00								
02	MBL	1.0000	22043.5		0.00								
03	DUP	1.0000	22043.5		0.00								
04	DMSO	1.0000	22043.5		0.00								
05	MS	1.0000	22043.5		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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Tc099
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			03/15/16 03:40	MHIGHTOWER				
02	MBL			03/15/16 03:40	MHIGHTOWER				
03	DUP			03/15/16 03:40	MHIGHTOWER				
04	DMSO			03/15/16 03:40	MHIGHTOWER				
05	MS			03/15/16 03:40	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.

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Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-Tc099-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: Tc099
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	TC-99	LCS	LCS	pCi/g	9.88E+02	5.56E+00	1.38E+00	1.02E+03	96.66	OK		OK	
02	TC-99	MBL	BLANK	pCi/g	0.00E+00	7.99E-01	1.36E+00					OK	OK
03	TC-99	DUP	J1V8D3 SAF: RC-155	pCi/g	4.14E+01	8.34E+00	1.30E+01				OK	OK	
04	TC-99	DMSO	J1V8D3 SAF: RC-155	pCi/g	4.05E+01	8.31E+00	1.29E+01					OK	
05	TC-99	MS	J1V8D3 SAF: RC-155	pCi/g	8.90E+03	5.10E+01	1.29E+01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-Tc099-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: Tc099

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	TC-99	LCS	03/10/16 00:00	1.00E+00	0.00	0.00	0.00			
02	TC-99	MBL	03/10/16 00:00	1.00E+00	0.00	0.00	0.00			
03	TC-99	DUP	03/07/16 13:40	1.07E-01	0.00	0.00	0.00			
04	TC-99	DMSO	03/07/16 13:40	1.07E-01	0.00	0.00	0.00			
05	TC-99	MS	03/07/16 13:40	1.07E-01	0.00	0.00	0.00			

Preliminary Data Report & Analytical Calculations
Work Order: 16-03050-Tc099-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-03050	Tc099	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TC-99	LCS	03/15/16 06:49	77798250	3100B	1	60	125142	22.2	0.941198317
02	TC-99	MBL	03/15/16 07:53	77798250	3100B	2	60	1332	22.2	0.950578106
03	TC-99	DUP	03/15/16 08:56	77798250	3100B	3	60	1884	22.2	0.939030837
04	TC-99	DMSO	03/15/16 09:59	77798250	3100B	4	60	1872	22.2	0.940160061
05	TC-99	MS	03/15/16 11:02	77798250	3100B	5	60	120840	22.2	0.945554895

Count Room Report
Client: Washington Closure Hanfor

16-03050-Tc099-1 (pCi/g) in
Tracer ID: Tc-2a

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	03/10/16 00:00	1.0000	1.0000	22043.5100		0.00		
02	MBL	BLANK	03/10/16 00:00	1.0000	1.0000	22043.5100		0.00		
03	DUP	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1066	1.0000	22043.5100		0.00		
04	DMSO	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1066	1.0000	22043.5100		0.00		
05	MS	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1066	1.0000	22043.5100		0.00		

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 3/15/2016 3:40 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-03050	1	Tc099	3/15/2016 3:34	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
Tc-99	Tc-2a	22043.510	3/15/2016	0.100	0.1029	0.1014			1021.75	22.478	1006.85	22.151	0.00	0.000	0.00	0.000
Tc-99 MS	Tc-2a	22043.51	3/15/2016	0.1												

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Tc-99MS	Tc-2a	22043.510	3/15/2016	1.0000	0.1000
02	Tc-99MS	Tc-2a	22043.510	3/15/2016	1.0000	0.1000
03	Tc-99MS	Tc-2a	22043.510	3/15/2016	1.0000	0.1000
04	Tc-99MS	Tc-2a	22043.510	3/15/2016	1.0000	0.1000
05	Tc-99MS	Tc-2a	22043.510	3/15/2016	1.0000	0.1000

Balance Printer Tapes

Tracer	LCS

Matrix Spike

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Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-03050	1	Tc099	grams	3/16/2016	MHIGHTOWER

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	J1V8D3 SAF: RC-155	DUP		1	22.52	4.44E-02	2.4000E+00	1.0656E-01				
04	J1V8D3 SAF: RC-155	DMSO		1	22.52	4.44E-02	2.4000E+00	1.0656E-01				
05	J1V8D3 SAF: RC-155 MS	MS		1	22.52	4.44E-02	2.4000E+00	1.0656E-01				

Comments	

Technician: Ma Date: 3/14/16

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EBERLINE SERVICES

Dilution Worksheet

Internal Work Order	16-03050
Fraction	**> 03 <**
Analysis Code	**Tc099**
Run Number	**1**
Analyst	**MHIGHTOWER**

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: Mh Date: 14 MAR 16

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EBERLINE SERVICES

Dilution Worksheet	**Internal Work Order**	16-03050
	Fraction	**> 04 <**
	Analysis Code	**Tc099**
	Run Number	**1**
	Analyst	**MHIGHTOWER**

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: MH Date: 14MAR16

00242

EBERLINE SERVICES

Dilution Worksheet

Internal Work Order	16-03050
Fraction	**> 05 <**
Analysis Code	**Tc099**
Run Number	**1**
Analyst	**MHIGHTOWER**

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: MH Date: 14 MAR 16

00213

3/15

B

Assay Definition-

Assay Description:
Tc99

Assay Type: CPM
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\Default\Tc99_cpm.13\20160315_0648
Raw Results Path: C:\Packard\Tricarb\Results\Default\Tc99_cpm.13\20160315_0648\20160315_0648.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Default\Tc99_cpm.13\20160315_0648\1603050 tc99a.csv
Assay File Name: C:\Packard\TriCarb\Assays\Tc99_cpm.13.lsa

Count Conditions-

Nuclide: 99Tc
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	5.0	75.0
B	5.0	294.0
C	5.0	300.0

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-

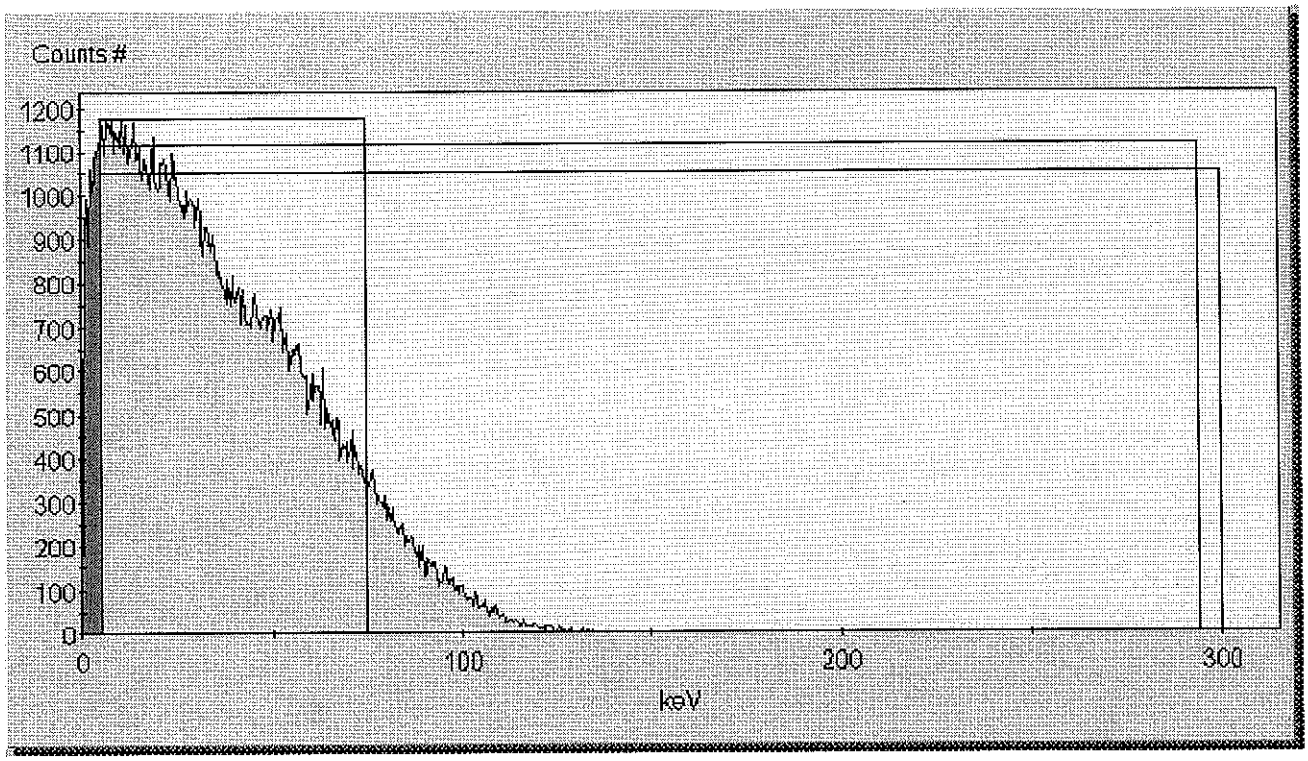
Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				
B				
C				

Cycle 1 Results

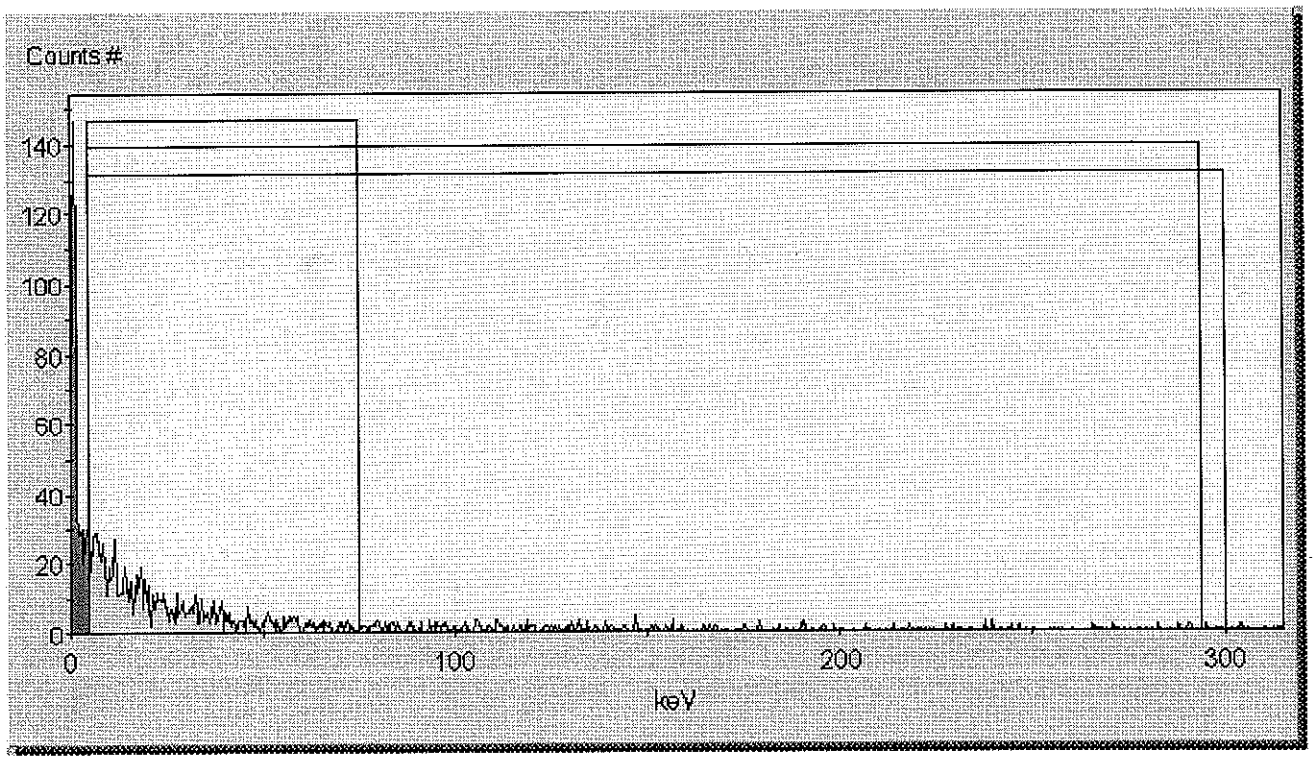
DATE	TIME	SMPL_ID	P#	PID	S#	CPMA	CPMB	CPMC	tSIE	Count Time
		16-03050-1-T99-01S	13	13	1	1874.6	2085.7	2085.8	354.13	60.00
3/15/2016	6:49:58 AM									

SpectraView Block Data



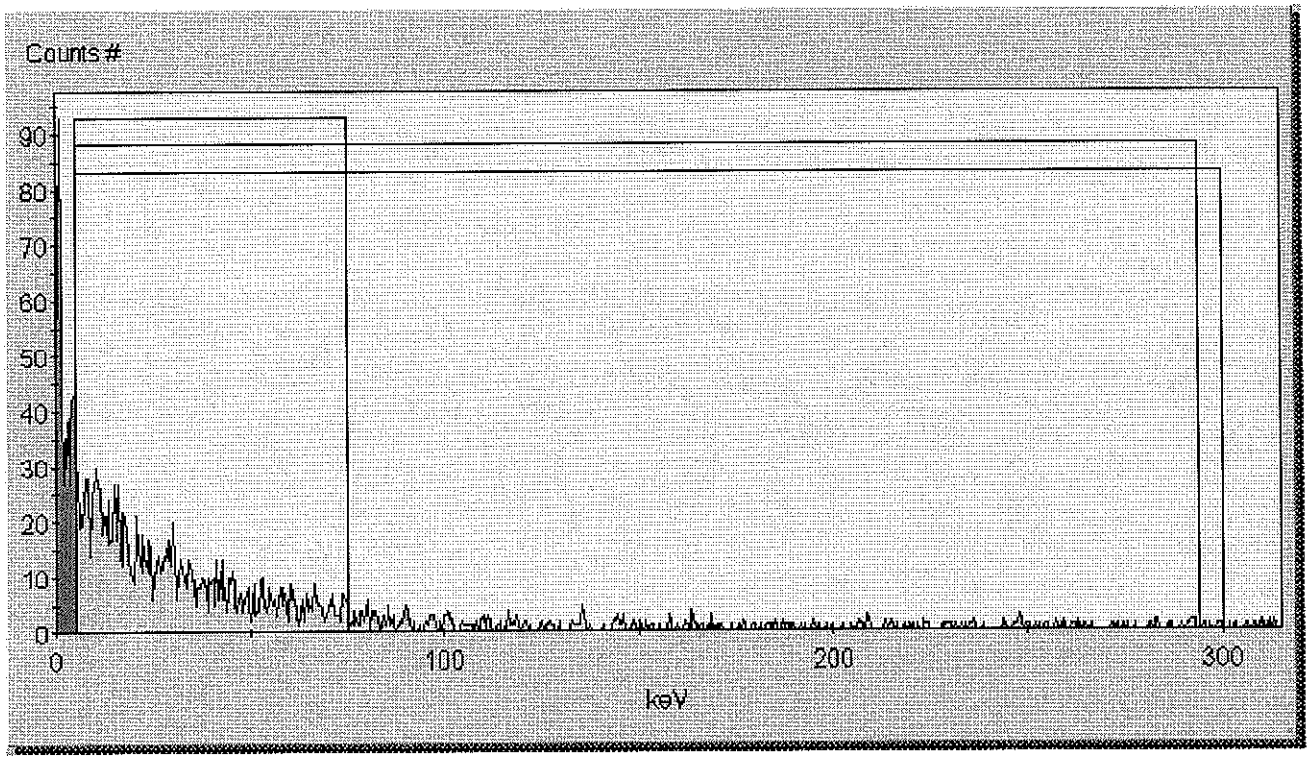
16-03050-1-T99-02S 13 13 2 16.3 22.2 22.3 359.28 60.00
3/15/2016 7:53:05 AM

SpectraView Block Data



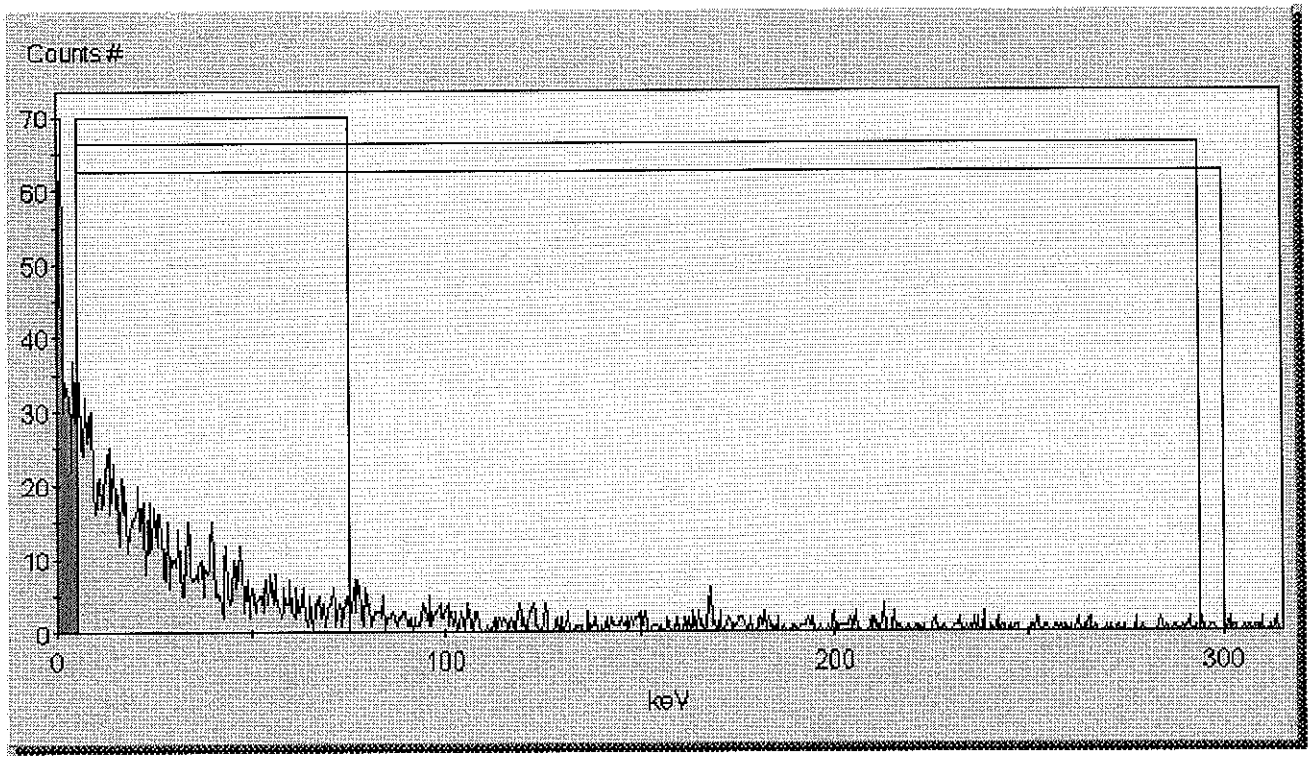
16-03050-1-T99-03S 13 13 3 25.5 31.4 31.5 352.87 60.00
3/15/2016 8:56:10 AM

SpectraView Block Data



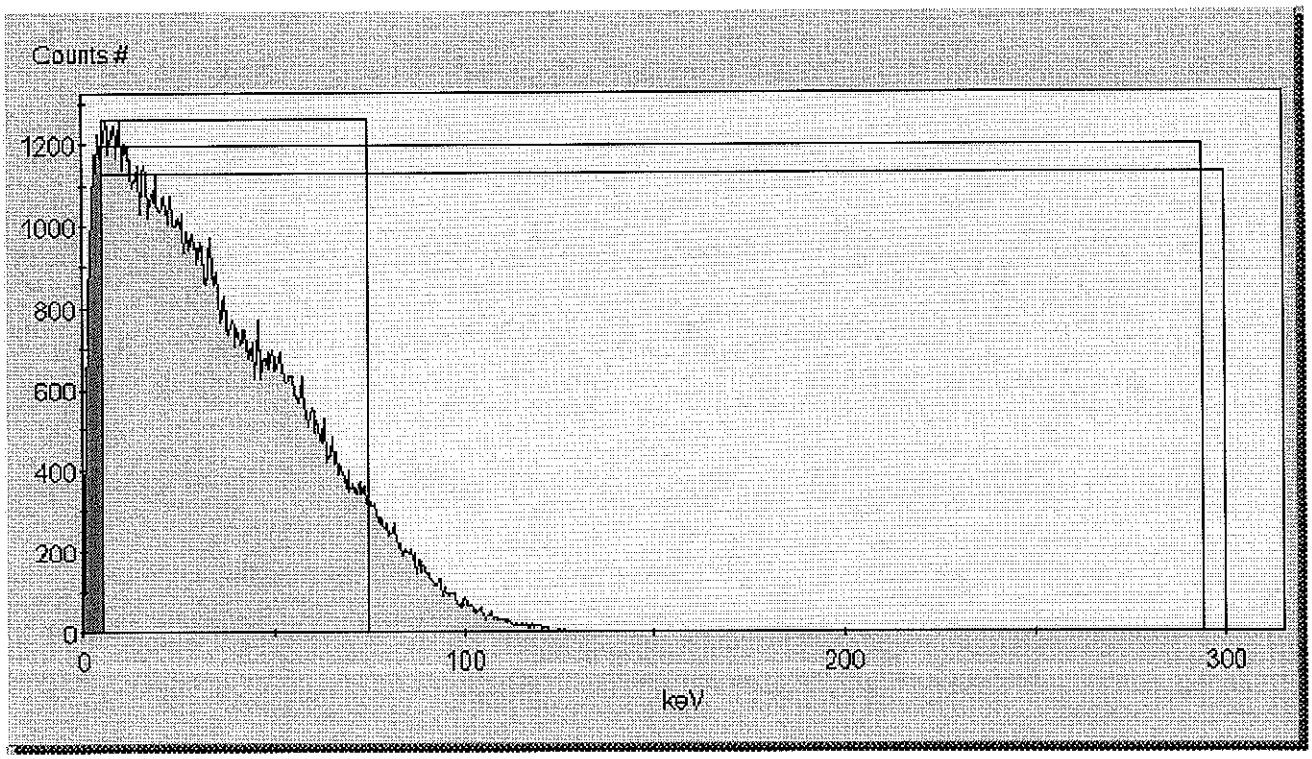
16-03050-1-T99-04S 13 13 4 23.7 31.2 31.3 353.53 60.00
3/15/2016 9:59:14 AM

SpectraView Block Data



16-03050-1-T99-05S 13 13 5 1833.6 2014.0 2014.1 356.58 60.00
3/15/2016 11:02:19 AM

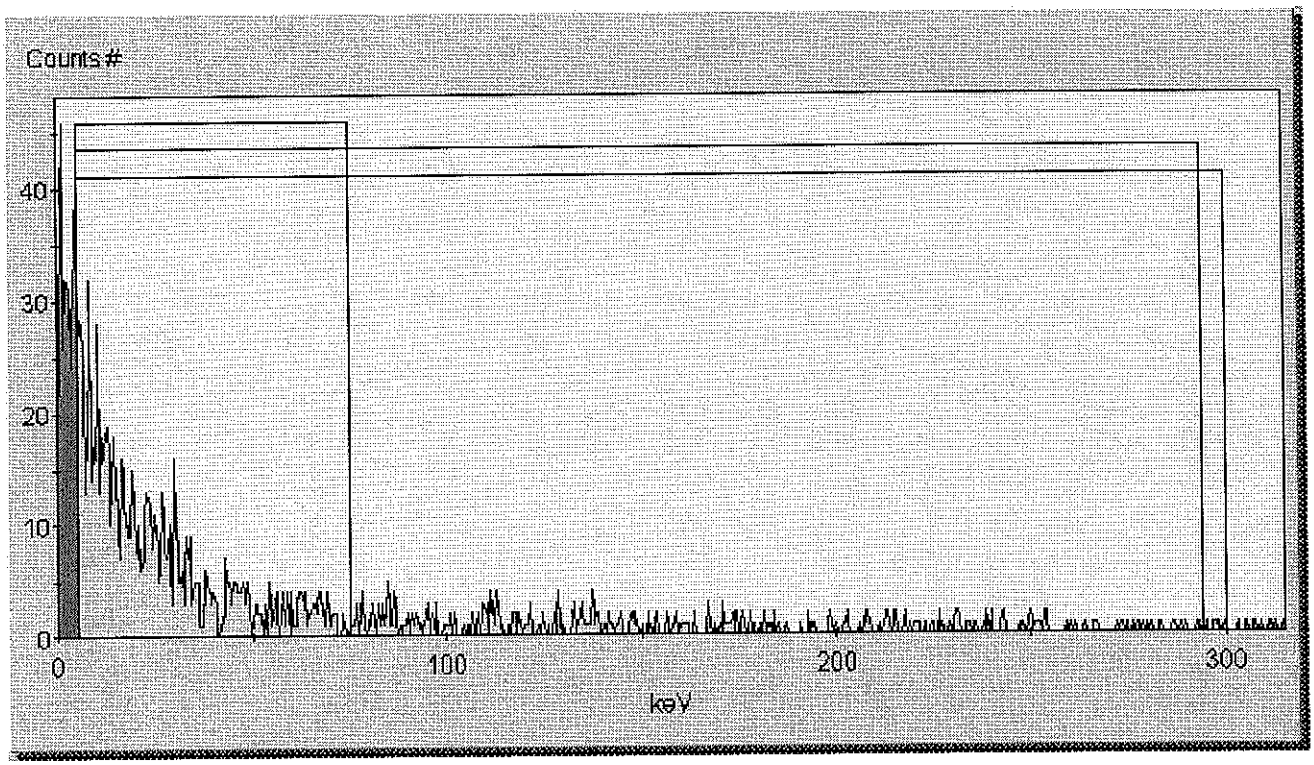
SpectraView Block Data



Sample #6	13	13	6	16.6	22.2	22.3	379.98	60.00

3/15/2016 12:05:24 PM

SpectraView Block Data



SNC Protocol

7/15
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: 27.07 Date Processed: 3/15/2016 5:50:30 AM
14C Chi Square: 20.95 Date Processed: 3/15/2016 5:50:30 AM
3H E^2/B (1-18.6 keV): 290.37 Date Processed: 3/15/2016 5:50:30 AM
14C E^2/B (4-156 keV): 565.98 Date Processed: 3/15/2016 5:50:30 AM
3H Efficiency (0-18.6 keV): 62.14 Date Processed: 3/15/2016 5:50:30 AM
14C Efficiency (0-156 keV): 95.26 Date Processed: 3/15/2016 5:50:30 AM
IPA Background Date Processed: 3/15/2016 5:50:30 AM
3H Background CPM (0-18.6 keV): 13.27 Date Processed: 3/15/2016 5:50:30 AM
14C Background CPM (0-156 keV): 19.50 Date Processed: 3/15/2016 5:50:30 AM
3H Calibration DPM: 207400
3H Reference Date: 10/29/2007
14C Calibration DPM: 120521

SECTION XIII

ANALYTICAL DATA (CARBON-14)

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
C0014
Run 1

Work Order	16-03050
Analysis Code	C0014
Run	1
Date Received	3/10/2016
Lab Deadline	3/16/2016
Client	Washington Closure Hanford
Project	S00W235A01
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	EPA 520.0 Modified
Instrument Type	Beta LSC
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		03/10/16 00:00	1.0000E+00
02	MBL	BLANK		03/10/16 00:00	1.0000E+00
03	DUP	J1V8D3 SAF: RC-155		03/07/16 13:40	7.8000E-01
04	DMSO	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	9.6000E-01
05	MS	J1V8D3 SAF: RC-155		03/07/16 13:40	6.8000E-01

* 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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
C0014
Run 1

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				0.00								

* 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.

: 00252

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
C0014
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			03/10/16 14:50	KSALLINGS				
02	MBL			03/10/16 14:50	KSALLINGS				
03	DUP			03/10/16 14:50	KSALLINGS				
04	DMSO			03/10/16 14:50	KSALLINGS				
05	MS			03/10/16 14:50	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.

00253

Preliminary Data Report & Analytical Calculations
Work Order: 16-03050-C0014-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: C0014
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	C-14	LCS	LCS	pCi/g	1.40E+03	1.41E+01	5.31E+00	1.38E+03	101.91	OK		OK	
02	C-14	MBL	BLANK	pCi/g	2.95E+00	2.97E+00	4.97E+00					OK	OK
03	C-14	DUP	J1V8D3 SAF: RC-155	pCi/g	6.90E+00	4.23E+00	6.99E+00				INV	OK	
04	C-14	DMSO	J1V8D3 SAF: RC-155	pCi/g	2.71E+00	3.40E+00	5.72E+00					OK	
05	C-14	MS	J1V8D3 SAF: RC-155	pCi/g	1.74E+03	1.90E+01	7.76E+00					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-C0014-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
Analysis Code: C0014
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	C-14	LCS	03/10/16 00:00	1.00E+00	0.00	0.00	0.00			
02	C-14	MBL	03/10/16 00:00	1.00E+00	0.00	0.00	0.00			
03	C-14	DUP	03/07/16 13:40	7.80E-01	0.00	0.00	0.00			
04	C-14	DMSO	03/07/16 13:40	9.60E-01	0.00	0.00	0.00			
05	C-14	MS	03/07/16 13:40	6.80E-01	0.00	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-C0014-1

Client: Washington Closure Hanford

Eberline Analytical Work Order: 16-03050

Analysis Code: C0014

Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	C-14	LCS	03/11/16 12:26	2092882.5	3100A	1	60	41208	17.1	0.643920994	
02	C-14	MBL	03/11/16 13:29	2092882.5	3100A	2	60	1116	17.1	0.687104302	
03	C-14	DUP	03/11/16 14:32	2092882.5	3100A	3	60	1176	17.1	0.627051704	
04	C-14	DMSO	03/11/16 15:35	2092882.5	3100A	4	60	1098	17.1	0.622552881	
05	C-14	MS	03/11/16 16:38	2092882.5	3100A	5	60	35166	17.1	0.647833312	

Count Room Report
Client: Washington Closure Hanfor

16-03050-C0014-1 (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	03/10/16 00:00	1.0000				0.00		
02	MBL	BLANK	03/10/16 00:00	1.0000				0.00		
03	DUP	J1V8D3 SAF: RC-155	03/07/16 13:40	0.7800				0.00		
04	DMSO	J1V8D3 SAF: RC-155	03/07/16 13:40	0.9600				0.00		
05	MS	J1V8D3 SAF: RC-155	03/07/16 13:40	0.6800				0.00		

: 08257

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 3/10/2016 2:50 PM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-03050	1	C0014	3/10/2016 14:49	KSALLINGS Ks		

LCS & Matrix Spikes					LCS	MS	RS	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
C-14	C-3a	2997.380	3/10/2016	1.070	1.0200	1.0300	1.0100		1377.17	38.561	1390.68	38.939	1363.67	38.183	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

Balance Printer Tapes

Tracer	LCS

Matrix Spike

00258

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-03050	1	C0014	grams	3/16/2016	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	J1V8D3 SAF: RC-155	DUP					7.8000E-01	7.8000E-01				
04	J1V8D3 SAF: RC-155	DMSO					9.6000E-01	9.6000E-01				
05	J1V8D3 SAF: RC-155 MS	MS					6.8000E-01	6.8000E-01				

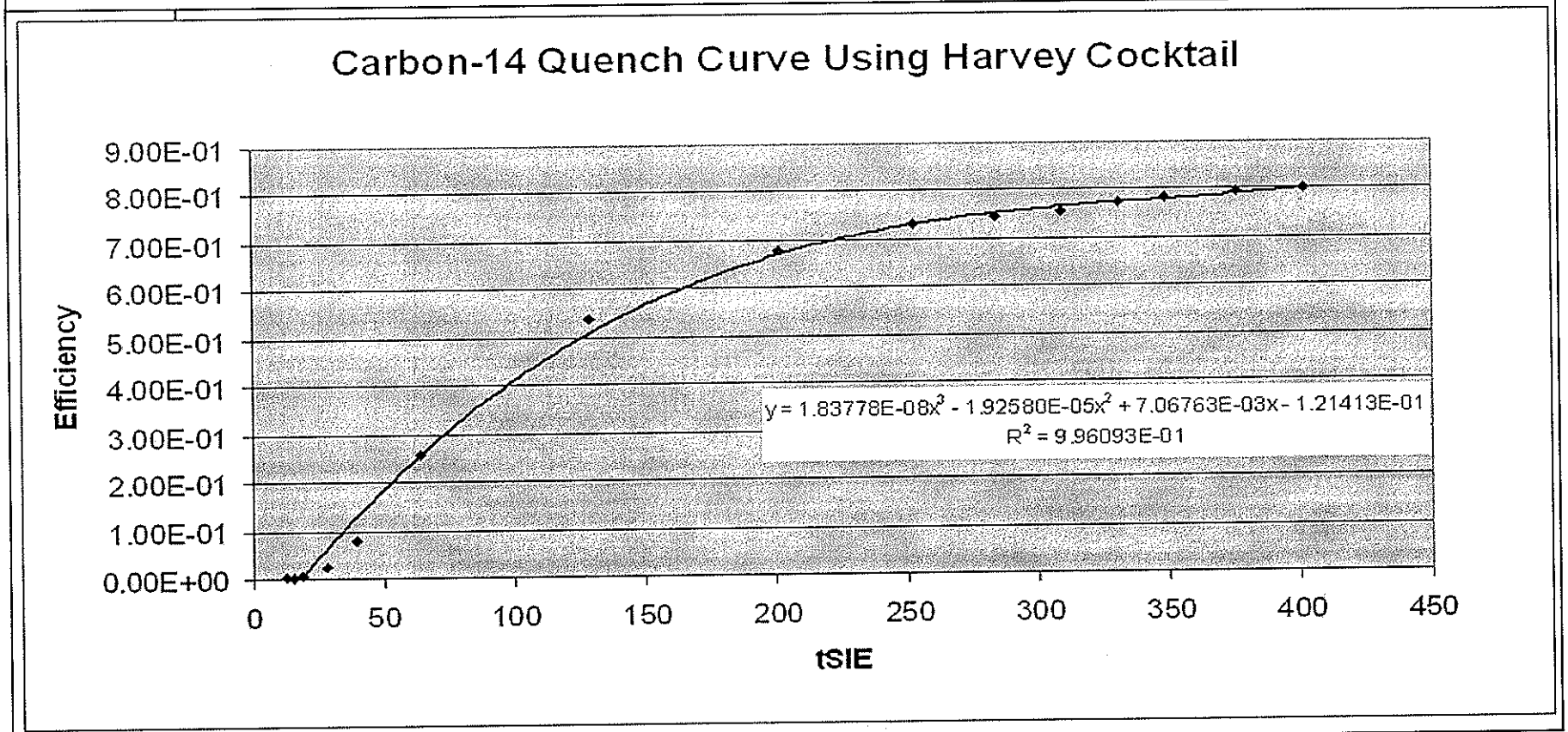
Comments	

Technician: Kenny Sallings Date: 3/10/16

00259

Work Order #	16-03050		C-14 Recovery				
tSIE	EFFICIENCY	Recovery Spike Activity	Grams Added	Total Activity	cpm	Bkg, cpm	Recovery Factor
189.08	65.067%	2997.38	1.01	3027.3538	674.6	17.1	0.333789817

3/14/2016 7:44



A 3/12/16 KB

Assay Definition-

Assay Description:
C14

Assay Type: CPM
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\Default\c14-cpm-6\20160311_1224
Raw Results Path: C:\Packard\Tricarb\Results\Default\c14-cpm-6\20160311_1224\20160311_1224.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Default\c14-cpm-6\20160311_1224\1603050 ac14.csv
Assay File Name: C:\Packard\TriCarb\Assays\c14-cpm-6.lsa

Count Conditions-

Nuclide: 14C
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	156.0
B	4.0	156.0
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-

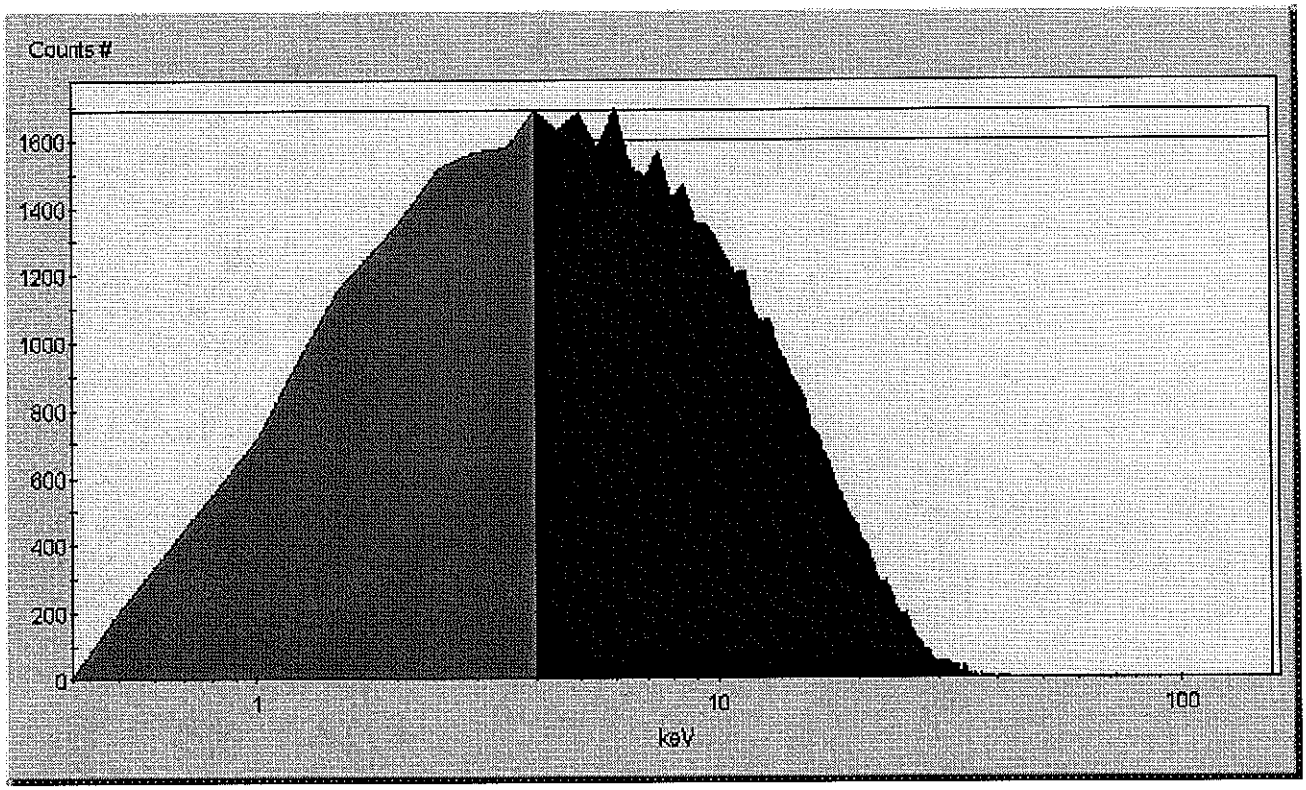
Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				
B				
C				

Cycle 1 Results

DATE	TIME	SMPL_ID	P#	PID	S#	CPMA	CPMB	CPMC	tSIE	Count Time
		16-03050-1-C14-01S	6	5	1	821.2	686.8	0.0	185.34	60.00
3/11/2016	12:26:01 PM									

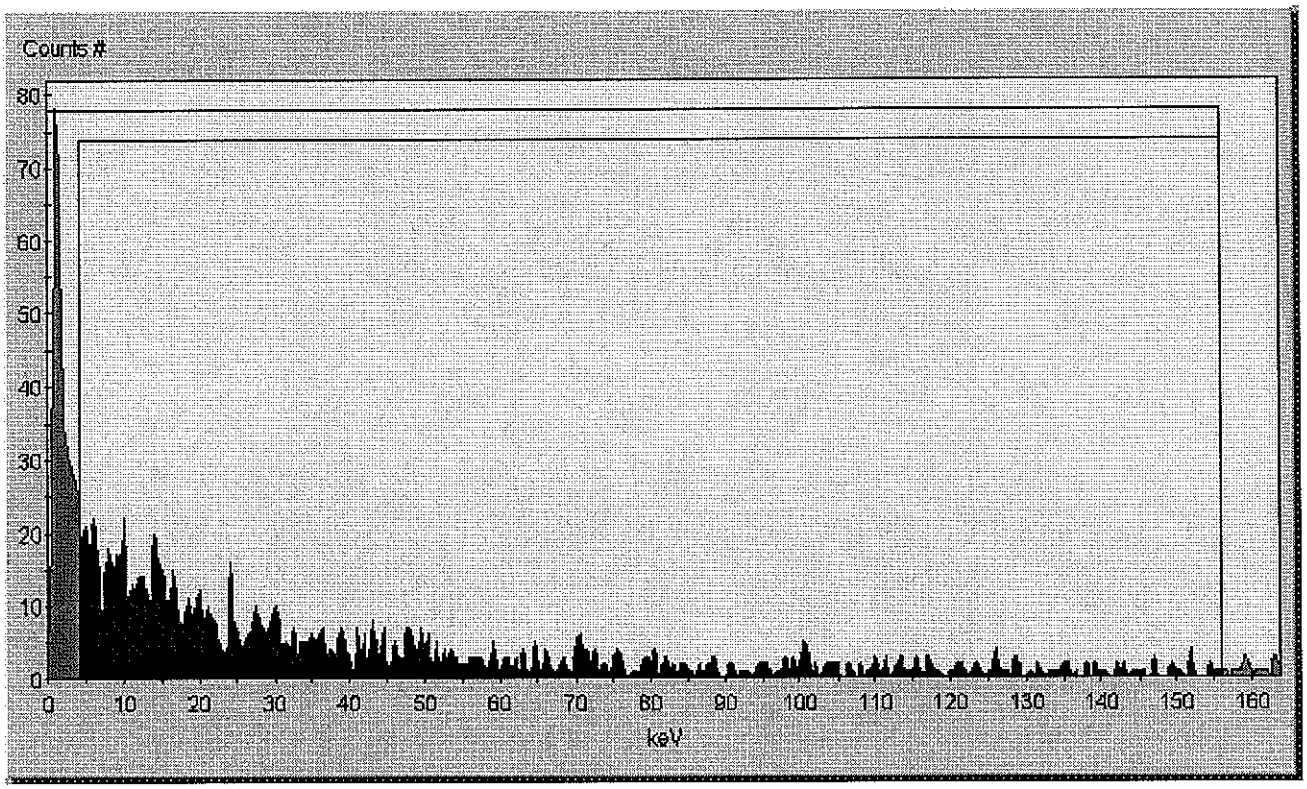
SpectraView Block Data



16-03050-1-C14-02S	6	5	2	23.6	18.6	0.0	212.49	60.00

3/11/2016 1:29:06 PM

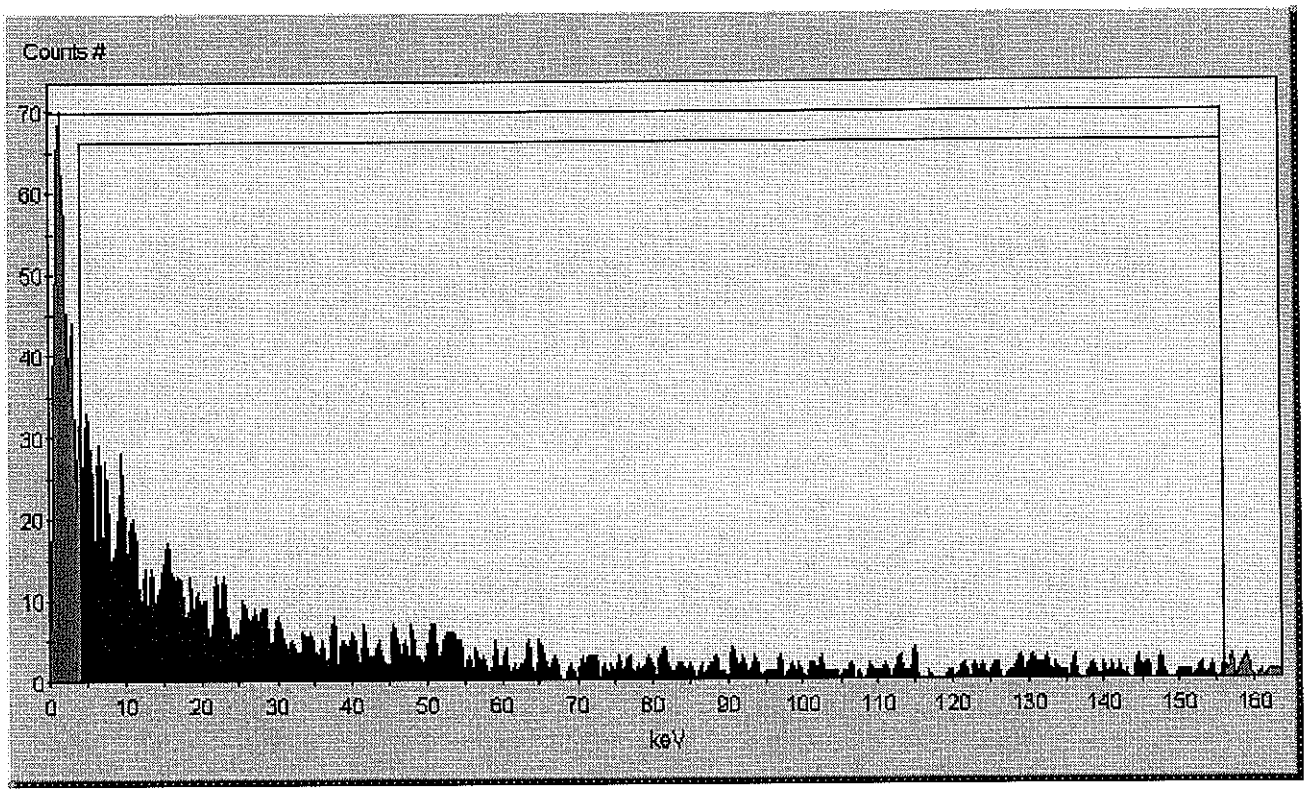
SpectraView Block Data



16-03050-1-C14-03S	6	5	3	25.1	19.6	0.0	176.48	60.00

3/11/2016 2:32:11 PM

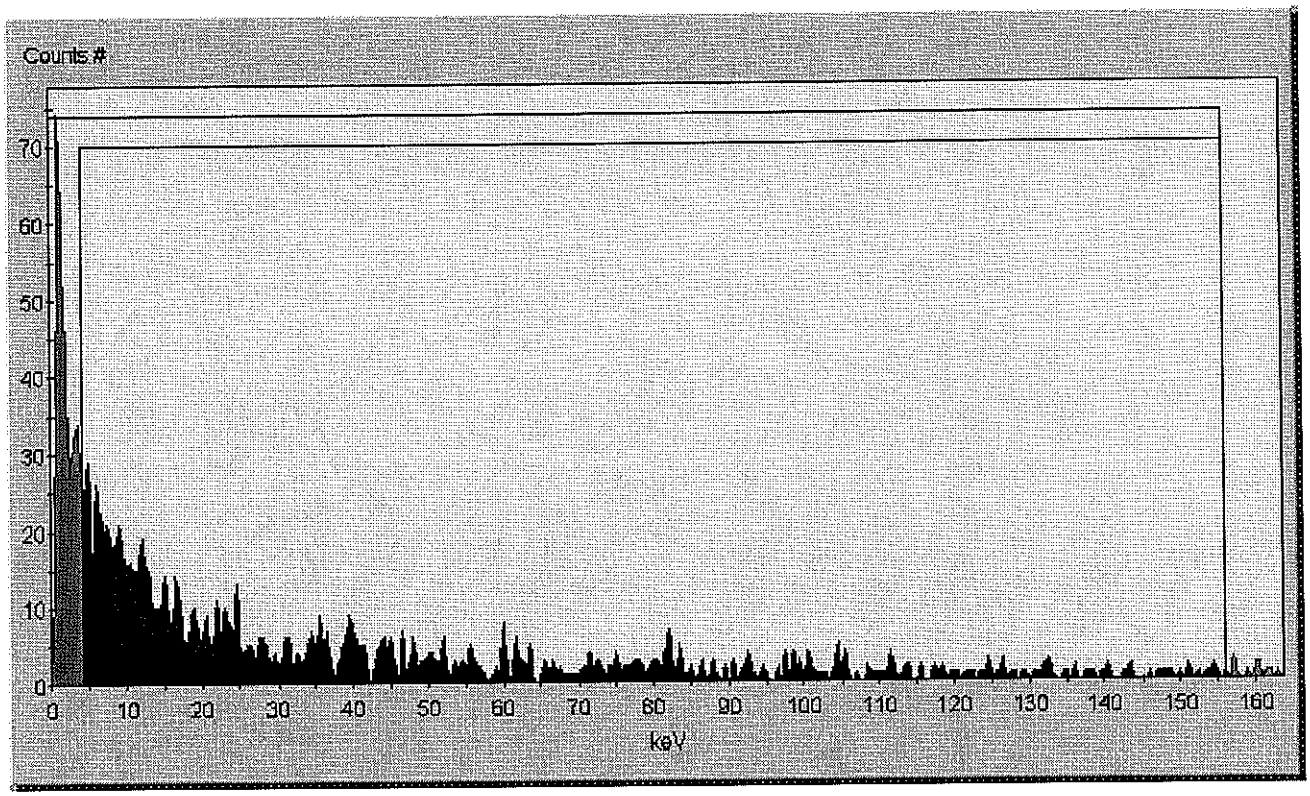
SpectraView Block Data



16-03050-1-C14-04S	6	5	4	23.1	18.3	0.0	174.24	60.00

3/11/2016 3:35:17 PM

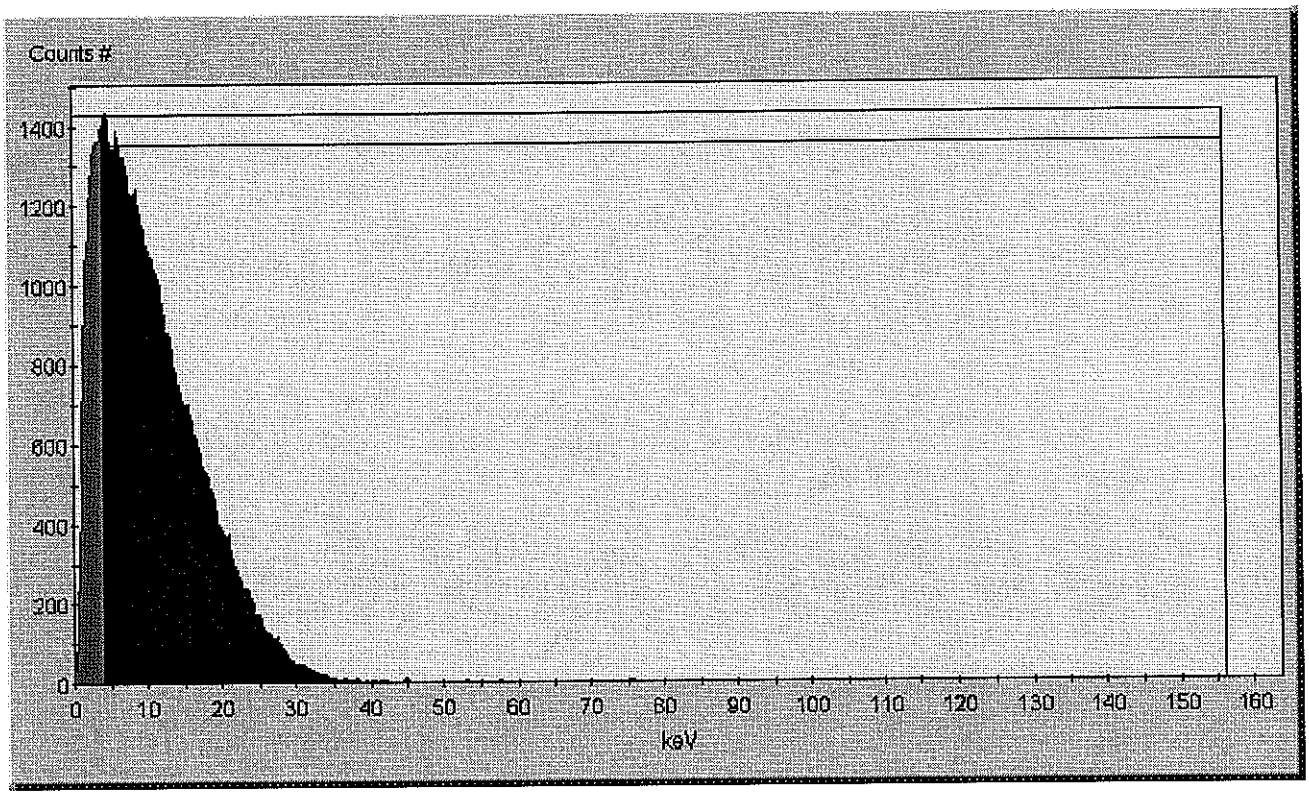
SpectraView Block Data



16-03050-1-C14-05S	6	5	5	701.9	586.1	0.0	187.51	60.00

3/11/2016 4:38:22 PM

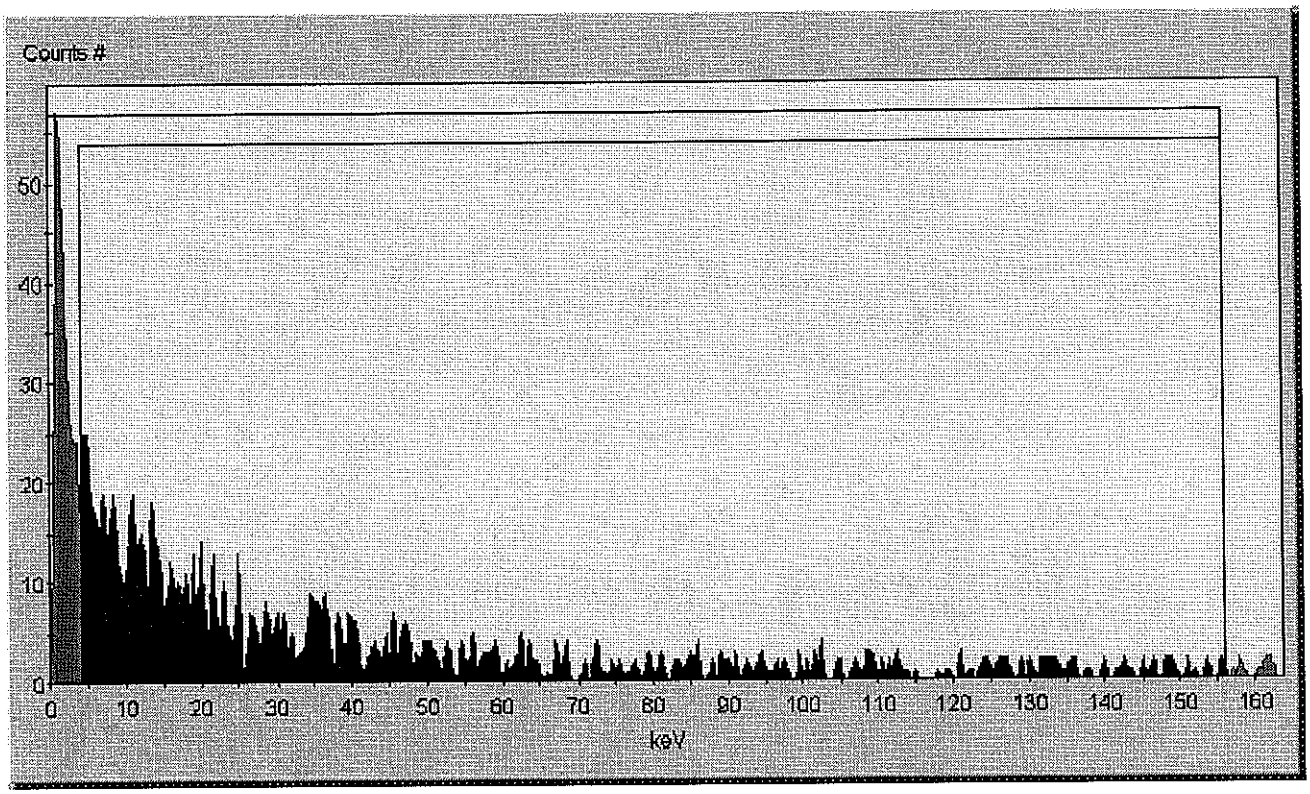
SpectraView Block Data



Sample #6	6	5	6	21.2	17.1	0.0	211.52	60.00

3/11/2016 5:41:28 PM

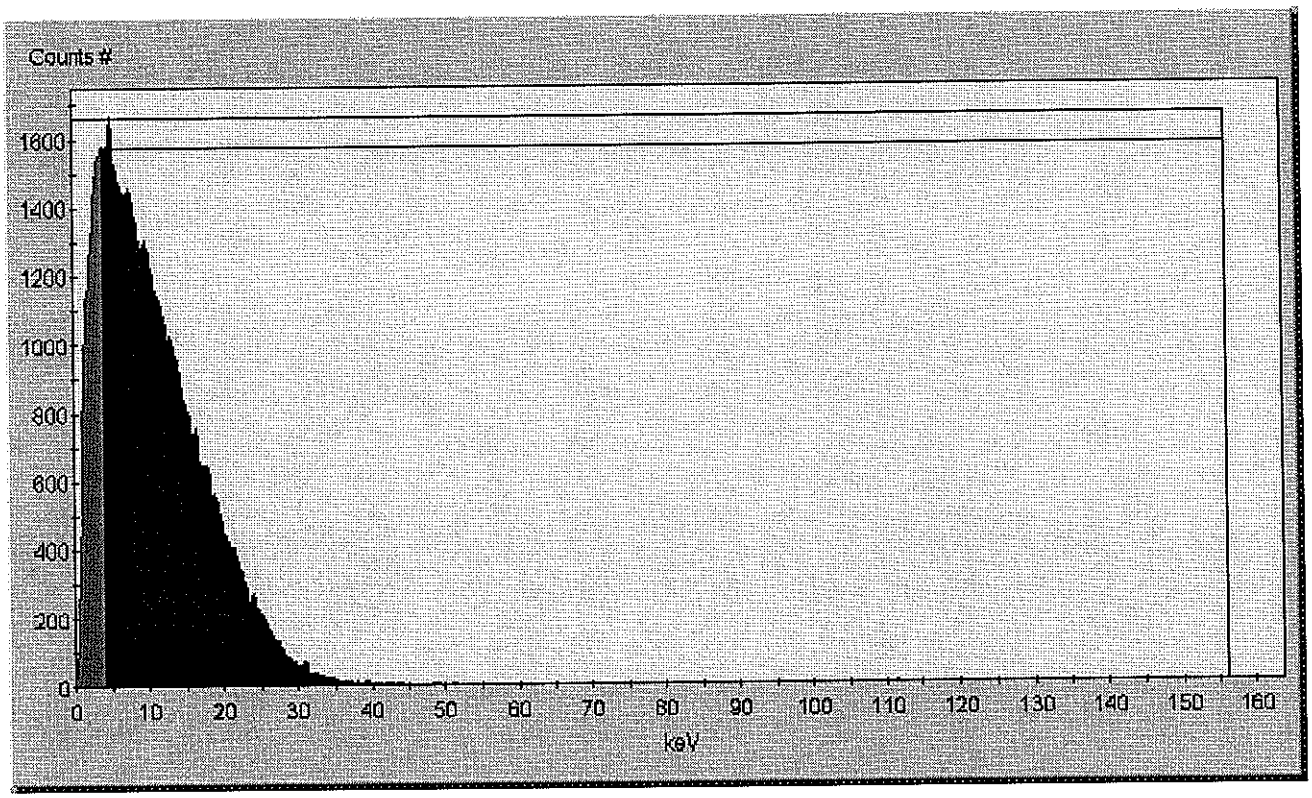
SpectraView Block Data



Sample #7	6	5	7	801.1	674.6	0.0	189.08	60.00

3/11/2016 6:44:33 PM

SpectraView Block Data


Counts #
1600
1400
1200
1000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
keV

SNC Protocol

3/11
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: 15.20 Date Processed: 3/11/2016 6:33:19 AM
14C Chi Square: 17.30 Date Processed: 3/11/2016 6:33:19 AM
3H E^2/B (1-18.6 keV): 293.73 Date Processed: 3/11/2016 6:33:19 AM
14C E^2/B (4-156 keV): 552.87 Date Processed: 3/11/2016 6:33:19 AM
3H Efficiency (0-18.6 keV): 60.61 Date Processed: 3/11/2016 6:33:19 AM
14C Efficiency (0-156 keV): 95.74 Date Processed: 3/11/2016 6:33:19 AM
IPA Background Date Processed: 3/11/2016 6:33:19 AM
3H Background CPM (0-18.6 keV): 12.58 Date Processed: 3/11/2016 6:33:19 AM
14C Background CPM (0-156 keV): 19.67 Date Processed: 3/11/2016 6:33:19 AM
3H Calibration DPM: 183600
3H Reference Date: 2/27/2007
14C Calibration DPM: 136900

SECTION XIV

ANALYTICAL DATA (NICKEL-63)

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Ni063
Run 1

Work Order	16-03050
Analysis Code	Ni063
Run	1
Date Received	3/10/2016
Lab Deadline	3/16/2016
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	
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		03/10/16 00:00	1.0000E+00
02	MBL	BLANK		03/10/16 00:00	1.0000E+00
03	DUP	J1V8D3 SAF: RC-155		03/07/16 13:40	1.0212E-01
04	DMSO	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	1.0212E-01
05	MS	J1V8D3 SAF: RC-155		03/07/16 13:40	1.0212E-01

* 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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Ni063
Run 1

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				0.00								

* 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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Ni063
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			03/14/16 11:49	KCOULSTON				
02	MBL			03/14/16 11:49	KCOULSTON				
03	DUP			03/14/16 11:49	KCOULSTON				
04	DMSO			03/14/16 11:49	KCOULSTON				
05	MS			03/14/16 11:49	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: 16-03050-Ni063-1

Client: Washington Closure Hanford
Eberline Analytical Work Order: 16-03050
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	1.47E+03	9.44E+00	2.39E+00	1.54E+03	95.70	OK		OK	
02	NI-63	MBL	BLANK	pCi/g	2.78E-01	1.40E+00	2.39E+00					OK	OK
03	NI-63	DUP	J1V8D3 SAF: RC-155	pCi/g	2.25E+03	3.90E+01	2.37E+01				INV	OK	
04	NI-63	DMSO	J1V8D3 SAF: RC-155	pCi/g	4.05E+03	5.21E+01	2.48E+01					OK	
05	NI-63	MS	J1V8D3 SAF: RC-155	pCi/g	5.16E+03	5.78E+01	2.45E+01					OK	

Preliminary Data Report & Analytical Calculations
Work Order: 16-03050-Ni063-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-03050	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	03/10/16 00:00	1.00E+00	0.00	0.00	0.00			
02	NI-63	MBL	03/10/16 00:00	1.00E+00	0.00	0.00	0.00			
03	NI-63	DUP	03/07/16 13:40	1.02E-01	0.00	0.00	0.00			
04	NI-63	DMSO	03/07/16 13:40	1.02E-01	0.00	0.00	0.00			
05	NI-63	MS	03/07/16 13:40	1.02E-01	0.00	0.00	0.00			

Preliminary Data Report & Analytical Calculations
Work Order: 16-03050-Ni063-1

Client	Eberline Analytical Work Order	Analysis Code	Run
Washington Closure Hanford	16-03050	Ni063	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	NI-63	LCS	03/14/16 15:48	36561.525	3100B	1	60	96246	17.7	0.486026822
02	NI-63	MBL	03/14/16 16:51	36561.525	3100B	2	60	1080	17.7	0.485748992
03	NI-63	DUP	03/14/16 19:59	36561.525	3100B	5	60	15732	17.7	0.478737824
04	NI-63	DMSO	03/14/16 18:56	36561.525	3100B	4	60	26268	17.7	0.457293765
05	NI-63	MS	03/14/16 17:53	36561.525	3100B	3	60	33630	17.7	0.46426826

Count Room Report
Client: Washington Closure Hanfor

16-03050-Ni063-1 (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	03/10/16 00:00	1.0000				0.00		
02	MBL	BLANK	03/10/16 00:00	1.0000				0.00		
03	DUP	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1021				0.00		
04	DMSO	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1021				0.00		
05	MS	J1V8D3 SAF: RC-155	03/07/16 13:40	0.1021				0.00		

Eberline Analytical
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 3/15/2016 10:52 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
16-03050	1	Ni063	3/15/2016 10:51	MMCDOUGALL		

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	21921.030	3/15/2016	0.150	0.1556	0.0088			1536.45	46.093	87.14	2.614	0.00	0.000	0.00	0.000

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Ni-63MS	Ni-3	21921.030	3/15/2016		0.1500
02	Ni-63MS	Ni-3	21921.030	3/15/2016		0.1500
03	Ni-63MS	Ni-3	21921.030	3/15/2016		0.1500
04	Ni-63MS	Ni-3	21921.030	3/15/2016		0.1500
05	Ni-63MS	Ni-3	21921.030	3/15/2016		0.1500

Balance Printer Tapes

Tracer	LCS

Matrix Spike

Corrected for Dilution

3/18/16

00279

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-03050	1	Ni063	grams	3/16/2016	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	J1V8D3 SAF: RC-155	DUP		1	22.52	4.44E-02	2.3000E+00	1.0212E-01				
04	J1V8D3 SAF: RC-155	DMSO		1	22.52	4.44E-02	2.3000E+00	1.0212E-01				
05	J1V8D3 SAF: RC-155 MS	MS		1	22.52	4.44E-02	2.3000E+00	1.0212E-01				

Comments	

Technician: JPachella Date: 3/14/16

00279

EBERLINE SERVICES

Dilution Worksheet	**Internal Work Order**	16-03050
	Fraction	**> 03 <**
	Analysis Code	**Ni063**
	Run Number	**1**
	Analyst	**JPACHELLA**

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: JPachella Date: 3-14-16

00260

EBERLINE SERVICES	Internal Work Order	16-03050
	Fraction	> 04 <
Dilution Worksheet	Analysis Code	Ni063
	Run Number	1
	Analyst	JPACHELLA

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: JPachella

Date: 3-14-16

00281

EBERLINE SERVICES

Dilution Worksheet

Internal Work Order	16-03050
Fraction	**> 05 <**
Analysis Code	**Ni063**
Run Number	**1**
Analyst	**JPACHELLA**

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**4.44**	ml	from the original sample and diluted it to	**100**	ml	0.0444
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1

Dilution Ratio	**0.0444**
Dilution Factor	**22.52252252**

Diluted by: JPachella Date: 3-14-16

Work Order #	16-03050		Ni-63 Recovery			EBERLINE SERVICES	
tSIE	EFFICIENCY	Recovery Spike Activity	Grams Added	Total Activity	cpm	Bkg, cpm	RF
245.82	24.166%	21921.44	0.1608	3524.967552	1772.1	17.7	2.06

3/15/2016 9:02

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

RECOVERY FACTOR

2.05956181

Remarks

3/15
(B)

Assay Definition-

Assay Description:
Ni63

Assay Type: CPM
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\Default\Ni63_cpm.12\20160314_1546
Raw Results Path: C:\Packard\Tricarb\Results\Default\Ni63_cpm.12\20160314_1546\20160314_1546.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Default\Ni63_cpm.12\20160314_1546\1603050 ni63a.csv
Assay File Name: C:\Packard\TriCarb\Assays\Ni63_cpm.12.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-

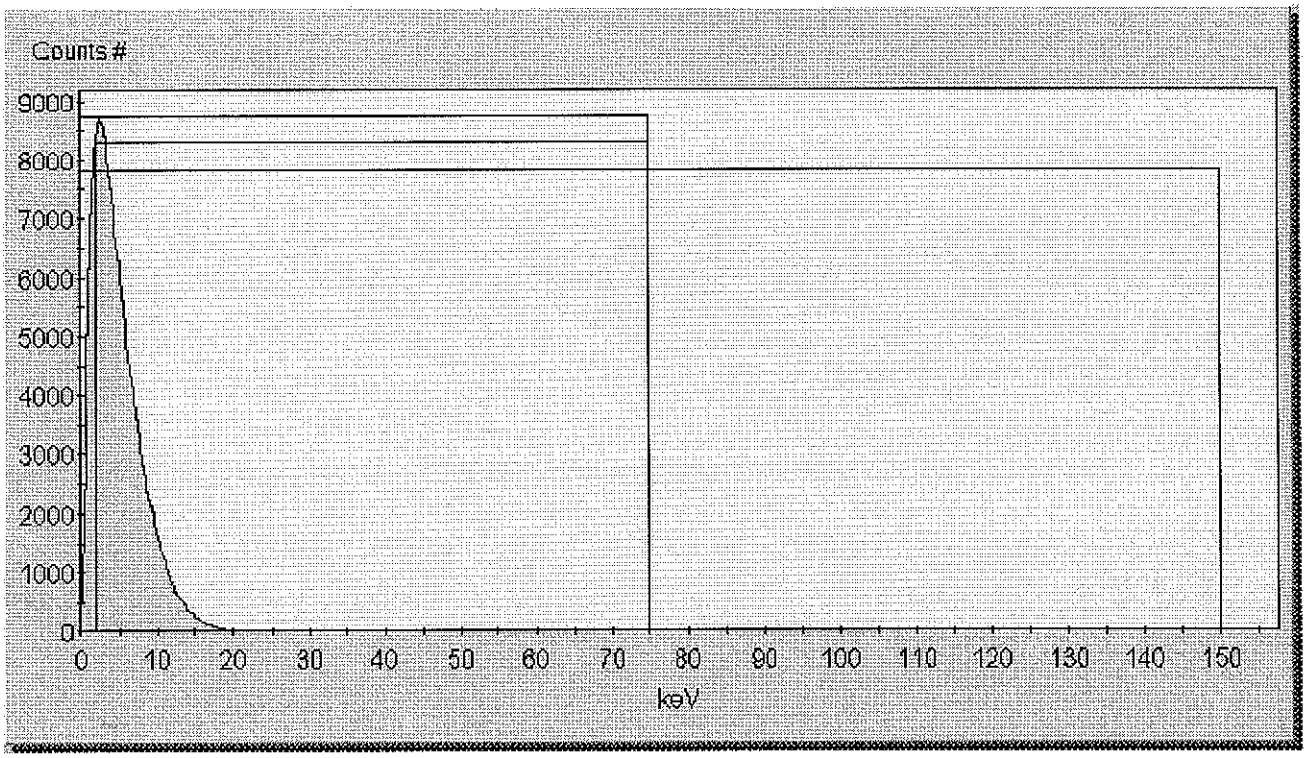
Half Life Correction: Off

Regions	Half Life	Units	Reference Date	Reference Time
A				
B				
C				

Cycle 1 Results

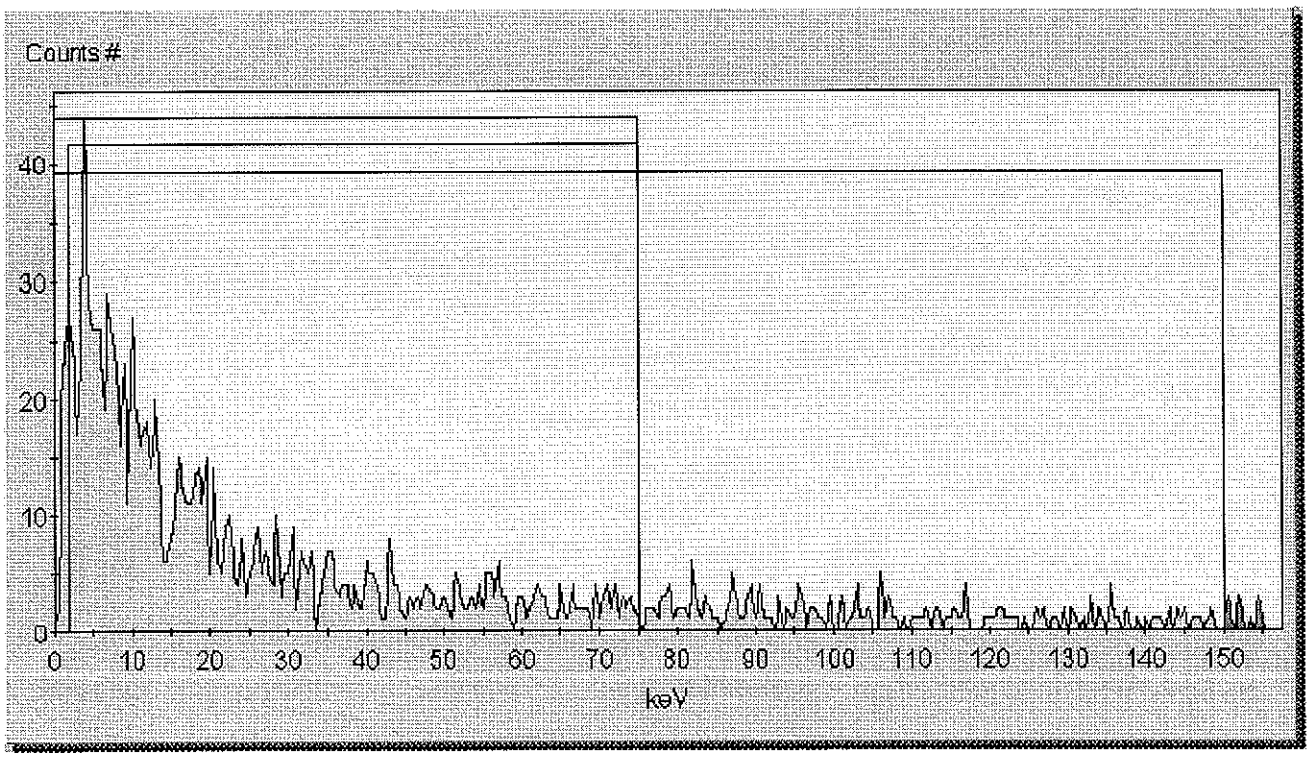
DATE	TIME	SMPL_ID	P#	PID	S#	CPMA	CPMB	CPMC	tSIE	Count Time
		16-03050-1-N63-01S	12	12	1	1855.2	1604.1	1858.6	224.75	60.00
3/14/2016	3:48:04 PM									

SpectraView Block Data



16-03050-1-N63-02S 12 12 2 18.8 18.0 22.0 224.20 60.00
3/14/2016 4:51:09 PM

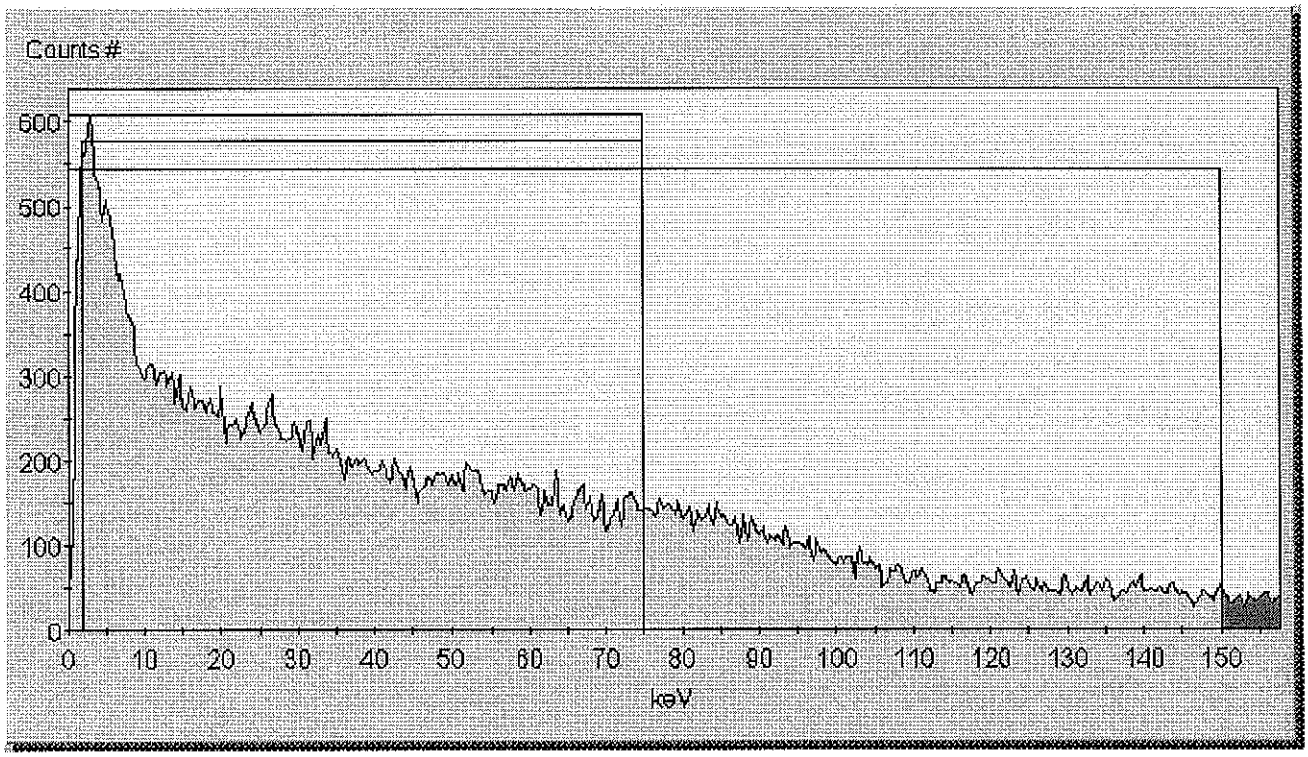
SpectraView Block Data



05 M 3/15/16

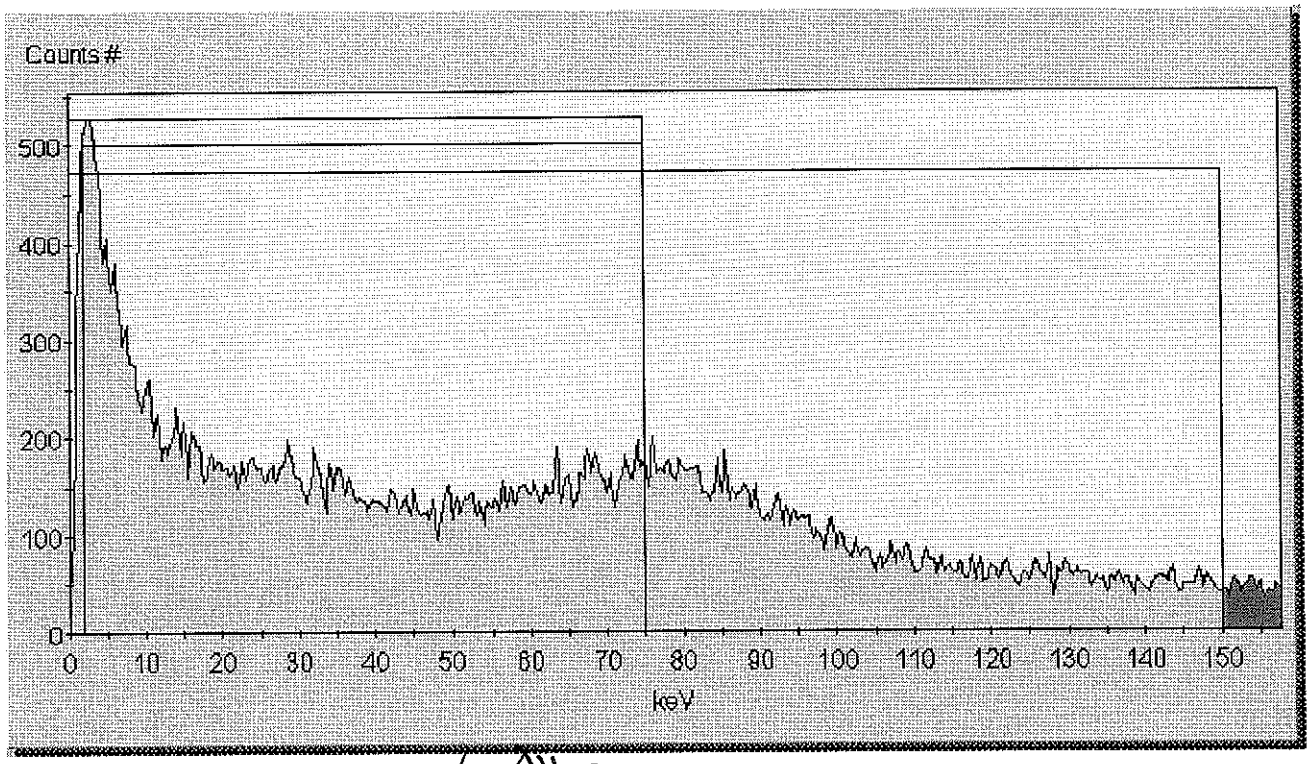
16-03050-1-N63-03S 12 12 3 577.1 560.5 772.1 184.63 60.00
3/14/2016 5:53:23 PM

SpectraView Block Data



16-03050-1-N63-04S 12 12 4 452.6 437.8 673.1 174.50 60.00
3/14/2016 6:56:29 PM

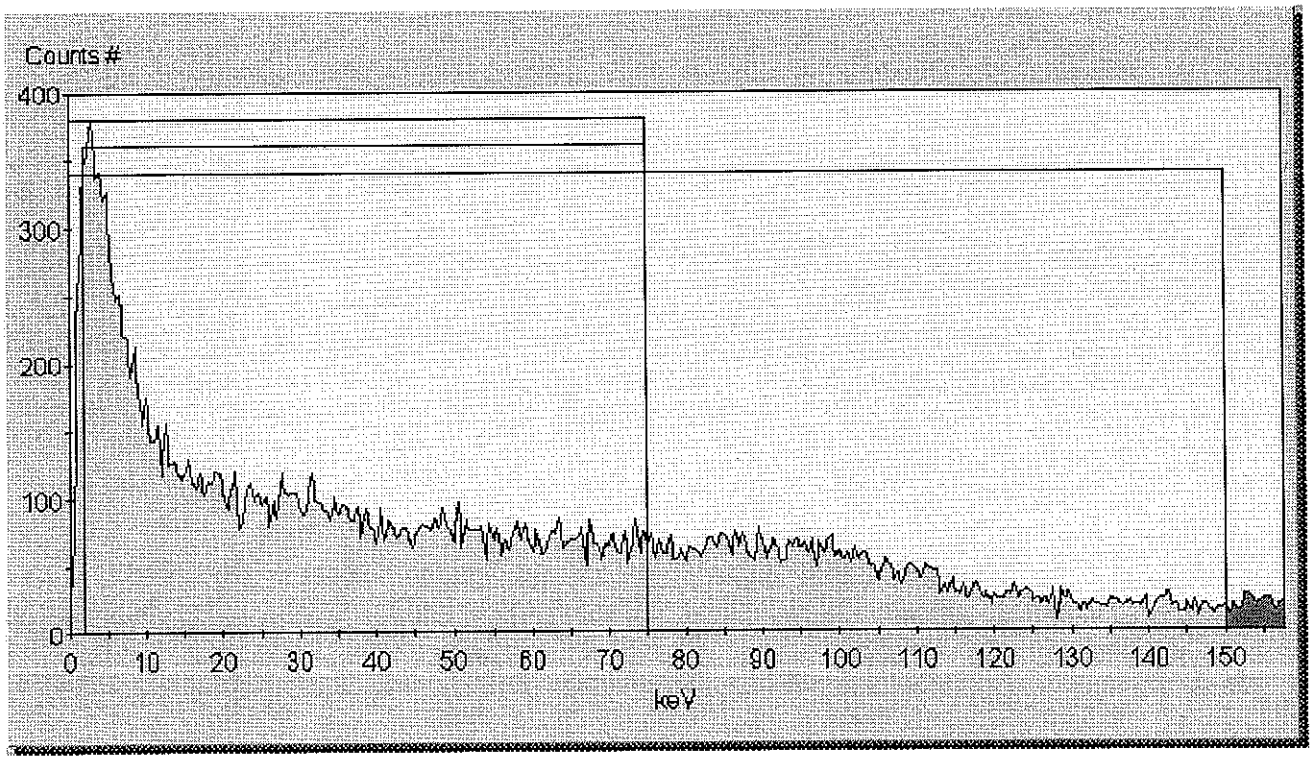
SpectraView Block Data



03 3/14/16

16-03050-1-N63-05S 12 12 5 272.1 262.2 374.0 210.29 60.00
3/14/2016 7:59:20 PM

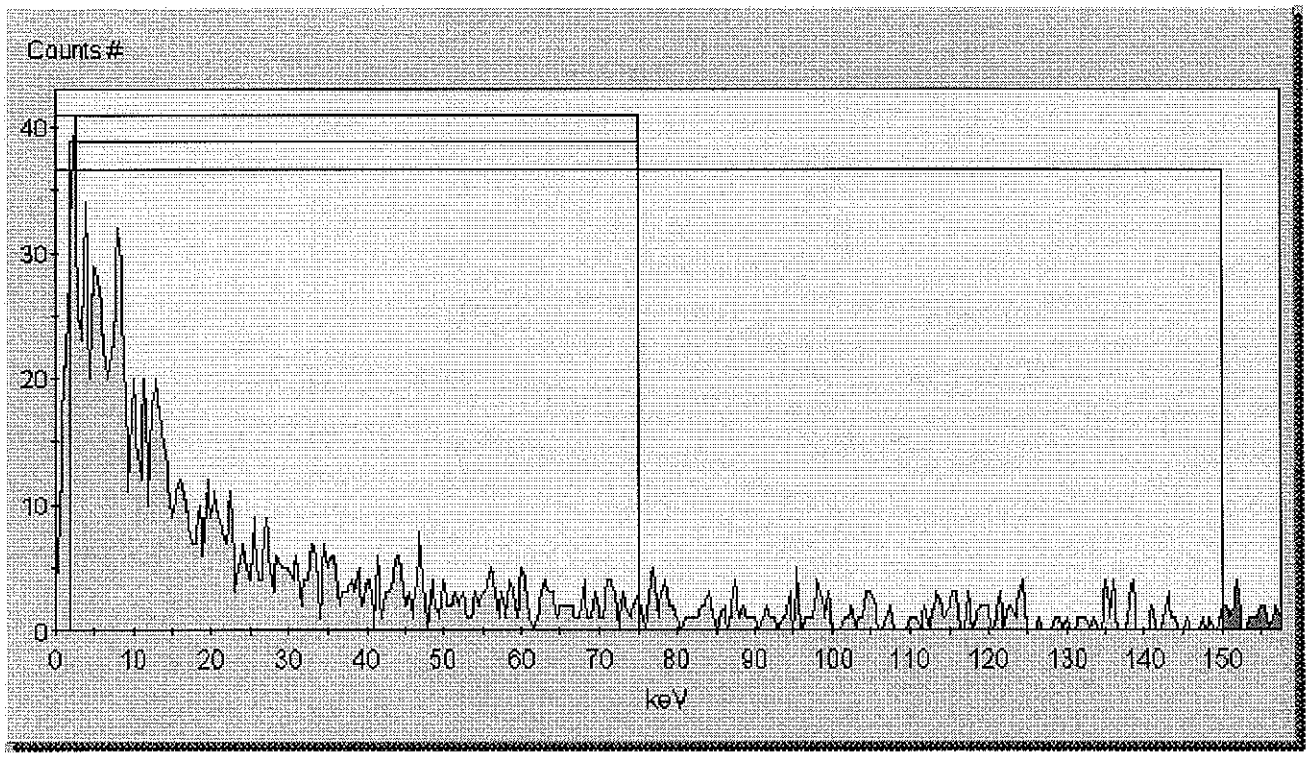
SpectraView Block Data



Sample #6	12	12	6	18.5	17.7	21.6	228.67	60.00

3/14/2016 9:02:25 PM

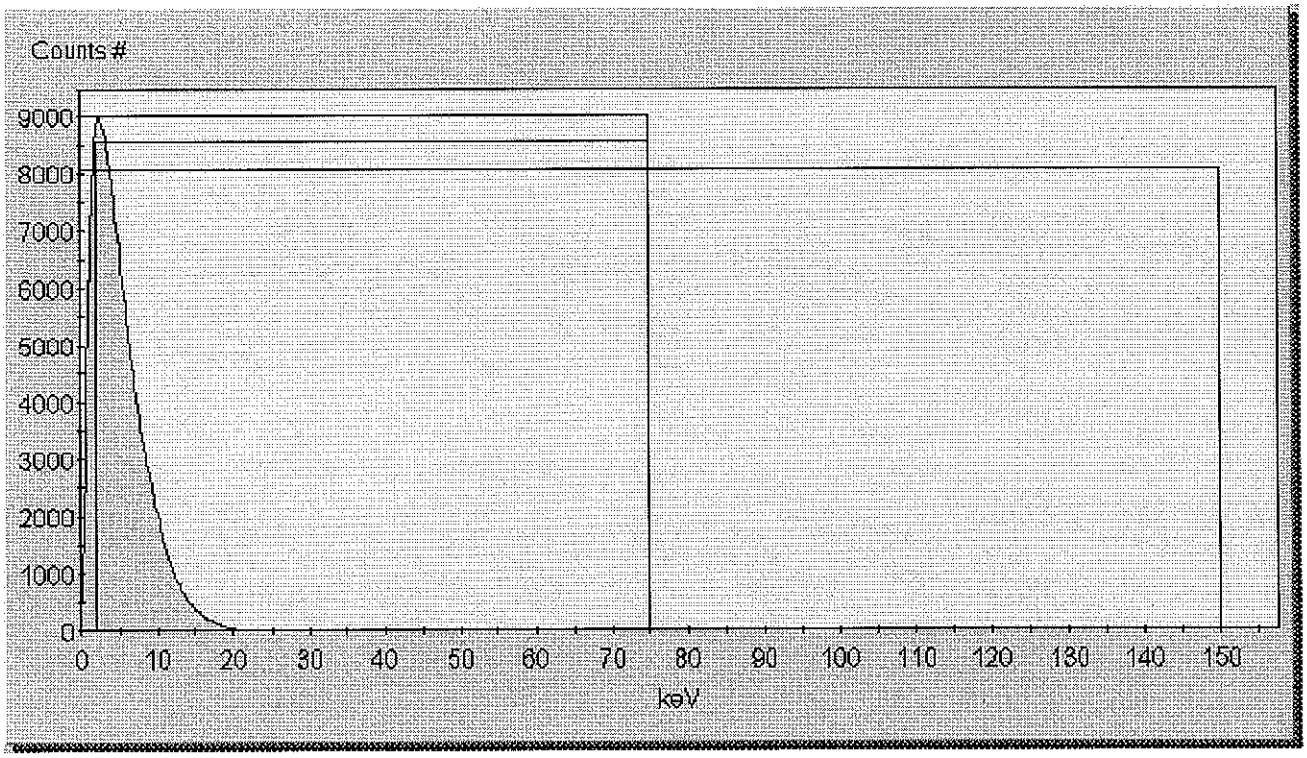
SpectraView Block Data



Sample #7	12	12	7	2026.6	1772.1	2029.6	245.82	60.00

3/14/2016 10:04:38 PM

SpectraView Block Data


Counts #
9000
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

3/14

Calibration Information
Software Version IC: 2.12
Software Version EC: 2.02
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 427086
3H Chi Square: 27.56 Date Processed: 3/14/2016 6:34:06 AM
14C Chi Square: 19.87 Date Processed: 3/14/2016 6:34:06 AM
3H E^2/B (1-18.6 keV): 267.49 Date Processed: 3/14/2016 6:34:06 AM
14C E^2/B (4-156 keV): 546.21 Date Processed: 3/14/2016 6:34:06 AM
3H Efficiency (0-18.6 keV): 62.02 Date Processed: 3/14/2016 6:34:06 AM
14C Efficiency (0-156 keV): 95.99 Date Processed: 3/14/2016 6:34:06 AM
IPA Background Date Processed: 3/14/2016 6:34:06 AM
3H Background CPM (0-18.6 keV): 14.28 Date Processed: 3/14/2016 6:34:06 AM
14C Background CPM (0-156 keV): 20.82 Date Processed: 3/14/2016 6:34:06 AM
3H Calibration DPM: 207400
3H Reference Date: 10/29/2007
14C Calibration DPM: 120521

SECTION XV

ANALYTICAL DATA (GAMMA SPECTROSCOPY)

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Gamma
Run 1

Work Order	16-03050
Analysis Code	Gamma
Run	1
Date Received	3/10/2016
Lab Deadline	3/16/2016
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		03/10/16 00:00	1.0000E+00
02	MBL	BLANK		03/10/16 00:00	1.0000E+00
03	DUP	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	2.8090E+01
04	DO	J1V8D3 SAF: RC-155	9520	03/07/16 13:40	2.8090E+01

* 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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
Gamma
Run 1

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.

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

16-03050
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								

* 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.

16290 : 0029

Preliminary Data Report & Analytical Calculations

Work Order: 16-03050-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	2.66E+03	1.55E+02	9.02E+00	2.65E+03	100.34	OK		03/10/16 00:00	1.00E+00	03/10/16 17:06	YES
01	CS-137	LCS	LCS	pCi/g	1.72E+03	1.57E+02	7.74E+00	1.68E+03	102.59	OK		03/10/16 00:00	1.00E+00	03/10/16 17:06	YES
02	AM-241	MBL	BLANK	pCi/g	-6.64E-01	1.11E+00	1.58E+00					03/10/16 00:00	1.00E+00	03/10/16 17:38	NO
02	CO-60	MBL	BLANK	pCi/g	1.50E-01	3.37E-01	9.98E-01					03/10/16 00:00	1.00E+00	03/10/16 17:38	NO
02	CS-137	MBL	BLANK	pCi/g	-3.41E-01	5.76E-01	7.82E-01					03/10/16 00:00	1.00E+00	03/10/16 17:38	NO
02	EU-152	MBL	BLANK	pCi/g	-1.39E-02	1.36E+00	1.65E+00					03/10/16 00:00	1.00E+00	03/10/16 17:38	NO
02	EU-154	MBL	BLANK	pCi/g	4.56E-01	1.25E+00	8.06E-01					03/10/16 00:00	1.00E+00	03/10/16 17:38	NO
02	EU-155	MBL	BLANK	pCi/g	1.16E+00	1.85E+00	2.52E+00					03/10/16 00:00	1.00E+00	03/10/16 17:38	NO
02	K-40	MBL	BLANK	pCi/g	2.86E+01	1.05E+01	1.10E+01					03/10/16 00:00	1.00E+00	03/10/16 17:38	YES
02	PA-234M	MBL	BLANK	pCi/g	1.99E+01	4.82E+01	9.31E+01					03/10/16 00:00	1.00E+00	03/10/16 17:38	NO
02	PB-212	MBL	BLANK	pCi/g	1.17E+00	6.12E-01	2.04E+00					03/10/16 00:00	1.00E+00	03/10/16 17:38	YES
02	PB-214	MBL	BLANK	pCi/g	1.47E+00	1.01E+00	1.55E+00					03/10/16 00:00	1.00E+00	03/10/16 17:38	YES
02	TH-234	MBL	BLANK	pCi/g	-3.52E-02	1.12E+01	1.65E+01					03/10/16 00:00	1.00E+00	03/10/16 17:38	NO
02	TL-208	MBL	BLANK	pCi/g	1.81E+00	1.38E+00	3.37E+00					03/10/16 00:00	1.00E+00	03/10/16 17:38	YES
02	U-235	MBL	BLANK	pCi/g	6.33E-02	2.59E+00	3.31E+00					03/10/16 00:00	1.00E+00	03/10/16 17:38	NO
03	AM-241	DUP	J1V8D3 SAF: RC-155	pCi/g	1.27E+03	9.34E+01	3.78E+01				NA	03/07/16 13:40	2.81E+01	03/10/16 15:44	YES
03	CO-60	DUP	J1V8D3 SAF: RC-155	pCi/g	-2.38E+00	3.93E+00	1.09E+01					03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
03	CS-137	DUP	J1V8D3 SAF: RC-155	pCi/g	9.57E+04	8.70E+03	9.82E+01				NA	03/07/16 13:40	2.81E+01	03/10/16 15:44	YES
03	EU-152	DUP	J1V8D3 SAF: RC-155	pCi/g	2.35E+01	6.75E+01	3.98E+01				NA	03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
03	EU-154	DUP	J1V8D3 SAF: RC-155	pCi/g	-1.38E+01	2.56E+01	2.02E+01					03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
03	EU-155	DUP	J1V8D3 SAF: RC-155	pCi/g	-7.83E+00	2.98E+01	2.50E+01					03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
03	K-40	DUP	J1V8D3 SAF: RC-155	pCi/g	1.61E+01	5.71E+01	8.26E+01					03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
03	PA-234M	DUP	J1V8D3 SAF: RC-155	pCi/g	-3.84E+02	1.19E+03	1.69E+03					03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
03	PB-212	DUP	J1V8D3 SAF: RC-155	pCi/g	-2.92E+01	2.24E+01	2.78E+01					03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
03	PB-214	DUP	J1V8D3 SAF: RC-155	pCi/g	-9.33E+00	3.55E+01	4.44E+01					03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
03	TH-234	DUP	J1V8D3 SAF: RC-155	pCi/g	-2.05E+02	1.19E+02	1.71E+02					03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
03	TL-208	DUP	J1V8D3 SAF: RC-155	pCi/g	1.18E+01	3.31E+00	3.63E+00					03/07/16 13:40	2.81E+01	03/10/16 15:44	YES
03	U-235	DUP	J1V8D3 SAF: RC-155	pCi/g	-2.24E+01	6.55E+01	8.19E+01					03/07/16 13:40	2.81E+01	03/10/16 15:44	NO
04	AM-241	DO	J1V8D3 SAF: RC-155	pCi/g	1.28E+03	9.40E+01	3.79E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	YES
04	CO-60	DO	J1V8D3 SAF: RC-155	pCi/g	1.28E+01	9.53E+00	1.09E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO
04	CS-137	DO	J1V8D3 SAF: RC-155	pCi/g	9.62E+04	8.75E+03	4.78E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	YES
04	EU-152	DO	J1V8D3 SAF: RC-155	pCi/g	-2.53E+01	6.75E+01	3.97E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO
04	EU-154	DO	J1V8D3 SAF: RC-155	pCi/g	1.80E+01	2.55E+01	2.02E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO
04	EU-155	DO	J1V8D3 SAF: RC-155	pCi/g	1.80E+01	2.99E+01	2.49E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO
04	K-40	DO	J1V8D3 SAF: RC-155	pCi/g	1.99E+01	5.67E+01	8.22E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO
04	PA-234M	DO	J1V8D3 SAF: RC-155	pCi/g	-1.19E+02	6.29E+02	1.69E+03					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO
04	PB-212	DO	J1V8D3 SAF: RC-155	pCi/g	2.77E+01	2.04E+01	3.39E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	YES
04	PB-214	DO	J1V8D3 SAF: RC-155	pCi/g	2.24E+01	3.55E+01	4.46E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO

Work Order: 16-03050-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	TH-234	DO	J1V8D3 SAF: RC-155	pCi/g	-3.30E+01	1.18E+02	1.72E+02					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO
04	TL-208	DO	J1V8D3 SAF: RC-155	pCi/g	4.83E+01	3.87E+01	6.61E+00					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO
04	U-235	DO	J1V8D3 SAF: RC-155	pCi/g	-5.33E+01	6.62E+01	8.19E+01					03/07/16 13:40	2.81E+01	03/10/16 16:25	NO

Count Room Report
Client: Washington Closure Hanfor

16-03050-Gamma-1 (pCi/g) in
Tracer ID:

30 mins

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	03/10/16 00:00	1.0000				0.00		
02	MBL	BLANK	03/10/16 00:00	1.0000				0.00		
03	DUP	J1V8D3 SAF: RC-155	03/07/16 13:40	28.0900				0.00		
04	DO	J1V8D3 SAF: RC-155	03/07/16 13:40	28.0900				0.00		

00297

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
16-03050	1	Gamma	grams	3/16/2016	KSALLINGS

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	J1V8D3 SAF: RC-155	DUP					2.8090E+01	2.8090E+01				
04	J1V8D3 SAF: RC-155	DO					2.8090E+01	2.8090E+01				

Comments	

Technician: Kenny Sally Date: 3/10/16

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-1307
LPGAS-13

94264

Sand in Falcon Petri Filled to Top

Customer: Eberline Analytical Corporation
P.O. No.: 1304009, Item 3 Product Code: 8401-EG-SAN
Reference Date: 01-Jul-2013 12:00 PM EST **Grams of Master Source:** 0.018434

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	———	2.145E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.641E+05	3.024E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.865E+04	1.634E+03	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.243E+05	2.291E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.627E+05	4.842E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.736E+05	3.201E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.120E+05	2.065E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.197E+05	7.737E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.074E+05	3.823E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.074E+05	3.824E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.444E+05	8.191E+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

Apex-Gamma

Analysis Report for 1603050-01

GAS 1307

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1603050-01
Sample Description	: GAS 1307
Sample Type	: SOIL
Sample Size	: 3.900E+01 grams
Facility	: Countroom
Sample Taken On	: 7/1/2013 4:47:29PM
Acquisition Started	: 3/10/2016 5:06:50PM
Procedure	: GAS-1407 pCi
Operator	: Administrator
Detector Name	: GE2
Geometry	: GAS-1407
Live Time	: 1800.0 seconds
Real Time	: 1888.8 seconds
Dead Time	: 4.70 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 5 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 11/2/2014
Efficiency Calibration Used Done On	: 10/25/2014
Efficiency Calibration Description	:
Sample Number	: 34265

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

3/11/16

Analysis Report for 1603050-01

GAS 1307

PEAK LOCATE REPORT

Peak Locate Performed on : 3/10/2016 5:38:23PM
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	12.08	12.21	0.0000	0.00
2	14.88	15.00	0.0000	0.00
3	18.09	18.21	0.0000	0.00
4	22.00	22.12	0.0000	0.00
5	24.67	24.79	0.0000	0.00
6	32.06	32.17	0.0000	0.00
7	36.56	36.67	0.0000	0.00
8	43.39	43.50	0.0000	0.00
9	50.51	50.61	0.0000	0.00
10	59.56	59.65	0.0000	0.00
11	67.58	67.67	0.0000	0.00
12	70.32	70.41	0.0000	0.00
13	88.03	88.11	0.0000	0.00
14	98.61	98.68	0.0000	0.00
15	122.05	122.11	0.0000	0.00
16	136.42	136.47	0.0000	0.00
17	165.83	165.86	0.0000	0.00
18	310.54	310.49	0.0000	0.00
19	391.65	391.56	0.0000	0.00
20	583.16	582.98	0.0000	0.00
21	661.69	661.48	0.0000	0.00
22	682.35	682.12	0.0000	0.00
23	771.68	771.42	0.0000	0.00
24	821.89	821.60	0.0000	0.00
25	838.69	838.40	0.0000	0.00
26	897.89	897.57	0.0000	0.00
27	958.68	958.34	0.0000	0.00
28	1153.13	1152.71	0.0000	0.00
29	1173.40	1172.98	0.0000	0.00
30	1195.10	1194.66	0.0000	0.00
31	1332.70	1332.22	0.0000	0.00
32	1349.47	1348.98	0.0000	0.00
33	1353.87	1353.38	0.0000	0.00
34	1366.31	1365.82	0.0000	0.00
35	1574.35	1573.79	0.0000	0.00
36	1745.59	1744.99	0.0000	0.00
37	1835.88	1835.26	0.0000	0.00
38	1844.28	1843.65	0.0000	0.00
39	2228.36	2227.66	0.0000	0.00
40	2302.55	2301.84	0.0000	0.00
41	2418.64	2417.92	0.0000	0.00
42	2505.64	2504.90	0.0000	0.00

Analysis Report for 1603050-01

GAS 1307

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1603050-01

GAS 1307

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/10/2016 5:38:23PM

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	12.08	9 -	28	12.21	7.44E+04	784.68	5.08E+04	1.21
m	2	14.88	9 -	28	15.00	1.59E+04	507.09	3.77E+04	1.00
m	3	18.09	9 -	28	18.21	2.65E+04	595.81	5.01E+04	1.21
m	4	22.00	9 -	28	22.12	1.02E+06	2252.97	4.74E+04	1.21
m	5	24.67	9 -	28	24.79	2.78E+05	1644.22	4.36E+04	1.21
	6	32.06	30 -	35	32.17	1.81E+04	542.76	4.51E+04	1.40
	7	36.56	36 -	39	36.67	3.52E+03	355.94	2.74E+04	2.55
	8	43.39	42 -	45	43.50	8.97E+02	376.47	3.51E+04	1.71
M	9	50.51	46 -	63	50.61	1.96E+04	607.24	4.74E+04	1.61
m	10	59.56	46 -	63	59.65	4.69E+05	1488.50	2.85E+04	1.35
M	11	67.58	66 -	74	67.67	2.06E+03	361.61	3.00E+04	2.60
m	12	70.32	66 -	74	70.41	1.68E+03	621.31	6.25E+04	2.60
	13	88.03	84 -	91	88.11	1.71E+05	981.15	4.62E+04	1.26
	14	98.61	97 -	100	98.68	4.92E+02	237.49	1.35E+04	1.23
	15	122.05	118 -	125	122.11	3.01E+04	514.08	2.39E+04	1.26
	16	136.42	133 -	140	136.47	3.97E+03	378.76	2.13E+04	1.93
	17	165.83	164 -	169	165.86	2.81E+03	293.45	1.50E+04	1.35
	18	310.54	309 -	313	310.49	2.32E+02	237.50	1.23E+04	1.82
	19	391.65	389 -	393	391.56	7.13E+02	239.15	1.21E+04	1.72
	20	583.16	581 -	586	582.98	1.71E+02	195.28	7.46E+03	3.12
	21	661.69	657 -	666	661.48	1.14E+05	742.08	1.36E+04	2.03
	22	682.35	679 -	685	682.12	2.78E+02	222.63	8.79E+03	2.76
	23	771.68	769 -	774	771.42	1.88E+02	195.79	7.51E+03	2.84
	24	821.89	819 -	825	821.60	2.99E+02	239.25	1.02E+04	2.51
	25	838.69	836 -	841	838.40	1.99E+02	209.52	8.62E+03	2.03
	26	897.89	894 -	901	897.57	6.22E+02	293.69	1.40E+04	2.28
	27	958.68	956 -	961	958.34	3.04E+02	252.01	1.25E+04	3.42
	28	1153.13	1151 -	1156	1152.71	1.30E+02	152.06	4.52E+03	3.10
	29	1173.40	1167 -	1178	1172.98	8.72E+04	652.38	9.60E+03	2.12
	30	1195.10	1191 -	1198	1194.66	2.76E+02	163.84	4.23E+03	5.03
	31	1332.70	1326 -	1338	1332.22	7.87E+04	583.11	3.00E+03	2.27
M	32	1349.47	1347 -	1358	1348.98	7.53E+01	55.28	7.44E+02	2.16
m	33	1353.87	1347 -	1358	1353.38	2.15E+02	122.77	1.83E+03	3.77
	34	1366.31	1364 -	1368	1365.82	5.03E+01	52.33	5.65E+02	2.97
	35	1574.35	1570 -	1577	1573.79	5.54E+01	66.63	7.01E+02	4.43
	36	1745.59	1740 -	1749	1744.99	5.62E+01	67.59	6.22E+02	7.44
	37	1835.88	1829 -	1841	1835.26	4.16E+02	90.43	7.64E+02	2.62
	38	1844.28	1842 -	1846	1843.65	3.56E+01	39.69	3.23E+02	3.16
	39	2228.36	2224 -	2232	2227.66	4.51E+01	55.03	4.42E+02	5.74
	40	2302.55	2299 -	2306	2301.84	5.25E+01	43.27	2.79E+02	3.78

Analysis Report for 1603050-01

GAS 1307

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
41	2418.64	2407 -	2428	2417.92	4.77E+01	36.28	7.86E+01	16.82
42	2505.64	2498 -	2511	2504.90	2.29E+03	100.59	1.04E+02	2.83

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 : 3/10/2016 5:38:23PM

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	12.08	9 -	28	7.44E+04	784.68	5.08E+04	3.71E+02
m	2	14.88	9 -	28	1.59E+04	507.09	3.77E+04	3.19E+02
m	3	18.09	9 -	28	2.65E+04	595.81	5.01E+04	3.68E+02
m	4	22.00	9 -	28	1.02E+06	2252.97	4.74E+04	3.58E+02
m	5	24.67	9 -	28	2.78E+05	1644.22	4.36E+04	3.43E+02
	6	32.06	30 -	35	1.81E+04	542.76	4.51E+04	3.87E+02
	7	36.56	36 -	39	3.52E+03	355.94	2.74E+04	2.76E+02
	8	43.39	42 -	45	8.97E+02	376.47	3.51E+04	3.06E+02
M	9	50.51	46 -	63	1.96E+04	607.24	4.74E+04	3.58E+02
m	10	59.56	46 -	63	4.69E+05	1488.50	2.85E+04	2.78E+02
M	11	67.58	66 -	74	2.06E+03	361.61	3.00E+04	2.85E+02
m	12	70.32	66 -	74	1.68E+03	621.31	6.25E+04	4.11E+02
	13	88.03	84 -	91	1.71E+05	981.15	4.62E+04	4.33E+02
	14	98.61	97 -	100	4.92E+02	237.49	1.35E+04	1.92E+02
	15	122.05	118 -	125	3.01E+04	514.08	2.39E+04	3.12E+02
	16	136.42	133 -	140	3.97E+03	378.76	2.13E+04	2.94E+02
	17	165.83	164 -	169	2.81E+03	293.45	1.50E+04	2.25E+02
	18	310.54	309 -	313	2.32E+02	237.50	1.23E+04	1.94E+02
	19	391.65	389 -	393	7.13E+02	239.15	1.21E+04	1.92E+02
	20	583.16	581 -	586	1.71E+02	195.28	7.46E+03	1.59E+02
	21	661.69	657 -	666	1.14E+05	742.08	1.36E+04	2.54E+02
	22	682.35	679 -	685	2.78E+02	222.63	8.79E+03	1.81E+02
	23	771.68	769 -	774	1.88E+02	195.79	7.51E+03	1.59E+02
	24	821.89	819 -	825	2.99E+02	239.25	1.02E+04	1.95E+02
	25	838.69	836 -	841	1.99E+02	209.52	8.62E+03	1.71E+02

Analysis Report for 1603050-01

GAS 1307

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
	26	897.89	894 -	901	6.22E+02	293.69	1.40E+04	2.38E+02
	27	958.68	956 -	961	3.04E+02	252.01	1.25E+04	2.05E+02
	28	1153.13	1151 -	1156	1.30E+02	152.06	4.52E+03	1.24E+02
	29	1173.40	1167 -	1178	8.72E+04	652.38	9.60E+03	2.28E+02
	30	1195.10	1191 -	1198	2.76E+02	163.84	4.23E+03	1.32E+02
	31	1332.70	1326 -	1338	7.87E+04	583.11	3.00E+03	1.31E+02
M	32	1349.47	1347 -	1358	7.53E+01	55.28	7.44E+02	4.48E+01
m	33	1353.87	1347 -	1358	2.15E+02	122.77	1.83E+03	7.03E+01
	34	1366.31	1364 -	1368	5.03E+01	52.33	5.65E+02	4.14E+01
	35	1574.35	1570 -	1577	5.54E+01	66.63	7.01E+02	5.34E+01
	36	1745.59	1740 -	1749	5.62E+01	67.59	6.22E+02	5.42E+01
	37	1835.88	1829 -	1841	4.16E+02	90.43	7.64E+02	6.63E+01
	38	1844.28	1842 -	1846	3.56E+01	39.69	3.23E+02	3.11E+01
	39	2228.36	2224 -	2232	4.51E+01	55.03	4.42E+02	4.39E+01
	40	2302.55	2299 -	2306	5.25E+01	43.27	2.79E+02	3.35E+01
	41	2418.64	2407 -	2428	4.77E+01	36.28	7.86E+01	2.76E+01
	42	2505.64	2498 -	2511	2.29E+03	100.59	1.04E+02	2.52E+01

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 : 3/10/2016 5:38:23PM

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	12.08	9 -	28	12.21	7.44E+04	784.68	5.08E+04	.....
m	2	14.88	9 -	28	15.00	1.59E+04	507.09	3.77E+04	.....
m	3	18.09	9 -	28	18.21	2.65E+04	595.81	5.01E+04	.....
m	4	22.00	9 -	28	22.12	1.02E+06	2252.97	4.74E+04	.....
m	5	24.67	9 -	28	24.79	2.78E+05	1644.22	4.36E+04	TH-231
	6	32.06	30 -	35	32.17	1.81E+04	542.76	4.51E+04	.....
	7	36.56	36 -	39	36.67	3.52E+03	355.94	2.74E+04	PM-145
									PM-145

Analysis Report for 1603050-01

GAS 1307

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	8	43.39	42 -	45	43.50	8.97E+02	376.47	3.51E+04	.....
M	9	50.51	46 -	63	50.61	1.96E+04	607.24	4.74E+04	TH-227
									TE-132
m	10	59.56	46 -	63	59.65	4.69E+05	1488.50	2.85E+04	AM-241
M	11	67.58	66 -	74	67.67	2.06E+03	361.61	3.00E+04	TH-230
									TA-182
									TI-44
									TM-171
m	12	70.32	66 -	74	70.41	1.68E+03	621.31	6.25E+04	.....
	13	88.03	84 -	91	88.11	1.71E+05	981.15	4.62E+04	CD-109
									LU-176
									SN-126
	14	98.61	97 -	100	98.68	4.92E+02	237.49	1.35E+04	.....
	15	122.05	118 -	125	122.11	3.01E+04	514.08	2.39E+04	CO-57
									EU-152
									SE-75
	16	136.42	133 -	140	136.47	3.97E+03	378.76	2.13E+04	CO-57
									SE-75
	17	165.83	164 -	169	165.86	2.81E+03	293.45	1.50E+04	CE-139
	18	310.54	309 -	313	310.49	2.32E+02	237.50	1.23E+04	.....
	19	391.65	389 -	393	391.56	7.13E+02	239.15	1.21E+04	SN-113
	20	583.16	581 -	586	582.98	1.71E+02	195.28	7.46E+03	TL-208
	21	661.69	657 -	666	661.48	1.14E+05	742.08	1.36E+04	CS-137
	22	682.35	679 -	685	682.12	2.78E+02	222.63	8.79E+03	.....
	23	771.68	769 -	774	771.42	1.88E+02	195.79	7.51E+03	.....
	24	821.89	819 -	825	821.60	2.99E+02	239.25	1.02E+04	.....
	25	838.69	836 -	841	838.40	1.99E+02	209.52	8.62E+03	.....
	26	897.89	894 -	901	897.57	6.22E+02	293.69	1.40E+04	Y-88
	27	958.68	956 -	961	958.34	3.04E+02	252.01	1.25E+04	.....
	28	1153.13	1151 -	1156	1152.71	1.30E+02	152.06	4.52E+03	EU-156
	29	1173.40	1167 -	1178	1172.98	8.72E+04	652.38	9.60E+03	CO-60
	30	1195.10	1191 -	1198	1194.66	2.76E+02	163.84	4.23E+03	.....
	31	1332.70	1326 -	1338	1332.22	7.87E+04	583.11	3.00E+03	CO-60
M	32	1349.47	1347 -	1358	1348.98	7.53E+01	55.28	7.44E+02	.....
m	33	1353.87	1347 -	1358	1353.38	2.15E+02	122.77	1.83E+03	.....
	34	1366.31	1364 -	1368	1365.82	5.03E+01	52.33	5.65E+02	.....
	35	1574.35	1570 -	1577	1573.79	5.54E+01	66.63	7.01E+02	.....
	36	1745.59	1740 -	1749	1744.99	5.62E+01	67.59	6.22E+02	.....
	37	1835.88	1829 -	1841	1835.26	4.16E+02	90.43	7.64E+02	Y-88
	38	1844.28	1842 -	1846	1843.65	3.56E+01	39.69	3.23E+02	.....
	39	2228.36	2224 -	2232	2227.66	4.51E+01	55.03	4.42E+02	.....
	40	2302.55	2299 -	2306	2301.84	5.25E+01	43.27	2.79E+02	.....
	41	2418.64	2407 -	2428	2417.92	4.77E+01	36.28	7.86E+01	.....
	42	2505.64	2498 -	2511	2504.90	2.29E+03	100.59	1.04E+02	.....

Analysis Report for 1603050-01

GAS 1307

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 : 3/10/2016 5:38:23PM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
M	1	12.08	7.44E+04	784.68	3.77E-04	9.36E-03
m	2	14.88	1.59E+04	507.09	2.03E-03	9.36E-03
m	3	18.09	2.65E+04	595.81	6.96E-03	9.36E-03
m	4	22.00	1.02E+06	2252.97	1.80E-02	9.36E-03
m	5	24.67	2.78E+05	1644.22	2.81E-02	9.36E-03
	6	32.06	1.81E+04	542.76	5.98E-02	9.36E-03
	7	36.56	3.52E+03	355.94	7.81E-02	9.36E-03
	8	43.39	8.97E+02	376.47	1.01E-01	9.36E-03
M	9	50.51	1.96E+04	607.24	1.17E-01	9.36E-03
m	10	59.56	4.69E+05	1488.50	1.30E-01	9.36E-03
M	11	67.58	2.06E+03	361.61	1.35E-01	1.00E-02
m	12	70.32	1.68E+03	621.31	1.36E-01	1.03E-02
	13	88.03	1.71E+05	981.15	1.35E-01	1.17E-02
	14	98.61	4.92E+02	237.49	1.31E-01	1.19E-02
	15	122.05	3.01E+04	514.08	1.21E-01	1.24E-02
	16	136.42	3.97E+03	378.76	1.14E-01	1.18E-02
	17	165.83	2.81E+03	293.45	1.02E-01	1.05E-02
	18	310.54	2.32E+02	237.50	6.35E-02	5.22E-03
	19	391.65	7.13E+02	239.15	5.19E-02	4.11E-03
	20	583.16	1.71E+02	195.28	3.59E-02	3.28E-03
	21	661.69	1.14E+05	742.08	3.18E-02	2.94E-03
	22	682.35	2.78E+02	222.63	3.08E-02	2.88E-03
	23	771.68	1.88E+02	195.79	2.73E-02	2.64E-03
	24	821.89	2.99E+02	239.25	2.57E-02	2.50E-03
	25	838.69	1.99E+02	209.52	2.52E-02	2.45E-03
	26	897.89	6.22E+02	293.69	2.35E-02	2.28E-03
	27	958.68	3.04E+02	252.01	2.20E-02	2.10E-03
	28	1153.13	1.30E+02	152.06	1.84E-02	1.51E-03
	29	1173.40	8.72E+04	652.38	1.81E-02	1.45E-03
	30	1195.10	2.76E+02	163.84	1.78E-02	1.44E-03
	31	1332.70	7.87E+04	583.11	1.61E-02	1.41E-03
M	32	1349.47	7.53E+01	55.28	1.59E-02	1.39E-03
m	33	1353.87	2.15E+02	122.77	1.59E-02	1.39E-03
	34	1366.31	5.03E+01	52.33	1.57E-02	1.38E-03

Analysis Report for 1603050-01

GAS 1307

Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
35	1574.35	5.54E+01	66.63	1.39E-02	1.18E-03
36	1745.59	5.62E+01	67.59	1.28E-02	1.01E-03
37	1835.88	4.16E+02	90.43	1.23E-02	9.22E-04
38	1844.28	3.56E+01	39.69	1.23E-02	9.22E-04
39	2228.36	4.51E+01	55.03	1.09E-02	9.22E-04
40	2302.55	5.25E+01	43.27	1.07E-02	9.22E-04
41	2418.64	4.77E+01	36.28	1.05E-02	9.22E-04
42	2505.64	2.29E+03	100.59	1.04E-02	9.22E-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 : 3/10/2016 5:38:23PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000033933.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	12.08	7.44E+04	784.68			7.44E+04	7.85E+02
m	2	14.88	1.59E+04	507.09			1.59E+04	5.07E+02
m	3	18.09	2.65E+04	595.81	6.29E+01	9.51E+00	2.65E+04	5.96E+02
m	4	22.00	1.02E+06	2252.97			1.02E+06	2.25E+03
m	5	24.67	2.78E+05	1644.22			2.78E+05	1.64E+03
	6	32.06	1.81E+04	542.76			1.81E+04	5.43E+02
	7	36.56	3.52E+03	355.94			3.52E+03	3.56E+02
	8	43.39	8.97E+02	376.47			8.97E+02	3.76E+02
M	9	50.51	1.96E+04	607.24			1.96E+04	6.07E+02
m	10	59.56	4.69E+05	1488.50			4.69E+05	1.49E+03
M	11	67.58	2.06E+03	361.61			2.06E+03	3.62E+02
m	12	70.32	1.68E+03	621.31			1.68E+03	6.21E+02
	13	88.03	1.71E+05	981.15			1.71E+05	9.81E+02
	14	98.61	4.92E+02	237.49			4.92E+02	2.37E+02
	15	122.05	3.01E+04	514.08			3.01E+04	5.14E+02
	16	136.42	3.97E+03	378.76			3.97E+03	3.79E+02
	17	165.83	2.81E+03	293.45			2.81E+03	2.93E+02
	18	310.54	2.32E+02	237.50			2.32E+02	2.38E+02
	19	391.65	7.13E+02	239.15			7.13E+02	2.39E+02
	20	583.16	1.71E+02	195.28	4.97E+00	1.99E+00	1.66E+02	1.95E+02
	21	661.69	1.14E+05	742.08			1.14E+05	7.42E+02
	22	682.35	2.78E+02	222.63			2.78E+02	2.23E+02

Analysis Report for 1603050-01

GAS 1307

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	23	771.68	1.88E+02	195.79			1.88E+02	1.96E+02
	24	821.89	2.99E+02	239.25			2.99E+02	2.39E+02
	25	838.69	1.99E+02	209.52			1.99E+02	2.10E+02
	26	897.89	6.22E+02	293.69			6.22E+02	2.94E+02
	27	958.68	3.04E+02	252.01			3.04E+02	2.52E+02
	28	1153.13	1.30E+02	152.06			1.30E+02	1.52E+02
	29	1173.40	8.72E+04	652.38			8.72E+04	6.52E+02
	30	1195.10	2.76E+02	163.84			2.76E+02	1.64E+02
	31	1332.70	7.87E+04	583.11			7.87E+04	5.83E+02
M	32	1349.47	7.53E+01	55.28			7.53E+01	5.53E+01
m	33	1353.87	2.15E+02	122.77			2.15E+02	1.23E+02
	34	1366.31	5.03E+01	52.33			5.03E+01	5.23E+01
	35	1574.35	5.54E+01	66.63			5.54E+01	6.66E+01
	36	1745.59	5.62E+01	67.59			5.62E+01	6.76E+01
	37	1835.88	4.16E+02	90.43			4.16E+02	9.04E+01
	38	1844.28	3.56E+01	39.69			3.56E+01	3.97E+01
	39	2228.36	4.51E+01	55.03			4.51E+01	5.50E+01
	40	2302.55	5.25E+01	43.27			5.25E+01	4.33E+01
	41	2418.64	4.77E+01	36.28			4.77E+01	3.63E+01
	42	2505.64	2.29E+03	100.59			2.29E+03	1.01E+02

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 : 3/10/2016 5:38:23PM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000033933.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	12.08	7.44E+04	784.68			7.44E+04	7.85E+02
m	2	14.88	1.59E+04	507.09			1.59E+04	5.07E+02
m	3	18.09	2.65E+04	595.81	6.29E+01	9.51E+00	2.65E+04	5.96E+02
m	4	22.00	1.02E+06	2252.97			1.02E+06	2.25E+03
m	5	24.67	2.78E+05	1644.22			2.78E+05	1.64E+03
	6	32.06	1.81E+04	542.76			1.81E+04	5.43E+02
	7	36.56	3.52E+03	355.94			3.52E+03	3.56E+02
	8	43.39	8.97E+02	376.47			8.97E+02	3.76E+02

Analysis Report for 1603050-01

GAS 1307

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
M	9	50.51	1.96E+04	607.24			1.96E+04	6.07E+02
m	10	59.56	4.69E+05	1488.50			4.69E+05	1.49E+03
M	11	67.58	2.06E+03	361.61			2.06E+03	3.62E+02
m	12	70.32	1.68E+03	621.31			1.68E+03	6.21E+02
	13	88.03	1.71E+05	981.15			1.71E+05	9.81E+02
	14	98.61	4.92E+02	237.49			4.92E+02	2.37E+02
	15	122.05	3.01E+04	514.08			3.01E+04	5.14E+02
	16	136.42	3.97E+03	378.76			3.97E+03	3.79E+02
	17	165.83	2.81E+03	293.45			2.81E+03	2.93E+02
	18	310.54	2.32E+02	237.50			2.32E+02	2.38E+02
	19	391.65	7.13E+02	239.15			7.13E+02	2.39E+02
	20	583.16	1.71E+02	195.28	4.97E+00	1.99E+00	1.66E+02	1.95E+02
	21	661.69	1.14E+05	742.08			1.14E+05	7.42E+02
	22	682.35	2.78E+02	222.63			2.78E+02	2.23E+02
	23	771.68	1.88E+02	195.79			1.88E+02	1.96E+02
	24	821.89	2.99E+02	239.25			2.99E+02	2.39E+02
	25	838.69	1.99E+02	209.52			1.99E+02	2.10E+02
	26	897.89	6.22E+02	293.69			6.22E+02	2.94E+02
	27	958.68	3.04E+02	252.01			3.04E+02	2.52E+02
	28	1153.13	1.30E+02	152.06			1.30E+02	1.52E+02
	29	1173.40	8.72E+04	652.38			8.72E+04	6.52E+02
	30	1195.10	2.76E+02	163.84			2.76E+02	1.64E+02
	31	1332.70	7.87E+04	583.11			7.87E+04	5.83E+02
M	32	1349.47	7.53E+01	55.28			7.53E+01	5.53E+01
m	33	1353.87	2.15E+02	122.77			2.15E+02	1.23E+02
	34	1366.31	5.03E+01	52.33			5.03E+01	5.23E+01
	35	1574.35	5.54E+01	66.63			5.54E+01	6.66E+01
	36	1745.59	5.62E+01	67.59			5.62E+01	6.76E+01
	37	1835.88	4.16E+02	90.43			4.16E+02	9.04E+01
	38	1844.28	3.56E+01	39.69			3.56E+01	3.97E+01
	39	2228.36	4.51E+01	55.03			4.51E+01	5.50E+01
	40	2302.55	5.25E+01	43.27			5.25E+01	4.33E+01
	41	2418.64	4.77E+01	36.28			4.77E+01	3.63E+01
	42	2505.64	2.29E+03	100.59			2.29E+03	1.01E+02

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

Analysis Report for 1603050-01

GAS 1307

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
CO-57	0.936	122.06	*	85.51	1.39E+03	1.45E+02
		136.48	*	10.60	1.56E+03	2.26E+02
CO-60	0.992	1173.22	*	100.00	2.64E+03	2.12E+02
		1332.49	*	100.00	2.68E+03	2.36E+02
Y-88	0.652	898.02	*	93.40	6.51E+03	3.14E+03
		1836.01	*	99.38	7.80E+03	1.79E+03
CD-109	0.978	88.03	*	3.72	5.70E+04	6.01E+03
SN-113	0.656	255.12		1.93		
		391.69	*	64.90	3.04E+03	1.05E+03
SN-126	0.967	87.57	*	37.00	1.32E+03	1.15E+02
CS-137	1.000	661.65	*	85.12	1.72E+03	1.60E+02
CE-139	0.775	165.85	*	80.35	1.87E+03	2.74E+02
TM-171	0.881	66.72	*	0.14	1.11E+04	2.12E+03
TL-208	0.311	583.14	*	30.22	5.91E+00	6.95E+00
		860.37		4.48		
		2614.66		35.85		
AM-241	1.000	59.54	*	35.90	3.90E+03	2.82E+02

* = 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 : 3/10/2016 5:38:23PM
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	12.08	4.13157E+01	0.53		
m	2	14.88	8.83282E+00	1.59		
m	3	18.09	1.47074E+01	1.13		
m	4	22.00	5.65502E+02	0.11		
m	5	24.67	1.54429E+02	0.30	Tol.	TH-231
	6	32.06	1.00711E+01	1.50		
	7	36.56	1.95487E+00	5.06	Tol.	PM-145 PM-145
	8	43.39	4.98441E-01	20.98		
M	9	50.51	1.08919E+01	1.55	Tol.	TE-132 TH-227
m	12	70.32	9.34492E-01	18.47		

Analysis Report for 1603050-01

GAS 1307

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	14	98.61	2.73310E-01	24.14		
	18	310.54	1.28860E-01	51.20	D-Esc	
	22	682.35	1.54222E-01	40.10		
	23	771.68	1.04460E-01	52.06		
	24	821.89	1.66243E-01	39.98	S-Esc	
	25	838.69	1.10571E-01	52.64		
	27	958.68	1.69035E-01	41.41		
	28	1153.13	7.20982E-02	58.58	Tol.	EU-156
	30	1195.10	1.53524E-01	29.64		
M	32	1349.47	4.18222E-02	36.72		
m	33	1353.87	1.19718E-01	28.49		
	34	1366.31	2.79429E-02	52.02		
	35	1574.35	3.08005E-02	60.09		
	36	1745.59	3.12216E-02	60.13		
	38	1844.28	1.97631E-02	55.79		
	39	2228.36	2.50397E-02	61.05	Sum	
	40	2302.55	2.91536E-02	41.22		
	41	2418.64	2.65134E-02	38.01	Sum	
	42	2505.64	1.27443E+00	2.19	Sum	

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	0.93	122.06	*	85.51	1.39E+03	1.45E+02
		136.48	*	10.60	1.56E+03	2.26E+02
CO-60	0.99	1173.22	*	100.00	2.64E+03	2.12E+02
		1332.49	*	100.00	2.68E+03	2.36E+02
Y-88	0.65	898.02	*	93.40	6.51E+03	3.14E+03
		1836.01	*	99.38	7.80E+03	1.79E+03
CD-109	0.97	88.03	*	3.72	5.70E+04	6.01E+03
SN-113	0.65	255.12		1.93		
		391.69	*	64.90	3.04E+03	1.05E+03

Analysis Report for 1603050-01

GAS 1307

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
SN-126	0.96	87.57	*	37.00	1.32E+03	1.15E+02
CS-137	1.00	661.65	*	85.12	1.72E+03	1.60E+02
CE-139	0.77	165.85	*	80.35	1.87E+03	2.74E+02
TM-171	0.88	66.72	*	0.14	1.11E+04	2.12E+03
TL-208	0.31	583.14	*	30.22	5.91E+00	6.95E+00
		860.37		4.48		
		2614.66		35.85		
AM-241	1.00	59.54	*	35.90	3.90E+03	2.82E+02

* = 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
	CO-57	0.936	1.44E+03	1.22E+02	
	CO-60	0.992	2.66E+03	1.58E+02	
	Y-88	0.652	7.48E+03	1.56E+03	
?	CD-109	0.978	5.70E+04	6.01E+03	
	SN-113	0.656	3.04E+03	1.05E+03	
?	SN-126	0.967	1.32E+03	1.15E+02	
	CS-137	1.000	1.72E+03	1.60E+02	
	CE-139	0.775	1.87E+03	2.74E+02	
	TM-171	0.881	1.11E+04	2.12E+03	
	TL-208	0.311	5.91E+00	6.95E+00	
	AM-241	1.000	3.90E+03	2.82E+02	

? = 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 1603050-01

GAS 1307

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/10/2016 5:38:23PM
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	12.08	4.13157E+01	0.53		
m	2	14.88	8.83282E+00	1.59		
m	3	18.09	1.47074E+01	1.13		
m	4	22.00	5.65502E+02	0.11		
m	5	24.67	1.54429E+02	0.30	Tol.	TH-231
	6	32.06	1.00711E+01	1.50		
	7	36.56	1.95487E+00	5.06	Tol.	PM-145 PM-145
	8	43.39	4.98441E-01	20.98		
M	9	50.51	1.08919E+01	1.55	Tol.	TE-132 TH-227
m	12	70.32	9.34492E-01	18.47		
	14	98.61	2.73310E-01	24.14		
	18	310.54	1.28860E-01	51.20	D-Esc	
	22	682.35	1.54222E-01	40.10		
	23	771.68	1.04460E-01	52.06		
	24	821.89	1.66243E-01	39.98	S-Esc	
	25	838.69	1.10571E-01	52.64		
	27	958.68	1.69035E-01	41.41		
	28	1153.13	7.20982E-02	58.58	Tol.	EU-156
	30	1195.10	1.53524E-01	29.64		
M	32	1349.47	4.18222E-02	36.72		
m	33	1353.87	1.19718E-01	28.49		
	34	1366.31	2.79429E-02	52.02		
	35	1574.35	3.08005E-02	60.09		
	36	1745.59	3.12216E-02	60.13		
	38	1844.28	1.97631E-02	55.79		
	39	2228.36	2.50397E-02	61.05	Sum	
	40	2302.55	2.91536E-02	41.22		
	41	2418.64	2.65134E-02	38.01	Sum	
	42	2505.64	1.27443E+00	2.19	Sum	

Analysis Report for 1603050-01

GAS 1307

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	1.16E+07	1.13E+07	1.13E+07
+		NA-22	1274.54		99.94	1.55E-01	5.66E+00	5.66E+00
+	@	NA-24	1368.53		99.99	1.00E+26	1.00E+26	1.00E+26
	@		2754.09		99.86	1.00E+26		1.00E+26
+		AL-26	1808.65		99.76	1.93E+00	2.84E+00	2.84E+00
+		K-40	1460.81		10.67	1.14E+00	2.17E+01	2.17E+01
+	@	AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26
+		TI-44	67.88		94.40	1.16E+00	1.59E+00	1.68E+00
			78.34		96.00	1.39E+00		1.59E+00
+		SC-46	889.25		99.98	-1.86E+03	1.99E+04	1.99E+04
			1120.51		99.99	4.19E+03		2.05E+04
+		V-48	983.52		99.98	-4.04E+18	1.02E+19	2.13E+19
			1312.10		97.50	1.00E+18		1.02E+19
+		CR-51	320.08		9.83	8.25E+10	1.10E+12	1.10E+12
+		MN-54	834.83		99.97	-2.85E+00	4.56E+01	4.56E+01
+		CO-56	846.75		99.96	1.22E+04	1.79E+04	3.01E+04
			1037.75		14.03	2.75E+04		2.54E+05
			1238.25		67.00	3.09E+03		2.75E+04
			1771.40		15.51	3.40E+04		1.03E+05
			2598.48		16.90	-7.63E+03		1.79E+04
+		CO-57	122.06	*	85.51	1.39E+03	2.88E+01	2.88E+01
			136.48	*	10.60	1.56E+03		2.32E+02
+		CO-58	810.76		99.40	-3.09E+04	7.42E+04	7.42E+04
+		FE-59	1099.22		56.50	-9.98E+06	2.77E+07	4.95E+07
			1291.56		43.20	3.12E+06		2.77E+07
+		CO-60	1173.22	*	100.00	2.64E+03	9.02E+00	1.39E+01
			1332.49	*	100.00	2.68E+03		9.02E+00
+		ZN-65	1115.52		50.75	1.39E+02	2.09E+02	2.09E+02
+	@	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	1.69E+05	8.06E+02	5.08E+03

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GAS 1307

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	SE-75	136.00		59.20	6.43E+03	8.06E+02	8.06E+02
		264.65		59.80	-4.65E+02		1.01E+03
		279.53		25.20	-1.76E+03		2.45E+03
		400.65		11.40	7.16E+02		7.28E+03
+	RB-82	776.52		13.00	-8.43E+11	1.32E+13	1.32E+13
+	RB-83	520.41		46.00	-5.02E+03	1.75E+04	1.75E+04
		529.64		30.30	7.17E+03		2.60E+04
		552.65		16.40	2.81E+04		4.71E+04
+	KR-85	513.99		0.43	-2.77E+02	8.24E+02	8.24E+02
+	SR-85	513.99		99.27	-3.72E+04	1.11E+05	1.11E+05
+	Y-88	898.02	*	93.40	6.51E+03	2.54E+03	5.01E+03
		1836.01	*	99.38	7.80E+03		2.54E+03
+	NB-93M	16.57		9.43	1.72E+04	1.27E+03	1.27E+03
+	NB-94	702.63		100.00	-1.23E+00	3.97E+00	3.97E+00
		871.10		100.00	8.91E-01		5.64E+00
+	NB-95	765.79		99.81	-3.52E+08	1.21E+09	1.21E+09
+	@ NB-95M	235.69		25.00	1.00E+26	1.00E+26	1.00E+26
+	ZR-95	724.18		43.70	-1.10E+05	3.27E+05	3.88E+05
		756.72		55.30	3.93E+04		3.27E+05
+	@ 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	5.20E+07	1.14E+08	1.14E+08
+	RU-106	621.84		9.80	-6.47E+01	2.29E+02	2.29E+02
+	AG-108M	433.93		89.90	-1.71E+00	3.50E+00	3.50E+00
		614.37		90.40	-7.48E-01		3.93E+00
		722.95		90.50	-3.75E+00		4.51E+00
+	CD-109	88.03	*	3.72	5.70E+04	2.90E+02	2.90E+02
+	AG-110M	657.75		93.14	1.42E+01	1.24E+02	2.32E+02
		677.61		10.53	-1.98E+02		5.67E+02
		706.67		16.46	-1.74E+02		3.68E+02
		763.93		21.98	1.24E+02		3.05E+02
		884.67		71.63	-2.31E+01		1.24E+02
		1384.27		23.94	-1.54E+01		1.63E+02
+	CD-113M	263.70		0.02	2.44E+02	1.02E+04	1.02E+04
+	SN-113	255.12		1.93	-2.58E+04	1.64E+03	3.83E+04
		391.69	*	64.90	3.04E+03		1.64E+03
+	TE123M	159.00		84.10	-1.09E+02	4.84E+02	4.84E+02
+	SB-124	602.71		97.87	-4.24E+04	2.93E+05	2.93E+05
		645.85		7.26	-4.37E+06		4.15E+06
		722.78		11.10	-2.48E+06		2.98E+06
		1691.02		49.00	2.64E+05		4.61E+05
+	I-125	35.49		6.49	1.67E+07	3.65E+06	3.65E+06
+	SB-125	176.33		6.89	-2.05E+01	2.04E+01	4.16E+01
		427.89		29.33	-6.54E+00		2.04E+01
		463.38		10.35	3.71E+01		6.66E+01
		600.56		17.80	8.25E+00		3.83E+01
		635.90		11.32	-2.94E+01		6.29E+01

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GAS 1307

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	@	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	1.32E+03	6.70E+00	6.70E+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
	@		783.80		14.70	1.00E+26		1.00E+26
+		I-129	29.78		57.00	-2.96E+02	6.77E+00	6.77E+00
			33.60		13.20	-2.93E+02		2.60E+01
			39.58		7.52	-3.43E+01		2.65E+01
+	@	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	7.76E+00	4.90E+00	5.29E+00
			302.84		17.80	2.87E+00		1.46E+01
			356.01		60.00	1.28E+00		4.90E+00
+	@	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	1.20E+00	8.89E+00	8.29E+01
			569.32		15.43	-3.45E+01		4.47E+01
			604.70		97.60	8.50E-01		8.89E+00
			795.84		85.40	-9.90E-01		1.34E+01
			801.93		8.73	-1.16E+01		1.34E+02
+		CS-135	268.24		16.00	-3.34E+00	1.29E+01	1.29E+01
+	@	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	1.72E+03	7.74E+00	7.74E+00
+		LA-138	788.74		34.00	5.19E+00	3.76E+00	1.36E+01
			1435.80		66.00	-9.57E-02		3.76E+00
+		CE-139	165.85	*	80.35	1.87E+03	3.01E+02	3.01E+02
+	@	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

Analysis Report for 1603050-01

GAS 1307

		Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	@	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	1.28E+08	3.52E+09	3.52E+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
	@		664.55		5.20	1.00E+26		1.00E+26
+		CE-144	133.54		10.80	-1.02E+03	1.46E+02	1.46E+02
+		PM-144	476.78		42.00	5.46E+01	2.35E+01	5.29E+01
			618.01		98.60	1.06E+01		2.35E+01
			696.49		99.49	-3.06E+00		2.58E+01
+		PM-145	36.85		21.70	1.28E+02	7.40E+00	1.39E+01
			37.36		39.70	6.85E+01		7.40E+00
			42.30		15.10	-3.54E+01		1.49E+01
			72.40		2.31	1.35E+00		7.20E+01
+		PM-146	453.90		39.94	2.12E+00	1.17E+01	1.17E+01
			735.90		14.01	1.03E+01		4.22E+01
			747.13		13.10	-6.47E+00		4.56E+01
+	@	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	5.33E+02	1.44E+01	1.61E+01
			244.69		5.40	8.10E+00		4.17E+01
			344.27		19.13	2.89E+00		1.44E+01
			778.89		9.20	4.66E+01		5.70E+01
			964.01		10.40	1.56E+01		7.47E+01
			1085.78		7.22	2.13E+01		1.02E+02
			1112.02		9.60	2.43E+01		7.94E+01
			1407.95		14.94	5.57E+00		1.90E+01
+		GD-153	97.43		31.30	9.99E+01	6.94E+01	6.94E+01
			103.18		22.20	-3.50E+01		9.66E+01
+		EU-154	123.07		40.50	2.95E+02	8.79E+00	8.79E+00
			723.30		19.70	-2.10E+01		2.52E+01
			873.19		11.50	1.91E+01		6.09E+01
			996.32		10.30	-2.79E+01		7.44E+01
			1004.76		17.90	-1.46E+01		4.31E+01
			1274.45		35.50	2.64E-01		9.62E+00
+		EU-155	86.50		30.90	2.28E+03	9.09E+00	2.70E+01
			105.30		20.70	6.93E+00		9.09E+00
+		EU-156	811.77		10.40	-2.14E+18	1.17E+21	1.43E+21
			1153.47		7.20	5.46E+20		2.17E+21
			1230.71		8.90	9.48E+20		1.17E+21
+		HO-166M	184.41		72.60	-4.91E-01	2.19E+00	2.19E+00
			280.45		29.60	-5.09E+00		7.09E+00
			410.94		11.10	5.70E-01		2.60E+01
			711.69		54.10	-8.15E-01		7.44E+00
+		TM-171	66.72	*	0.14	1.11E+04	5.43E+03	5.43E+03
+		HF-172	81.75		4.52	-2.45E+01	3.02E+01	8.67E+01

Analysis Report for 1603050-01

GAS 1307

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	HF-172	125.81	11.30	-7.27E+00	3.02E+01	3.02E+01
+	@ 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	1.60E+01	3.81E+01	9.66E+01
		272.11	21.20	4.71E+00		3.81E+01
+	HF-175	343.40	84.00	-2.43E+04	4.79E+04	4.79E+04
+	LU-176	88.34	13.30	3.66E+03	2.01E+00	4.29E+01
		201.83	86.00	-6.58E-01		2.01E+00
		306.78	94.00	-9.81E-02		2.37E+00
+	TA-182	67.75	41.20	9.94E+02	1.44E+03	1.44E+03
		1121.30	34.90	-1.58E+03		6.53E+03
		1189.05	16.23	1.15E+03		1.14E+04
		1221.41	26.98	2.91E+03		5.11E+03
		1231.02	11.44	7.79E+03		1.16E+04
+	IR-192	308.46	29.68	-2.35E+04	7.29E+04	7.54E+04
		468.07	48.10	-8.07E+03		7.29E+04
+	HG-203	279.19	77.30	2.39E+06	6.09E+06	6.09E+06
+	BI-207	569.67	97.72	-2.33E+00	3.02E+00	3.02E+00
		1063.62	74.90	-8.55E-01		8.77E+00
+	TL-208	583.14 *	30.22	5.91E+00	2.18E+00	1.14E+01
		860.37	4.48	3.86E+01		1.24E+02
		2614.66	35.85	7.56E-01		2.18E+00
+	BI-210M	262.00	45.00	1.34E+00	4.52E+00	4.52E+00
		300.00	23.00	8.33E-01		9.43E+00
+	PB-210	46.50	4.25	-9.95E+02	5.95E+01	5.95E+01
+	PB-211	404.84	2.90	-2.52E+01	9.74E+01	9.74E+01
		831.96	2.90	1.65E+01		1.76E+02
+	BI-212	727.17	11.80	7.93E+00	3.47E+01	3.47E+01
		1620.62	2.75	2.96E+01		1.03E+02
+	PB-212	238.63	44.60	1.71E+00	4.43E+00	4.43E+00
		300.09	3.41	5.62E+00		6.36E+01
+	BI-214	609.31	46.30	4.30E+00	7.65E+00	7.65E+00
		1120.29	15.10	8.19E+00		4.00E+01
		1764.49	15.80	-2.19E+00		1.73E+01
		2204.22	4.98	1.93E+01		5.64E+01
+	PB-214	295.21	19.19	-4.79E+00	6.62E+00	1.13E+01
		351.92	37.19	2.73E+00		6.62E+00
+	RN-219	401.80	6.50	3.20E+01	4.34E+01	4.34E+01
+	RA-223	323.87	3.88	1.75E+01	5.90E+01	5.90E+01
+	RA-224	240.98	3.95	-1.20E+01	4.99E+01	4.99E+01
+	@ RA-225	40.00	31.00	1.00E+26	1.00E+26	1.00E+26
+	RA-226	186.21	3.28	3.21E+00	4.97E+01	4.97E+01
+	TH-227	50.10	8.40	3.48E+02	1.70E+01	3.91E+01
		236.00	11.50	-3.69E+00		1.70E+01
		256.20	6.30	-5.56E+00		3.16E+01
+	AC-228	338.32	11.40	5.44E+00	2.08E+01	2.08E+01

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GAS 1307

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	AC-228	911.07		27.70	-6.74E+00	2.08E+01	2.27E+01
		969.11		16.60	-1.64E+01		3.86E+01
+	TH-230	48.44		16.90	1.25E+02	1.87E+01	1.87E+01
		62.85		4.60	-1.04E+03		2.77E+01
		67.67		0.37	2.87E+02		4.17E+02
+	PA-231	283.67		1.60	1.62E+01	9.47E+01	1.32E+02
		302.67		2.30	1.86E+01		9.47E+01
+	TH-231	25.64		14.70	2.46E+04	2.25E+01	2.17E+02
		84.21		6.40	-1.27E+01		2.25E+01
+	PA-233	311.98		38.60	3.77E+11	5.38E+11	5.38E+11
+	PA-234	131.20		20.40	-1.98E+00	6.22E+00	6.22E+00
		733.99		8.80	1.02E+01		4.77E+01
		946.00		12.00	1.14E+00		5.82E+01
+	PA-234M	1001.03		0.92	-2.08E+02	6.74E+02	6.74E+02
+	TH-234	63.29		3.80	-1.26E+03	3.34E+01	3.34E+01
+	U-235	143.76		10.50	-7.37E-01	1.26E+01	1.26E+01
		163.35		4.70	3.40E+00		3.12E+01
		205.31		4.70	1.35E+01		3.73E+01
+	NP-237	86.50		12.60	3.84E+03	4.54E+01	4.54E+01
+	@ 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	3.90E+03	1.57E+01	1.57E+01
+	AM-243	74.67		66.00	-1.77E+00	2.20E+00	2.20E+00
+	CM-243	209.75		3.29	-8.77E+00	1.60E+01	5.85E+01
		228.14		10.60	1.21E+01		1.94E+01
		277.60		14.00	-1.10E+00		1.60E+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

Analysis Report for 1603050-01

GAS 1307

	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	1.13E+07	1.13E+07	1.16E+07	5.60E+06
	NA-22	1274.54		99.94	5.66E+00	5.66E+00	1.55E-01	2.77E+00
@	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		1.00E+26	1.00E+20
	AL-26	1808.65		99.76	2.84E+00	2.84E+00	1.93E+00	1.38E+00
	K-40	1460.81		10.67	2.17E+01	2.17E+01	1.14E+00	1.05E+01
@	AR-41	1293.64		99.16	1.00E+26	1.00E+26	1.00E+26	1.00E+20
	TI-44	67.88		94.40	1.68E+00	1.59E+00	1.16E+00	8.37E-01
		78.34		96.00	1.59E+00		1.39E+00	7.89E-01
	SC-46	889.25		99.98	1.99E+04	1.99E+04	-1.86E+03	9.90E+03
		1120.51		99.99	2.05E+04		4.19E+03	1.01E+04
	V-48	983.52		99.98	2.13E+19	1.02E+19	-4.04E+18	1.06E+19
		1312.10		97.50	1.02E+19		1.00E+18	5.00E+18
	CR-51	320.08		9.83	1.10E+12	1.10E+12	8.25E+10	5.45E+11
	MN-54	834.83		99.97	4.56E+01	4.56E+01	-2.85E+00	2.26E+01
	CO-56	846.75		99.96	3.01E+04	1.79E+04	1.22E+04	1.49E+04
		1037.75		14.03	2.54E+05		2.75E+04	1.26E+05
		1238.25		67.00	2.75E+04		3.09E+03	1.35E+04
		1771.40		15.51	1.03E+05		3.40E+04	4.98E+04
		2598.48		16.90	1.79E+04		-7.63E+03	7.24E+03
+	CO-57	122.06	*	85.51	2.88E+01	2.88E+01	1.39E+03	1.43E+01
		136.48	*	10.60	2.32E+02		1.56E+03	1.15E+02
	CO-58	810.76		99.40	7.42E+04	7.42E+04	-3.09E+04	3.68E+04
	FE-59	1099.22		56.50	4.95E+07	2.77E+07	-9.98E+06	2.46E+07
		1291.56		43.20	2.77E+07		3.12E+06	1.35E+07
+	CO-60	1173.22	*	100.00	1.39E+01	9.02E+00	2.64E+03	6.90E+00
		1332.49	*	100.00	9.02E+00		2.68E+03	4.47E+00
	ZN-65	1115.52		50.75	2.09E+02	2.09E+02	1.39E+02	1.04E+02
@	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	5.08E+03	8.06E+02	1.69E+05	2.53E+03
		136.00		59.20	8.06E+02		6.43E+03	4.01E+02
		264.65		59.80	1.01E+03		-4.65E+02	5.01E+02
		279.53		25.20	2.45E+03		-1.76E+03	1.22E+03
		400.65		11.40	7.28E+03		7.16E+02	3.61E+03
	RB-82	776.52		13.00	1.32E+13	1.32E+13	-8.43E+11	6.54E+12
	RB-83	520.41		46.00	1.75E+04	1.75E+04	-5.02E+03	8.69E+03
		529.64		30.30	2.60E+04		7.17E+03	1.29E+04
		552.65		16.40	4.71E+04		2.81E+04	2.33E+04
	KR-85	513.99		0.43	8.24E+02	8.24E+02	-2.77E+02	4.08E+02
	SR-85	513.99		99.27	1.11E+05	1.11E+05	-3.72E+04	5.50E+04
+	Y-88	898.02	*	93.40	5.01E+03	2.54E+03	6.51E+03	2.49E+03
		1836.01	*	99.38	2.54E+03		7.80E+03	1.25E+03
	NB-93M	16.57		9.43	1.27E+03	1.27E+03	1.72E+04	6.34E+02
	NB-94	702.63		100.00	3.97E+00	3.97E+00	-1.23E+00	1.97E+00
		871.10		100.00	5.64E+00		8.91E-01	2.80E+00
	NB-95	765.79		99.81	1.21E+09	1.21E+09	-3.52E+08	5.99E+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	3.88E+05	3.27E+05	-1.10E+05	1.93E+05
		756.72		55.30	3.27E+05		3.93E+04	1.62E+05

Analysis Report for 1603050-01

GAS 1307

	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	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
	RU-103	497.08		89.00	1.14E+08	1.14E+08	5.20E+07	5.68E+07
	RU-106	621.84		9.80	2.29E+02	2.29E+02	-6.47E+01	1.14E+02
	AG-108M	433.93		89.90	3.50E+00	3.50E+00	-1.71E+00	1.74E+00
		614.37		90.40	3.93E+00		-7.48E-01	1.95E+00
		722.95		90.50	4.51E+00		-3.75E+00	2.23E+00
+	CD-109	88.03	*	3.72	2.90E+02	2.90E+02	5.70E+04	1.44E+02
	AG-110M	657.75		93.14	2.32E+02	1.24E+02	1.42E+01	1.16E+02
		677.61		10.53	5.67E+02		-1.98E+02	2.81E+02
		706.67		16.46	3.68E+02		-1.74E+02	1.82E+02
		763.93		21.98	3.05E+02		1.24E+02	1.51E+02
		884.67		71.63	1.24E+02		-2.31E+01	6.16E+01
		1384.27		23.94	1.63E+02		-1.54E+01	7.93E+01
	CD-113M	263.70		0.02	1.02E+04	1.02E+04	2.44E+02	5.05E+03
+	SN-113	255.12		1.93	3.83E+04	1.64E+03	-2.58E+04	1.90E+04
		391.69	*	64.90	1.64E+03		3.04E+03	8.16E+02
	TE123M	159.00		84.10	4.84E+02	4.84E+02	-1.09E+02	2.40E+02
	SB-124	602.71		97.87	2.93E+05	2.93E+05	-4.24E+04	1.45E+05
		645.85		7.26	4.15E+06		-4.37E+06	2.06E+06
		722.78		11.10	2.98E+06		-2.48E+06	1.48E+06
		1691.02		49.00	4.61E+05		2.64E+05	2.24E+05
	I-125	35.49		6.49	3.65E+06	3.65E+06	1.67E+07	1.82E+06
	SB-125	176.33		6.89	4.16E+01	2.04E+01	-2.05E+01	2.06E+01
		427.89		29.33	2.04E+01		-6.54E+00	1.01E+01
		463.38		10.35	6.66E+01		3.71E+01	3.31E+01
		600.56		17.80	3.83E+01		8.25E+00	1.90E+01
		635.90		11.32	6.29E+01		-2.94E+01	3.12E+01
@	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	6.70E+00	6.70E+00	1.32E+03	3.34E+00
@	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	6.77E+00	6.77E+00	-2.96E+02	3.37E+00
		33.60		13.20	2.60E+01		-2.93E+02	1.29E+01
		39.58		7.52	2.65E+01		-3.43E+01	1.32E+01
@	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	5.29E+00	4.90E+00	7.76E+00	2.63E+00
		302.84		17.80	1.46E+01		2.87E+00	7.25E+00
		356.01		60.00	4.90E+00		1.28E+00	2.43E+00
@	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	8.29E+01	8.89E+00	1.20E+00	4.10E+01
		569.32		15.43	4.47E+01		-3.45E+01	2.21E+01

Analysis Report for 1603050-01

GAS 1307

	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	8.89E+00	8.89E+00	8.50E-01	4.40E+00
		795.84		85.40	1.34E+01		-9.90E-01	6.66E+00
		801.93		8.73	1.34E+02		-1.16E+01	6.66E+01
	CS-135	268.24		16.00	1.29E+01	1.29E+01	-3.34E+00	6.41E+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	7.74E+00	7.74E+00	1.72E+03	3.85E+00
	LA-138	788.74		34.00	1.36E+01	3.76E+00	5.19E+00	6.76E+00
		1435.80		66.00	3.76E+00		-9.57E-02	1.83E+00
+	CE-139	165.85	*	80.35	3.01E+02	3.01E+02	1.87E+03	1.49E+02
@	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	3.52E+09	3.52E+09	1.28E+08	1.75E+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	1.46E+02	1.46E+02	-1.02E+03	7.28E+01
	PM-144	476.78		42.00	5.29E+01	2.35E+01	5.46E+01	2.63E+01
		618.01		98.60	2.35E+01		1.06E+01	1.16E+01
		696.49		99.49	2.58E+01		-3.06E+00	1.28E+01
	PM-145	36.85		21.70	1.39E+01	7.40E+00	1.28E+02	6.90E+00
		37.36		39.70	7.40E+00		6.85E+01	3.68E+00
		42.30		15.10	1.49E+01		-3.54E+01	7.41E+00
		72.40		2.31	7.20E+01		1.35E+00	3.58E+01
	PM-146	453.90		39.94	1.17E+01	1.17E+01	2.12E+00	5.83E+00
		735.90		14.01	4.22E+01		1.03E+01	2.09E+01
		747.13		13.10	4.56E+01		-6.47E+00	2.26E+01
@	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	1.61E+01	1.44E+01	5.33E+02	8.00E+00
		244.69		5.40	4.17E+01		8.10E+00	2.07E+01
		344.27		19.13	1.44E+01		2.89E+00	7.14E+00
		778.89		9.20	5.70E+01		4.66E+01	2.83E+01
		964.01		10.40	7.47E+01		1.56E+01	3.71E+01
		1085.78		7.22	1.02E+02		2.13E+01	5.04E+01
		1112.02		9.60	7.94E+01		2.43E+01	3.94E+01

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GAS 1307

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	1.90E+01	1.44E+01	5.57E+00	9.24E+00
GD-153	97.43	31.30	6.94E+01	6.94E+01	9.99E+01	3.45E+01
	103.18	22.20	9.66E+01		-3.50E+01	4.80E+01
EU-154	123.07	40.50	8.79E+00	8.79E+00	2.95E+02	4.38E+00
	723.30	19.70	2.52E+01		-2.10E+01	1.25E+01
	873.19	11.50	6.09E+01		1.91E+01	3.02E+01
	996.32	10.30	7.44E+01		-2.79E+01	3.69E+01
	1004.76	17.90	4.31E+01		-1.46E+01	2.14E+01
	1274.45	35.50	9.62E+00		2.64E-01	4.70E+00
EU-155	86.50	30.90	2.70E+01	9.09E+00	2.28E+03	1.35E+01
	105.30	20.70	9.09E+00		6.93E+00	4.52E+00
EU-156	811.77	10.40	1.43E+21	1.17E+21	-2.14E+18	7.10E+20
	1153.47	7.20	2.17E+21		5.46E+20	1.07E+21
	1230.71	8.90	1.17E+21		9.48E+20	5.74E+20
HO-166M	184.41	72.60	2.19E+00	2.19E+00	-4.91E-01	1.09E+00
	280.45	29.60	7.09E+00		-5.09E+00	3.52E+00
	410.94	11.10	2.60E+01		5.70E-01	1.29E+01
	711.69	54.10	7.44E+00		-8.15E-01	3.69E+00
+ TM-171	66.72 *	0.14	5.43E+03	5.43E+03	1.11E+04	2.71E+03
HF-172	81.75	4.52	8.67E+01	3.02E+01	-2.45E+01	4.31E+01
	125.81	11.30	3.02E+01		-7.27E+00	1.50E+01
@ 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	9.66E+01	3.81E+01	1.60E+01	4.80E+01
	272.11	21.20	3.81E+01		4.71E+00	1.89E+01
HF-175	343.40	84.00	4.79E+04	4.79E+04	-2.43E+04	2.37E+04
LU-176	88.34	13.30	4.29E+01	2.01E+00	3.66E+03	2.14E+01
	201.83	86.00	2.01E+00		-6.58E-01	1.00E+00
	306.78	94.00	2.37E+00		-9.81E-02	1.17E+00
TA-182	67.75	41.20	1.44E+03	1.44E+03	9.94E+02	7.18E+02
	1121.30	34.90	6.53E+03		-1.58E+03	3.24E+03
	1189.05	16.23	1.14E+04		1.15E+03	5.62E+03
	1221.41	26.98	5.11E+03		2.91E+03	2.51E+03
	1231.02	11.44	1.16E+04		7.79E+03	5.68E+03
IR-192	308.46	29.68	7.54E+04	7.29E+04	-2.35E+04	3.74E+04
	468.07	48.10	7.29E+04		-8.07E+03	3.62E+04
HG-203	279.19	77.30	6.09E+06	6.09E+06	2.39E+06	3.02E+06
BI-207	569.67	97.72	3.02E+00	3.02E+00	-2.33E+00	1.50E+00
	1063.62	74.90	8.77E+00		-8.55E-01	4.35E+00
+ TL-208	583.14 *	30.22	1.14E+01	2.18E+00	5.91E+00	5.65E+00
	860.37	4.48	1.24E+02		3.86E+01	6.13E+01
	2614.66	35.85	2.18E+00		7.56E-01	9.46E-01
BI-210M	262.00	45.00	4.52E+00	4.52E+00	1.34E+00	2.25E+00
	300.00	23.00	9.43E+00		8.33E-01	4.68E+00
PB-210	46.50	4.25	5.95E+01	5.95E+01	-9.95E+02	2.96E+01
PB-211	404.84	2.90	9.74E+01	9.74E+01	-2.52E+01	4.83E+01
	831.96	2.90	1.76E+02		1.65E+01	8.75E+01
BI-212	727.17	11.80	3.47E+01	3.47E+01	7.93E+00	1.72E+01
	1620.62	2.75	1.03E+02		2.96E+01	5.02E+01
PB-212	238.63	44.60	4.43E+00	4.43E+00	1.71E+00	2.20E+00
	300.09	3.41	6.36E+01		5.62E+00	3.16E+01

Analysis Report for 1603050-01

GAS 1307

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	7.65E+00	7.65E+00	4.30E+00	3.79E+00
	1120.29	15.10	4.00E+01		8.19E+00	1.98E+01
	1764.49	15.80	1.73E+01		-2.19E+00	8.37E+00
	2204.22	4.98	5.64E+01		1.93E+01	2.72E+01
PB-214	295.21	19.19	1.13E+01	6.62E+00	-4.79E+00	5.61E+00
	351.92	37.19	6.62E+00		2.73E+00	3.29E+00
RN-219	401.80	6.50	4.34E+01	4.34E+01	3.20E+01	2.16E+01
RA-223	323.87	3.88	5.90E+01	5.90E+01	1.75E+01	2.93E+01
RA-224	240.98	3.95	4.99E+01	4.99E+01	-1.20E+01	2.48E+01
@ RA-225	40.00	31.00	1.00E+26	1.00E+26	1.00E+26	1.00E+20
RA-226	186.21	3.28	4.97E+01	4.97E+01	3.21E+00	2.47E+01
TH-227	50.10	8.40	3.91E+01	1.70E+01	3.48E+02	1.95E+01
	236.00	11.50	1.70E+01		-3.69E+00	8.43E+00
	256.20	6.30	3.16E+01		-5.56E+00	1.57E+01
AC-228	338.32	11.40	2.08E+01	2.08E+01	5.44E+00	1.03E+01
	911.07	27.70	2.27E+01		-6.74E+00	1.13E+01
	969.11	16.60	3.86E+01		-1.64E+01	1.91E+01
TH-230	48.44	16.90	1.87E+01	1.87E+01	1.25E+02	9.31E+00
	62.85	4.60	2.77E+01		-1.04E+03	1.37E+01
	67.67	0.37	4.17E+02		2.87E+02	2.07E+02
PA-231	283.67	1.60	1.32E+02	9.47E+01	1.62E+01	6.56E+01
	302.67	2.30	9.47E+01		1.86E+01	4.70E+01
TH-231	25.64	14.70	2.17E+02	2.25E+01	2.46E+04	1.08E+02
	84.21	6.40	2.25E+01		-1.27E+01	1.12E+01
PA-233	311.98	38.60	5.38E+11	5.38E+11	3.77E+11	2.67E+11
PA-234	131.20	20.40	6.22E+00	6.22E+00	-1.98E+00	3.09E+00
	733.99	8.80	4.77E+01		1.02E+01	2.37E+01
	946.00	12.00	5.82E+01		1.14E+00	2.89E+01
PA-234M	1001.03	0.92	6.74E+02	6.74E+02	-2.08E+02	3.34E+02
TH-234	63.29	3.80	3.34E+01	3.34E+01	-1.26E+03	1.66E+01
U-235	143.76	10.50	1.26E+01	1.26E+01	-7.37E-01	6.28E+00
	163.35	4.70	3.12E+01		3.40E+00	1.55E+01
	205.31	4.70	3.73E+01		1.35E+01	1.85E+01
NP-237	86.50	12.60	4.54E+01	4.54E+01	3.84E+03	2.27E+01
@ 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	1.57E+01	1.57E+01	3.90E+03	7.86E+00
AM-243	74.67	66.00	2.20E+00	2.20E+00	-1.77E+00	1.10E+00
CM-243	209.75	3.29	5.85E+01	1.60E+01	-8.77E+00	2.90E+01
	228.14	10.60	1.94E+01		1.21E+01	9.63E+00
	277.60	14.00	1.60E+01		-1.10E+00	7.92E+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 1603050-01

GAS 1307

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 1307

Elapsed Live time: 1800
Elapsed Real Time: 1889

Channel								
1:	1	3	1	2	3	29	2971	6993
9:	5788	7068	18462	57660	51848	18435	21289	13935
17:	17269	28526	10124	21187	113880	827156	287854	53799
25:	241324	73992	9912	3016	3096	3316	5076	16319
33:	9002	3987	2991	5244	5411	3541	3023	3196
41:	3425	3813	4785	5133	4698	5067	6039	8621
49:	13826	16956	14460	13933	13390	13237	13326	13853
57:	14352	15851	180277	323934	18235	2862	2835	3010
65:	3351	3920	4371	4520	4459	4531	4490	4213
73:	4102	4138	4012	3986	4229	4414	3929	4062
81:	4106	4060	3770	4010	4036	4021	17466	124279
89:	36517	2118	1900	1899	1921	1843	1792	1706
97:	1829	1751	1969	1717	1582	1692	1870	1676
105:	1612	1718	1620	1596	1661	1691	1556	1674
113:	1639	1565	1536	1554	1591	1594	1579	1542
121:	4268	22900	7400	1370	1441	1368	1406	1357
129:	1392	1344	1365	1265	1381	1347	1430	3117
137:	3216	1444	1314	1356	1313	1349	1345	1333
145:	1322	1338	1361	1329	1286	1265	1313	1310
153:	1311	1240	1310	1261	1284	1257	1201	1303
161:	1290	1299	1246	1245	1917	3155	1531	1227
169:	1225	1274	1270	1143	1278	1341	1237	1243
177:	1214	1242	1301	1277	1334	1345	1359	1372
185:	1479	1424	1468	1499	1501	1495	1459	1470
193:	1469	1410	1464	1407	1535	1450	1522	1510
201:	1469	1419	1465	1441	1464	1465	1465	1439
209:	1449	1492	1542	1558	1538	1605	1592	1630
217:	1648	1642	1671	1633	1546	1587	1650	1557
225:	1462	1505	1512	1602	1484	1424	1450	1474
233:	1463	1420	1449	1518	1476	1481	1502	1479
241:	1450	1399	1418	1461	1394	1377	1385	1387
249:	1368	1333	1395	1425	1396	1366	1305	1349
257:	1326	1384	1335	1330	1373	1422	1337	1318
265:	1332	1387	1347	1351	1329	1310	1386	1323
273:	1291	1270	1292	1314	1335	1259	1302	1308
281:	1320	1249	1346	1242	1342	1254	1249	1372
289:	1262	1243	1254	1293	1268	1232	1296	1194
297:	1320	1294	1221	1208	1213	1228	1165	1228
305:	1287	1211	1243	1241	1262	1372	1311	1258
313:	1183	1252	1198	1301	1146	1163	1206	1224
321:	1160	1193	1209	1237	1224	1180	1205	1220
329:	1184	1171	1201	1210	1235	1210	1194	1197
337:	1153	1276	1256	1156	1185	1169	1197	1236
345:	1117	1258	1178	1134	1181	1176	1213	1255
353:	1222	1177	1177	1164	1261	1156	1132	1233
361:	1176	1170	1221	1152	1247	1212	1206	1255

369:	1235	1159	1196	1190	1193	1210	1133	1183

Sample Title: GAS 1307

Channel								
377:	1250	1231	1208	1184	1188	1227	1255	1243
385:	1231	1230	1220	1246	1196	1157	1558	1655
393:	1179	1213	1261	1237	1186	1232	1228	1251
401:	1243	1271	1278	1257	1190	1277	1215	1257
409:	1186	1272	1279	1323	1250	1240	1314	1297
417:	1240	1346	1288	1282	1281	1304	1310	1330
425:	1390	1307	1298	1326	1329	1318	1359	1294
433:	1289	1363	1349	1330	1387	1370	1297	1336
441:	1335	1360	1336	1389	1383	1467	1420	1396
449:	1448	1426	1327	1392	1441	1411	1468	1396
457:	1449	1407	1447	1458	1527	1527	1447	1493
465:	1555	1462	1483	1538	1454	1496	1517	1436
473:	1481	1362	1474	1376	1287	1376	1186	1162
481:	1160	1167	1143	1042	1054	1034	996	1013
489:	1072	1043	1005	1079	1043	969	1034	1038
497:	1034	972	976	904	1024	876	951	921
505:	905	895	903	940	944	930	996	930
513:	905	904	877	909	932	872	867	911
521:	879	811	884	842	734	796	797	803
529:	798	830	775	768	826	804	804	766
537:	767	792	758	736	735	795	753	780
545:	738	716	718	696	735	746	660	712
553:	718	713	666	635	710	659	674	690
561:	621	655	654	666	727	687	615	654
569:	618	664	657	659	673	648	622	646
577:	649	654	663	645	649	697	662	683
585:	618	593	616	630	663	636	667	625
593:	610	624	648	651	677	646	613	652
601:	612	664	646	627	620	656	646	671
609:	638	664	620	637	625	617	621	607
617:	643	630	608	648	663	606	602	594
625:	623	656	605	661	633	635	635	632
633:	616	608	626	615	658	647	622	668
641:	651	653	625	622	650	586	616	640
649:	604	684	672	698	669	668	726	688
657:	662	682	888	8184	51644	48953	7327	865
665:	755	693	680	671	648	669	715	646
673:	677	625	685	613	614	650	638	678
681:	674	710	709	657	607	625	642	629
689:	588	614	613	594	621	613	563	611
697:	665	647	605	646	630	643	601	606
705:	586	615	608	605	636	645	601	621
713:	610	607	628	634	627	650	651	608
721:	627	607	557	641	573	585	656	594
729:	628	617	610	629	622	634	640	645
737:	670	614	644	635	632	621	623	606
745:	630	614	659	645	630	635	642	657
753:	617	630	611	644	634	664	623	597
761:	621	672	641	659	643	603	633	623
769:	634	667	666	701	652	625	624	652
777:	683	667	652	663	685	692	671	608
785:	718	683	654	660	665	647	675	650
793:	680	609	719	657	650	676	647	684

801:	653	702	702	670	717	748	660	685

Sample Title: GAS 1307

Channel								
809:	683	762	743	697	699	738	696	752
817:	733	731	758	782	814	826	749	756
825:	698	728	714	739	715	725	773	783
833:	699	744	716	725	747	786	805	721
841:	724	709	797	709	739	735	784	750
849:	757	741	751	772	781	783	759	804
857:	783	789	834	806	794	808	846	829
865:	774	776	823	867	750	781	817	823
873:	846	846	817	821	816	791	822	863
881:	812	825	840	840	909	868	810	892
889:	830	855	855	880	858	842	907	906
897:	1058	1140	1003	892	868	919	976	919
905:	903	899	953	918	899	911	901	982
913:	964	941	999	927	985	998	999	909
921:	952	952	973	1012	936	976	926	1017
929:	962	1010	988	1006	1026	1053	1005	1006
937:	994	1005	1063	1052	1050	1047	1068	1081
945:	1081	1030	1028	1084	1113	1088	1078	1119
953:	1101	1056	1011	1067	1127	1083	1113	1068
961:	1075	1000	1044	956	914	895	895	836
969:	858	821	833	850	807	864	799	825
977:	790	822	809	795	797	783	803	816
985:	798	826	819	800	753	750	759	808
993:	775	791	724	771	751	743	763	769
1001:	779	712	748	754	785	760	760	791
1009:	767	762	785	770	752	757	742	744
1017:	736	708	750	708	727	752	770	781
1025:	751	746	753	709	698	740	686	699
1033:	719	708	705	700	695	717	692	742
1041:	673	725	685	679	681	716	704	686
1049:	699	740	651	725	665	662	724	686
1057:	666	677	654	737	689	621	662	651
1065:	678	650	655	706	684	695	681	751
1073:	690	708	655	678	665	699	699	633
1081:	674	683	728	674	667	722	672	642
1089:	705	674	714	692	712	714	724	691
1097:	685	690	723	714	719	677	732	672
1105:	683	717	747	728	699	698	731	659
1113:	719	695	723	653	652	631	630	560
1121:	563	501	466	482	480	510	530	462
1129:	493	459	472	418	449	428	427	415
1137:	436	420	463	444	397	400	441	422
1145:	419	404	394	402	385	351	396	422
1153:	404	406	377	387	372	378	375	394
1161:	400	368	409	366	369	428	402	410
1169:	365	552	3604	22015	39697	20314	3316	533
1177:	411	382	388	402	356	348	340	336
1185:	338	320	327	340	319	311	300	314
1193:	325	321	323	276	286	246	223	279
1201:	216	225	228	231	221	227	191	205
1209:	226	183	200	183	189	180	193	185
1217:	163	182	167	188	159	152	169	156
1225:	145	136	136	160	168	138	148	182

1233:	133	131	128	146	139	128	113	153

Sample Title: GAS 1307

Channel								
1241:	117	124	132	113	123	107	103	106
1249:	116	123	103	117	104	90	121	116
1257:	88	113	109	107	111	103	85	94
1265:	93	98	108	92	102	89	92	87
1273:	88	92	100	84	95	78	96	101
1281:	100	101	93	103	73	86	88	100
1289:	90	94	107	86	68	96	86	97
1297:	90	89	91	83	86	86	95	99
1305:	92	109	100	105	103	96	95	91
1313:	99	99	105	93	91	109	116	107
1321:	108	104	137	107	93	98	120	142
1329:	246	2074	14420	32765	23670	5573	646	146
1337:	140	128	139	125	123	128	118	125
1345:	123	115	81	126	113	101	132	93
1353:	146	115	101	102	80	65	82	69
1361:	80	77	48	62	81	59	84	47
1369:	68	71	63	52	54	65	60	73
1377:	65	62	52	72	60	63	78	70
1385:	59	65	69	69	75	72	78	74
1393:	50	67	48	56	67	59	65	55
1401:	62	66	50	61	58	63	64	46
1409:	57	74	61	49	56	65	58	61
1417:	58	61	48	52	44	66	53	75
1425:	50	51	56	52	55	62	42	70
1433:	56	52	53	59	61	59	65	63
1441:	59	51	53	67	52	46	63	45
1449:	56	56	52	60	46	51	53	51
1457:	33	59	55	55	46	46	51	46
1465:	46	45	52	46	46	56	50	59
1473:	43	51	43	45	48	46	58	61
1481:	55	56	57	61	42	41	45	41
1489:	50	54	41	51	49	55	59	45
1497:	57	60	48	50	36	49	52	49
1505:	62	42	43	61	43	51	32	59
1513:	45	50	57	41	52	51	49	63
1521:	53	63	41	48	52	47	58	41
1529:	49	50	43	66	55	56	50	49
1537:	53	60	53	50	47	42	51	53
1545:	49	40	60	48	61	38	49	60
1553:	50	52	47	40	45	57	49	52
1561:	53	48	48	63	45	45	49	55
1569:	45	46	39	58	57	59	55	52
1577:	40	45	41	47	46	49	51	43
1585:	41	35	44	40	38	37	49	51
1593:	43	48	55	43	45	54	52	46
1601:	45	52	52	56	47	47	36	47
1609:	41	36	45	41	45	37	47	56
1617:	40	53	40	64	38	51	51	44
1625:	38	58	42	42	31	54	36	50
1633:	44	35	47	45	43	38	46	50
1641:	44	44	49	51	38	40	41	49
1649:	42	52	41	41	38	40	50	45
1657:	42	45	46	35	43	31	37	42

1665:	55	44	42	49	55	38	43	40

Sample Title: GAS 1307

Channel								
1673:	47	42	49	42	46	45	57	38
1681:	38	42	40	40	39	41	55	39
1689:	40	39	40	48	38	41	43	25
1697:	32	40	40	36	38	52	38	44
1705:	41	28	42	38	40	39	40	43
1713:	39	36	42	37	37	43	39	34
1721:	36	49	35	48	38	40	37	43
1729:	44	45	40	43	34	44	43	32
1737:	37	35	29	31	43	32	34	32
1745:	34	46	45	40	30	34	34	45
1753:	45	48	50	43	41	35	45	27
1761:	37	36	44	45	39	38	47	38
1769:	47	34	47	37	38	36	40	36
1777:	36	37	34	35	46	33	39	29
1785:	36	42	39	38	42	31	44	30
1793:	37	35	34	47	32	43	36	38
1801:	24	38	35	44	55	29	46	37
1809:	36	36	40	44	37	24	44	36
1817:	38	30	30	39	31	43	34	34
1825:	42	41	38	33	29	41	45	42
1833:	48	87	133	155	77	52	40	29
1841:	20	36	48	34	50	29	41	37
1849:	35	34	46	39	31	37	41	51
1857:	36	45	32	34	44	31	43	40
1865:	36	49	43	21	32	48	38	34
1873:	34	31	42	32	30	43	48	40
1881:	34	43	43	40	33	37	46	46
1889:	44	37	34	29	38	40	30	29
1897:	37	29	41	37	30	28	36	47
1905:	37	39	31	26	44	35	35	50
1913:	35	34	34	35	40	33	42	34
1921:	38	34	37	36	31	47	40	35
1929:	37	40	23	32	40	33	45	32
1937:	24	37	26	31	26	33	38	39
1945:	28	35	30	38	36	34	35	29
1953:	41	36	40	48	36	37	30	34
1961:	35	42	23	41	52	34	31	30
1969:	28	34	38	44	33	39	33	26
1977:	32	39	38	41	30	47	41	37
1985:	36	38	38	31	30	28	36	39
1993:	40	30	32	49	34	28	35	39
2001:	36	34	33	36	46	24	34	34
2009:	35	29	25	49	41	38	36	33
2017:	29	31	35	40	37	30	41	34
2025:	36	34	30	27	39	36	26	35
2033:	43	31	29	32	36	28	38	35
2041:	31	36	37	30	41	30	23	25
2049:	29	36	33	36	40	24	33	35
2057:	33	37	27	29	31	34	31	23
2065:	33	38	23	34	36	28	34	39
2073:	32	30	22	31	33	24	32	28
2081:	34	25	26	23	35	27	29	29
2089:	22	24	33	32	25	28	37	33

2097:	33	32	31	36	29	32	37	32

Sample Title: GAS 1307

Channel								
2105:	23	38	22	31	28	27	29	27
2113:	29	25	24	37	26	30	35	27
2121:	26	35	28	34	32	28	26	24
2129:	27	28	27	27	18	24	30	39
2137:	38	24	36	25	26	26	28	26
2145:	20	34	23	40	25	29	24	25
2153:	34	27	31	30	23	22	40	34
2161:	28	25	28	35	20	31	21	46
2169:	41	22	24	34	32	21	26	32
2177:	26	33	39	25	29	29	25	33
2185:	28	23	29	33	27	31	29	27
2193:	29	27	33	32	27	23	34	34
2201:	37	25	31	37	30	28	27	27
2209:	27	28	27	24	32	40	33	19
2217:	33	27	28	29	36	21	21	20
2225:	25	35	37	33	23	30	35	28
2233:	28	29	30	36	35	31	39	25
2241:	37	34	23	24	27	27	35	29
2249:	29	29	35	41	34	37	42	31
2257:	30	46	38	42	32	30	32	48
2265:	30	36	34	35	46	41	42	38
2273:	40	39	36	35	35	34	31	49
2281:	37	45	40	31	41	39	34	36
2289:	36	37	30	38	34	27	36	32
2297:	27	12	20	26	26	29	32	18
2305:	19	22	15	23	31	21	20	19
2313:	24	26	23	24	12	25	14	15
2321:	21	19	21	22	15	23	11	23
2329:	18	16	12	21	12	18	14	12
2337:	14	21	15	17	15	13	15	16
2345:	17	21	17	16	18	15	12	12
2353:	10	17	22	16	18	16	10	15
2361:	12	11	14	12	20	14	12	12
2369:	9	9	8	9	10	10	9	13
2377:	5	9	7	9	9	7	11	10
2385:	8	9	10	10	9	8	7	7
2393:	5	4	9	4	6	6	8	4
2401:	8	7	3	10	6	2	5	2
2409:	10	6	4	3	4	3	2	5
2417:	5	5	4	4	1	1	6	1
2425:	11	2	3	0	1	6	4	2
2433:	2	1	2	3	3	4	5	3
2441:	3	3	3	2	2	6	4	6
2449:	5	4	3	7	2	0	4	7
2457:	2	1	3	4	3	3	3	2
2465:	2	3	2	1	0	1	3	1
2473:	3	3	2	2	4	7	6	3
2481:	6	5	3	6	3	4	3	4
2489:	3	7	6	6	5	5	5	6
2497:	7	4	5	6	8	55	225	566
2505:	773	489	168	35	6	4	2	2
2513:	6	4	2	3	2	3	1	1
2521:	0	4	2	6	2	4	1	2

2529:	1	0	1	1	1	0	2	0

Sample Title: GAS 1307

Channel								
2537:	0	0	2	0	0	0	0	2
2545:	0	1	1	3	0	0	2	1
2553:	2	1	1	0	2	0	0	2
2561:	2	0	0	1	3	0	0	1
2569:	3	1	1	0	0	0	0	0
2577:	0	0	0	0	0	1	0	0
2585:	0	0	1	0	0	1	1	2
2593:	1	0	1	2	1	1	1	0
2601:	0	0	2	1	1	0	1	1
2609:	0	0	1	2	3	7	1	0
2617:	1	0	1	1	1	0	1	0
2625:	2	0	2	1	4	1	1	1
2633:	0	0	0	0	1	1	0	0
2641:	0	1	0	1	0	0	0	0
2649:	0	0	0	0	1	3	1	1
2657:	0	0	0	0	1	0	1	0
2665:	0	0	0	0	0	0	1	0
2673:	1	1	1	1	0	0	0	0
2681:	0	1	1	0	0	0	0	0
2689:	0	0	0	0	1	0	0	0
2697:	1	0	0	0	1	0	0	0
2705:	0	0	0	0	0	0	1	1
2713:	0	0	1	0	0	0	0	0
2721:	0	0	0	0	0	0	0	0
2729:	0	0	6	1	3	0	4	0
2737:	1	1	2	1	0	0	0	0
2745:	0	1	1	1	0	2	0	0
2753:	0	0	0	0	0	0	0	0
2761:	0	0	0	0	1	0	0	0
2769:	1	0	0	0	0	0	0	1
2777:	1	1	3	0	2	0	0	0
2785:	0	1	1	0	0	0	1	0
2793:	0	0	1	0	0	0	0	0
2801:	0	1	0	1	0	0	0	0
2809:	1	0	0	0	0	0	0	0
2817:	0	0	0	1	0	0	0	0
2825:	0	0	2	0	0	0	1	0
2833:	0	1	0	0	0	1	0	0
2841:	0	1	0	0	0	0	1	0
2849:	0	0	0	0	0	1	1	0
2857:	1	0	0	1	0	1	2	0
2865:	0	0	0	0	0	0	0	0
2873:	0	0	0	1	0	0	1	0
2881:	0	0	0	0	1	0	0	1
2889:	0	0	2	0	0	0	0	1
2897:	0	0	0	0	1	0	0	0
2905:	0	0	0	0	1	2	1	0
2913:	1	0	1	0	0	0	1	2
2921:	0	0	0	0	0	0	1	0
2929:	1	0	0	2	0	0	0	1
2937:	0	1	0	0	0	0	1	0
2945:	1	0	0	0	0	1	0	0
2953:	1	0	0	1	0	1	0	0

2961:	0	0	0	0	1	2	0	0

Sample Title: GAS 1307

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

3393:	0	0	0	0	0	0	0	0

Sample Title: GAS 1307

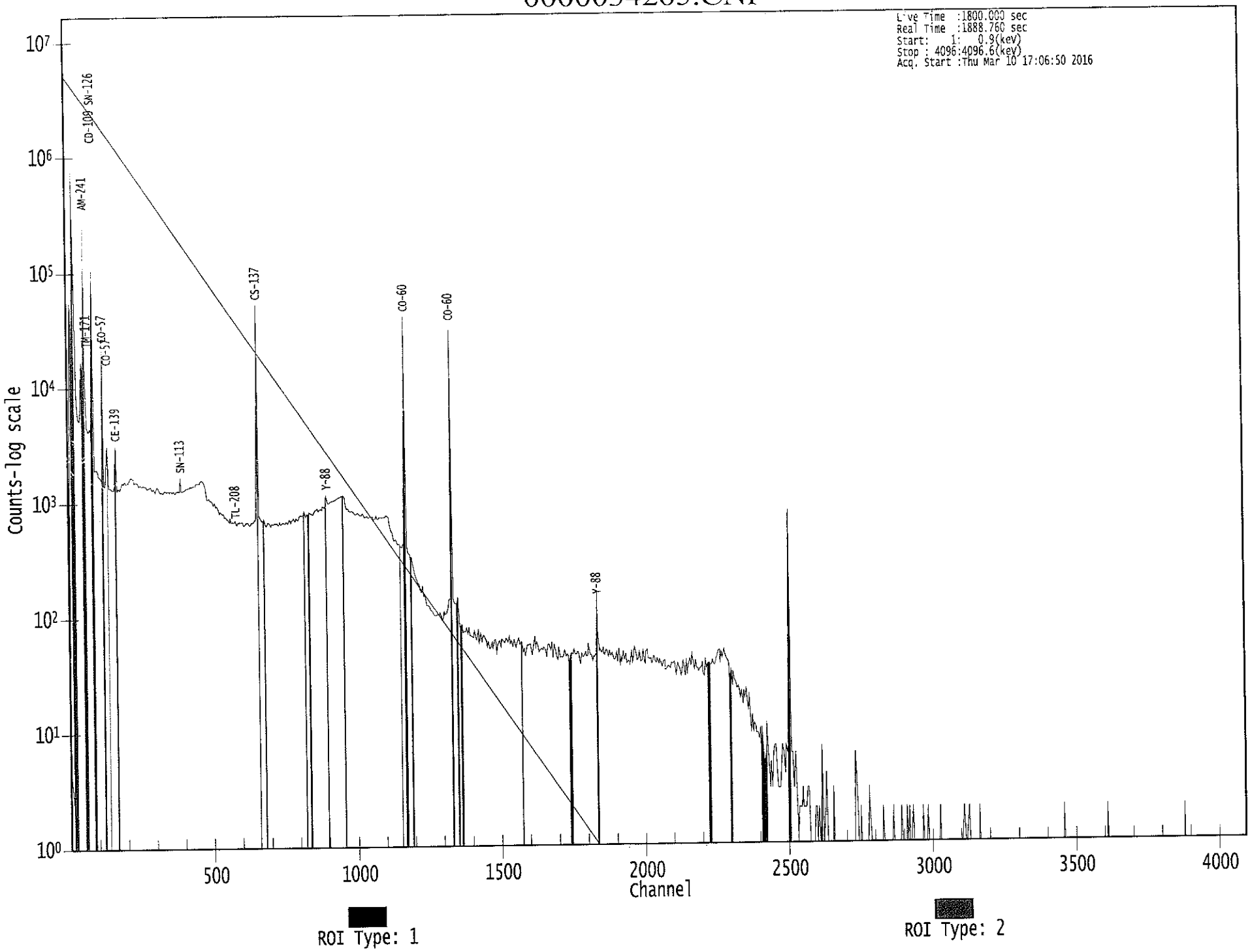
Channel								
3401:	1	0	1	0	0	1	0	0
3409:	0	0	0	0	0	0	0	0
3417:	0	0	0	0	1	0	0	0
3425:	0	0	0	0	0	0	1	0
3433:	0	0	0	0	0	0	0	0
3441:	0	0	0	0	0	0	0	0
3449:	0	0	0	0	0	0	0	1
3457:	0	2	0	0	0	0	0	0
3465:	0	0	0	0	0	0	0	0
3473:	0	0	0	0	1	0	0	0
3481:	0	0	1	0	1	0	0	0
3489:	0	0	1	0	1	0	0	0
3497:	0	0	0	0	1	0	0	0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

3825:	0	0	0	0	0	0	0	0

Sample Title: GAS 1307

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

0000034265.CNF



: 00337

ICB 3/10/16

Apex-Gamma

Analysis Report for 1603050-02
BLANK

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1603050-02
Sample Description	: BLANK
Sample Type	: SOIL
Sample Size	: 1.383E+01 grams
Facility	: Countroom
Sample Taken On	: 3/10/2016 5:06:18PM
Acquisition Started	: 3/10/2016 5:38:51PM
Procedure	: GAS-1407 pCi
Operator	: Administrator
Detector Name	: GE2
Geometry	: GAS-1407
Live Time	: 1800.0 seconds
Real Time	: 1800.4 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 7 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 11/2/2014
Efficiency Calibration Used Done On	: 10/25/2014
Efficiency Calibration Description	:
Sample Number	: 34267

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

AG
3/10/16

Analysis Report for 1603050-02

BLANK

PEAK LOCATE REPORT

Peak Locate Performed on : 3/10/2016 6:08:55PM
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	22.14	22.25	0.0000	0.00
2	74.83	74.92	0.0000	0.00
3	91.98	92.06	0.0000	0.00
4	236.00	236.00	0.0000	0.00
5	239.13	239.13	0.0000	0.00
6	351.86	351.80	0.0000	0.00
7	362.37	362.30	0.0000	0.00
8	406.63	406.53	0.0000	0.00
9	579.18	579.00	0.0000	0.00
10	583.17	582.99	0.0000	0.00
11	609.38	609.19	0.0000	0.00
12	872.53	872.22	0.0000	0.00
13	911.07	910.74	0.0000	0.00
14	945.41	945.07	0.0000	0.00
15	969.20	968.85	0.0000	0.00
16	1022.96	1022.59	0.0000	0.00
17	1166.52	1166.09	0.0000	0.00
18	1461.30	1460.78	0.0000	0.00
19	1898.80	1898.17	0.0000	0.00

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1603050-02

BLANK

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/10/2016 6:08:55PM

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	22.14	19 -	25	22.25	1.84E+02	78.97	9.86E+02	1.77
	2	74.83	71 -	78	74.92	2.71E+02	140.03	3.10E+03	7.18
	3	91.98	88 -	95	92.06	1.71E+02	113.26	2.02E+03	3.83
M	4	236.00	235 -	250	236.00	7.29E+00	8.54	1.83E+01	1.28
m	5	239.13	235 -	250	239.13	4.54E+01	19.49	4.03E+01	1.41
	6	351.86	347 -	355	351.80	3.93E+01	19.75	3.53E+01	2.59
	7	362.37	356 -	369	362.30	3.71E+01	24.31	4.98E+01	10.61
	8	406.63	401 -	414	406.53	2.90E+01	24.90	5.60E+01	9.73
M	9	579.18	578 -	591	579.00	7.36E+00	3.08	3.92E+00	1.67
m	10	583.17	578 -	591	582.99	2.30E+01	13.78	1.83E+01	1.84
	11	609.38	605 -	614	609.19	2.61E+01	20.93	4.17E+01	2.62
	12	872.53	869 -	874	872.22	7.50E+00	6.71	3.00E+00	1.79
	13	911.07	908 -	913	910.74	8.70E+00	7.00	2.60E+00	2.26
	14	945.41	941 -	949	945.07	8.64E+00	8.02	4.73E+00	1.56
	15	969.20	967 -	971	968.85	5.50E+00	6.67	5.00E+00	1.31
	16	1022.96	1019 -	1025	1022.59	8.30E+00	7.23	3.40E+00	2.85
	17	1166.52	1161 -	1172	1166.09	1.09E+01	13.71	1.81E+01	2.78
	18	1461.30	1455 -	1465	1460.78	4.72E+01	15.17	5.68E+00	3.14
	19	1898.80	1894 -	1900	1898.17	6.00E+00	4.90	0.00E+00	1.98

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 : 3/10/2016 6:08:55PM

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

Analysis Report for 1603050-02

BLANK

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
	1	22.14	19 -	25	1.84E+02	78.97	9.86E+02	6.10E+01
	2	74.83	71 -	78	2.71E+02	140.03	3.10E+03	1.12E+02
	3	91.98	88 -	95	1.71E+02	113.26	2.02E+03	9.06E+01
M	4	236.00	235 -	250	7.29E+00	8.54	1.83E+01	7.03E+00
m	5	239.13	235 -	250	4.54E+01	19.49	4.03E+01	1.04E+01
	6	351.86	347 -	355	3.93E+01	19.75	3.53E+01	1.25E+01
	7	362.37	356 -	369	3.71E+01	24.31	4.98E+01	1.73E+01
	8	406.63	401 -	414	2.90E+01	24.90	5.60E+01	1.85E+01
M	9	579.18	578 -	591	7.36E+00	3.08	3.92E+00	3.26E+00
m	10	583.17	578 -	591	2.30E+01	13.78	1.83E+01	7.03E+00
	11	609.38	605 -	614	2.61E+01	20.93	4.17E+01	1.50E+01
	12	872.53	869 -	874	7.50E+00	6.71	3.00E+00	3.18E+00
	13	911.07	908 -	913	8.70E+00	7.00	2.60E+00	3.10E+00
	14	945.41	941 -	949	8.64E+00	8.02	4.73E+00	4.48E+00
	15	969.20	967 -	971	5.50E+00	6.67	5.00E+00	3.90E+00
	16	1022.96	1019 -	1025	8.30E+00	7.23	3.40E+00	3.59E+00
	17	1166.52	1161 -	1172	1.09E+01	13.71	1.81E+01	9.87E+00
	18	1461.30	1455 -	1465	4.72E+01	15.17	5.68E+00	5.30E+00
	19	1898.80	1894 -	1900	6.00E+00	4.90	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 : 3/10/2016 6:08:55PM

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	22.14	19 -	25	22.25	1.84E+02	78.97	9.86E+02	.....
	2	74.83	71 -	78	74.92	2.71E+02	140.03	3.10E+03	AM-243
	3	91.98	88 -	95	92.06	1.71E+02	113.26	2.02E+03	ND-147
M	4	236.00	235 -	250	236.00	7.29E+00	8.54	1.83E+01	TH-227 NB-95M
m	5	239.13	235 -	250	239.13	4.54E+01	19.49	4.03E+01	PB-212

Analysis Report for 1603050-02

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	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	6	351.86	347 -	355	351.80	3.93E+01	19.75	3.53E+01	PB-214
	7	362.37	356 -	369	362.30	3.71E+01	24.31	4.98E+01	.....
	8	406.63	401 -	414	406.53	2.90E+01	24.90	5.60E+01	.....
M	9	579.18	578 -	591	579.00	7.36E+00	3.08	3.92E+00	.....
m	10	583.17	578 -	591	582.99	2.30E+01	13.78	1.83E+01	TL-208
	11	609.38	605 -	614	609.19	2.61E+01	20.93	4.17E+01	BI-214
	12	872.53	869 -	874	872.22	7.50E+00	6.71	3.00E+00	EU-154
	13	911.07	908 -	913	910.74	8.70E+00	7.00	2.60E+00	AC-228
	14	945.41	941 -	949	945.07	8.64E+00	8.02	4.73E+00	PA-234
	15	969.20	967 -	971	968.85	5.50E+00	6.67	5.00E+00	AC-228
	16	1022.96	1019 -	1025	1022.59	8.30E+00	7.23	3.40E+00	.....
	17	1166.52	1161 -	1172	1166.09	1.09E+01	13.71	1.81E+01	.....
	18	1461.30	1455 -	1465	1460.78	4.72E+01	15.17	5.68E+00	K-40
	19	1898.80	1894 -	1900	1898.17	6.00E+00	4.90	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 : 3/10/2016 6:08:55PM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
	1	22.14	1.84E+02	78.97	1.85E-02	9.36E-03
	2	74.83	2.71E+02	140.03	1.36E-01	1.06E-02
	3	91.98	1.71E+02	113.26	1.34E-01	1.18E-02
M	4	236.00	7.29E+00	8.54	7.92E-02	7.49E-03
m	5	239.13	4.54E+01	19.49	7.84E-02	7.35E-03
	6	351.86	3.93E+01	19.75	5.70E-02	4.65E-03
	7	362.37	3.71E+01	24.31	5.56E-02	4.51E-03
	8	406.63	2.90E+01	24.90	5.02E-02	4.04E-03
M	9	579.18	7.36E+00	3.08	3.61E-02	3.30E-03
m	10	583.17	2.30E+01	13.78	3.59E-02	3.28E-03
	11	609.38	2.61E+01	20.93	3.44E-02	3.17E-03
	12	872.53	7.50E+00	6.71	2.42E-02	2.35E-03
	13	911.07	8.70E+00	7.00	2.32E-02	2.24E-03
	14	945.41	8.64E+00	8.02	2.23E-02	2.14E-03
	15	969.20	5.50E+00	6.67	2.18E-02	2.07E-03
	16	1022.96	8.30E+00	7.23	2.07E-02	1.91E-03

Analysis Report for 1603050-02

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Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
17	1166.52	1.09E+01	13.71	1.82E-02	1.47E-03
18	1461.30	4.72E+01	15.17	1.48E-02	1.29E-03
19	1898.80	6.00E+00	4.90	1.20E-02	9.22E-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 : 3/10/2016 6:08:55PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000033933.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	22.14	1.84E+02	78.97			1.84E+02	7.90E+01
	2	74.83	2.71E+02	140.03			2.71E+02	1.40E+02
	3	91.98	1.71E+02	113.26	3.72E+01	6.47E+00	1.34E+02	1.13E+02
M	4	236.00	7.29E+00	8.54			7.29E+00	8.54E+00
m	5	239.13	4.54E+01	19.49	7.68E+00	3.58E+00	3.78E+01	1.98E+01
	6	351.86	3.93E+01	19.75	1.06E+01	2.73E+00	2.87E+01	1.99E+01
	7	362.37	3.71E+01	24.31			3.71E+01	2.43E+01
	8	406.63	2.90E+01	24.90			2.90E+01	2.49E+01
M	9	579.18	7.36E+00	3.08			7.36E+00	3.08E+00
m	10	583.17	2.30E+01	13.78	4.97E+00	1.99E+00	1.81E+01	1.39E+01
	11	609.38	2.61E+01	20.93	7.68E+00	2.24E+00	1.85E+01	2.10E+01
	12	872.53	7.50E+00	6.71			7.50E+00	6.71E+00
	13	911.07	8.70E+00	7.00	1.61E+00	1.66E+00	7.09E+00	7.19E+00
	14	945.41	8.64E+00	8.02			8.64E+00	8.02E+00
	15	969.20	5.50E+00	6.67	6.00E-01	1.40E+00	4.90E+00	6.82E+00
	16	1022.96	8.30E+00	7.23			8.30E+00	7.23E+00
	17	1166.52	1.09E+01	13.71			1.09E+01	1.37E+01
	18	1461.30	4.72E+01	15.17	5.50E+00	1.23E+00	4.17E+01	1.52E+01
	19	1898.80	6.00E+00	4.90			6.00E+00	4.90E+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 1603050-02

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AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 3/10/2016 6:08:55PM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000033933.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	22.14	1.84E+02	78.97			1.84E+02	7.90E+01
	2	74.83	2.71E+02	140.03			2.71E+02	1.40E+02
	3	91.98	1.71E+02	113.26	3.72E+01	6.47E+00	1.34E+02	1.13E+02
M	4	236.00	7.29E+00	8.54			7.29E+00	8.54E+00
m	5	239.13	4.54E+01	19.49	7.68E+00	3.58E+00	3.78E+01	1.98E+01
	6	351.86	3.93E+01	19.75	1.06E+01	2.73E+00	2.87E+01	1.99E+01
	7	362.37	3.71E+01	24.31			3.71E+01	2.43E+01
	8	406.63	2.90E+01	24.90			2.90E+01	2.49E+01
M	9	579.18	7.36E+00	3.08			7.36E+00	3.08E+00
m	10	583.17	2.30E+01	13.78	4.97E+00	1.99E+00	1.81E+01	1.39E+01
	11	609.38	2.61E+01	20.93	7.68E+00	2.24E+00	1.85E+01	2.10E+01
	12	872.53	7.50E+00	6.71			7.50E+00	6.71E+00
	13	911.07	8.70E+00	7.00	1.61E+00	1.66E+00	7.09E+00	7.19E+00
	14	945.41	8.64E+00	8.02			8.64E+00	8.02E+00
	15	969.20	5.50E+00	6.67	6.00E-01	1.40E+00	4.90E+00	6.82E+00
	16	1022.96	8.30E+00	7.23			8.30E+00	7.23E+00
	17	1166.52	1.09E+01	13.71			1.09E+01	1.37E+01
	18	1461.30	4.72E+01	15.17	5.50E+00	1.23E+00	4.17E+01	1.52E+01
	19	1898.80	6.00E+00	4.90			6.00E+00	4.90E+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

Analysis Report for 1603050-02

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Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.962	1460.81	*	10.67	2.86E+01	1.08E+01
NB-95M	0.985	235.69	*	25.00	4.02E-01	4.73E-01
ND-147	0.604	91.11	*	28.90	3.78E+00	3.21E+00
		531.02		13.10		
TL-208	0.311	583.14	*	30.22	1.81E+00	1.40E+00
		860.37		4.48		
		2614.66		35.85		
PB-212	0.859	238.63	*	44.60	1.17E+00	6.25E-01
		300.09		3.41		
BI-214	0.459	609.31	*	46.30	1.26E+00	1.44E+00
		1120.29		15.10		
		1764.49		15.80		
		2204.22		4.98		
PB-214	0.428	295.21		19.19		
		351.92	*	37.19	1.47E+00	1.03E+00
AC-228	0.530	338.32		11.40		
		911.07	*	27.70	1.20E+00	1.22E+00
		969.11	*	16.60	1.47E+00	2.05E+00
AM-243	0.996	74.67	*	66.00	3.27E+00	1.71E+00

* = 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 : 3/10/2016 6:08:55PM
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	22.14	1.02215E-01	21.46		
	7	362.37	2.06048E-02	32.77		
	8	406.63	1.61111E-02	42.93		
M	9	579.18	4.08684E-03	20.95		
	12	872.53	4.16667E-03	44.72	Tol.	EU-154
	14	945.41	4.79798E-03	46.41	Tol.	PA-234
	16	1022.96	4.61111E-03	43.54		
	17	1166.52	6.06944E-03	62.75	Sum	
	19	1898.80	3.33333E-03	40.82		

Analysis Report for 1603050-02

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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	0.96	1460.81	*	10.67	2.86E+01	1.08E+01
NB-95M	0.98	235.69	*	25.00	4.02E-01	4.73E-01
ND-147	0.60	91.11	*	28.90	3.78E+00	3.21E+00
		531.02		13.10		
TL-208	0.31	583.14	*	30.22	1.81E+00	1.40E+00
		860.37		4.48		
		2614.66		35.85		
PB-212	0.85	238.63	*	44.60	1.17E+00	6.25E-01
		300.09		3.41		
BI-214	0.45	609.31	*	46.30	1.26E+00	1.44E+00
		1120.29		15.10		
		1764.49		15.80		
		2204.22		4.98		
PB-214	0.42	295.21		19.19		
		351.92	*	37.19	1.47E+00	1.03E+00
AC-228	0.53	338.32		11.40		
		911.07	*	27.70	1.20E+00	1.22E+00
		969.11	*	16.60	1.47E+00	2.05E+00
AM-243	0.99	74.67	*	66.00	3.27E+00	1.71E+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 1603050-02

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INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.962	2.86E+01	1.08E+01	
NB-95M	0.985	4.02E-01	4.73E-01	
ND-147	0.604	3.78E+00	3.21E+00	
TL-208	0.311	1.81E+00	1.40E+00	
PB-212	0.859	1.17E+00	6.25E-01	
BI-214	0.459	1.26E+00	1.44E+00	
PB-214	0.428	1.47E+00	1.03E+00	
AC-228	0.530	1.27E+00	1.05E+00	
AM-243	0.996	3.27E+00	1.71E+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 1603050-02

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UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/10/2016 6:08:55PM
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	22.14	1.02215E-01	21.46		
	7	362.37	2.06048E-02	32.77		
	8	406.63	1.61111E-02	42.93		
M	9	579.18	4.08684E-03	20.95		
	12	872.53	4.16667E-03	44.72	Tol.	EU-154
	14	945.41	4.79798E-03	46.41	Tol.	PA-234
	16	1022.96	4.61111E-03	43.54		
	17	1166.52	6.06944E-03	62.75	Sum	
	19	1898.80	3.33333E-03	40.82		

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	1.91E+00	4.84E+00	4.84E+00
+	NA-22	1274.54		99.94	1.62E-01	9.14E-01	9.14E-01
+	NA-24	1368.53		99.99	7.17E-02	7.72E-01	7.72E-01
		2754.09		99.86	2.23E-01		1.04E+00
+	AL-26	1808.65		99.76	-8.73E-02	8.11E-01	8.11E-01
+	K-40	1460.81	*	10.67	2.86E+01	1.10E+01	1.10E+01
+	AR-41	1293.64		99.16	0.00E+00	8.29E-01	8.29E-01
+	TI-44	67.88		94.40	-3.20E-01	8.21E-01	8.21E-01

Analysis Report for 1603050-02

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	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	TI-44	78.34		96.00	5.24E-01	8.21E-01	1.01E+00
+	SC-46	889.25		99.98	-9.15E-02	5.49E-01	5.49E-01
		1120.51		99.99	9.88E-02		9.56E-01
+	V-48	983.52		99.98	1.01E-01	8.02E-01	8.02E-01
		1312.10		97.50	-4.27E-03		1.08E+00
+	CR-51	320.08		9.83	-1.41E+00	4.47E+00	4.47E+00
+	MN-54	834.83		99.97	1.03E-01	7.49E-01	7.49E-01
+	CO-56	846.75		99.96	-6.94E-02	7.91E-01	7.91E-01
		1037.75		14.03	1.33E+00		5.70E+00
		1238.25		67.00	0.00E+00		1.49E+00
		1771.40		15.51	-3.04E+00		5.13E+00
		2598.48		16.90	-2.72E+00		4.61E+00
+	CO-57	122.06		85.51	2.23E-01	3.97E-01	3.97E-01
		136.48		10.60	2.97E-01		3.01E+00
+	CO-58	810.76		99.40	2.10E-02	7.32E-01	7.32E-01
+	FE-59	1099.22		56.50	-3.99E-01	1.07E+00	1.07E+00
		1291.56		43.20	-6.07E-01		1.12E+00
+	CO-60	1173.22		100.00	1.50E-01	9.98E-01	9.98E-01
		1332.49		100.00	3.52E-01		1.12E+00
+	ZN-65	1115.52		50.75	-4.08E-01	1.35E+00	1.35E+00
+	GA-67	93.31		35.70	2.99E+00	2.81E+00	3.00E+00
		208.95		2.24	2.62E+00		1.72E+01
		300.22		16.00	5.39E-01		2.81E+00
+	SE-75	121.11		16.70	1.07E+00	5.02E-01	2.07E+00
		136.00		59.20	-2.76E-01		5.02E-01
		264.65		59.80	4.19E-01		7.48E-01
		279.53		25.20	-2.58E-01		1.67E+00
		400.65		11.40	6.24E-02		4.20E+00
+	RB-82	776.52		13.00	1.18E+00	6.00E+00	6.00E+00
+	RB-83	520.41		46.00	-1.50E-01	1.19E+00	1.19E+00
		529.64		30.30	4.10E-01		1.65E+00
		552.65		16.40	-8.76E-01		2.78E+00
+	KR-85	513.99		0.43	-3.68E+01	1.42E+02	1.42E+02
+	SR-85	513.99		99.27	-1.61E-01	6.21E-01	6.21E-01
+	Y-88	898.02		93.40	-2.84E-01	6.97E-01	6.97E-01
		1836.01		99.38	4.43E-01		1.16E+00
+	NB-93M	16.57		9.43	1.28E+02	2.09E+02	2.09E+02
+	NB-94	702.63		100.00	1.95E-01	7.47E-01	8.52E-01
		871.10		100.00	8.96E-02		7.47E-01
+	NB-95	765.79		99.81	3.52E-01	7.96E-01	7.96E-01
+	NB-95M	235.69	*	25.00	4.02E-01	3.52E+00	3.52E+00
+	ZR-95	724.18		43.70	-2.75E-01	1.18E+00	1.72E+00
		756.72		55.30	-6.03E-01		1.18E+00
+	MO-99	181.06		6.20	5.19E-01	5.45E+00	5.90E+00
		739.58		12.80	-4.23E-01		5.45E+00
		778.00		4.50	1.87E-01		1.69E+01
+	RU-103	497.08		89.00	-2.01E-02	4.64E-01	4.64E-01

Analysis Report for 1603050-02

BLANK

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	RU-106	621.84	9.80	1.57E+00	7.37E+00	7.37E+00
+	AG-108M	433.93	89.90	1.24E-01	6.26E-01	6.26E-01
		614.37	90.40	1.10E-01		7.29E-01
		722.95	90.50	-3.84E-01		7.75E-01
+	CD-109	88.03	3.72	-2.75E+00	2.69E+01	2.69E+01
+	AG-110M	657.75	93.14	9.37E-02	7.56E-01	7.56E-01
		677.61	10.53	4.60E-01		6.47E+00
		706.67	16.46	1.27E+00		4.59E+00
		763.93	21.98	-2.28E+00		2.98E+00
		884.67	71.63	-1.27E-01		7.63E-01
		1384.27	23.94	5.84E-01		2.71E+00
+	CD-113M	263.70	0.02	2.24E+02	1.86E+03	1.86E+03
+	SN-113	255.12	1.93	1.42E+01	6.87E-01	2.22E+01
		391.69	64.90	-2.50E-01		6.87E-01
+	TE123M	159.00	84.10	2.16E-01	4.23E-01	4.23E-01
+	SB-124	602.71	97.87	-7.12E-02	7.67E-01	7.67E-01
		645.85	7.26	-2.85E+00		8.01E+00
		722.78	11.10	-3.13E+00		6.32E+00
		1691.02	49.00	1.69E-01		1.24E+00
+	I-125	35.49	6.49	-5.68E-01	7.18E+00	7.18E+00
+	SB-125	176.33	6.89	1.28E+00	1.60E+00	5.23E+00
		427.89	29.33	-5.02E-01		1.60E+00
		463.38	10.35	-3.53E-01		5.15E+00
		600.56	17.80	-1.45E+00		3.62E+00
		635.90	11.32	-3.39E-01		6.02E+00
+	SB-126	414.70	83.30	-8.51E-02	4.61E-01	4.61E-01
		666.33	99.60	-5.19E-02		7.38E-01
		695.00	99.60	-1.13E-01		6.79E-01
		720.50	53.80	7.41E-02		1.39E+00
+	SN-126	87.57	37.00	-2.76E-01	2.70E+00	2.70E+00
+	SB-127	473.00	25.00	4.50E-01	1.50E+00	2.24E+00
		685.20	35.70	-5.77E-01		1.50E+00
		783.80	14.70	-2.85E+00		4.60E+00
+	I-129	29.78	57.00	4.76E-02	1.28E+00	1.28E+00
		33.60	13.20	-8.21E-01		3.98E+00
		39.58	7.52	-1.13E+00		4.65E+00
+	I-131	284.30	6.05	3.30E+00	6.62E-01	6.72E+00
		364.48	81.20	7.27E-02		6.62E-01
		636.97	7.26	5.14E+00		1.07E+01
		722.89	1.80	-1.94E+01		3.91E+01
+	TE-132	49.72	13.10	-6.41E-01	4.31E-01	2.15E+00
		228.16	88.00	-7.64E-02		4.31E-01
+	BA-133	81.00	33.00	1.56E+00	7.01E-01	2.66E+00
		302.84	17.80	-2.18E-01		2.84E+00
		356.01	60.00	-8.14E-01		7.01E-01
+	I-133	529.87	86.30	-8.54E-02	5.72E-01	5.72E-01
+	XE-133	81.00	38.00	1.36E+00	2.32E+00	2.32E+00
+	CS-134	563.23	8.38	-6.98E-01	9.18E-01	5.54E+00

Analysis Report for 1603050-02

BLANK

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	CS-134	569.32		15.43	1.92E-01	9.18E-01	3.85E+00
		604.70		97.60	-1.78E-02		9.18E-01
		795.84		85.40	5.47E-01		1.10E+00
		801.93		8.73	-3.00E+00		7.88E+00
+	CS-135	268.24		16.00	-5.22E-01	3.01E+00	3.01E+00
+	I-135	1131.51		22.50	9.31E-02	2.92E+00	3.94E+00
		1260.41		28.60	-1.07E+00		2.92E+00
		1678.03		9.54	2.81E+00		1.01E+01
+	CS-136	153.22		7.46	2.70E+00	6.72E-01	4.85E+00
		163.89		4.61	2.87E-02		7.39E+00
		176.55		13.56	2.58E-01		2.64E+00
		273.65		12.66	-1.57E-01		3.33E+00
		340.57		48.50	9.28E-02		9.18E-01
		818.50		99.70	-4.50E-02		6.72E-01
		1048.07		79.60	2.92E-01		1.23E+00
		1235.34		19.70	2.04E+00		5.07E+00
+	CS-137	661.65		85.12	-3.41E-01	7.82E-01	7.82E-01
+	LA-138	788.74		34.00	-3.23E-01	1.02E+00	2.08E+00
		1435.80		66.00	5.47E-02		1.02E+00
+	CE-139	165.85		80.35	-2.97E-01	3.85E-01	3.85E-01
+	BA-140	162.64		6.70	-3.44E+00	1.95E+00	4.94E+00
		304.84		4.50	8.09E+00		1.16E+01
		423.70		3.20	-6.22E-01		1.37E+01
		437.55		2.00	4.14E+00		2.66E+01
		537.32		25.00	4.48E-02		1.95E+00
+	LA-140	328.77		20.50	6.57E-01	9.78E-01	2.51E+00
		487.03		45.50	-1.40E-01		9.78E-01
		815.85		23.50	6.56E-01		2.98E+00
		1596.49		95.49	-4.14E-02		9.95E-01
+	CE-141	145.44		48.40	1.20E-01	7.44E-01	7.44E-01
+	CE-143	57.36		11.80	-5.86E-01	1.16E+00	4.08E+00
		293.26		42.00	-4.87E-01		1.16E+00
		664.55		5.20	-2.24E+00		1.39E+01
+	CE-144	133.54		10.80	6.22E-01	2.92E+00	2.92E+00
+	PM-144	476.78		42.00	4.72E-01	7.04E-01	1.20E+00
		618.01		98.60	2.02E-01		7.46E-01
		696.49		99.49	-4.72E-02		7.04E-01
+	PM-145	36.85		21.70	1.08E+00	1.11E+00	2.08E+00
		37.36		39.70	5.77E-01		1.11E+00
		42.30		15.10	5.18E-01		2.26E+00
		72.40		2.31	-8.30E+00		4.12E+01
+	PM-146	453.90		39.94	5.98E-02	1.20E+00	1.20E+00
		735.90		14.01	-2.13E+00		4.30E+00
		747.13		13.10	-1.98E+00		5.33E+00
+	ND-147	91.11	*	28.90	3.78E+00	3.84E+00	5.22E+00
		531.02		13.10	-9.62E-03		3.84E+00
+	PM-149	285.90		3.10	-7.99E+00	1.14E+01	1.14E+01
+	EU-152	121.78		20.50	9.29E-01	1.65E+00	1.65E+00
		244.69		5.40	2.61E-01		7.89E+00

Analysis Report for 1603050-02

BLANK

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	EU-152	344.27		19.13	-1.39E-02	1.65E+00	1.96E+00
		778.89		9.20	6.54E-01		8.21E+00
		964.01		10.40	2.04E+00		7.93E+00
		1085.78		7.22	1.04E+00		1.34E+01
		1112.02		9.60	-1.04E+00		7.12E+00
		1407.95		14.94	7.46E-01		7.13E+00
+	GD-153	97.43		31.30	-6.15E-01	2.49E+00	2.49E+00
		103.18		22.20	1.53E+00		2.67E+00
+	EU-154	123.07		40.50	2.82E-01	8.06E-01	8.06E-01
		723.30		19.70	-1.77E+00		3.56E+00
		873.19		11.50	-7.81E-01		6.80E+00
		996.32		10.30	-9.93E-01		6.51E+00
		1004.76		17.90	1.22E+00		5.42E+00
		1274.45		35.50	4.56E-01		2.57E+00
+	EU-155	86.50		30.90	-3.20E-01	2.52E+00	3.20E+00
		105.30		20.70	1.16E+00		2.52E+00
+	EU-156	811.77		10.40	1.29E+00	7.01E+00	7.01E+00
		1153.47		7.20	4.10E+00		1.23E+01
		1230.71		8.90	-2.12E+00		8.47E+00
+	HO-166M	184.41		72.60	6.30E-02	5.81E-01	5.81E-01
		280.45		29.60	-2.20E-01		1.43E+00
		410.94		11.10	2.06E+00		4.82E+00
		711.69		54.10	-1.13E-01		1.28E+00
+	TM-171	66.72		0.14	-2.25E+01	5.26E+02	5.26E+02
+	HF-172	81.75		4.52	3.60E+00	2.59E+00	1.87E+01
		125.81		11.30	-4.03E-01		2.59E+00
+	LU-172	181.53		20.60	-2.12E-01	1.27E+00	1.77E+00
		810.06		16.63	1.26E-01		4.38E+00
		912.12		15.25	-4.63E-01		5.37E+00
		1093.66		62.50	0.00E+00		1.27E+00
+	LU-173	100.72		5.24	-2.46E+00	2.32E+00	1.22E+01
		272.11		21.20	3.87E-01		2.32E+00
+	HF-175	343.40		84.00	-2.38E-02	4.46E-01	4.46E-01
+	LU-176	88.34		13.30	-7.69E-01	3.48E-01	7.53E+00
		201.83		86.00	-2.20E-01		3.48E-01
		306.78		94.00	-1.08E-02		4.68E-01
+	TA-182	67.75		41.20	-7.33E-01	1.88E+00	1.88E+00
		1121.30		34.90	8.97E-01		2.98E+00
		1189.05		16.23	-1.87E-01		4.03E+00
		1221.41		26.98	-1.01E-01		3.66E+00
		1231.02		11.44	-1.10E+00		7.19E+00
+	IR-192	308.46		29.68	-4.59E-02	1.25E+00	1.35E+00
		468.07		48.10	2.05E-01		1.25E+00
+	HG-203	279.19		77.30	-1.27E-01	5.17E-01	5.17E-01
+	BI-207	569.67		97.72	3.03E-02	6.09E-01	6.09E-01
		1063.62		74.90	-7.28E-02		1.03E+00
+	TL-208	583.14	*	30.22	1.81E+00	3.37E+00	3.37E+00
		860.37		4.48	3.29E+00		1.86E+01
		2614.66		35.85	1.18E+00		3.56E+00

Analysis Report for 1603050-02

BLANK

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	BI-210M	262.00		45.00	-7.46E-01	7.94E-01	7.94E-01
		300.00		23.00	3.72E-01		1.94E+00
+	PB-210	46.50		4.25	5.71E+00	8.52E+00	8.52E+00
+	PB-211	404.84		2.90	-8.10E-01	1.82E+01	1.82E+01
		831.96		2.90	-1.20E+01		2.34E+01
+	BI-212	727.17		11.80	9.53E-01	6.95E+00	6.95E+00
		1620.62		2.75	1.45E+00		3.13E+01
+	PB-212	238.63	*	44.60	1.17E+00	2.04E+00	2.04E+00
		300.09		3.41	2.51E+00		1.31E+01
+	BI-214	609.31	*	46.30	1.26E+00	2.34E+00	2.34E+00
		1120.29		15.10	6.54E-01		6.33E+00
		1764.49		15.80	1.94E+00		7.63E+00
		2204.22		4.98	1.98E+00		2.38E+01
+	PB-214	295.21		19.19	1.02E+00	1.55E+00	2.58E+00
		351.92	*	37.19	1.47E+00		1.55E+00
+	RN-219	401.80		6.50	-8.98E-01	8.07E+00	8.07E+00
+	RA-223	323.87		3.88	-5.31E+00	1.16E+01	1.16E+01
+	RA-224	240.98		3.95	5.36E+00	1.51E+01	1.51E+01
+	RA-225	40.00		31.00	-2.71E-01	1.11E+00	1.11E+00
+	RA-226	186.21		3.28	7.02E-01	1.33E+01	1.33E+01
+	TH-227	50.10		8.40	-9.86E-01	3.31E+00	3.31E+00
		236.00		11.50	-7.39E+00		4.08E+00
		256.20		6.30	-4.02E-01		6.54E+00
+	AC-228	338.32		11.40	-7.08E-01	1.80E+00	4.27E+00
		911.07	*	27.70	1.20E+00		1.80E+00
		969.11	*	16.60	1.47E+00		3.37E+00
+	TH-230	48.44		16.90	-2.26E+00	1.48E+00	1.48E+00
		62.85		4.60	-2.92E-02		1.36E+01
		67.67		0.37	-8.16E+01		2.10E+02
+	PA-231	283.67		1.60	1.24E+01	2.20E+01	2.53E+01
		302.67		2.30	-1.68E+00		2.20E+01
+	TH-231	25.64		14.70	6.14E+00	1.25E+01	1.41E+01
		84.21		6.40	2.58E-02		1.25E+01
+	PA-233	311.98		38.60	4.23E-01	1.14E+00	1.14E+00
+	PA-234	131.20		20.40	3.31E-02	1.53E+00	1.53E+00
		733.99		8.80	-1.70E+00		7.16E+00
		946.00		12.00	1.74E+00		7.05E+00
+	PA-234M	1001.03		0.92	1.99E+01	9.31E+01	9.31E+01
+	TH-234	63.29		3.80	-3.52E-02	1.65E+01	1.65E+01
+	U-235	143.76		10.50	6.33E-02	3.31E+00	3.31E+00
		163.35		4.70	-4.91E+00		7.05E+00
		205.31		4.70	-5.42E-01		7.51E+00
+	NP-237	86.50		12.60	-7.86E-01	7.85E+00	7.85E+00
+	NP-239	106.10		22.70	3.41E-01	2.13E+00	2.13E+00
		228.18		10.70	-6.30E-01		3.55E+00
		277.60		14.10	1.94E-01		2.79E+00
+	AM-241	59.54		35.90	-6.64E-01	1.58E+00	1.58E+00

Analysis Report for 1603050-02

BLANK

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	AM-243	74.67	*	66.00	3.27E+00	2.73E+00	2.73E+00
+	CM-243	209.75		3.29	-3.04E+00	2.79E+00	1.14E+01
		228.14		10.60	-6.30E-01		3.55E+00
		277.60		14.00	1.94E-01		2.79E+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	4.84E+00	4.84E+00	1.91E+00	2.09E+00
	NA-22	1274.54		99.94	9.14E-01	9.14E-01	1.62E-01	3.69E-01
	NA-24	1368.53		99.99	7.72E-01	7.72E-01	7.17E-02	2.89E-01
		2754.09		99.86	1.04E+00		2.23E-01	3.67E-01
	AL-26	1808.65		99.76	8.11E-01	8.11E-01	-8.73E-02	2.87E-01
+	K-40	1460.81	*	10.67	1.10E+01	1.10E+01	2.86E+01	4.56E+00
	AR-41	1293.64		99.16	8.29E-01	8.29E-01	0.00E+00	2.94E-01
	TI-44	67.88		94.40	8.21E-01	8.21E-01	-3.20E-01	3.99E-01
		78.34		96.00	1.01E+00		5.24E-01	4.96E-01
	SC-46	889.25		99.98	5.49E-01	5.49E-01	-9.15E-02	2.13E-01
		1120.51		99.99	9.56E-01		9.88E-02	4.00E-01
	V-48	983.52		99.98	8.02E-01	8.02E-01	1.01E-01	3.33E-01
		1312.10		97.50	1.08E+00		-4.27E-03	4.50E-01
	CR-51	320.08		9.83	4.47E+00	4.47E+00	-1.41E+00	1.99E+00
	MN-54	834.83		99.97	7.49E-01	7.49E-01	1.03E-01	3.16E-01
	CO-56	846.75		99.96	7.91E-01	7.91E-01	-6.94E-02	3.36E-01
		1037.75		14.03	5.70E+00		1.33E+00	2.34E+00
		1238.25		67.00	1.49E+00		0.00E+00	6.19E-01
		1771.40		15.51	5.13E+00		-3.04E+00	1.82E+00

Analysis Report for 1603050-02

BLANK

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
CO-56	2598.48	16.90	4.61E+00	7.91E-01	-2.72E+00	1.46E+00
CO-57	122.06	85.51	3.97E-01	3.97E-01	2.23E-01	1.84E-01
	136.48	10.60	3.01E+00		2.97E-01	1.38E+00
CO-58	810.76	99.40	7.32E-01	7.32E-01	2.10E-02	3.09E-01
FE-59	1099.22	56.50	1.07E+00	1.07E+00	-3.99E-01	4.02E-01
	1291.56	43.20	1.12E+00		-6.07E-01	3.53E-01
CO-60	1173.22	100.00	9.98E-01	9.98E-01	1.50E-01	4.18E-01
	1332.49	100.00	1.12E+00		3.52E-01	4.71E-01
ZN-65	1115.52	50.75	1.35E+00	1.35E+00	-4.08E-01	5.23E-01
GA-67	93.31	35.70	3.00E+00	2.81E+00	2.99E+00	1.47E+00
	208.95	2.24	1.72E+01		2.62E+00	7.85E+00
	300.22	16.00	2.81E+00		5.39E-01	1.26E+00
SE-75	121.11	16.70	2.07E+00	5.02E-01	1.07E+00	9.64E-01
	136.00	59.20	5.02E-01		-2.76E-01	2.29E-01
	264.65	59.80	7.48E-01		4.19E-01	3.40E-01
	279.53	25.20	1.67E+00		-2.58E-01	7.52E-01
	400.65	11.40	4.20E+00		6.24E-02	1.85E+00
RB-82	776.52	13.00	6.00E+00	6.00E+00	1.18E+00	2.58E+00
RB-83	520.41	46.00	1.19E+00	1.19E+00	-1.50E-01	5.14E-01
	529.64	30.30	1.65E+00		4.10E-01	7.03E-01
	552.65	16.40	2.78E+00		-8.76E-01	1.15E+00
KR-85	513.99	0.43	1.42E+02	1.42E+02	-3.68E+01	6.27E+01
SR-85	513.99	99.27	6.21E-01	6.21E-01	-1.61E-01	2.74E-01
Y-88	898.02	93.40	6.97E-01	6.97E-01	-2.84E-01	2.82E-01
	1836.01	99.38	1.16E+00		4.43E-01	4.61E-01
NB-93M	16.57	9.43	2.09E+02	2.09E+02	1.28E+02	1.01E+02
NB-94	702.63	100.00	8.52E-01	7.47E-01	1.95E-01	3.77E-01
	871.10	100.00	7.47E-01		8.96E-02	3.13E-01
NB-95	765.79	99.81	7.96E-01	7.96E-01	3.52E-01	3.44E-01
+ NB-95M	235.69 *	25.00	3.52E+00	3.52E+00	4.02E-01	1.69E+00
ZR-95	724.18	43.70	1.72E+00	1.18E+00	-2.75E-01	7.44E-01
	756.72	55.30	1.18E+00		-6.03E-01	4.92E-01
MO-99	181.06	6.20	5.90E+00	5.45E+00	5.19E-01	2.70E+00
	739.58	12.80	5.45E+00		-4.23E-01	2.32E+00
	778.00	4.50	1.69E+01		1.87E-01	7.24E+00
RU-103	497.08	89.00	4.64E-01	4.64E-01	-2.01E-02	1.92E-01
RU-106	621.84	9.80	7.37E+00	7.37E+00	1.57E+00	3.24E+00
AG-108M	433.93	89.90	6.26E-01	6.26E-01	1.24E-01	2.78E-01
	614.37	90.40	7.29E-01		1.10E-01	3.17E-01
	722.95	90.50	7.75E-01		-3.84E-01	3.32E-01
CD-109	88.03	3.72	2.69E+01	2.69E+01	-2.75E+00	1.32E+01
AG-110M	657.75	93.14	7.56E-01	7.56E-01	9.37E-02	3.29E-01
	677.61	10.53	6.47E+00		4.60E-01	2.79E+00
	706.67	16.46	4.59E+00		1.27E+00	2.00E+00
	763.93	21.98	2.98E+00		-2.28E+00	1.25E+00
	884.67	71.63	7.63E-01		-1.27E-01	2.96E-01
	1384.27	23.94	2.71E+00		5.84E-01	9.60E-01
CD-113M	263.70	0.02	1.86E+03	1.86E+03	2.24E+02	8.42E+02
SN-113	255.12	1.93	2.22E+01	6.87E-01	1.42E+01	1.01E+01
	391.69	64.90	6.87E-01		-2.50E-01	3.00E-01
TE123M	159.00	84.10	4.23E-01	4.23E-01	2.16E-01	1.95E-01
SB-124	602.71	97.87	7.67E-01	7.67E-01	-7.12E-02	3.40E-01
	645.85	7.26	8.01E+00		-2.85E+00	3.38E+00

Analysis Report for 1603050-02

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Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
SB-124	722.78	11.10	6.32E+00	7.67E-01	-3.13E+00	2.71E+00
	1691.02	49.00	1.24E+00		1.69E-01	3.93E-01
I-125	35.49	6.49	7.18E+00	7.18E+00	-5.68E-01	3.29E+00
SB-125	176.33	6.89	5.23E+00	1.60E+00	1.28E+00	2.40E+00
	427.89	29.33	1.60E+00		-5.02E-01	6.96E-01
	463.38	10.35	5.15E+00		-3.53E-01	2.26E+00
	600.56	17.80	3.62E+00		-1.45E+00	1.58E+00
	635.90	11.32	6.02E+00		-3.39E-01	2.62E+00
SB-126	414.70	83.30	4.61E-01	4.61E-01	-8.51E-02	1.95E-01
	666.33	99.60	7.38E-01		-5.19E-02	3.22E-01
	695.00	99.60	6.79E-01		-1.13E-01	2.91E-01
	720.50	53.80	1.39E+00		7.41E-02	6.02E-01
SN-126	87.57	37.00	2.70E+00	2.70E+00	-2.76E-01	1.32E+00
SB-127	473.00	25.00	2.24E+00	1.50E+00	4.50E-01	9.86E-01
	685.20	35.70	1.50E+00		-5.77E-01	6.13E-01
	783.80	14.70	4.60E+00		-2.85E+00	1.93E+00
I-129	29.78	57.00	1.28E+00	1.28E+00	4.76E-02	5.88E-01
	33.60	13.20	3.98E+00		-8.21E-01	1.82E+00
	39.58	7.52	4.65E+00		-1.13E+00	2.10E+00
I-131	284.30	6.05	6.72E+00	6.62E-01	3.30E+00	3.00E+00
	364.48	81.20	6.62E-01		7.27E-02	2.98E-01
	636.97	7.26	1.07E+01		5.14E+00	4.73E+00
	722.89	1.80	3.91E+01		-1.94E+01	1.67E+01
TE-132	49.72	13.10	2.15E+00	4.31E-01	-6.41E-01	9.79E-01
	228.16	88.00	4.31E-01		-7.64E-02	1.95E-01
BA-133	81.00	33.00	2.66E+00	7.01E-01	1.56E+00	1.30E+00
	302.84	17.80	2.84E+00		-2.18E-01	1.29E+00
	356.01	60.00	7.01E-01		-8.14E-01	3.07E-01
I-133	529.87	86.30	5.72E-01	5.72E-01	-8.54E-02	2.42E-01
XE-133	81.00	38.00	2.32E+00	2.32E+00	1.36E+00	1.13E+00
CS-134	563.23	8.38	5.54E+00	9.18E-01	-6.98E-01	2.30E+00
	569.32	15.43	3.85E+00		1.92E-01	1.67E+00
	604.70	97.60	9.18E-01		-1.78E-02	4.16E-01
	795.84	85.40	1.10E+00		5.47E-01	4.87E-01
	801.93	8.73	7.88E+00		-3.00E+00	3.30E+00
CS-135	268.24	16.00	3.01E+00	3.01E+00	-5.22E-01	1.38E+00
I-135	1131.51	22.50	3.94E+00	2.92E+00	9.31E-02	1.59E+00
	1260.41	28.60	2.92E+00		-1.07E+00	1.13E+00
	1678.03	9.54	1.01E+01		2.81E+00	3.77E+00
CS-136	153.22	7.46	4.85E+00	6.72E-01	2.70E+00	2.24E+00
	163.89	4.61	7.39E+00		2.87E-02	3.38E+00
	176.55	13.56	2.64E+00		2.58E-01	1.21E+00
	273.65	12.66	3.33E+00		-1.57E-01	1.50E+00
	340.57	48.50	9.18E-01		9.28E-02	4.07E-01
	818.50	99.70	6.72E-01		-4.50E-02	2.79E-01
	1048.07	79.60	1.23E+00		2.92E-01	5.22E-01
	1235.34	19.70	5.07E+00		2.04E+00	2.10E+00
CS-137	661.65	85.12	7.82E-01	7.82E-01	-3.41E-01	3.37E-01
LA-138	788.74	34.00	2.08E+00	1.02E+00	-3.23E-01	8.79E-01
	1435.80	66.00	1.02E+00		5.47E-02	3.60E-01
CE-139	165.85	80.35	3.85E-01	3.85E-01	-2.97E-01	1.75E-01
BA-140	162.64	6.70	4.94E+00	1.95E+00	-3.44E+00	2.26E+00
	304.84	4.50	1.16E+01		8.09E+00	5.30E+00

Analysis Report for 1603050-02

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Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
BA-140	423.70		3.20	1.37E+01	1.95E+00	-6.22E-01	5.89E+00
	437.55		2.00	2.66E+01		4.14E+00	1.17E+01
	537.32		25.00	1.95E+00		4.48E-02	8.25E-01
LA-140	328.77		20.50	2.51E+00	9.78E-01	6.57E-01	1.14E+00
	487.03		45.50	9.78E-01		-1.40E-01	4.13E-01
	815.85		23.50	2.98E+00		6.56E-01	1.25E+00
	1596.49		95.49	9.95E-01		-4.14E-02	3.86E-01
CE-141	145.44		48.40	7.44E-01	7.44E-01	1.20E-01	3.44E-01
CE-143	57.36		11.80	4.08E+00	1.16E+00	-5.86E-01	1.94E+00
	293.26		42.00	1.16E+00		-4.87E-01	5.28E-01
	664.55		5.20	1.39E+01		-2.24E+00	6.05E+00
CE-144	133.54		10.80	2.92E+00	2.92E+00	6.22E-01	1.34E+00
PM-144	476.78		42.00	1.20E+00	7.04E-01	4.72E-01	5.18E-01
	618.01		98.60	7.46E-01		2.02E-01	3.29E-01
	696.49		99.49	7.04E-01		-4.72E-02	3.03E-01
PM-145	36.85		21.70	2.08E+00	1.11E+00	1.08E+00	9.53E-01
	37.36		39.70	1.11E+00		5.77E-01	5.08E-01
	42.30		15.10	2.26E+00		5.18E-01	1.03E+00
	72.40		2.31	4.12E+01		-8.30E+00	2.01E+01
PM-146	453.90		39.94	1.20E+00	1.20E+00	5.98E-02	5.21E-01
	735.90		14.01	4.30E+00		-2.13E+00	1.78E+00
	747.13		13.10	5.33E+00		-1.98E+00	2.27E+00
ND-147	91.11	*	28.90	5.22E+00	3.84E+00	3.78E+00	2.57E+00
	531.02		13.10	3.84E+00		-9.62E-03	1.63E+00
PM-149	285.90		3.10	1.14E+01	1.14E+01	-7.99E+00	4.99E+00
EU-152	121.78		20.50	1.65E+00	1.65E+00	9.29E-01	7.67E-01
	244.69		5.40	7.89E+00		2.61E-01	3.59E+00
	344.27		19.13	1.96E+00		-1.39E-02	8.50E-01
	778.89		9.20	8.21E+00		6.54E-01	3.51E+00
	964.01		10.40	7.93E+00		2.04E+00	3.32E+00
	1085.78		7.22	1.34E+01		1.04E+00	5.67E+00
	1112.02		9.60	7.12E+00		-1.04E+00	2.76E+00
	1407.95		14.94	7.13E+00		7.46E-01	2.92E+00
GD-153	97.43		31.30	2.49E+00	2.49E+00	-6.15E-01	1.21E+00
	103.18		22.20	2.67E+00		1.53E+00	1.28E+00
EU-154	123.07		40.50	8.06E-01	8.06E-01	2.82E-01	3.73E-01
	723.30		19.70	3.56E+00		-1.77E+00	1.53E+00
	873.19		11.50	6.80E+00		-7.81E-01	2.87E+00
	996.32		10.30	6.51E+00		-9.93E-01	2.58E+00
	1004.76		17.90	5.42E+00		1.22E+00	2.32E+00
	1274.45		35.50	2.57E+00		4.56E-01	1.04E+00
EU-155	86.50		30.90	3.20E+00	2.52E+00	-3.20E-01	1.56E+00
	105.30		20.70	2.52E+00		1.16E+00	1.20E+00
EU-156	811.77		10.40	7.01E+00	7.01E+00	1.29E+00	2.96E+00
	1153.47		7.20	1.23E+01		4.10E+00	5.05E+00
	1230.71		8.90	8.47E+00		-2.12E+00	3.28E+00
HO-166M	184.41		72.60	5.81E-01	5.81E-01	6.30E-02	2.69E-01
	280.45		29.60	1.43E+00		-2.20E-01	6.42E-01
	410.94		11.10	4.82E+00		2.06E+00	2.15E+00
	711.69		54.10	1.28E+00		-1.13E-01	5.47E-01
TM-171	66.72		0.14	5.26E+02	5.26E+02	-2.25E+01	2.55E+02
HF-172	81.75		4.52	1.87E+01	2.59E+00	3.60E+00	9.12E+00
	125.81		11.30	2.59E+00		-4.03E-01	1.18E+00

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	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	LU-172	181.53		20.60	1.77E+00	1.27E+00	-2.12E-01	8.11E-01
		810.06		16.63	4.38E+00		1.26E-01	1.85E+00
		912.12		15.25	5.37E+00		-4.63E-01	2.27E+00
		1093.66		62.50	1.27E+00		0.00E+00	5.12E-01
	LU-173	100.72		5.24	1.22E+01	2.32E+00	-2.46E+00	5.88E+00
		272.11		21.20	2.32E+00		3.87E-01	1.06E+00
	HF-175	343.40		84.00	4.46E-01	4.46E-01	-2.38E-02	1.93E-01
	LU-176	88.34		13.30	7.53E+00	3.48E-01	-7.69E-01	3.68E+00
		201.83		86.00	3.48E-01		-2.20E-01	1.55E-01
		306.78		94.00	4.68E-01		-1.08E-02	2.09E-01
	TA-182	67.75		41.20	1.88E+00	1.88E+00	-7.33E-01	9.15E-01
		1121.30		34.90	2.98E+00		8.97E-01	1.27E+00
		1189.05		16.23	4.03E+00		-1.87E-01	1.51E+00
		1221.41		26.98	3.66E+00		-1.01E-01	1.52E+00
		1231.02		11.44	7.19E+00		-1.10E+00	2.85E+00
	IR-192	308.46		29.68	1.35E+00	1.25E+00	-4.59E-02	5.96E-01
		468.07		48.10	1.25E+00		2.05E-01	5.58E-01
	HG-203	279.19		77.30	5.17E-01	5.17E-01	-1.27E-01	2.31E-01
	BI-207	569.67		97.72	6.09E-01	6.09E-01	3.03E-02	2.63E-01
		1063.62		74.90	1.03E+00		-7.28E-02	4.15E-01
+	TL-208	583.14	*	30.22	3.37E+00	3.37E+00	1.81E+00	1.55E+00
		860.37		4.48	1.86E+01		3.29E+00	7.96E+00
		2614.66		35.85	3.56E+00		1.18E+00	1.38E+00
	BI-210M	262.00		45.00	7.94E-01	7.94E-01	-7.46E-01	3.52E-01
		300.00		23.00	1.94E+00		3.72E-01	8.73E-01
	PB-210	46.50		4.25	8.52E+00	8.52E+00	5.71E+00	3.94E+00
	PB-211	404.84		2.90	1.82E+01	1.82E+01	-8.10E-01	8.11E+00
		831.96		2.90	2.34E+01		-1.20E+01	9.71E+00
	BI-212	727.17		11.80	6.95E+00	6.95E+00	9.53E-01	3.05E+00
		1620.62		2.75	3.13E+01		1.45E+00	1.17E+01
+	PB-212	238.63	*	44.60	2.04E+00	2.04E+00	1.17E+00	9.78E-01
		300.09		3.41	1.31E+01		2.51E+00	5.89E+00
+	BI-214	609.31	*	46.30	2.34E+00	2.34E+00	1.26E+00	1.08E+00
		1120.29		15.10	6.33E+00		6.54E-01	2.65E+00
		1764.49		15.80	7.63E+00		1.94E+00	3.08E+00
		2204.22		4.98	2.38E+01		1.98E+00	9.23E+00
+	PB-214	295.21		19.19	2.58E+00	1.55E+00	1.02E+00	1.18E+00
		351.92	*	37.19	1.55E+00		1.47E+00	7.08E-01
	RN-219	401.80		6.50	8.07E+00	8.07E+00	-8.98E-01	3.59E+00
	RA-223	323.87		3.88	1.16E+01	1.16E+01	-5.31E+00	5.21E+00
	RA-224	240.98		3.95	1.51E+01	1.51E+01	5.36E+00	7.06E+00
	RA-225	40.00		31.00	1.11E+00	1.11E+00	-2.71E-01	5.03E-01
	RA-226	186.21		3.28	1.33E+01	1.33E+01	7.02E-01	6.17E+00
	TH-227	50.10		8.40	3.31E+00	3.31E+00	-9.86E-01	1.51E+00
		236.00		11.50	4.08E+00		-7.39E+00	1.88E+00
		256.20		6.30	6.54E+00		-4.02E-01	2.96E+00
+	AC-228	338.32		11.40	4.27E+00	1.80E+00	-7.08E-01	1.91E+00
		911.07	*	27.70	1.80E+00		1.20E+00	6.72E-01
		969.11	*	16.60	3.37E+00		1.47E+00	1.28E+00
	TH-230	48.44		16.90	1.48E+00	1.48E+00	-2.26E+00	6.61E-01
		62.85		4.60	1.36E+01		-2.92E-02	6.58E+00
		67.67		0.37	2.10E+02		-8.16E+01	1.02E+02
	PA-231	283.67		1.60	2.53E+01	2.20E+01	1.24E+01	1.13E+01

Analysis Report for 1603050-02

BLANK

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	PA-231	302.67		2.30	2.20E+01	2.20E+01	-1.68E+00	1.00E+01
	TH-231	25.64		14.70	1.41E+01	1.25E+01	6.14E+00	6.75E+00
		84.21		6.40	1.25E+01		2.58E-02	6.06E+00
	PA-233	311.98		38.60	1.14E+00	1.14E+00	4.23E-01	5.07E-01
	PA-234	131.20		20.40	1.53E+00	1.53E+00	3.31E-02	7.03E-01
		733.99		8.80	7.16E+00		-1.70E+00	3.00E+00
		946.00		12.00	7.05E+00		1.74E+00	2.98E+00
	PA-234M	1001.03		0.92	9.31E+01	9.31E+01	1.99E+01	3.90E+01
	TH-234	63.29		3.80	1.65E+01	1.65E+01	-3.52E-02	7.94E+00
	U-235	143.76		10.50	3.31E+00	3.31E+00	6.33E-02	1.53E+00
		163.35		4.70	7.05E+00		-4.91E+00	3.22E+00
		205.31		4.70	7.51E+00		-5.42E-01	3.40E+00
	NP-237	86.50		12.60	7.85E+00	7.85E+00	-7.86E-01	3.84E+00
	NP-239	106.10		22.70	2.13E+00	2.13E+00	3.41E-01	1.01E+00
		228.18		10.70	3.55E+00		-6.30E-01	1.61E+00
		277.60		14.10	2.79E+00		1.94E-01	1.25E+00
	AM-241	59.54		35.90	1.58E+00	1.58E+00	-6.64E-01	7.56E-01
+	AM-243	74.67	*	66.00	2.73E+00	2.73E+00	3.27E+00	1.35E+00
	CM-243	209.75		3.29	1.14E+01	2.79E+00	-3.04E+00	5.17E+00
		228.14		10.60	3.55E+00		-6.30E-01	1.61E+00
		277.60		14.00	2.79E+00		1.94E-01	1.24E+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

No Action Level results available for reporting purposes.

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

Analysis Report for 1603050-02

BLANK

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: BLANK

Elapsed Live time: 1800
Elapsed Real Time: 1800

Channel								
1:	0	0	0	0	0	0	40	316
9:	538	692	539	280	669	320	42	61
17:	101	83	80	84	94	167	126	55
25:	71	54	34	21	18	19	7	12
33:	14	17	9	17	13	12	8	14
41:	9	13	14	7	12	15	26	11
49:	8	6	20	17	34	34	23	36
57:	36	57	60	70	64	83	78	90
65:	94	96	121	145	139	175	179	215
73:	235	242	230	234	246	241	175	185
81:	190	157	147	146	142	139	120	134
89:	136	155	132	171	171	138	146	106
97:	86	88	62	50	52	46	44	34
105:	38	26	19	17	16	17	13	11
113:	13	16	17	15	10	8	11	10
121:	17	13	9	8	5	7	9	11
129:	9	7	8	12	8	7	9	8
137:	7	7	13	9	5	10	11	9
145:	11	9	13	9	9	9	10	8
153:	13	8	11	4	7	9	11	7
161:	12	7	13	2	4	14	5	7
169:	9	8	8	9	6	8	10	8
177:	7	8	7	7	9	6	11	7
185:	10	20	11	9	11	10	10	9
193:	7	5	9	6	10	9	5	6
201:	4	4	3	5	9	5	9	9
209:	3	9	6	7	8	5	8	2
217:	4	7	5	5	6	8	6	7
225:	7	7	9	4	4	6	7	4
233:	7	6	3	10	6	21	39	8
241:	10	11	6	9	8	3	9	4
249:	6	5	7	4	5	6	9	7
257:	6	2	7	4	4	4	3	6
265:	10	8	7	3	9	12	8	10
273:	6	4	6	2	5	8	5	3
281:	3	8	7	2	4	3	2	6
289:	6	10	4	4	5	6	14	8
297:	2	5	4	8	5	5	6	12
305:	7	7	5	2	4	2	3	11
313:	3	5	2	2	3	5	6	4
321:	4	4	8	3	5	4	9	8
329:	7	4	3	5	5	3	9	3
337:	4	8	10	1	4	3	3	2
345:	2	4	2	5	3	4	12	16
353:	10	4	1	1	5	6	7	2
361:	1	4	8	3	6	7	8	2

369:	2	3	4	2	7	8	5	2

Sample Title: BLANK

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

801:	2	0	2	1	1	3	1	3

Sample Title: BLANK

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

1233:	0	1	1	1	3	1	1	0

Sample Title: BLANK

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

1665:	0	1	1	0	2	0	0	0

Sample Title: BLANK

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

2097:	1	0	1	0	0	0	0	0

Sample Title: BLANK

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

2529:	0	0	0	0	0	0	0	0

Sample Title: BLANK

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

2961:	0	0	0	0	0	0	0	0

Sample Title: BLANK

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

3393:	0	0	0	1	0	0	0	0

Sample Title: BLANK

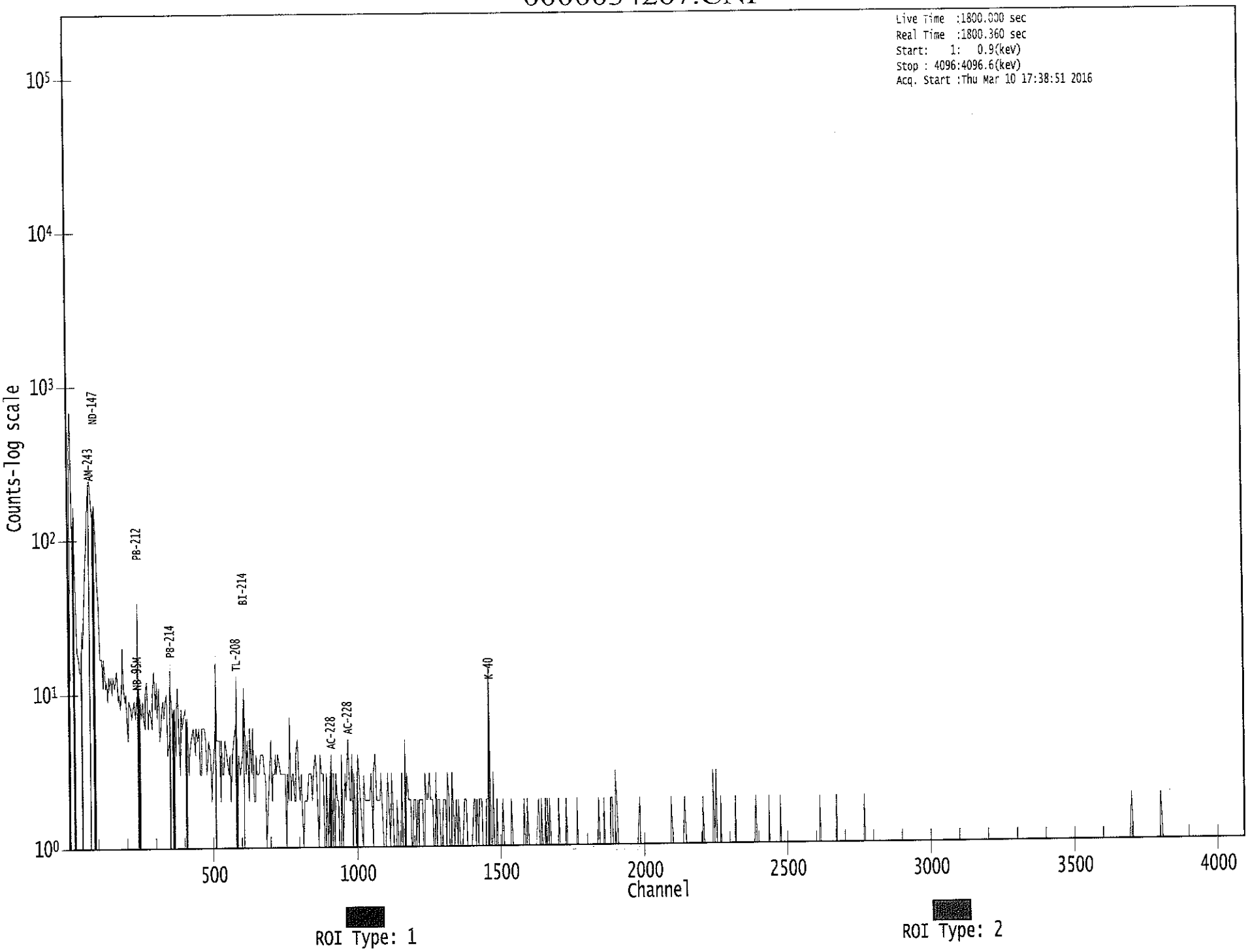
Channel								
3401:	1	0	0	0	0	0	0	0
3409:	0	0	0	0	0	0	0	0
3417:	0	0	1	0	1	0	0	0
3425:	0	0	0	0	0	1	0	0
3433:	0	0	0	0	0	0	0	0
3441:	0	0	0	0	0	0	0	0
3449:	0	0	0	0	0	0	0	0
3457:	0	0	0	0	0	0	0	0
3465:	0	1	0	0	0	0	0	0
3473:	0	0	0	0	0	0	0	0
3481:	0	0	0	0	0	0	0	0
3489:	0	0	0	0	0	0	1	0
3497:	0	0	0	0	0	0	0	0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

3825:	0	0	0	1	0	0	0	0

Sample Title: BLANK

Channel								
3833:	0	0	0	0	0	0	0	1
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	0	0	0	0
3881:	0	0	0	0	0	0	0	0
3889:	0	0	0	0	0	0	0	0
3897:	0	0	0	0	0	1	0	1
3905:	0	0	0	0	0	0	0	0
3913:	0	1	0	0	0	0	0	1
3921:	0	0	0	0	0	0	0	0
3929:	0	0	0	0	0	1	0	0
3937:	0	0	0	0	0	0	0	0
3945:	0	0	0	1	0	0	0	0
3953:	0	0	0	0	0	0	0	0
3961:	0	0	0	0	0	0	0	0
3969:	0	0	0	0	0	0	0	0
3977:	0	0	1	0	0	0	0	0
3985:	0	0	1	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	0	0	0
4025:	0	0	0	0	0	0	0	0
4033:	0	0	0	0	0	0	0	0
4041:	0	0	0	0	0	0	0	0
4049:	0	0	0	0	0	0	0	0
4057:	1	0	0	0	0	0	0	0
4065:	0	0	0	0	0	0	0	0
4073:	1	1	0	0	0	0	0	0
4081:	0	0	0	0	0	0	0	0
4089:	0	0	0	0	0	0	0	0

0000034267.CNF



: 00371

KB 3/10/16

Apex-Gamma

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1603050-03
Sample Description	: J1V8D3 SAF: RC-155
Sample Type	: SOIL
Sample Size	: 2.809E+01 grams
Facility	: Countroom
Sample Taken On	: 3/7/2016 3:44:13PM
Acquisition Started	: 3/10/2016 3:44:33PM
Procedure	: GAS-1407 pCi
Operator	: Administrator
Detector Name	: GE2
Geometry	: GAS-1407
Live Time	: 1800.0 seconds
Real Time	: 2423.3 seconds
Dead Time	: 25.72 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 5 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 11/2/2014
Efficiency Calibration Used Done On	: 10/25/2014
Efficiency Calibration Description	:
Sample Number	: 34253

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

AG 3/11/16

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

PEAK LOCATE REPORT

Peak Locate Performed on : 3/10/2016 4:25:01PM
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	17.20	17.32	0.0000	0.00
2	21.74	21.86	0.0000	0.00
3	29.22	29.33	0.0000	0.00
4	31.97	32.08	0.0000	0.00
5	36.39	36.50	0.0000	0.00
6	50.19	50.30	0.0000	0.00
7	59.44	59.54	0.0000	0.00
8	93.65	93.73	0.0000	0.00
9	122.82	122.88	0.0000	0.00
10	155.26	155.30	0.0000	0.00
11	185.94	185.97	0.0000	0.00
12	188.71	188.73	0.0000	0.00
13	192.34	192.36	0.0000	0.00
14	265.95	265.93	0.0000	0.00
15	379.29	379.21	0.0000	0.00
16	472.60	472.47	0.0000	0.00
17	583.68	583.50	0.0000	0.00
18	651.50	651.29	0.0000	0.00
19	661.57	661.35	0.0000	0.00
20	681.23	681.00	0.0000	0.00
21	692.67	692.44	0.0000	0.00
22	735.77	735.52	0.0000	0.00
23	1032.36	1031.99	0.0000	0.00
24	1114.12	1113.71	0.0000	0.00
25	1128.14	1127.73	0.0000	0.00
26	1174.72	1174.29	0.0000	0.00
27	1320.02	1319.54	0.0000	0.00
28	1322.75	1322.27	0.0000	0.00
29	1332.88	1332.40	0.0000	0.00
30	1364.93	1364.44	0.0000	0.00
31	1474.91	1474.39	0.0000	0.00
32	1624.68	1624.11	0.0000	0.00
33	1738.63	1738.03	0.0000	0.00
34	2028.38	2027.72	0.0000	0.00
35	2068.61	2067.94	0.0000	0.00
36	2115.67	2114.99	0.0000	0.00
37	2238.70	2238.00	0.0000	0.00
38	2474.30	2473.57	0.0000	0.00
39	2481.41	2480.68	0.0000	0.00
40	2491.73	2491.00	0.0000	0.00
41	2505.45	2504.72	0.0000	0.00
42	2532.23	2531.50	0.0000	0.00

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

Peak No.	Energy (keV)	Centroid Channel	Centroid Uncertainty	Peak Significance
43	2614.32	2613.58	0.0000	0.00
44	2728.27	2727.52	0.0000	0.00

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/10/2016 4:25:01PM

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	17.20	15 -	19	17.32	4.80E+03	1329.59	3.90E+05	1.66
	2	21.74	20 -	24	21.86	2.17E+04	1384.86	4.13E+05	1.51
M	3	29.22	28 -	41	29.33	1.69E+04	774.44	1.89E+05	1.33
m	4	31.97	28 -	41	32.08	6.83E+05	2055.86	3.69E+05	1.49
m	5	36.39	28 -	41	36.50	2.08E+05	1700.24	4.47E+05	1.77
	6	50.19	49 -	52	50.30	2.40E+03	1191.38	3.52E+05	2.97
	7	59.44	56 -	63	59.54	1.11E+05	2105.77	6.63E+05	1.88
	8	93.65	92 -	96	93.73	2.56E+03	1234.39	3.36E+05	4.41
	9	122.82	121 -	125	122.88	1.10E+03	1186.95	3.12E+05	2.46
	10	155.26	154 -	157	155.30	1.19E+03	958.78	2.29E+05	5.00
M	11	185.94	184 -	204	185.97	1.10E+04	859.20	2.02E+05	3.11
m	12	188.71	184 -	204	188.73	1.27E+04	2020.40	6.08E+05	3.12
m	13	192.34	184 -	204	192.36	1.12E+04	2019.20	6.10E+05	3.14
	14	265.95	264 -	269	265.93	1.63E+03	1309.47	3.41E+05	3.19
	15	379.29	377 -	382	379.21	1.16E+03	1348.36	3.63E+05	4.77
	16	472.60	467 -	477	472.47	3.12E+04	2609.89	8.84E+05	7.69
	17	583.68	582 -	586	583.50	8.21E+02	606.11	8.07E+04	4.32
	18	651.50	649 -	654	651.29	1.15E+03	667.52	8.86E+04	2.09
M	19	661.57	655 -	686	661.35	4.84E+06	4451.52	8.72E+04	1.75
m	20	681.23	655 -	686	681.00	1.12E+03	650.67	9.68E+04	1.76
	21	692.67	690 -	696	692.44	3.58E+03	835.76	1.23E+05	2.46
	22	735.77	733 -	738	735.52	5.85E+02	583.26	6.74E+04	2.63
	23	1032.36	1030 -	1035	1031.99	3.34E+02	374.59	2.78E+04	2.51
	24	1114.12	1112 -	1117	1113.71	2.88E+02	333.82	2.20E+04	2.77
	25	1128.14	1125 -	1131	1127.73	4.38E+02	366.29	2.40E+04	3.83
	26	1174.72	1172 -	1177	1174.29	3.86E+02	286.20	1.60E+04	2.72
M	27	1320.02	1314 -	1325	1319.54	3.19E+03	413.01	2.24E+04	4.77
m	28	1322.75	1314 -	1325	1322.27	3.37E+03	313.45	1.35E+04	2.23
	29	1332.88	1330 -	1336	1332.40	1.94E+02	227.66	9.28E+03	2.72
	30	1364.93	1362 -	1367	1364.44	1.54E+02	186.26	6.79E+03	3.56
	31	1474.91	1472 -	1477	1474.39	1.33E+02	145.68	4.14E+03	2.66
	32	1624.68	1622 -	1627	1624.11	8.97E+01	93.36	1.67E+03	2.42
	33	1738.63	1736 -	1742	1738.03	6.38E+01	72.45	9.04E+02	2.55
	34	2028.38	2022 -	2031	2027.72	4.22E+01	42.02	2.24E+02	4.00
	35	2068.61	2063 -	2072	2067.94	3.59E+01	34.50	1.48E+02	4.91
	36	2115.67	2112 -	2118	2114.99	2.17E+01	24.55	9.26E+01	3.14
	37	2238.70	2232 -	2243	2238.00	2.92E+01	25.38	6.56E+01	1.42
	38	2474.30	2468 -	2477	2473.57	1.25E+01	12.45	1.51E+01	4.28
	39	2481.41	2478 -	2485	2480.68	1.00E+01	9.38	8.00E+00	1.19
	40	2491.73	2487 -	2495	2491.00	7.50E+00	9.41	9.00E+00	4.83

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
41	2505.45	2500 -	2508	2504.72	1.13E+01	11.52	1.35E+01	1.39
42	2532.23	2528 -	2533	2531.50	6.00E+00	4.90	0.00E+00	1.16
43	2614.32	2608 -	2620	2613.58	8.18E+01	22.24	2.03E+01	3.50
44	2728.27	2725 -	2730	2727.52	4.75E+00	5.74	2.50E+00	1.79

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 : 3/10/2016 4:25:01PM

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	17.20	15 -	19	4.80E+03	1329.59	3.90E+05	1.09E+03
	2	21.74	20 -	24	2.17E+04	1384.86	4.13E+05	1.25E+03
M	3	29.22	28 -	41	1.69E+04	774.44	1.89E+05	7.15E+02
m	4	31.97	28 -	41	6.83E+05	2055.86	3.69E+05	9.99E+02
m	5	36.39	28 -	41	2.08E+05	1700.24	4.47E+05	1.10E+03
	6	50.19	49 -	52	2.40E+03	1191.38	3.52E+05	9.76E+02
	7	59.44	56 -	63	1.11E+05	2105.77	6.63E+05	1.64E+03
	8	93.65	92 -	96	2.56E+03	1234.39	3.36E+05	1.01E+03
	9	122.82	121 -	125	1.10E+03	1186.95	3.12E+05	9.74E+02
	10	155.26	154 -	157	1.19E+03	958.78	2.29E+05	7.86E+02
M	11	185.94	184 -	204	1.10E+04	859.20	2.02E+05	7.39E+02
m	12	188.71	184 -	204	1.27E+04	2020.40	6.08E+05	1.28E+03
m	13	192.34	184 -	204	1.12E+04	2019.20	6.10E+05	1.28E+03
	14	265.95	264 -	269	1.63E+03	1309.47	3.41E+05	1.07E+03
	15	379.29	377 -	382	1.16E+03	1348.36	3.63E+05	1.11E+03
	16	472.60	467 -	477	3.12E+04	2609.89	8.84E+05	2.13E+03
	17	583.68	582 -	586	8.21E+02	606.11	8.07E+04	4.96E+02
	18	651.50	649 -	654	1.15E+03	667.52	8.86E+04	5.46E+02
M	19	661.57	655 -	686	4.84E+06	4451.52	8.72E+04	4.86E+02
m	20	681.23	655 -	686	1.12E+03	650.67	9.68E+04	5.11E+02
	21	692.67	690 -	696	3.58E+03	835.76	1.23E+05	6.80E+02
	22	735.77	733 -	738	5.85E+02	583.26	6.74E+04	4.78E+02
	23	1032.36	1030 -	1035	3.34E+02	374.59	2.78E+04	3.06E+02

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
	24	1114.12	1112 -	1117	2.88E+02	333.82	2.20E+04	2.73E+02
	25	1128.14	1125 -	1131	4.38E+02	366.29	2.40E+04	2.99E+02
	26	1174.72	1172 -	1177	3.86E+02	286.20	1.60E+04	2.33E+02
M	27	1320.02	1314 -	1325	3.19E+03	413.01	2.24E+04	2.46E+02
m	28	1322.75	1314 -	1325	3.37E+03	313.45	1.35E+04	1.91E+02
	29	1332.88	1330 -	1336	1.94E+02	227.66	9.28E+03	1.86E+02
	30	1364.93	1362 -	1367	1.54E+02	186.26	6.79E+03	1.52E+02
	31	1474.91	1472 -	1477	1.33E+02	145.68	4.14E+03	1.18E+02
	32	1624.68	1622 -	1627	8.97E+01	93.36	1.67E+03	7.52E+01
	33	1738.63	1736 -	1742	6.38E+01	72.45	9.04E+02	5.81E+01
	34	2028.38	2022 -	2031	4.22E+01	42.02	2.24E+02	3.29E+01
	35	2068.61	2063 -	2072	3.59E+01	34.50	1.48E+02	2.66E+01
	36	2115.67	2112 -	2118	2.17E+01	24.55	9.26E+01	1.87E+01
	37	2238.70	2232 -	2243	2.92E+01	25.38	6.56E+01	1.89E+01
	38	2474.30	2468 -	2477	1.25E+01	12.45	1.51E+01	8.43E+00
	39	2481.41	2478 -	2485	1.00E+01	9.38	8.00E+00	5.70E+00
	40	2491.73	2487 -	2495	7.50E+00	9.41	9.00E+00	6.29E+00
	41	2505.45	2500 -	2508	1.13E+01	11.52	1.35E+01	7.70E+00
	42	2532.23	2528 -	2533	6.00E+00	4.90	0.00E+00	0.00E+00
	43	2614.32	2608 -	2620	8.18E+01	22.24	2.03E+01	1.06E+01
	44	2728.27	2725 -	2730	4.75E+00	5.74	2.50E+00	3.08E+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 : 3/10/2016 4:25:01PM

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	17.20	15 -	19	17.32	4.80E+03	1329.59	3.90E+05	NB-93M
	2	21.74	20 -	24	21.86	2.17E+04	1384.86	4.13E+05	.....
M	3	29.22	28 -	41	29.33	1.69E+04	774.44	1.89E+05	I-129
m	4	31.97	28 -	41	32.08	6.83E+05	2055.86	3.69E+05	.....

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
m	5	36.39	28 -	41	36.50	2.08E+05	1700.24	4.47E+05	PM-145 I-125 PM-145
	6	50.19	49 -	52	50.30	2.40E+03	1191.38	3.52E+05	TH-227 TE-132
	7	59.44	56 -	63	59.54	1.11E+05	2105.77	6.63E+05	AM-241
	8	93.65	92 -	96	93.73	2.56E+03	1234.39	3.36E+05	GA-67
	9	122.82	121 -	125	122.88	1.10E+03	1186.95	3.12E+05	EU-154 CO-57
	10	155.26	154 -	157	155.30	1.19E+03	958.78	2.29E+05	.....
M	11	185.94	184 -	204	185.97	1.10E+04	859.20	2.02E+05	RA-226
m	12	188.71	184 -	204	188.73	1.27E+04	2020.40	6.08E+05	.....
m	13	192.34	184 -	204	192.36	1.12E+04	2019.20	6.10E+05	.....
	14	265.95	264 -	269	265.93	1.63E+03	1309.47	3.41E+05	.....
	15	379.29	377 -	382	379.21	1.16E+03	1348.36	3.63E+05	.....
	16	472.60	467 -	477	472.47	3.12E+04	2609.89	8.84E+05	SB-127
	17	583.68	582 -	586	583.50	8.21E+02	606.11	8.07E+04	TL-208
	18	651.50	649 -	654	651.29	1.15E+03	667.52	8.86E+04	.....
M	19	661.57	655 -	686	661.35	4.84E+06	4451.52	8.72E+04	CS-137
m	20	681.23	655 -	686	681.00	1.12E+03	650.67	9.68E+04	.....
	21	692.67	690 -	696	692.44	3.58E+03	835.76	1.23E+05	.....
	22	735.77	733 -	738	735.52	5.85E+02	583.26	6.74E+04	PM-146
	23	1032.36	1030 -	1035	1031.99	3.34E+02	374.59	2.78E+04	.....
	24	1114.12	1112 -	1117	1113.71	2.88E+02	333.82	2.20E+04	.....
	25	1128.14	1125 -	1131	1127.73	4.38E+02	366.29	2.40E+04	.....
	26	1174.72	1172 -	1177	1174.29	3.86E+02	286.20	1.60E+04	.....
M	27	1320.02	1314 -	1325	1319.54	3.19E+03	413.01	2.24E+04	.....
m	28	1322.75	1314 -	1325	1322.27	3.37E+03	313.45	1.35E+04	.....
	29	1332.88	1330 -	1336	1332.40	1.94E+02	227.66	9.28E+03	CO-60
	30	1364.93	1362 -	1367	1364.44	1.54E+02	186.26	6.79E+03	.....
	31	1474.91	1472 -	1477	1474.39	1.33E+02	145.68	4.14E+03	.....
	32	1624.68	1622 -	1627	1624.11	8.97E+01	93.36	1.67E+03	.....
	33	1738.63	1736 -	1742	1738.03	6.38E+01	72.45	9.04E+02	.....
	34	2028.38	2022 -	2031	2027.72	4.22E+01	42.02	2.24E+02	.....
	35	2068.61	2063 -	2072	2067.94	3.59E+01	34.50	1.48E+02	.....
	36	2115.67	2112 -	2118	2114.99	2.17E+01	24.55	9.26E+01	.....
	37	2238.70	2232 -	2243	2238.00	2.92E+01	25.38	6.56E+01	.....
	38	2474.30	2468 -	2477	2473.57	1.25E+01	12.45	1.51E+01	.....
	39	2481.41	2478 -	2485	2480.68	1.00E+01	9.38	8.00E+00	.....
	40	2491.73	2487 -	2495	2491.00	7.50E+00	9.41	9.00E+00	.....
	41	2505.45	2500 -	2508	2504.72	1.13E+01	11.52	1.35E+01	.....
	42	2532.23	2528 -	2533	2531.50	6.00E+00	4.90	0.00E+00	.....
	43	2614.32	2608 -	2620	2613.58	8.18E+01	22.24	2.03E+01	TL-208
	44	2728.27	2725 -	2730	2727.52	4.75E+00	5.74	2.50E+00	.....

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

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 : 3/10/2016 4:25:01PM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
	1	17.20	4.80E+03	1329.59	5.21E-03	9.36E-03
	2	21.74	2.17E+04	1384.86	1.71E-02	9.36E-03
M	3	29.22	1.69E+04	774.44	4.75E-02	9.36E-03
m	4	31.97	6.83E+05	2055.86	5.95E-02	9.36E-03
m	5	36.39	2.08E+05	1700.24	7.74E-02	9.36E-03
	6	50.19	2.40E+03	1191.38	1.17E-01	9.36E-03
	7	59.44	1.11E+05	2105.77	1.29E-01	9.36E-03
	8	93.65	2.56E+03	1234.39	1.33E-01	1.18E-02
	9	122.82	1.10E+03	1186.95	1.21E-01	1.24E-02
	10	155.26	1.19E+03	958.78	1.06E-01	1.09E-02
M	11	185.94	1.10E+04	859.20	9.43E-02	9.61E-03
m	12	188.71	1.27E+04	2020.40	9.34E-02	9.49E-03
m	13	192.34	1.12E+04	2019.20	9.21E-02	9.34E-03
	14	265.95	1.63E+03	1309.47	7.21E-02	6.22E-03
	15	379.29	1.16E+03	1348.36	5.34E-02	4.28E-03
	16	472.60	3.12E+04	2609.89	4.38E-02	3.76E-03
	17	583.68	8.21E+02	606.11	3.59E-02	3.28E-03
	18	651.50	1.15E+03	667.52	3.22E-02	2.99E-03
M	19	661.57	4.84E+06	4451.52	3.18E-02	2.94E-03
m	20	681.23	1.12E+03	650.67	3.09E-02	2.89E-03
	21	692.67	3.58E+03	835.76	3.04E-02	2.86E-03
	22	735.77	5.85E+02	583.26	2.86E-02	2.74E-03
	23	1032.36	3.34E+02	374.59	2.05E-02	1.88E-03
	24	1114.12	2.88E+02	333.82	1.90E-02	1.63E-03
	25	1128.14	4.38E+02	366.29	1.88E-02	1.59E-03
	26	1174.72	3.86E+02	286.20	1.81E-02	1.45E-03
M	27	1320.02	3.19E+03	413.01	1.62E-02	1.41E-03
m	28	1322.75	3.37E+03	313.45	1.62E-02	1.41E-03
	29	1332.88	1.94E+02	227.66	1.61E-02	1.41E-03
	30	1364.93	1.54E+02	186.26	1.57E-02	1.38E-03
	31	1474.91	1.33E+02	145.68	1.47E-02	1.27E-03
	32	1624.68	8.97E+01	93.36	1.35E-02	1.13E-03
	33	1738.63	6.38E+01	72.45	1.28E-02	1.02E-03
	34	2028.38	4.22E+01	42.02	1.15E-02	9.22E-04

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
35	2068.61	3.59E+01	34.50	1.14E-02	9.22E-04
36	2115.67	2.17E+01	24.55	1.12E-02	9.22E-04
37	2238.70	2.92E+01	25.38	1.09E-02	9.22E-04
38	2474.30	1.25E+01	12.45	1.04E-02	9.22E-04
39	2481.41	1.00E+01	9.38	1.04E-02	9.22E-04
40	2491.73	7.50E+00	9.41	1.04E-02	9.22E-04
41	2505.45	1.13E+01	11.52	1.04E-02	9.22E-04
42	2532.23	6.00E+00	4.90	1.03E-02	9.22E-04
43	2614.32	8.18E+01	22.24	1.02E-02	9.22E-04
44	2728.27	4.75E+00	5.74	1.01E-02	9.22E-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 : 3/10/2016 4:25:01PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000033933.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	17.20	4.80E+03	1329.59			4.80E+03	1.33E+03
	2	21.74	2.17E+04	1384.86			2.17E+04	1.38E+03
M	3	29.22	1.69E+04	774.44			1.69E+04	7.74E+02
m	4	31.97	6.83E+05	2055.86			6.83E+05	2.06E+03
m	5	36.39	2.08E+05	1700.24			2.08E+05	1.70E+03
	6	50.19	2.40E+03	1191.38			2.40E+03	1.19E+03
	7	59.44	1.11E+05	2105.77			1.11E+05	2.11E+03
	8	93.65	2.56E+03	1234.39	3.72E+01	6.47E+00	2.52E+03	1.23E+03
	9	122.82	1.10E+03	1186.95			1.10E+03	1.19E+03
	10	155.26	1.19E+03	958.78			1.19E+03	9.59E+02
M	11	185.94	1.10E+04	859.20	2.44E+01	3.91E+00	1.10E+04	8.59E+02
m	12	188.71	1.27E+04	2020.40			1.27E+04	2.02E+03
m	13	192.34	1.12E+04	2019.20			1.12E+04	2.02E+03
	14	265.95	1.63E+03	1309.47			1.63E+03	1.31E+03
	15	379.29	1.16E+03	1348.36			1.16E+03	1.35E+03
	16	472.60	3.12E+04	2609.89			3.12E+04	2.61E+03
	17	583.68	8.21E+02	606.11	4.97E+00	1.99E+00	8.16E+02	6.06E+02
	18	651.50	1.15E+03	667.52			1.15E+03	6.68E+02
M	19	661.57	4.84E+06	4451.52			4.84E+06	4.45E+03
m	20	681.23	1.12E+03	650.67			1.12E+03	6.51E+02

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	21	692.67	3.58E+03	835.76			3.58E+03	8.36E+02
	22	735.77	5.85E+02	583.26			5.85E+02	5.83E+02
	23	1032.36	3.34E+02	374.59			3.34E+02	3.75E+02
	24	1114.12	2.88E+02	333.82			2.88E+02	3.34E+02
	25	1128.14	4.38E+02	366.29			4.38E+02	3.66E+02
	26	1174.72	3.86E+02	286.20			3.86E+02	2.86E+02
M	27	1320.02	3.19E+03	413.01			3.19E+03	4.13E+02
m	28	1322.75	3.37E+03	313.45			3.37E+03	3.13E+02
	29	1332.88	1.94E+02	227.66			1.94E+02	2.28E+02
	30	1364.93	1.54E+02	186.26			1.54E+02	1.86E+02
	31	1474.91	1.33E+02	145.68			1.33E+02	1.46E+02
	32	1624.68	8.97E+01	93.36			8.97E+01	9.34E+01
	33	1738.63	6.38E+01	72.45			6.38E+01	7.24E+01
	34	2028.38	4.22E+01	42.02			4.22E+01	4.20E+01
	35	2068.61	3.59E+01	34.50			3.59E+01	3.45E+01
	36	2115.67	2.17E+01	24.55			2.17E+01	2.46E+01
	37	2238.70	2.92E+01	25.38			2.92E+01	2.54E+01
	38	2474.30	1.25E+01	12.45			1.25E+01	1.24E+01
	39	2481.41	1.00E+01	9.38			1.00E+01	9.38E+00
	40	2491.73	7.50E+00	9.41			7.50E+00	9.41E+00
	41	2505.45	1.13E+01	11.52			1.13E+01	1.15E+01
	42	2532.23	6.00E+00	4.90			6.00E+00	4.90E+00
	43	2614.32	8.18E+01	22.24	3.61E+00	7.60E-01	7.82E+01	2.23E+01
	44	2728.27	4.75E+00	5.74			4.75E+00	5.74E+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 : 3/10/2016 4:25:01PM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000033933.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	17.20	4.80E+03	1329.59			4.80E+03	1.33E+03
	2	21.74	2.17E+04	1384.86			2.17E+04	1.38E+03
M	3	29.22	1.69E+04	774.44			1.69E+04	7.74E+02
m	4	31.97	6.83E+05	2055.86			6.83E+05	2.06E+03

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
m	5	36.39	2.08E+05	1700.24			2.08E+05	1.70E+03
	6	50.19	2.40E+03	1191.38			2.40E+03	1.19E+03
	7	59.44	1.11E+05	2105.77			1.11E+05	2.11E+03
	8	93.65	2.56E+03	1234.39	3.72E+01	6.47E+00	2.52E+03	1.23E+03
	9	122.82	1.10E+03	1186.95			1.10E+03	1.19E+03
	10	155.26	1.19E+03	958.78			1.19E+03	9.59E+02
M	11	185.94	1.10E+04	859.20	2.44E+01	3.91E+00	1.10E+04	8.59E+02
m	12	188.71	1.27E+04	2020.40			1.27E+04	2.02E+03
m	13	192.34	1.12E+04	2019.20			1.12E+04	2.02E+03
	14	265.95	1.63E+03	1309.47			1.63E+03	1.31E+03
	15	379.29	1.16E+03	1348.36			1.16E+03	1.35E+03
	16	472.60	3.12E+04	2609.89			3.12E+04	2.61E+03
	17	583.68	8.21E+02	606.11	4.97E+00	1.99E+00	8.16E+02	6.06E+02
	18	651.50	1.15E+03	667.52			1.15E+03	6.68E+02
M	19	661.57	4.84E+06	4451.52			4.84E+06	4.45E+03
m	20	681.23	1.12E+03	650.67			1.12E+03	6.51E+02
	21	692.67	3.58E+03	835.76			3.58E+03	8.36E+02
	22	735.77	5.85E+02	583.26			5.85E+02	5.83E+02
	23	1032.36	3.34E+02	374.59			3.34E+02	3.75E+02
	24	1114.12	2.88E+02	333.82			2.88E+02	3.34E+02
	25	1128.14	4.38E+02	366.29			4.38E+02	3.66E+02
	26	1174.72	3.86E+02	286.20			3.86E+02	2.86E+02
M	27	1320.02	3.19E+03	413.01			3.19E+03	4.13E+02
m	28	1322.75	3.37E+03	313.45			3.37E+03	3.13E+02
	29	1332.88	1.94E+02	227.66			1.94E+02	2.28E+02
	30	1364.93	1.54E+02	186.26			1.54E+02	1.86E+02
	31	1474.91	1.33E+02	145.68			1.33E+02	1.46E+02
	32	1624.68	8.97E+01	93.36			8.97E+01	9.34E+01
	33	1738.63	6.38E+01	72.45			6.38E+01	7.24E+01
	34	2028.38	4.22E+01	42.02			4.22E+01	4.20E+01
	35	2068.61	3.59E+01	34.50			3.59E+01	3.45E+01
	36	2115.67	2.17E+01	24.55			2.17E+01	2.46E+01
	37	2238.70	2.92E+01	25.38			2.92E+01	2.54E+01
	38	2474.30	1.25E+01	12.45			1.25E+01	1.24E+01
	39	2481.41	1.00E+01	9.38			1.00E+01	9.38E+00
	40	2491.73	7.50E+00	9.41			7.50E+00	9.41E+00
	41	2505.45	1.13E+01	11.52			1.13E+01	1.15E+01
	42	2532.23	6.00E+00	4.90			6.00E+00	4.90E+00
	43	2614.32	8.18E+01	22.24	3.61E+00	7.60E-01	7.82E+01	2.23E+01
	44	2728.27	4.75E+00	5.74			4.75E+00	5.74E+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 1603050-03

J1V8D3 SAF: RC-155

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	0.750	122.06	*	85.51	5.73E+00	6.22E+00
		136.48		10.60		
GA-67	0.558	93.31	*	35.70	5.38E+01	6.93E+01
		208.95		2.24		
		300.22		16.00		
NB-93M	0.939	16.57	*	9.43	5.22E+03	9.48E+03
I-125	0.880	35.49	*	6.49	2.29E+04	2.78E+03
I-129	0.472	29.78	*	57.00	3.33E+02	6.74E+01
		33.60		13.20		
		39.58		7.52		
CS-137	0.999	661.65	*	85.12	9.57E+04	8.88E+03
TL-208	0.860	583.14	*	30.22	4.02E+01	3.01E+01
		860.37		4.48		
		2614.66	*	35.85	1.14E+01	3.40E+00
RA-226	0.988	186.21	*	3.28	1.90E+03	3.48E+03
AM-241	0.998	59.54	*	35.90	1.27E+03	9.53E+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 : 3/10/2016 4:25:01PM
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	21.74	1.20809E+01	3.18		

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
m	4	31.97	3.79693E+02	0.15		
	6	50.19	1.33350E+00	24.82	Tol.	TE-132 TH-227
	10	155.26	6.63601E-01	40.13		
m	12	188.71	7.04744E+00	7.96		
m	13	192.34	6.24486E+00	8.98		
	14	265.95	9.06827E-01	40.11		
	15	379.29	6.45193E-01	58.05		
	16	472.60	1.73595E+01	4.18	Tol.	SB-127
	18	651.50	6.39915E-01	28.98		
m	20	681.23	6.23976E-01	28.97		
	21	692.67	1.99090E+00	11.66		
	22	735.77	3.25194E-01	49.82	Tol.	PM-146
	23	1032.36	1.85278E-01	56.16		
	24	1114.12	1.59867E-01	58.00		
	25	1128.14	2.43297E-01	41.82		
	26	1174.72	2.14590E-01	37.05		
M	27	1320.02	1.77286E+00	6.47		
m	28	1322.75	1.87451E+00	4.64	Sum	
	29	1332.88	1.07952E-01	58.58	Tol.	CO-60
	30	1364.93	8.56043E-02	60.44		
	31	1474.91	7.37354E-02	54.88		
	32	1624.68	4.98575E-02	52.02		
	33	1738.63	3.54565E-02	56.76		
	34	2028.38	2.34343E-02	49.81		
	35	2068.61	1.99697E-02	47.98		
	36	2115.67	1.20547E-02	56.57		
	37	2238.70	1.62142E-02	43.48		
	38	2474.30	6.93056E-03	49.90		
	39	2481.41	5.55556E-03	46.90		
	40	2491.73	4.16667E-03	62.72		
	41	2505.45	6.25000E-03	51.21		
	42	2532.23	3.33333E-03	40.82		
	44	2728.27	2.63889E-03	60.47		

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

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
CO-57	0.75	122.06	*	85.51	5.73E+00	6.22E+00
		136.48		10.60		
GA-67	0.55	93.31	*	35.70	5.38E+01	6.93E+01
		208.95		2.24		
		300.22		16.00		
NB-93M	0.93	16.57	*	9.43	5.22E+03	9.48E+03
I-125	0.88	35.49	*	6.49	2.29E+04	2.78E+03
I-129	0.47	29.78	*	57.00	3.33E+02	6.74E+01
		33.60		13.20		
		39.58		7.52		
CS-137	0.99	661.65	*	85.12	9.57E+04	8.88E+03
TL-208	0.86	583.14	*	30.22	4.02E+01	3.01E+01
		860.37		4.48		
		2614.66	*	35.85	1.14E+01	3.40E+00
RA-226	0.98	186.21	*	3.28	1.90E+03	3.48E+03
AM-241	0.99	59.54	*	35.90	1.27E+03	9.53E+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
CO-57	0.750	5.73E+00	6.22E+00	
GA-67	0.558	5.38E+01	6.93E+01	
NB-93M	0.939	5.22E+03	9.48E+03	
I-125	0.880	2.29E+04	2.78E+03	
I-129	0.472	3.33E+02	6.74E+01	
CS-137	0.999	9.57E+04	8.88E+03	
TL-208	0.860	1.18E+01	3.38E+00	
RA-226	0.988	1.90E+03	3.48E+03	
AM-241	0.998	1.27E+03	9.53E+01	

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

? = 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 1603050-03

J1V8D3 SAF: RC-155

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/10/2016 4:25:01PM
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	21.74	1.20809E+01	3.18		
m	4	31.97	3.79693E+02	0.15		
	6	50.19	1.33350E+00	24.82	Tol.	TE-132 TH-227
	10	155.26	6.63601E-01	40.13		
m	12	188.71	7.04744E+00	7.96		
m	13	192.34	6.24486E+00	8.98		
	14	265.95	9.06827E-01	40.11		
	15	379.29	6.45193E-01	58.05		
	16	472.60	1.73595E+01	4.18	Tol.	SB-127
	18	651.50	6.39915E-01	28.98		
m	20	681.23	6.23976E-01	28.97		
	21	692.67	1.99090E+00	11.66		
	22	735.77	3.25194E-01	49.82	Tol.	PM-146
	23	1032.36	1.85278E-01	56.16		
	24	1114.12	1.59867E-01	58.00		
	25	1128.14	2.43297E-01	41.82		
	26	1174.72	2.14590E-01	37.05		
M	27	1320.02	1.77286E+00	6.47		
m	28	1322.75	1.87451E+00	4.64	Sum	
	29	1332.88	1.07952E-01	58.58	Tol.	CO-60
	30	1364.93	8.56043E-02	60.44		
	31	1474.91	7.37354E-02	54.88		
	32	1624.68	4.98575E-02	52.02		
	33	1738.63	3.54565E-02	56.76		
	34	2028.38	2.34343E-02	49.81		
	35	2068.61	1.99697E-02	47.98		
	36	2115.67	1.20547E-02	56.57		
	37	2238.70	1.62142E-02	43.48		
	38	2474.30	6.93056E-03	49.90		
	39	2481.41	5.55556E-03	46.90		
	40	2491.73	4.16667E-03	62.72		
	41	2505.45	6.25000E-03	51.21		
	42	2532.23	3.33333E-03	40.82		
	44	2728.27	2.63889E-03	60.47		

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

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	3.44E+02	2.49E+02	2.49E+02
+	NA-22	1274.54		99.94	-4.90E+00	1.29E+01	1.29E+01
+	NA-24	1368.53		99.99	-1.91E+01	1.80E+01	2.85E+02
		2754.09		99.86	-3.00E+00		1.80E+01
+	AL-26	1808.65		99.76	-6.86E-01	4.21E+00	4.21E+00
+	K-40	1460.81		10.67	1.61E+01	8.26E+01	8.26E+01
+	AR-41	1293.64		99.16	-6.00E+12	1.11E+13	1.11E+13
+	TI-44	67.88		94.40	2.37E+00	6.30E+00	6.65E+00
		78.34		96.00	1.74E+00		6.30E+00
+	SC-46	889.25		99.98	1.65E+00	1.53E+01	1.66E+01
		1120.51		99.99	8.21E+00		1.53E+01
+	V-48	983.52		99.98	-2.53E+00	1.72E+01	1.79E+01
		1312.10		97.50	1.32E+00		1.72E+01
+	CR-51	320.08		9.83	2.63E+01	1.65E+02	1.65E+02
+	MN-54	834.83		99.97	1.04E+01	1.66E+01	1.66E+01
+	CO-56	846.75		99.96	-1.85E+00	5.75E+00	1.69E+01
		1037.75		14.03	4.66E+01		1.14E+02
		1238.25		67.00	-1.47E+00		1.99E+01
		1771.40		15.51	2.82E+00		3.14E+01
		2598.48		16.90	1.12E+00		5.75E+00
+	CO-57	122.06	*	85.51	5.73E+00	1.02E+01	1.02E+01
		136.48		10.60	3.30E+01		8.03E+01
+	CO-58	810.76		99.40	9.23E+00	1.70E+01	1.70E+01
+	FE-59	1099.22		56.50	6.68E+00	2.82E+01	2.82E+01
		1291.56		43.20	-6.06E-01		3.22E+01
+	CO-60	1173.22		100.00	-2.38E+00	1.09E+01	1.37E+01
		1332.49		100.00	3.65E+00		1.09E+01
+	ZN-65	1115.52		50.75	5.49E-01	2.99E+01	2.99E+01
+	GA-67	93.31	*	35.70	5.38E+01	4.32E+01	4.32E+01
		208.95		2.24	1.42E+02		9.94E+02
		300.22		16.00	-1.48E+01		1.69E+02
+	SE-75	121.11		16.70	2.13E+00	1.45E+01	4.96E+01

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	SE-75	136.00		59.20	-7.12E+00	1.45E+01	1.45E+01
		264.65		59.80	7.71E+00		2.22E+01
		279.53		25.20	7.82E+00		5.46E+01
		400.65		11.40	-1.02E+01		1.76E+02
+	RB-82	776.52		13.00	-4.82E+01	1.39E+02	1.39E+02
+	RB-83	520.41		46.00	-1.67E+01	4.14E+01	4.14E+01
		529.64		30.30	3.75E+01		6.06E+01
		552.65		16.40	4.85E+01		9.69E+01
+	KR-85	513.99		0.43	5.87E+02	4.40E+03	4.40E+03
+	SR-85	513.99		99.27	2.65E+00	1.99E+01	1.99E+01
+	Y-88	898.02		93.40	-2.98E+00	4.04E+00	1.75E+01
		1836.01		99.38	-8.71E-01		4.04E+00
+	NB-93M	16.57	*	9.43	5.22E+03	2.37E+03	2.37E+03
+	NB-94	702.63		100.00	-2.21E+01	1.63E+01	1.88E+01
		871.10		100.00	5.41E+00		1.63E+01
+	NB-95	765.79		99.81	8.18E+00	1.79E+01	1.79E+01
+	NB-95M	235.69		25.00	-4.67E+00	8.80E+01	8.80E+01
+	ZR-95	724.18		43.70	2.87E+01	3.16E+01	4.20E+01
		756.72		55.30	4.85E+00		3.16E+01
+	MO-99	181.06		6.20	-1.49E+03	2.88E+02	3.51E+02
		739.58		12.80	1.91E+01		2.88E+02
		778.00		4.50	-1.96E+01		7.91E+02
+	RU-103	497.08		89.00	2.50E+00	2.41E+01	2.41E+01
+	RU-106	621.84		9.80	6.42E+01	1.66E+02	1.66E+02
+	AG-108M	433.93		89.90	-5.43E-01	1.79E+01	2.54E+01
		614.37		90.40	1.99E+00		1.79E+01
		722.95		90.50	1.33E+01		1.97E+01
+	CD-109	88.03		3.72	1.28E+02	2.08E+02	2.08E+02
+	AG-110M	657.75		93.14	2.95E+04	2.26E+01	1.44E+02
		677.61		10.53	-6.29E+01		2.11E+02
		706.67		16.46	4.82E+01		1.13E+02
		763.93		21.98	-3.59E+01		7.71E+01
		884.67		71.63	-2.21E+00		2.26E+01
		1384.27		23.94	1.85E+01		4.14E+01
+	CD-113M	263.70		0.02	-5.09E+03	5.67E+04	5.67E+04
+	SN-113	255.12		1.93	1.51E+02	2.99E+01	6.75E+02
		391.69		64.90	1.47E+01		2.99E+01
+	TE123M	159.00		84.10	-2.98E+00	1.09E+01	1.09E+01
+	SB-124	602.71		97.87	-3.23E+00	1.22E+01	1.72E+01
		645.85		7.26	-3.32E+02		2.38E+02
		722.78		11.10	1.12E+02		1.66E+02
		1691.02		49.00	-2.62E+00		1.22E+01
+	I-125	35.49	*	6.49	2.29E+04	5.69E+02	5.69E+02
+	SB-125	176.33		6.89	-1.27E+02	7.56E+01	1.41E+02
		427.89		29.33	-1.23E+01		7.56E+01
		463.38		10.35	-8.12E+01		2.54E+02
		600.56		17.80	3.83E+01		9.18E+01
		635.90		11.32	-7.73E+01		1.44E+02

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	SB-126	414.70		83.30	-7.11E+00	2.43E+01	2.97E+01
		666.33		99.60	-3.27E+04		5.44E+01
		695.00		99.60	1.11E+01		2.43E+01
		720.50		53.80	2.58E+01		3.95E+01
+	SN-126	87.57		37.00	1.28E+01	2.08E+01	2.08E+01
+	SB-127	473.00		25.00	1.00E+03	1.03E+02	1.83E+02
		685.20		35.70	9.68E+00		1.03E+02
		783.80		14.70	9.64E+01		1.95E+02
+	I-129	29.78	*	57.00	3.33E+02	9.92E+01	9.92E+01
		33.60		13.20	-1.81E+04		1.56E+02
		39.58		7.52	-1.23E+03		1.36E+02
+	I-131	284.30		6.05	4.43E+01	2.75E+01	2.93E+02
		364.48		81.20	-4.19E+00		2.75E+01
		636.97		7.26	1.67E+01		2.92E+02
		722.89		1.80	8.66E+02		1.28E+03
+	TE-132	49.72		13.10	1.30E+02	2.62E+01	1.14E+02
		228.16		88.00	1.02E+01		2.62E+01
+	BA-133	81.00		33.00	7.93E+00	1.82E+01	1.82E+01
		302.84		17.80	-6.27E+01		8.04E+01
		356.01		60.00	8.43E+00		2.80E+01
+	I-133	529.87		86.30	1.28E+02	2.30E+02	2.30E+02
+	XE-133	81.00		38.00	1.02E+01	2.35E+01	2.35E+01
+	CS-134	563.23		8.38	4.65E+01	1.67E+01	1.75E+02
		569.32		15.43	5.57E+00		9.32E+01
		604.70		97.60	-2.15E+00		1.67E+01
		795.84		85.40	2.39E+00		1.94E+01
		801.93		8.73	3.78E+01		1.89E+02
+	CS-135	268.24		16.00	-4.52E+01	8.21E+01	8.21E+01
+	I-135	1131.51		22.50	-9.89E+03	8.97E+04	1.28E+05
		1260.41		28.60	-7.39E+03		8.97E+04
		1678.03		9.54	1.54E+04		1.25E+05
+	CS-136	153.22		7.46	-5.97E+01	1.93E+01	1.39E+02
		163.89		4.61	-1.26E+01		2.33E+02
		176.55		13.56	-7.65E+01		8.43E+01
		273.65		12.66	-3.53E+01		1.23E+02
		340.57		48.50	-2.83E+01		3.86E+01
		818.50		99.70	5.16E+00		1.93E+01
		1048.07		79.60	3.21E+00		2.28E+01
		1235.34		19.70	-5.84E+00		7.73E+01
+	CS-137	661.65	*	85.12	9.57E+04	9.82E+01	9.82E+01
+	LA-138	788.74		34.00	1.65E+00	1.37E+01	4.87E+01
		1435.80		66.00	-1.94E+00		1.37E+01
+	CE-139	165.85		80.35	2.09E+00	1.17E+01	1.17E+01
+	BA-140	162.64		6.70	-1.56E+02	8.09E+01	1.60E+02
		304.84		4.50	-1.40E+02		3.77E+02
		423.70		3.20	-3.09E+02		7.99E+02
		437.55		2.00	-1.48E+03		1.36E+03
		537.32		25.00	6.60E+01		8.09E+01
+	LA-140	328.77		20.50	2.71E+01	9.17E+00	8.87E+01

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	LA-140	487.03	45.50	1.02E+01	9.17E+00	5.50E+01
		815.85	23.50	-2.32E+01		8.22E+01
		1596.49	95.49	1.60E+00		9.17E+00
+	CE-141	145.44	48.40	4.58E+00	1.90E+01	1.90E+01
+	CE-143	57.36	11.80	-1.54E+04	1.52E+02	2.74E+02
		293.26	42.00	-7.78E-02		1.52E+02
		664.55	5.20	6.24E+06		1.46E+04
+	CE-144	133.54	10.80	2.01E+01	7.80E+01	7.80E+01
+	PM-144	476.78	42.00	8.25E+01	1.65E+01	5.96E+01
		618.01	98.60	1.80E+00		1.65E+01
		696.49	99.49	1.06E+01		2.04E+01
+	PM-145	36.85	21.70	5.83E+03	4.44E+01	8.32E+01
		37.36	39.70	3.11E+03		4.44E+01
		42.30	15.10	1.88E+01		6.15E+01
		72.40	2.31	-3.04E+01		2.66E+02
+	PM-146	453.90	39.94	-1.96E+01	6.31E+01	6.31E+01
		735.90	14.01	5.98E+01		1.24E+02
		747.13	13.10	9.14E+01		1.31E+02
+	ND-147	91.11	28.90	-1.42E+01	3.23E+01	3.23E+01
		531.02	13.10	1.18E+02		1.64E+02
+	PM-149	285.90	3.10	3.83E+02	1.14E+03	1.14E+03
+	EU-152	121.78	20.50	4.74E+01	3.98E+01	3.98E+01
		244.69	5.40	-1.66E+02		2.32E+02
		344.27	19.13	2.35E+01		8.46E+01
		778.89	9.20	6.63E+01		1.81E+02
		964.01	10.40	-8.20E+01		1.51E+02
		1085.78	7.22	1.47E+02		2.13E+02
		1112.02	9.60	-2.57E+01		1.58E+02
		1407.95	14.94	3.50E+01		6.44E+01
+	GD-153	97.43	31.30	7.28E+00	2.47E+01	2.47E+01
		103.18	22.20	-1.04E+01		3.49E+01
+	EU-154	123.07	40.50	9.45E+00	2.02E+01	2.02E+01
		723.30	19.70	6.11E+01		9.05E+01
		873.19	11.50	-2.68E+01		1.42E+02
		996.32	10.30	1.12E+01		1.52E+02
		1004.76	17.90	1.42E-01		8.75E+01
		1274.45	35.50	-1.38E+01		3.63E+01
+	EU-155	86.50	30.90	1.32E+01	2.50E+01	2.50E+01
		105.30	20.70	-7.83E+00		3.73E+01
+	EU-156	811.77	10.40	9.18E+01	1.69E+02	1.81E+02
		1153.47	7.20	5.46E+01		2.24E+02
		1230.71	8.90	1.18E+02		1.69E+02
+	HO-166M	184.41	72.60	-2.34E+01	1.50E+01	1.50E+01
		280.45	29.60	6.56E+00		4.58E+01
		410.94	11.10	-9.74E+01		1.85E+02
		711.69	54.10	1.35E+01		3.38E+01
+	TM-171	66.72	0.14	3.64E+03	4.53E+03	4.53E+03
+	HF-172	81.75	4.52	-3.50E-01	7.29E+01	1.33E+02
		125.81	11.30	-9.98E+00		7.29E+01

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	LU-172	181.53		20.60	-2.44E+02	3.33E+01	6.87E+01
		810.06		16.63	7.31E+01		1.35E+02
		912.12		15.25	2.95E+01		1.43E+02
		1093.66		62.50	1.37E+01		3.33E+01
+	LU-173	100.72		5.24	-7.58E+01	6.27E+01	1.47E+02
		272.11		21.20	2.02E+01		6.27E+01
+	HF-175	343.40		84.00	-1.41E+01	1.98E+01	1.98E+01
+	LU-176	88.34		13.30	3.55E+01	1.35E+01	5.79E+01
		201.83		86.00	7.02E+00		1.35E+01
		306.78		94.00	-3.89E-01		1.54E+01
+	TA-182	67.75		41.20	5.54E+00	1.55E+01	1.55E+01
		1121.30		34.90	9.08E+00		4.35E+01
		1189.05		16.23	-6.64E-01		8.41E+01
		1221.41		26.98	2.87E+01		4.97E+01
		1231.02		11.44	8.33E+01		1.17E+02
+	IR-192	308.46		29.68	3.49E+01	5.06E+01	5.06E+01
		468.07		48.10	5.83E+01		5.71E+01
+	HG-203	279.19		77.30	-6.36E+00	1.83E+01	1.83E+01
+	BI-207	569.67		97.72	8.78E-01	1.47E+01	1.47E+01
		1063.62		74.90	8.80E-02		2.06E+01
+	TL-208	583.14	*	30.22	4.02E+01	3.63E+00	4.91E+01
		860.37		4.48	8.24E+00		3.65E+02
		2614.66	*	35.85	1.14E+01		3.63E+00
	BI-210M	262.00		45.00	1.27E+01	2.89E+01	2.89E+01
		300.00		23.00	-5.40E+00		6.18E+01
+	PB-210	46.50		4.25	-2.84E+02	1.95E+02	1.95E+02
+	PB-211	404.84		2.90	-3.17E+02	5.66E+02	6.91E+02
		831.96		2.90	-6.90E+01		5.66E+02
+	BI-212	727.17		11.80	-1.10E+01	1.49E+02	1.49E+02
		1620.62		2.75	8.31E+01		2.59E+02
+	PB-212	238.63		44.60	-2.92E+01	2.78E+01	2.78E+01
		300.09		3.41	-3.65E+01		4.17E+02
+	BI-214	609.31		46.30	9.66E+00	3.06E+01	3.50E+01
		1120.29		15.10	5.30E+01		9.88E+01
		1764.49		15.80	-1.15E-01		3.06E+01
		2204.22		4.98	9.06E+00		3.57E+01
+	PB-214	295.21		19.19	3.45E+01	4.44E+01	7.32E+01
		351.92		37.19	-9.33E+00		4.44E+01
+	RN-219	401.80		6.50	-5.64E+01	3.05E+02	3.05E+02
+	RA-223	323.87		3.88	2.01E+02	3.92E+02	3.92E+02
+	RA-224	240.98		3.95	1.68E+02	3.16E+02	3.16E+02
+	RA-225	40.00		31.00	-3.39E+02	3.73E+01	3.73E+01
+	RA-226	186.21	*	3.28	1.90E+03	1.11E+03	1.11E+03
+	TH-227	50.10		8.40	1.06E+02	9.34E+01	9.34E+01
		236.00		11.50	-5.69E+00		1.07E+02
		256.20		6.30	6.21E+01		2.03E+02
+	AC-228	338.32		11.40	1.04E+02	5.78E+01	1.39E+02
		911.07		27.70	-6.10E+00		5.78E+01

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	AC-228	969.11		16.60	-2.18E+01	5.78E+01	9.47E+01
+	TH-230	48.44		16.90	5.45E+01	4.77E+01	4.77E+01
		62.85		4.60	-1.70E+02		1.42E+02
		67.67		0.37	6.06E+02		1.70E+03
+	PA-231	283.67		1.60	1.29E+02	6.22E+02	8.54E+02
		302.67		2.30	-4.85E+02		6.22E+02
+	TH-231	25.64		14.70	-2.78E+02	9.34E+01	1.93E+02
		84.21		6.40	5.09E+00		9.34E+01
+	PA-233	311.98		38.60	-1.86E+01	4.11E+01	4.11E+01
+	PA-234	131.20		20.40	3.94E+01	4.08E+01	4.08E+01
		733.99		8.80	1.71E+01		1.98E+02
		946.00		12.00	4.13E+01		1.33E+02
+	PA-234M	1001.03		0.92	-3.84E+02	1.69E+03	1.69E+03
+	TH-234	63.29		3.80	-2.05E+02	1.71E+02	1.71E+02
+	U-235	143.76		10.50	-2.24E+01	8.19E+01	8.19E+01
		163.35		4.70	-1.90E+02		1.94E+02
		205.31		4.70	-4.69E+01		2.48E+02
+	NP-237	86.50		12.60	3.23E+01	6.11E+01	6.11E+01
+	NP-239	106.10		22.70	6.29E+01	8.28E+01	8.28E+01
		228.18		10.70	1.07E+02		2.75E+02
		277.60		14.10	6.78E+01		2.32E+02
+	AM-241	59.54	*	35.90	1.27E+03	3.78E+01	3.78E+01
+	AM-243	74.67		66.00	2.96E+00	9.26E+00	9.26E+00
+	CM-243	209.75		3.29	6.56E+01	9.61E+01	3.57E+02
		228.14		10.60	4.46E+01		1.14E+02
		277.60		14.00	2.81E+01		9.61E+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

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	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	2.49E+02	2.49E+02	3.44E+02	1.24E+02
	NA-22	1274.54		99.94	1.29E+01	1.29E+01	-4.90E+00	6.42E+00
	NA-24	1368.53		99.99	2.85E+02	1.80E+01	-1.91E+01	1.41E+02
		2754.09		99.86	1.80E+01		-3.00E+00	6.98E+00
	AL-26	1808.65		99.76	4.21E+00	4.21E+00	-6.86E-01	2.04E+00
	K-40	1460.81		10.67	8.26E+01	8.26E+01	1.61E+01	4.08E+01
	AR-41	1293.64		99.16	1.11E+13	1.11E+13	-6.00E+12	5.50E+12
	TI-44	67.88		94.40	6.65E+00	6.30E+00	2.37E+00	3.32E+00
		78.34		96.00	6.30E+00		1.74E+00	3.14E+00
	SC-46	889.25		99.98	1.66E+01	1.53E+01	1.65E+00	8.25E+00
		1120.51		99.99	1.53E+01		8.21E+00	7.61E+00
	V-48	983.52		99.98	1.79E+01	1.72E+01	-2.53E+00	8.93E+00
		1312.10		97.50	1.72E+01		1.32E+00	8.53E+00
	CR-51	320.08		9.83	1.65E+02	1.65E+02	2.63E+01	8.23E+01
	MN-54	834.83		99.97	1.66E+01	1.66E+01	1.04E+01	8.26E+00
	CO-56	846.75		99.96	1.69E+01	5.75E+00	-1.85E+00	8.40E+00
		1037.75		14.03	1.14E+02		4.66E+01	5.69E+01
		1238.25		67.00	1.99E+01		-1.47E+00	9.87E+00
		1771.40		15.51	3.14E+01		2.82E+00	1.53E+01
		2598.48		16.90	5.75E+00		1.12E+00	2.45E+00
+	CO-57	122.06	*	85.51	1.02E+01	1.02E+01	5.73E+00	5.09E+00
		136.48		10.60	8.03E+01		3.30E+01	4.01E+01
	CO-58	810.76		99.40	1.70E+01	1.70E+01	9.23E+00	8.49E+00
	FE-59	1099.22		56.50	2.82E+01	2.82E+01	6.68E+00	1.41E+01
		1291.56		43.20	3.22E+01		-6.06E-01	1.60E+01
	CO-60	1173.22		100.00	1.37E+01	1.09E+01	-2.38E+00	6.82E+00
		1332.49		100.00	1.09E+01		3.65E+00	5.39E+00
	ZN-65	1115.52		50.75	2.99E+01	2.99E+01	5.49E-01	1.49E+01
+	GA-67	93.31	*	35.70	4.32E+01	4.32E+01	5.38E+01	2.16E+01
		208.95		2.24	9.94E+02		1.42E+02	4.96E+02
		300.22		16.00	1.69E+02		-1.48E+01	8.42E+01
	SE-75	121.11		16.70	4.96E+01	1.45E+01	2.13E+00	2.48E+01
		136.00		59.20	1.45E+01		-7.12E+00	7.23E+00
		264.65		59.80	2.22E+01		7.71E+00	1.11E+01
		279.53		25.20	5.46E+01		7.82E+00	2.73E+01
		400.65		11.40	1.76E+02		-1.02E+01	8.78E+01
	RB-82	776.52		13.00	1.39E+02	1.39E+02	-4.82E+01	6.92E+01
	RB-83	520.41		46.00	4.14E+01	4.14E+01	-1.67E+01	2.07E+01
		529.64		30.30	6.06E+01		3.75E+01	3.02E+01
		552.65		16.40	9.69E+01		4.85E+01	4.83E+01
	KR-85	513.99		0.43	4.40E+03	4.40E+03	5.87E+02	2.20E+03
	SR-85	513.99		99.27	1.99E+01	1.99E+01	2.65E+00	9.91E+00
	Y-88	898.02		93.40	1.75E+01	4.04E+00	-2.98E+00	8.72E+00
		1836.01		99.38	4.04E+00		-8.71E-01	1.96E+00
+	NB-93M	16.57	*	9.43	2.37E+03	2.37E+03	5.22E+03	1.18E+03
	NB-94	702.63		100.00	1.88E+01	1.63E+01	-2.21E+01	9.35E+00
		871.10		100.00	1.63E+01		5.41E+00	8.13E+00
	NB-95	765.79		99.81	1.79E+01	1.79E+01	8.18E+00	8.92E+00
	NB-95M	235.69		25.00	8.80E+01	8.80E+01	-4.67E+00	4.39E+01
	ZR-95	724.18		43.70	4.20E+01	3.16E+01	2.87E+01	2.09E+01
		756.72		55.30	3.16E+01		4.85E+00	1.57E+01

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	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	3.51E+02	2.88E+02	-1.49E+03	1.75E+02
		739.58		12.80	2.88E+02		1.91E+01	1.43E+02
		778.00		4.50	7.91E+02		-1.96E+01	3.94E+02
	RU-103	497.08		89.00	2.41E+01	2.41E+01	2.50E+00	1.20E+01
	RU-106	621.84		9.80	1.66E+02	1.66E+02	6.42E+01	8.29E+01
	AG-108M	433.93		89.90	2.54E+01	1.79E+01	-5.43E-01	1.27E+01
		614.37		90.40	1.79E+01		1.99E+00	8.94E+00
		722.95		90.50	1.97E+01		1.33E+01	9.82E+00
	CD-109	88.03		3.72	2.08E+02	2.08E+02	1.28E+02	1.04E+02
	AG-110M	657.75		93.14	1.44E+02	2.26E+01	2.95E+04	7.20E+01
		677.61		10.53	2.11E+02		-6.29E+01	1.05E+02
		706.67		16.46	1.13E+02		4.82E+01	5.66E+01
		763.93		21.98	7.71E+01		-3.59E+01	3.84E+01
		884.67		71.63	2.26E+01		-2.21E+00	1.13E+01
		1384.27		23.94	4.14E+01		1.85E+01	2.05E+01
	CD-113M	263.70		0.02	5.67E+04	5.67E+04	-5.09E+03	2.83E+04
	SN-113	255.12		1.93	6.75E+02	2.99E+01	1.51E+02	3.37E+02
		391.69		64.90	2.99E+01		1.47E+01	1.49E+01
	TE123M	159.00		84.10	1.09E+01	1.09E+01	-2.98E+00	5.43E+00
	SB-124	602.71		97.87	1.72E+01	1.22E+01	-3.23E+00	8.55E+00
		645.85		7.26	2.38E+02		-3.32E+02	1.19E+02
		722.78		11.10	1.66E+02		1.12E+02	8.28E+01
		1691.02		49.00	1.22E+01		-2.62E+00	6.00E+00
+	I-125	35.49	*	6.49	5.69E+02	5.69E+02	2.29E+04	2.84E+02
	SB-125	176.33		6.89	1.41E+02	7.56E+01	-1.27E+02	7.05E+01
		427.89		29.33	7.56E+01		-1.23E+01	3.78E+01
		463.38		10.35	2.54E+02		-8.12E+01	1.27E+02
		600.56		17.80	9.18E+01		3.83E+01	4.58E+01
		635.90		11.32	1.44E+02		-7.73E+01	7.19E+01
	SB-126	414.70		83.30	2.97E+01	2.43E+01	-7.11E+00	1.48E+01
		666.33		99.60	5.44E+01		-3.27E+04	2.72E+01
		695.00		99.60	2.43E+01		1.11E+01	1.21E+01
		720.50		53.80	3.95E+01		2.58E+01	1.97E+01
	SN-126	87.57		37.00	2.08E+01	2.08E+01	1.28E+01	1.04E+01
	SB-127	473.00		25.00	1.83E+02	1.03E+02	1.00E+03	9.12E+01
		685.20		35.70	1.03E+02		9.68E+00	5.12E+01
		783.80		14.70	1.95E+02		9.64E+01	9.72E+01
+	I-129	29.78	*	57.00	9.92E+01	9.92E+01	3.33E+02	4.96E+01
		33.60		13.20	1.56E+02		-1.81E+04	7.77E+01
		39.58		7.52	1.36E+02		-1.23E+03	6.78E+01
	I-131	284.30		6.05	2.93E+02	2.75E+01	4.43E+01	1.46E+02
		364.48		81.20	2.75E+01		-4.19E+00	1.37E+01
		636.97		7.26	2.92E+02		1.67E+01	1.46E+02
		722.89		1.80	1.28E+03		8.66E+02	6.40E+02
	TE-132	49.72		13.10	1.14E+02	2.62E+01	1.30E+02	5.71E+01
		228.16		88.00	2.62E+01		1.02E+01	1.31E+01
	BA-133	81.00		33.00	1.82E+01	1.82E+01	7.93E+00	9.07E+00
		302.84		17.80	8.04E+01		-6.27E+01	4.02E+01
		356.01		60.00	2.80E+01		8.43E+00	1.40E+01
	I-133	529.87		86.30	2.30E+02	2.30E+02	1.28E+02	1.15E+02
	XE-133	81.00		38.00	2.35E+01	2.35E+01	1.02E+01	1.17E+01
	CS-134	563.23		8.38	1.75E+02	1.67E+01	4.65E+01	8.71E+01
		569.32		15.43	9.32E+01		5.57E+00	4.65E+01

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

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	1.67E+01	1.67E+01	-2.15E+00	8.30E+00
	795.84		85.40	1.94E+01		2.39E+00	9.67E+00
	801.93		8.73	1.89E+02		3.78E+01	9.40E+01
CS-135	268.24		16.00	8.21E+01	8.21E+01	-4.52E+01	4.10E+01
I-135	1131.51		22.50	1.28E+05	8.97E+04	-9.89E+03	6.38E+04
	1260.41		28.60	8.97E+04		-7.39E+03	4.46E+04
	1678.03		9.54	1.25E+05		1.54E+04	6.12E+04
CS-136	153.22		7.46	1.39E+02	1.93E+01	-5.97E+01	6.93E+01
	163.89		4.61	2.33E+02		-1.26E+01	1.16E+02
	176.55		13.56	8.43E+01		-7.65E+01	4.21E+01
	273.65		12.66	1.23E+02		-3.53E+01	6.15E+01
	340.57		48.50	3.86E+01		-2.83E+01	1.93E+01
	818.50		99.70	1.93E+01		5.16E+00	9.63E+00
	1048.07		79.60	2.28E+01		3.21E+00	1.14E+01
	1235.34		19.70	7.73E+01		-5.84E+00	3.84E+01
CS-137	661.65	*	85.12	9.82E+01	9.82E+01	9.57E+04	4.91E+01
LA-138	788.74		34.00	4.87E+01	1.37E+01	1.65E+00	2.43E+01
	1435.80		66.00	1.37E+01		-1.94E+00	6.79E+00
CE-139	165.85		80.35	1.17E+01	1.17E+01	2.09E+00	5.83E+00
BA-140	162.64		6.70	1.60E+02	8.09E+01	-1.56E+02	7.99E+01
	304.84		4.50	3.77E+02		-1.40E+02	1.88E+02
	423.70		3.20	7.99E+02		-3.09E+02	3.99E+02
	437.55		2.00	1.36E+03		-1.48E+03	6.80E+02
	537.32		25.00	8.09E+01		6.60E+01	4.03E+01
LA-140	328.77		20.50	8.87E+01	9.17E+00	2.71E+01	4.43E+01
	487.03		45.50	5.50E+01		1.02E+01	2.75E+01
	815.85		23.50	8.22E+01		-2.32E+01	4.10E+01
	1596.49		95.49	9.17E+00		1.60E+00	4.52E+00
CE-141	145.44		48.40	1.90E+01	1.90E+01	4.58E+00	9.51E+00
CE-143	57.36		11.80	2.74E+02	1.52E+02	-1.54E+04	1.37E+02
	293.26		42.00	1.52E+02		-7.78E-02	7.58E+01
	664.55		5.20	1.46E+04		6.24E+06	7.28E+03
CE-144	133.54		10.80	7.80E+01	7.80E+01	2.01E+01	3.89E+01
PM-144	476.78		42.00	5.96E+01	1.65E+01	8.25E+01	2.97E+01
	618.01		98.60	1.65E+01		1.80E+00	8.24E+00
	696.49		99.49	2.04E+01		1.06E+01	1.02E+01
PM-145	36.85		21.70	8.32E+01	4.44E+01	5.83E+03	4.15E+01
	37.36		39.70	4.44E+01		3.11E+03	2.22E+01
	42.30		15.10	6.15E+01		1.88E+01	3.07E+01
	72.40		2.31	2.66E+02		-3.04E+01	1.33E+02
PM-146	453.90		39.94	6.31E+01	6.31E+01	-1.96E+01	3.15E+01
	735.90		14.01	1.24E+02		5.98E+01	6.19E+01
	747.13		13.10	1.31E+02		9.14E+01	6.51E+01
ND-147	91.11		28.90	3.23E+01	3.23E+01	-1.42E+01	1.61E+01
	531.02		13.10	1.64E+02		1.18E+02	8.16E+01
PM-149	285.90		3.10	1.14E+03	1.14E+03	3.83E+02	5.69E+02
EU-152	121.78		20.50	3.98E+01	3.98E+01	4.74E+01	1.99E+01
	244.69		5.40	2.32E+02		-1.66E+02	1.16E+02
	344.27		19.13	8.46E+01		2.35E+01	4.22E+01
	778.89		9.20	1.81E+02		6.63E+01	9.04E+01
	964.01		10.40	1.51E+02		-8.20E+01	7.53E+01
	1085.78		7.22	2.13E+02		1.47E+02	1.06E+02
	1112.02		9.60	1.58E+02		-2.57E+01	7.87E+01

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	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	6.44E+01	3.98E+01	3.50E+01	3.19E+01
	GD-153	97.43		31.30	2.47E+01	2.47E+01	7.28E+00	1.23E+01
		103.18		22.20	3.49E+01		-1.04E+01	1.74E+01
	EU-154	123.07		40.50	2.02E+01	2.02E+01	9.45E+00	1.01E+01
		723.30		19.70	9.05E+01		6.11E+01	4.51E+01
		873.19		11.50	1.42E+02		-2.68E+01	7.06E+01
		996.32		10.30	1.52E+02		1.12E+01	7.56E+01
		1004.76		17.90	8.75E+01		1.42E-01	4.36E+01
		1274.45		35.50	3.63E+01		-1.38E+01	1.81E+01
	EU-155	86.50		30.90	2.50E+01	2.50E+01	1.32E+01	1.25E+01
		105.30		20.70	3.73E+01		-7.83E+00	1.86E+01
	EU-156	811.77		10.40	1.81E+02	1.69E+02	9.18E+01	9.04E+01
		1153.47		7.20	2.24E+02		5.46E+01	1.11E+02
		1230.71		8.90	1.69E+02		1.18E+02	8.39E+01
	HO-166M	184.41		72.60	1.50E+01	1.50E+01	-2.34E+01	7.49E+00
		280.45		29.60	4.58E+01		6.56E+00	2.29E+01
		410.94		11.10	1.85E+02		-9.74E+01	9.23E+01
		711.69		54.10	3.38E+01		1.35E+01	1.69E+01
	TM-171	66.72		0.14	4.53E+03	4.53E+03	3.64E+03	2.26E+03
	HF-172	81.75		4.52	1.33E+02	7.29E+01	-3.50E-01	6.62E+01
		125.81		11.30	7.29E+01		-9.98E+00	3.64E+01
	LU-172	181.53		20.60	6.87E+01	3.33E+01	-2.44E+02	3.43E+01
		810.06		16.63	1.35F+02		7.31E+01	6.72E+01
		912.12		15.25	1.43E+02		2.95E+01	7.14E+01
		1093.66		62.50	3.33E+01		1.37E+01	1.66E+01
	LU-173	100.72		5.24	1.47E+02	6.27E+01	-7.58E+01	7.34E+01
		272.11		21.20	6.27E+01		2.02E+01	3.13E+01
	HF-175	343.40		84.00	1.98E+01	1.98E+01	-1.41E+01	9.87E+00
	LU-176	88.34		13.30	5.79E+01	1.35E+01	3.55E+01	2.89E+01
		201.83		86.00	1.35E+01		7.02E+00	6.76E+00
		306.78		94.00	1.54E+01		-3.89E-01	7.71E+00
	TA-182	67.75		41.20	1.55E+01	1.55E+01	5.54E+00	7.75E+00
		1121.30		34.90	4.35E+01		9.08E+00	2.16E+01
		1189.05		16.23	8.41E+01		-6.64E-01	4.18E+01
		1221.41		26.98	4.97E+01		2.87E+01	2.47E+01
		1231.02		11.44	1.17E+02		8.33E+01	5.79E+01
	IR-192	308.46		29.68	5.06E+01	5.06E+01	3.49E+01	2.53E+01
		468.07		48.10	5.71E+01		5.83E+01	2.85E+01
	HG-203	279.19		77.30	1.83E+01	1.83E+01	-6.36E+00	9.13E+00
	BI-207	569.67		97.72	1.47E+01	1.47E+01	8.78E-01	7.33E+00
		1063.62		74.90	2.06E+01		8.80E-02	1.03E+01
+	TL-208	583.14	*	30.22	4.91E+01	3.63E+00	4.02E+01	2.45E+01
		860.37		4.48	3.65E+02		8.24E+00	1.82E+02
		2614.66	*	35.85	3.63E+00		1.14E+01	1.62E+00
	BI-210M	262.00		45.00	2.89E+01	2.89E+01	1.27E+01	1.44E+01
		300.00		23.00	6.18E+01		-5.40E+00	3.08E+01
	PB-210	46.50		4.25	1.95E+02	1.95E+02	-2.84E+02	9.74E+01
	PB-211	404.84		2.90	6.91E+02	5.66E+02	-3.17E+02	3.45E+02
		831.96		2.90	5.66E+02		-6.90E+01	2.82E+02
	BI-212	727.17		11.80	1.49E+02	1.49E+02	-1.10E+01	7.42E+01
		1620.62		2.75	2.59E+02		8.31E+01	1.27E+02
	PB-212	238.63		44.60	2.78E+01	2.78E+01	-2.92E+01	1.39E+01
		300.09		3.41	4.17E+02		-3.65E+01	2.08E+02

Analysis Report for 1603050-03

J1V8D3 SAF: RC-155

	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	3.50E+01	3.06E+01	9.66E+00	1.75E+01
		1120.29		15.10	9.88E+01		5.30E+01	4.92E+01
		1764.49		15.80	3.06E+01		-1.15E-01	1.50E+01
		2204.22		4.98	3.57E+01		9.06E+00	1.65E+01
	PB-214	295.21		19.19	7.32E+01	4.44E+01	3.45E+01	3.65E+01
		351.92		37.19	4.44E+01		-9.33E+00	2.22E+01
	RN-219	401.80		6.50	3.05E+02	3.05E+02	-5.64E+01	1.52E+02
	RA-223	323.87		3.88	3.92E+02	3.92E+02	2.01E+02	1.96E+02
	RA-224	240.98		3.95	3.16E+02	3.16E+02	1.68E+02	1.58E+02
	RA-225	40.00		31.00	3.73E+01	3.73E+01	-3.39E+02	1.86E+01
+	RA-226	186.21	*	3.28	1.11E+03	1.11E+03	1.90E+03	5.57E+02
	TH-227	50.10		8.40	9.34E+01	9.34E+01	1.06E+02	4.66E+01
		236.00		11.50	1.07E+02		-5.69E+00	5.36E+01
		256.20		6.30	2.03E+02		6.21E+01	1.01E+02
	AC-228	338.32		11.40	1.39E+02	5.78E+01	1.04E+02	6.96E+01
		911.07		27.70	5.78E+01		-6.10E+00	2.88E+01
		969.11		16.60	9.47E+01		-2.18E+01	4.71E+01
	TH-230	48.44		16.90	4.77E+01	4.77E+01	5.45E+01	2.38E+01
		62.85		4.60	1.42E+02		-1.70E+02	7.09E+01
		67.67		0.37	1.70E+03		6.06E+02	8.47E+02
	PA-231	283.67		1.60	8.54E+02	6.22E+02	1.29E+02	4.26E+02
		302.67		2.30	6.22E+02		-4.85E+02	3.10E+02
	TH-231	25.64		14.70	1.93E+02	9.34E+01	-2.78E+02	9.64E+01
		84.21		6.40	9.34E+01		5.09E+00	4.66E+01
	PA-233	311.98		38.60	4.11E+01	4.11E+01	-1.86E+01	2.05E+01
	PA-234	131.20		20.40	4.08E+01	4.08E+01	3.94E+01	2.04E+01
		733.99		8.80	1.98E+02		1.71E+01	9.89E+01
		946.00		12.00	1.33E+02		4.13E+01	6.60E+01
	PA-234M	1001.03		0.92	1.69E+03	1.69E+03	-3.84E+02	8.43E+02
	TH-234	63.29		3.80	1.71E+02	1.71E+02	-2.05E+02	8.56E+01
	U-235	143.76		10.50	8.19E+01	8.19E+01	-2.24E+01	4.09E+01
		163.35		4.70	1.94E+02		-1.90E+02	9.70E+01
		205.31		4.70	2.48E+02		-4.69E+01	1.24E+02
	NP-237	86.50		12.60	6.11E+01	6.11E+01	3.23E+01	3.05E+01
	NP-239	106.10		22.70	8.28E+01	8.28E+01	6.29E+01	4.14E+01
		228.18		10.70	2.75E+02		1.07E+02	1.38E+02
		277.60		14.10	2.32E+02		6.78E+01	1.16E+02
+	AM-241	59.54	*	35.90	3.78E+01	3.78E+01	1.27E+03	1.89E+01
	AM-243	74.67		66.00	9.26E+00	9.26E+00	2.96E+00	4.62E+00
	CM-243	209.75		3.29	3.57E+02	9.61E+01	6.56E+01	1.78E+02
		228.14		10.60	1.14E+02		4.46E+01	5.72E+01
		277.60		14.00	9.61E+01		2.81E+01	4.80E+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 1603050-03

J1V8D3 SAF: RC-155

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: J1V8D3 SAF: RC-155

Elapsed Live time: 1800
Elapsed Real Time: 2423

Channel								
1:	5	4	1	5	68	1001	20163	31974
9:	31971	32927	33968	35360	36583	38865	36843	38934
17:	43324	42127	38342	41073	46112	55223	45704	40139
25:	41221	45549	46757	48083	56171	62496	137770	482584
33:	191046	52766	55327	135369	133217	60478	44447	44159
41:	44081	43827	44099	43578	43525	43333	43350	44116
49:	44866	45061	44376	44125	43313	43194	43452	43178
57:	43014	44012	90916	97648	43170	40134	40111	39854
65:	39434	38845	38969	38661	37883	38055	37588	37479
73:	37692	37441	37663	37005	36961	36510	36212	36129
81:	35755	35695	35352	35340	35404	35159	34694	35032
89:	34754	34447	34032	34529	34718	33834	33881	33421
97:	32767	33276	32914	32512	32314	32225	31607	32003
105:	31948	31878	31634	31670	31503	32094	31989	31742
113:	31724	31752	31694	31549	31520	31372	31270	31588
121:	31395	31665	31647	31335	30962	30990	30769	30479
129:	30764	30616	30504	30421	30329	29975	29798	30414
137:	29822	30128	30122	29864	29875	29604	29320	29456
145:	29429	29185	29245	29000	29025	29113	28743	29157
153:	28390	28969	28999	28748	28742	28254	28342	28759
161:	28630	28541	28185	28465	28446	28822	28431	28704
169:	28728	28508	28677	28609	28613	28961	28878	29043
177:	29156	29421	29947	30053	30467	31255	32729	34538
185:	36433	37312	37583	38269	38072	37213	37604	37044
193:	36824	36466	35736	35628	35540	35159	35007	35092
201:	34821	34517	34255	34325	34001	33666	33591	33649
209:	33226	33288	33421	33191	33082	32943	32361	32786
217:	32596	32574	32350	32263	32238	31920	31942	31887
225:	31604	31544	31559	31223	31144	31370	30972	31289
233:	30845	30748	30784	31034	30617	30858	30816	30370
241:	29912	30806	30423	29882	29970	29921	29872	29917
249:	29647	29973	29054	29544	29452	29456	29077	29293
257:	29057	28951	28797	29024	29262	29017	28628	28783
265:	29097	28883	28794	28512	28247	28282	28500	28448
273:	28248	28115	28178	28454	28315	28495	27893	28396
281:	28228	28343	28158	28331	27971	28054	28046	28086
289:	27862	27750	27821	27695	27846	27951	27760	27858
297:	27984	27730	27750	27845	27719	27728	27652	27917
305:	27588	28089	27917	28118	27919	27947	27870	27639
313:	27681	27974	28020	27902	27838	27784	28222	27718
321:	27384	28092	27749	27944	27923	28173	28074	28538
329:	27923	28151	27985	27931	28222	28191	27898	28075
337:	28422	28292	28234	28515	28144	28420	28106	28706
345:	28592	28732	28594	28443	28423	28325	28432	28765
353:	28504	28832	28795	29141	29210	28954	29131	28998
361:	29220	29246	29098	29280	29465	29449	29457	29714

369:	29706	29671	29733	29927	29778	30000	29893	29903

Sample Title: J1V8D3 SAF: RC-155

Channel								
377:	30380	30453	30351	30560	30380	30427	30165	30640
385:	30818	30756	30786	31245	31058	31232	31358	31628
393:	31601	31785	31527	32037	31945	32052	32064	32423
401:	32467	32515	32538	32672	32946	33119	33111	33410
409:	33361	33523	33715	33732	33565	34153	34103	34434
417:	34788	34521	34861	35049	35177	35578	35352	35261
425:	35788	35804	36029	36186	36719	36660	36742	37051
433:	37504	37759	37578	37878	38103	38180	38546	39031
441:	39134	39528	39193	39497	40371	40131	40128	40976
449:	41167	40899	41353	41810	42178	42270	42214	42199
457:	42937	43124	43091	43502	43580	43968	44164	44291
465:	44368	45053	44607	45039	44895	44220	44536	44066
473:	43615	42933	41767	39809	37576	35385	33388	31738
481:	30581	29716	28974	28109	27212	26712	26367	26118
489:	25502	25017	24734	24583	24373	24110	23736	23373
497:	23087	23020	22496	22503	22237	21830	21785	21486
505:	21074	21149	20498	20561	20569	20097	20088	19843
513:	19449	19168	18850	18669	18878	18221	17992	17664
521:	17687	17391	17450	17218	16716	16816	16397	16133
529:	16008	15716	15640	15327	15063	14884	14668	14608
537:	14349	14079	13693	13761	13228	13075	12896	12896
545:	12450	12127	12063	11741	11681	11422	11209	10946
553:	10994	10663	10479	10390	10248	10169	9827	9815
561:	9730	9587	9453	9222	9170	9045	9137	8926
569:	8919	8958	8681	8799	8770	8646	8490	8552
577:	8303	8425	8360	8304	8235	8411	8422	8244
585:	8184	7888	7909	8002	7880	7874	7885	7746
593:	7685	7633	7637	7508	7638	7372	7471	7434
601:	7440	7287	7373	7223	7207	7129	7233	7283
609:	7079	7202	7096	7010	7130	6921	7024	6937
617:	7030	6868	6939	6899	6869	6897	6793	6901
625:	6767	6793	6620	6722	6753	6641	6770	6671
633:	6594	6649	6708	6624	6656	6642	6641	6721
641:	6725	6618	6564	6730	6699	6749	6708	6887
649:	6970	7363	7929	7985	7613	7607	7838	8117
657:	8339	9266	24420	505858	2356989	1773030	239267	24069
665:	16868	15290	14233	13501	13144	12508	12286	11888
673:	11406	11415	11158	10672	10593	10533	10424	10179
681:	10282	9979	10034	9828	9906	9622	9778	9630
689:	9543	9672	9752	9987	10109	9054	8304	8367
697:	8133	7908	7630	7505	7258	7120	7172	7081
705:	6962	6880	7103	7045	6638	6762	6683	6821
713:	6549	6645	6459	6431	6489	6420	6147	6411
721:	6422	6208	6071	6208	5894	6053	5959	5930
729:	5739	5790	5819	5800	5750	5791	5813	5778
737:	5582	5572	5439	5508	5423	5418	5341	5349
745:	5397	5342	5344	5414	5212	5307	5150	5149
753:	5238	5229	5101	4971	5010	4945	5042	5094
761:	4885	5030	5020	4856	4957	4898	4877	4826
769:	5036	4887	4714	4864	4746	4714	4662	4579
777:	4690	4718	4666	4606	4745	4720	4528	4647
785:	4632	4547	4442	4417	4555	4447	4439	4412
793:	4434	4460	4388	4412	4429	4296	4345	4259

801:	4435	4277	4133	4235	4233	4181	4155	4174

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Channel								
809:	4215	4175	4137	4250	4250	4101	4049	4148
817:	4169	4080	4115	4186	4092	4107	3943	4037
825:	3927	3972	3874	4084	3994	3863	3944	3962
833:	3919	4017	4063	3983	3977	3887	3917	3887
841:	3965	3849	3854	3821	3897	3904	3704	3903
849:	3785	3833	3783	3812	3855	3688	3767	3607
857:	3682	3590	3702	3715	3706	3726	3679	3683
865:	3678	3587	3525	3615	3632	3540	3540	3592
873:	3593	3559	3556	3523	3582	3504	3320	3444
881:	3383	3380	3416	3353	3406	3361	3325	3370
889:	3404	3381	3438	3299	3309	3375	3341	3259
897:	3284	3255	3227	3281	3162	3285	3168	3193
905:	3173	3221	3181	3191	3194	3045	3220	3144
913:	3183	3082	3150	3115	3044	3125	3041	3135
921:	3115	2959	2929	3045	2971	3103	3053	3024
929:	2957	2977	2923	2997	2897	2940	2915	2949
937:	3077	2954	2912	2985	2959	2880	2885	2900
945:	2895	2917	2984	2815	2861	2803	2843	2845
953:	2797	2763	2748	2728	2701	2894	2797	2785
961:	2744	2745	2729	2676	2737	2717	2695	2699
969:	2811	2604	2631	2681	2665	2768	2685	2665
977:	2550	2646	2697	2666	2549	2577	2668	2652
985:	2670	2547	2599	2603	2615	2514	2481	2484
993:	2582	2565	2556	2459	2550	2494	2419	2545
1001:	2520	2450	2424	2522	2571	2429	2483	2480
1009:	2496	2505	2430	2412	2437	2388	2423	2416
1017:	2426	2395	2399	2460	2366	2318	2458	2380
1025:	2450	2410	2347	2349	2312	2399	2395	2396
1033:	2429	2291	2299	2266	2352	2357	2330	2356
1041:	2254	2298	2228	2219	2279	2252	2262	2268
1049:	2120	2262	2266	2178	2300	2150	2230	2162
1057:	2214	2237	2143	2162	2184	2189	2190	2101
1065:	2144	2170	2180	2104	2108	2146	2175	2113
1073:	2071	2083	2119	2193	2052	2085	2010	2030
1081:	2036	2073	2060	2116	1965	2112	2022	2033
1089:	1934	2014	1972	1983	1998	2035	1995	2001
1097:	1949	1961	1943	1990	2025	1944	1913	1906
1105:	1882	2001	1889	1900	2005	1860	1879	1897
1113:	2039	1801	1941	1806	1802	1788	1841	1887
1121:	1875	1763	1824	1730	1804	1789	1827	1845
1129:	1746	1778	1656	1699	1686	1652	1691	1669
1137:	1632	1648	1694	1586	1639	1581	1614	1540
1145:	1620	1490	1544	1545	1531	1518	1533	1522
1153:	1563	1490	1520	1528	1458	1513	1508	1426
1161:	1458	1450	1465	1388	1400	1404	1423	1450
1169:	1413	1415	1381	1361	1520	1386	1429	1360
1177:	1348	1276	1309	1322	1344	1357	1359	1394
1185:	1296	1358	1391	1297	1309	1272	1292	1253
1193:	1303	1269	1251	1268	1307	1268	1259	1269
1201:	1336	1249	1254	1184	1201	1279	1212	1163
1209:	1269	1223	1255	1221	1280	1277	1164	1179
1217:	1229	1206	1205	1241	1206	1208	1204	1151
1225:	1137	1144	1129	1201	1158	1219	1130	1161

1233:	1210	1117	1128	1114	1143	1152	1148	1119

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Channel								
1241:	1142	1080	1163	1165	1143	1123	1094	1123
1249:	1058	1102	1078	1143	1135	1147	1089	1115
1257:	1192	1115	1074	1131	1078	1090	1085	1098
1265:	1148	1146	1090	1063	1103	1041	1035	1032
1273:	1119	1093	1105	1060	1007	1093	1101	1105
1281:	1103	1011	1070	1156	1074	1076	1152	1110
1289:	1105	1136	1067	1080	1090	1110	1113	1069
1297:	1113	1169	1142	1145	1124	1126	1129	1173
1305:	1131	1252	1155	1203	1290	1255	1238	1345
1313:	1325	1338	1372	1368	1487	1505	1636	1843
1321:	2148	2532	2171	1175	689	687	707	692
1329:	658	676	702	728	729	682	672	644
1337:	675	657	609	663	622	628	611	650
1345:	612	570	596	665	641	601	594	575
1353:	612	596	609	600	594	604	585	570
1361:	600	582	615	619	594	586	552	544
1369:	564	588	549	576	553	542	523	533
1377:	545	544	549	506	526	536	532	531
1385:	547	505	533	472	528	540	492	495
1393:	516	531	503	483	511	534	502	467
1401:	492	452	472	519	458	495	488	521
1409:	472	477	478	469	494	486	453	502
1417:	458	494	460	430	445	445	433	430
1425:	437	419	448	414	425	482	411	437
1433:	405	385	407	424	439	442	389	428
1441:	396	373	404	383	405	383	375	367
1449:	401	385	385	387	388	380	395	407
1457:	387	385	397	419	373	366	368	366
1465:	357	389	403	375	344	375	350	336
1473:	374	404	382	372	335	358	331	371
1481:	356	325	292	331	324	336	336	346
1489:	305	328	323	313	305	312	327	318
1497:	284	290	301	355	292	304	263	301
1505:	295	313	306	284	295	282	250	271
1513:	311	285	299	314	266	294	297	263
1521:	278	268	275	260	306	258	231	270
1529:	258	246	283	264	254	218	281	228
1537:	237	286	244	249	225	238	272	236
1545:	266	248	250	232	235	236	228	245
1553:	196	232	237	259	222	214	222	221
1561:	193	224	211	217	232	243	219	213
1569:	211	210	227	181	194	194	211	202
1577:	179	223	212	185	223	204	174	188
1585:	177	190	186	181	214	184	190	180
1593:	168	202	171	219	165	182	179	175
1601:	173	171	154	177	165	173	176	149
1609:	178	170	152	179	151	161	159	170
1617:	167	168	171	168	151	126	181	162
1625:	162	155	140	140	141	167	130	154
1633:	127	143	155	143	127	126	177	136
1641:	131	130	129	149	129	126	109	129
1649:	110	132	137	149	131	131	133	129
1657:	133	129	127	116	122	137	117	130

1665:	123	121	127	144	140	107	118	112

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Channel								
1673:	116	114	95	131	110	107	109	107
1681:	101	93	112	105	101	87	98	102
1689:	107	111	85	98	127	84	103	104
1697:	86	96	88	89	84	87	87	91
1705:	91	84	90	109	88	89	75	77
1713:	92	83	64	83	80	87	86	93
1721:	87	100	87	79	78	82	88	100
1729:	83	82	70	84	79	89	62	72
1737:	81	92	83	69	62	57	69	65
1745:	66	65	60	72	74	54	50	69
1753:	57	65	59	64	50	70	71	69
1761:	61	64	67	62	53	70	59	77
1769:	52	68	67	51	56	54	72	60
1777:	60	64	72	51	59	73	49	45
1785:	51	58	47	52	57	57	55	63
1793:	44	53	54	47	61	62	50	44
1801:	51	54	43	53	40	49	41	55
1809:	47	35	48	50	43	48	51	36
1817:	45	53	36	42	41	39	50	47
1825:	45	39	29	45	38	50	41	48
1833:	43	33	38	41	33	45	37	37
1841:	52	32	37	42	41	27	35	32
1849:	43	30	34	37	26	39	34	33
1857:	36	42	39	27	40	33	29	29
1865:	37	39	30	29	25	39	29	34
1873:	49	25	32	36	23	32	43	33
1881:	34	32	36	28	24	31	29	44
1889:	27	31	28	33	27	31	22	27
1897:	34	27	32	34	28	36	24	34
1905:	31	29	22	15	36	28	19	32
1913:	29	25	33	27	23	27	23	25
1921:	15	28	21	25	20	24	24	24
1929:	28	21	21	19	18	16	24	26
1937:	21	25	23	27	28	27	34	26
1945:	29	27	22	16	16	14	22	23
1953:	31	26	26	29	29	25	15	15
1961:	25	27	12	27	21	19	24	20
1969:	19	19	16	18	20	19	15	18
1977:	30	20	16	16	29	19	20	17
1985:	20	14	19	19	16	21	19	16
1993:	17	16	20	18	21	20	18	18
2001:	14	21	27	19	16	15	12	16
2009:	9	9	9	17	12	20	17	12
2017:	15	17	15	17	17	13	18	10
2025:	11	16	23	21	18	18	6	10
2033:	15	11	15	11	23	17	10	13
2041:	11	12	14	8	5	18	11	10
2049:	16	12	13	11	10	12	10	13
2057:	9	6	16	10	8	11	6	9
2065:	14	10	14	14	17	10	11	5
2073:	8	11	4	7	11	8	9	10
2081:	9	15	13	10	9	10	13	5
2089:	15	10	14	12	4	8	10	6

2097:	8	4	11	10	6	11	17	9

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Channel								
2105:	10	8	14	4	9	8	10	5
2113:	9	16	13	13	9	3	9	8
2121:	10	6	11	9	3	8	6	9
2129:	9	8	5	11	10	6	9	12
2137:	6	4	5	6	4	9	5	4
2145:	11	6	9	7	1	6	7	13
2153:	9	10	6	7	5	7	10	9
2161:	5	12	9	4	7	3	8	5
2169:	8	8	4	3	6	9	5	7
2177:	5	7	3	4	3	3	7	7
2185:	7	3	3	6	8	9	6	5
2193:	4	11	4	3	4	5	3	7
2201:	7	11	7	6	4	4	4	3
2209:	5	6	5	4	5	3	4	5
2217:	6	5	6	7	9	7	2	5
2225:	5	4	3	10	3	7	3	3
2233:	6	4	3	3	12	7	5	6
2241:	5	4	4	1	5	7	4	3
2249:	6	6	3	7	1	3	3	7
2257:	2	4	4	3	2	2	6	7
2265:	2	3	3	6	6	1	6	7
2273:	3	5	4	4	5	7	4	4
2281:	2	0	1	3	4	4	6	1
2289:	3	7	3	2	11	3	4	3
2297:	4	8	1	2	3	3	2	5
2305:	2	6	6	3	6	2	7	6
2313:	1	7	5	1	3	2	2	5
2321:	2	3	4	4	11	1	6	3
2329:	5	5	1	1	2	3	2	3
2337:	1	1	3	4	1	1	2	5
2345:	3	3	1	4	5	0	1	3
2353:	1	2	1	3	6	9	1	1
2361:	2	0	2	5	1	3	2	3
2369:	1	3	2	5	1	4	5	0
2377:	4	1	1	2	3	2	3	2
2385:	2	2	4	4	1	2	1	0
2393:	2	2	2	3	1	2	2	1
2401:	1	4	1	3	0	6	1	0
2409:	1	0	4	0	3	1	0	3
2417:	1	2	1	2	2	4	2	0
2425:	4	4	2	3	3	0	0	0
2433:	1	1	1	2	2	2	1	1
2441:	1	1	3	1	1	1	1	1
2449:	1	2	1	1	2	1	2	0
2457:	0	1	2	0	2	3	2	1
2465:	0	2	1	1	0	2	1	4
2473:	2	4	4	2	0	1	1	7
2481:	2	0	1	2	0	1	0	3
2489:	1	1	0	4	1	2	0	1
2497:	0	2	0	1	1	1	1	2
2505:	7	3	2	0	2	3	1	1
2513:	2	1	1	0	1	0	2	1
2521:	1	0	0	0	0	1	0	0

2529:	0	1	1	4	0	0	1	1

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Channel								
2537:	0	1	0	1	1	1	1	0
2545:	1	0	0	0	0	1	2	0
2553:	1	1	2	1	0	1	1	1
2561:	2	1	1	1	0	1	0	1
2569:	1	0	1	1	0	0	1	1
2577:	2	1	1	1	0	0	2	0
2585:	2	1	1	0	3	1	0	0
2593:	2	0	1	1	1	2	1	3
2601:	2	0	0	2	1	2	0	1
2609:	1	1	7	12	22	20	18	3
2617:	3	2	2	0	2	1	2	2
2625:	2	0	0	1	3	0	1	1
2633:	0	1	1	2	1	0	1	1
2641:	0	0	1	2	1	0	1	3
2649:	0	1	0	2	0	1	1	1
2657:	0	0	2	0	1	0	1	0
2665:	1	0	0	0	1	1	0	0
2673:	1	0	0	1	0	1	2	0
2681:	1	1	0	1	1	0	1	1
2689:	0	1	1	1	0	1	1	0
2697:	0	0	0	1	0	0	0	1
2705:	0	1	0	2	0	0	0	1
2713:	1	1	0	1	1	0	0	2
2721:	1	0	2	1	0	0	3	3
2729:	0	0	0	0	0	1	0	0
2737:	1	1	0	1	0	0	0	1
2745:	0	1	1	0	1	0	1	0
2753:	0	0	0	0	2	1	0	1
2761:	0	0	0	0	0	0	0	0
2769:	0	1	1	1	0	1	1	2
2777:	1	1	1	1	0	0	0	0
2785:	1	3	0	1	0	0	0	1
2793:	0	0	2	0	0	0	1	0
2801:	0	0	0	0	1	0	0	0
2809:	0	0	1	1	0	0	2	1
2817:	1	1	0	0	0	0	3	1
2825:	0	1	0	0	0	1	0	0
2833:	0	0	0	0	0	0	1	1
2841:	1	1	0	0	1	1	0	0
2849:	0	0	0	0	1	1	0	0
2857:	0	0	0	2	0	0	0	0
2865:	0	0	0	0	1	0	1	0
2873:	0	0	0	0	0	2	0	0
2881:	0	0	0	0	1	0	0	2
2889:	1	0	0	0	0	0	0	0
2897:	0	1	1	1	1	0	0	0
2905:	0	0	0	0	0	0	0	0
2913:	0	0	0	0	1	0	0	0
2921:	0	0	0	0	0	1	0	0
2929:	0	1	2	0	2	0	0	1
2937:	0	0	0	1	0	2	0	0
2945:	0	0	0	1	0	0	0	0
2953:	0	0	0	0	0	1	0	0

2961:	0	0	0	0	1	0	0	1

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

3393:	0	0	0	0	1	0	0	0

Sample Title: J1V8D3 SAF: RC-155

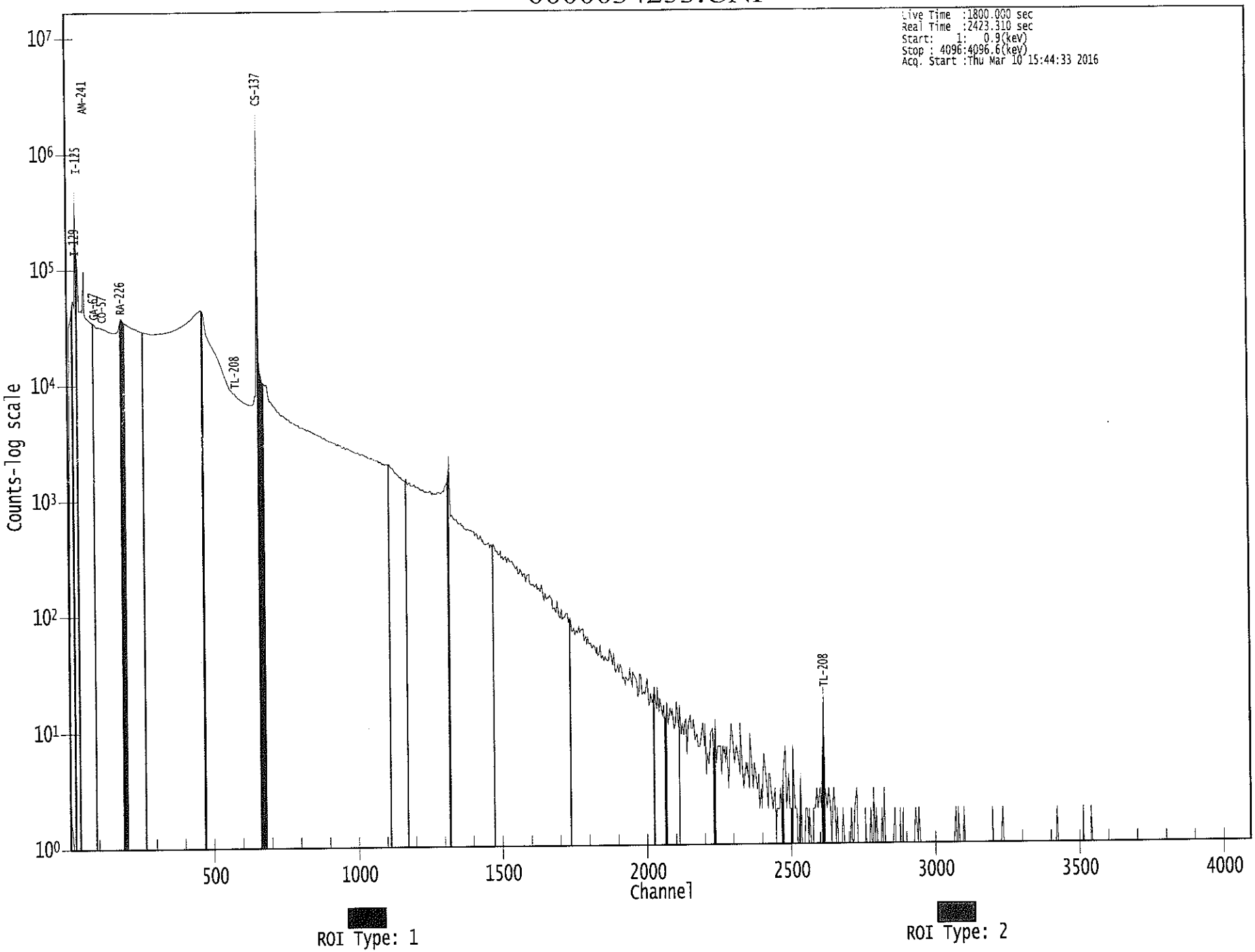
Channel								
3401:	1	1	0	0	0	0	0	1
3409:	0	0	0	0	0	0	0	0
3417:	1	0	0	0	2	0	0	0
3425:	0	0	0	0	0	0	0	0
3433:	0	0	0	0	0	0	0	0
3441:	0	0	0	0	1	0	0	0
3449:	1	0	0	0	0	1	0	0
3457:	0	0	0	0	0	0	0	0
3465:	0	0	0	1	0	0	0	0
3473:	0	0	0	0	0	0	0	0
3481:	0	0	0	0	1	0	0	0
3489:	0	0	0	0	1	0	0	0
3497:	0	0	0	0	1	0	0	1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

3825:	0	0	0	1	0	0	0	0

Sample Title: J1V8D3 SAF: RC-155

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

0000034253.CNF



0004 0

KB 3/10/16

Apex-Gamma

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1603050-04
Sample Description	: J1V8D3 SAF: RC-155
Sample Type	: SOIL
Sample Size	: 2.809E+01 grams
Facility	: Countroom
Sample Taken On	: 3/7/2016 4:16:47PM
Acquisition Started	: 3/10/2016 4:25:54PM
Procedure	: GAS-1407 pCi
Operator	: Administrator
Detector Name	: GE2
Geometry	: GAS-1407
Live Time	: 1800.0 seconds
Real Time	: 2422.8 seconds
Dead Time	: 25.71 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 5 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 11/2/2014
Efficiency Calibration Used Done On	: 10/25/2014
Efficiency Calibration Description	:
Sample Number	: 34260

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

AG 3/11/16

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

PEAK LOCATE REPORT

Peak Locate Performed on : 3/10/2016 5:06:21PM
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	17.33	17.46	0.0000	0.00
2	21.73	21.85	0.0000	0.00
3	29.32	29.44	0.0000	0.00
4	31.97	32.08	0.0000	0.00
5	36.38	36.49	0.0000	0.00
6	49.77	49.87	0.0000	0.00
7	59.42	59.52	0.0000	0.00
8	85.54	85.62	0.0000	0.00
9	92.91	92.99	0.0000	0.00
10	99.13	99.21	0.0000	0.00
11	122.80	122.86	0.0000	0.00
12	187.70	187.73	0.0000	0.00
13	191.21	191.23	0.0000	0.00
14	239.04	239.04	0.0000	0.00
15	470.80	470.68	0.0000	0.00
16	474.43	474.31	0.0000	0.00
17	510.02	509.88	0.0000	0.00
18	651.60	651.39	0.0000	0.00
19	661.57	661.35	0.0000	0.00
20	692.72	692.49	0.0000	0.00
21	712.78	712.54	0.0000	0.00
22	720.44	720.20	0.0000	0.00
23	997.65	997.29	0.0000	0.00
24	1320.50	1320.02	0.0000	0.00
25	1322.84	1322.36	0.0000	0.00
26	1601.52	1600.95	0.0000	0.00
27	1849.17	1848.55	0.0000	0.00
28	2047.82	2047.16	0.0000	0.00
29	2243.21	2242.51	0.0000	0.00
30	2249.88	2249.18	0.0000	0.00
31	2403.31	2402.59	0.0000	0.00
32	2445.27	2444.54	0.0000	0.00
33	2512.53	2511.80	0.0000	0.00
34	2521.63	2520.90	0.0000	0.00
35	2529.63	2528.90	0.0000	0.00
36	2614.37	2613.63	0.0000	0.00
37	2714.48	2713.73	0.0000	0.00
38	2725.35	2724.60	0.0000	0.00
39	3196.42	3195.67	0.0000	0.00

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 3/10/2016 5:06:21PM

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	17.33	15 -	19	17.46	4.64E+03	1333.26	3.92E+05	1.69
	2	21.73	20 -	24	21.85	2.21E+04	1384.86	4.13E+05	1.52
M	3	29.32	28 -	41	29.44	1.96E+04	774.31	1.88E+05	1.31
m	4	31.97	28 -	41	32.08	6.82E+05	2055.94	3.69E+05	1.47
m	5	36.38	28 -	41	36.49	2.15E+05	1889.43	5.36E+05	1.84
	6	49.77	49 -	52	49.87	1.64E+03	1190.33	3.52E+05	3.10
	7	59.42	56 -	63	59.52	1.11E+05	2107.91	6.64E+05	1.87
	8	85.54	84 -	88	85.62	1.66E+03	1253.87	3.47E+05	2.32
	9	92.91	92 -	95	92.99	1.62E+03	1043.58	2.70E+05	1.51
	10	99.13	98 -	101	99.21	1.40E+03	1024.81	2.61E+05	2.72
	11	122.80	121 -	125	122.86	1.01E+03	1184.56	3.11E+05	1.57
M	12	187.70	184 -	204	187.73	1.45E+04	1644.00	4.74E+05	3.12
m	13	191.21	184 -	204	191.23	6.99E+03	1456.93	4.07E+05	1.95
	14	239.04	237 -	242	239.04	1.82E+03	1350.98	3.63E+05	3.52
M	15	470.80	466 -	477	470.68	1.72E+04	2411.35	8.14E+05	4.06
m	16	474.43	466 -	477	474.31	1.68E+04	1987.16	6.19E+05	4.07
	17	510.02	508 -	513	509.88	1.42E+03	1095.54	2.38E+05	4.70
	18	651.60	649 -	653	651.39	7.91E+02	576.56	7.35E+04	1.76
	19	661.57	655 -	666	661.35	4.86E+06	4648.89	2.66E+05	1.97
	20	692.72	690 -	696	692.49	3.24E+03	837.10	1.24E+05	2.54
	21	712.78	710 -	715	712.54	5.62E+02	630.54	7.88E+04	2.58
	22	720.44	718 -	723	720.20	1.07E+03	612.96	7.40E+04	1.99
	23	997.65	995 -	1001	997.29	3.79E+02	438.50	3.46E+04	1.89
M	24	1320.50	1314 -	1327	1320.02	3.32E+03	467.62	2.39E+04	5.25
m	25	1322.84	1314 -	1327	1322.36	3.39E+03	311.38	1.21E+04	2.22
	26	1601.52	1597 -	1605	1600.95	1.74E+02	139.26	2.87E+03	4.74
	27	1849.17	1844 -	1852	1848.55	5.84E+01	59.91	5.03E+02	2.45
	28	2047.82	2040 -	2055	2047.16	6.62E+01	50.79	2.30E+02	5.82
M	29	2243.21	2240 -	2266	2242.51	1.56E+01	10.95	1.34E+01	2.78
m	30	2249.88	2240 -	2266	2249.18	1.41E+01	27.07	6.31E+01	4.40
	31	2403.31	2398 -	2407	2402.59	1.60E+01	14.28	2.00E+01	2.88
	32	2445.27	2440 -	2452	2444.54	1.67E+01	15.32	2.06E+01	1.12
	33	2512.53	2509 -	2514	2511.80	5.00E+00	4.47	0.00E+00	2.41
	34	2521.63	2517 -	2524	2520.90	1.00E+01	6.32	0.00E+00	5.48
	35	2529.63	2526 -	2531	2528.90	1.00E+01	6.32	0.00E+00	2.97
	36	2614.37	2606 -	2621	2613.63	6.20E+01	29.80	6.40E+01	2.75
	37	2714.48	2711 -	2716	2713.73	4.42E+00	5.74	3.17E+00	1.88
	38	2725.35	2720 -	2727	2724.60	5.00E+00	4.47	0.00E+00	1.24
	39	3196.42	3191 -	3199	3195.67	6.00E+00	4.90	0.00E+00	1.70

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

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 : 3/10/2016 5:06:21PM

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	17.33	15 -	19	4.64E+03	1333.26	3.92E+05	1.09E+03
	2	21.73	20 -	24	2.21E+04	1384.86	4.13E+05	1.25E+03
M	3	29.32	28 -	41	1.96E+04	774.31	1.88E+05	7.13E+02
m	4	31.97	28 -	41	6.82E+05	2055.94	3.69E+05	9.98E+02
m	5	36.38	28 -	41	2.15E+05	1889.43	5.36E+05	1.20E+03
	6	49.77	49 -	52	1.64E+03	1190.33	3.52E+05	9.76E+02
	7	59.42	56 -	63	1.11E+05	2107.91	6.64E+05	1.64E+03
	8	85.54	84 -	88	1.66E+03	1253.87	3.47E+05	1.03E+03
	9	92.91	92 -	95	1.62E+03	1043.58	2.70E+05	8.55E+02
	10	99.13	98 -	101	1.40E+03	1024.81	2.61E+05	8.40E+02
	11	122.80	121 -	125	1.01E+03	1184.56	3.11E+05	9.72E+02
M	12	187.70	184 -	204	1.45E+04	1644.00	4.74E+05	1.13E+03
m	13	191.21	184 -	204	6.99E+03	1456.93	4.07E+05	1.05E+03
	14	239.04	237 -	242	1.82E+03	1350.98	3.63E+05	1.11E+03
M	15	470.80	466 -	477	1.72E+04	2411.35	8.14E+05	1.48E+03
m	16	474.43	466 -	477	1.68E+04	1987.16	6.19E+05	1.29E+03
	17	510.02	508 -	513	1.42E+03	1095.54	2.38E+05	8.98E+02
	18	651.60	649 -	653	7.91E+02	576.56	7.35E+04	4.72E+02
	19	661.57	655 -	666	4.86E+06	4648.89	2.66E+05	1.21E+03
	20	692.72	690 -	696	3.24E+03	837.10	1.24E+05	6.82E+02
	21	712.78	710 -	715	5.62E+02	630.54	7.88E+04	5.17E+02
	22	720.44	718 -	723	1.07E+03	612.96	7.40E+04	5.01E+02
	23	997.65	995 -	1001	3.79E+02	438.50	3.46E+04	3.59E+02
M	24	1320.50	1314 -	1327	3.32E+03	467.62	2.39E+04	2.54E+02
m	25	1322.84	1314 -	1327	3.39E+03	311.38	1.21E+04	1.81E+02
	26	1601.52	1597 -	1605	1.74E+02	139.26	2.87E+03	1.12E+02
	27	1849.17	1844 -	1852	5.84E+01	59.91	5.03E+02	4.76E+01
	28	2047.82	2040 -	2055	6.62E+01	50.79	2.30E+02	3.96E+01
M	29	2243.21	2240 -	2266	1.56E+01	10.95	1.34E+01	6.01E+00
m	30	2249.88	2240 -	2266	1.41E+01	27.07	6.31E+01	1.31E+01
	31	2403.31	2398 -	2407	1.60E+01	14.28	2.00E+01	9.73E+00

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
32	2445.27	2440 -	2452	1.67E+01	15.32	2.06E+01	1.07E+01
33	2512.53	2509 -	2514	5.00E+00	4.47	0.00E+00	0.00E+00
34	2521.63	2517 -	2524	1.00E+01	6.32	0.00E+00	0.00E+00
35	2529.63	2526 -	2531	1.00E+01	6.32	0.00E+00	0.00E+00
36	2614.37	2606 -	2621	6.20E+01	29.80	6.40E+01	2.08E+01
37	2714.48	2711 -	2716	4.42E+00	5.74	3.17E+00	3.22E+00
38	2725.35	2720 -	2727	5.00E+00	4.47	0.00E+00	0.00E+00
39	3196.42	3191 -	3199	6.00E+00	4.90	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 : 3/10/2016 5:06:21PM

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	17.33	15 -	19	17.46	4.64E+03	1333.26	3.92E+05	NB-93M
	2	21.73	20 -	24	21.85	2.21E+04	1384.86	4.13E+05	.....
M	3	29.32	28 -	41	29.44	1.96E+04	774.31	1.88E+05	I-129
m	4	31.97	28 -	41	32.08	6.82E+05	2055.94	3.69E+05	.....
m	5	36.38	28 -	41	36.49	2.15E+05	1889.43	5.36E+05	PM-145 I-125 PM-145
	6	49.77	49 -	52	49.87	1.64E+03	1190.33	3.52E+05	TE-132 TH-227
	7	59.42	56 -	63	59.52	1.11E+05	2107.91	6.64E+05	AM-241
	8	85.54	84 -	88	85.62	1.66E+03	1253.87	3.47E+05	EU-155 NP-237
	9	92.91	92 -	95	92.99	1.62E+03	1043.58	2.70E+05	GA-67
	10	99.13	98 -	101	99.21	1.40E+03	1024.81	2.61E+05	.....
	11	122.80	121 -	125	122.86	1.01E+03	1184.56	3.11E+05	EU-154 CO-57
M	12	187.70	184 -	204	187.73	1.45E+04	1644.00	4.74E+05	.....
m	13	191.21	184 -	204	191.23	6.99E+03	1456.93	4.07E+05	.....

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	14	239.04	237 -	242	239.04	1.82E+03	1350.98	3.63E+05	PB-212
M	15	470.80	466 -	477	470.68	1.72E+04	2411.35	8.14E+05	.....
m	16	474.43	466 -	477	474.31	1.68E+04	1987.16	6.19E+05	.....
	17	510.02	508 -	513	509.88	1.42E+03	1095.54	2.38E+05	.....
	18	651.60	649 -	653	651.39	7.91E+02	576.56	7.35E+04	.....
	19	661.57	655 -	666	661.35	4.86E+06	4648.89	2.66E+05	CS-137
	20	692.72	690 -	696	692.49	3.24E+03	837.10	1.24E+05	.....
	21	712.78	710 -	715	712.54	5.62E+02	630.54	7.88E+04	.....
	22	720.44	718 -	723	720.20	1.07E+03	612.96	7.40E+04	SB-126
	23	997.65	995 -	1001	997.29	3.79E+02	438.50	3.46E+04	.....
M	24	1320.50	1314 -	1327	1320.02	3.32E+03	467.62	2.39E+04	.....
m	25	1322.84	1314 -	1327	1322.36	3.39E+03	311.38	1.21E+04	.....
	26	1601.52	1597 -	1605	1600.95	1.74E+02	139.26	2.87E+03	.....
	27	1849.17	1844 -	1852	1848.55	5.84E+01	59.91	5.03E+02	.....
	28	2047.82	2040 -	2055	2047.16	6.62E+01	50.79	2.30E+02	.....
M	29	2243.21	2240 -	2266	2242.51	1.56E+01	10.95	1.34E+01	.....
m	30	2249.88	2240 -	2266	2249.18	1.41E+01	27.07	6.31E+01	.....
	31	2403.31	2398 -	2407	2402.59	1.60E+01	14.28	2.00E+01	.....
	32	2445.27	2440 -	2452	2444.54	1.67E+01	15.32	2.06E+01	.....
	33	2512.53	2509 -	2514	2511.80	5.00E+00	4.47	0.00E+00	.....
	34	2521.63	2517 -	2524	2520.90	1.00E+01	6.32	0.00E+00	.....
	35	2529.63	2526 -	2531	2528.90	1.00E+01	6.32	0.00E+00	.....
	36	2614.37	2606 -	2621	2613.63	6.20E+01	29.80	6.40E+01	TL-208
	37	2714.48	2711 -	2716	2713.73	4.42E+00	5.74	3.17E+00	.....
	38	2725.35	2720 -	2727	2724.60	5.00E+00	4.47	0.00E+00	.....
	39	3196.42	3191 -	3199	3195.67	6.00E+00	4.90	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 : 3/10/2016 5:06:21PM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
	1	17.33	4.64E+03	1333.26	5.46E-03	9.36E-03
	2	21.73	2.21E+04	1384.86	1.71E-02	9.36E-03
M	3	29.32	1.96E+04	774.31	4.80E-02	9.36E-03
m	4	31.97	6.82E+05	2055.94	5.95E-02	9.36E-03

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
m	5	36.38	2.15E+05	1889.43	7.74E-02	9.36E-03
	6	49.77	1.64E+03	1190.33	1.16E-01	9.36E-03
	7	59.42	1.11E+05	2107.91	1.29E-01	9.36E-03
	8	85.54	1.66E+03	1253.87	1.36E-01	1.15E-02
	9	92.91	1.62E+03	1043.58	1.33E-01	1.18E-02
	10	99.13	1.40E+03	1024.81	1.31E-01	1.19E-02
	11	122.80	1.01E+03	1184.56	1.21E-01	1.24E-02
M	12	187.70	1.45E+04	1644.00	9.37E-02	9.54E-03
m	13	191.21	6.99E+03	1456.93	9.25E-02	9.39E-03
	14	239.04	1.82E+03	1350.98	7.84E-02	7.36E-03
M	15	470.80	1.72E+04	2411.35	4.39E-02	3.76E-03
m	16	474.43	1.68E+04	1987.16	4.36E-02	3.75E-03
	17	510.02	1.42E+03	1095.54	4.08E-02	3.60E-03
	18	651.60	7.91E+02	576.56	3.22E-02	2.99E-03
	19	661.57	4.86E+06	4648.89	3.18E-02	2.94E-03
	20	692.72	3.24E+03	837.10	3.04E-02	2.86E-03
	21	712.78	5.62E+02	630.54	2.95E-02	2.80E-03
	22	720.44	1.07E+03	612.96	2.92E-02	2.78E-03
	23	997.65	3.79E+02	438.50	2.12E-02	1.98E-03
M	24	1320.50	3.32E+03	467.62	1.62E-02	1.41E-03
m	25	1322.84	3.39E+03	311.38	1.62E-02	1.41E-03
	26	1601.52	1.74E+02	139.26	1.37E-02	1.15E-03
	27	1849.17	5.84E+01	59.91	1.23E-02	9.22E-04
	28	2047.82	6.62E+01	50.79	1.15E-02	9.22E-04
M	29	2243.21	1.56E+01	10.95	1.09E-02	9.22E-04
m	30	2249.88	1.41E+01	27.07	1.09E-02	9.22E-04
	31	2403.31	1.60E+01	14.28	1.05E-02	9.22E-04
	32	2445.27	1.67E+01	15.32	1.05E-02	9.22E-04
	33	2512.53	5.00E+00	4.47	1.04E-02	9.22E-04
	34	2521.63	1.00E+01	6.32	1.03E-02	9.22E-04
	35	2529.63	1.00E+01	6.32	1.03E-02	9.22E-04
	36	2614.37	6.20E+01	29.80	1.02E-02	9.22E-04
	37	2714.48	4.42E+00	5.74	1.01E-02	9.22E-04
	38	2725.35	5.00E+00	4.47	1.01E-02	9.22E-04
	39	3196.42	6.00E+00	4.90	1.00E-02	9.22E-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 : 3/10/2016 5:06:21PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000033933.CNF

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	17.33	4.64E+03	1333.26			4.64E+03	1.33E+03
	2	21.73	2.21E+04	1384.86			2.21E+04	1.38E+03
M	3	29.32	1.96E+04	774.31			1.96E+04	7.74E+02
m	4	31.97	6.82E+05	2055.94			6.82E+05	2.06E+03
m	5	36.38	2.15E+05	1889.43			2.15E+05	1.89E+03
	6	49.77	1.64E+03	1190.33			1.64E+03	1.19E+03
	7	59.42	1.11E+05	2107.91			1.11E+05	2.11E+03
	8	85.54	1.66E+03	1253.87			1.66E+03	1.25E+03
	9	92.91	1.62E+03	1043.58	3.72E+01	6.47E+00	1.58E+03	1.04E+03
	10	99.13	1.40E+03	1024.81			1.40E+03	1.02E+03
	11	122.80	1.01E+03	1184.56			1.01E+03	1.18E+03
M	12	187.70	1.45E+04	1644.00			1.45E+04	1.64E+03
m	13	191.21	6.99E+03	1456.93			6.99E+03	1.46E+03
	14	239.04	1.82E+03	1350.98	7.68E+00	3.58E+00	1.81E+03	1.35E+03
M	15	470.80	1.72E+04	2411.35			1.72E+04	2.41E+03
m	16	474.43	1.68E+04	1987.16			1.68E+04	1.99E+03
	17	510.02	1.42E+03	1095.54			1.42E+03	1.10E+03
	18	651.60	7.91E+02	576.56			7.91E+02	5.77E+02
	19	661.57	4.86E+06	4648.89			4.86E+06	4.65E+03
	20	692.72	3.24E+03	837.10			3.24E+03	8.37E+02
	21	712.78	5.62E+02	630.54			5.62E+02	6.31E+02
	22	720.44	1.07E+03	612.96			1.07E+03	6.13E+02
	23	997.65	3.79E+02	438.50			3.79E+02	4.39E+02
M	24	1320.50	3.32E+03	467.62			3.32E+03	4.68E+02
m	25	1322.84	3.39E+03	311.38			3.39E+03	3.11E+02
	26	1601.52	1.74E+02	139.26			1.74E+02	1.39E+02
	27	1849.17	5.84E+01	59.91			5.84E+01	5.99E+01
	28	2047.82	6.62E+01	50.79			6.62E+01	5.08E+01
M	29	2243.21	1.56E+01	10.95			1.56E+01	1.10E+01
m	30	2249.88	1.41E+01	27.07			1.41E+01	2.71E+01
	31	2403.31	1.60E+01	14.28			1.60E+01	1.43E+01
	32	2445.27	1.67E+01	15.32			1.67E+01	1.53E+01
	33	2512.53	5.00E+00	4.47			5.00E+00	4.47E+00
	34	2521.63	1.00E+01	6.32			1.00E+01	6.32E+00
	35	2529.63	1.00E+01	6.32			1.00E+01	6.32E+00
	36	2614.37	6.20E+01	29.80	3.61E+00	7.60E-01	5.84E+01	2.98E+01
	37	2714.48	4.42E+00	5.74			4.42E+00	5.74E+00
	38	2725.35	5.00E+00	4.47			5.00E+00	4.47E+00
	39	3196.42	6.00E+00	4.90			6.00E+00	4.90E+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 1603050-04

J1V8D3 SAF: RC-155

AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 3/10/2016 5:06:21PM

Ref. Peak Energy : 0.00 Reference Date :

Peak Ratio : 0.00 Uncertainty : 0.00

Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000033933.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	17.33	4.64E+03	1333.26			4.64E+03	1.33E+03
	2	21.73	2.21E+04	1384.86			2.21E+04	1.38E+03
M	3	29.32	1.96E+04	774.31			1.96E+04	7.74E+02
m	4	31.97	6.82E+05	2055.94			6.82E+05	2.06E+03
m	5	36.38	2.15E+05	1889.43			2.15E+05	1.89E+03
	6	49.77	1.64E+03	1190.33			1.64E+03	1.19E+03
	7	59.42	1.11E+05	2107.91			1.11E+05	2.11E+03
	8	85.54	1.66E+03	1253.87			1.66E+03	1.25E+03
	9	92.91	1.62E+03	1043.58	3.72E+01	6.47E+00	1.58E+03	1.04E+03
	10	99.13	1.40E+03	1024.81			1.40E+03	1.02E+03
	11	122.80	1.01E+03	1184.56			1.01E+03	1.18E+03
M	12	187.70	1.45E+04	1644.00			1.45E+04	1.64E+03
m	13	191.21	6.99E+03	1456.93			6.99E+03	1.46E+03
	14	239.04	1.82E+03	1350.98	7.68E+00	3.58E+00	1.81E+03	1.35E+03
M	15	470.80	1.72E+04	2411.35			1.72E+04	2.41E+03
m	16	474.43	1.68E+04	1987.16			1.68E+04	1.99E+03
	17	510.02	1.42E+03	1095.54			1.42E+03	1.10E+03
	18	651.60	7.91E+02	576.56			7.91E+02	5.77E+02
	19	661.57	4.86E+06	4648.89			4.86E+06	4.65E+03
	20	692.72	3.24E+03	837.10			3.24E+03	8.37E+02
	21	712.78	5.62E+02	630.54			5.62E+02	6.31E+02
	22	720.44	1.07E+03	612.96			1.07E+03	6.13E+02
	23	997.65	3.79E+02	438.50			3.79E+02	4.39E+02
M	24	1320.50	3.32E+03	467.62			3.32E+03	4.68E+02
m	25	1322.84	3.39E+03	311.38			3.39E+03	3.11E+02
	26	1601.52	1.74E+02	139.26			1.74E+02	1.39E+02
	27	1849.17	5.84E+01	59.91			5.84E+01	5.99E+01
	28	2047.82	6.62E+01	50.79			6.62E+01	5.08E+01
M	29	2243.21	1.56E+01	10.95			1.56E+01	1.10E+01
m	30	2249.88	1.41E+01	27.07			1.41E+01	2.71E+01
	31	2403.31	1.60E+01	14.28			1.60E+01	1.43E+01
	32	2445.27	1.67E+01	15.32			1.67E+01	1.53E+01
	33	2512.53	5.00E+00	4.47			5.00E+00	4.47E+00
	34	2521.63	1.00E+01	6.32			1.00E+01	6.32E+00
	35	2529.63	1.00E+01	6.32			1.00E+01	6.32E+00
	36	2614.37	6.20E+01	29.80	3.61E+00	7.60E-01	5.84E+01	2.98E+01
	37	2714.48	4.42E+00	5.74			4.42E+00	5.74E+00
	38	2725.35	5.00E+00	4.47			5.00E+00	4.47E+00
	39	3196.42	6.00E+00	4.90			6.00E+00	4.90E+00

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

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	0.754	122.06	*	85.51	5.26E+00	6.21E+00
		136.48		10.60		
GA-67	0.554	93.31	*	35.70	3.37E+01	4.59E+01
		208.95		2.24		
		300.22		16.00		
NB-93M	0.911	16.57	*	9.43	4.81E+03	8.36E+03
I-125	0.882	35.49	*	6.49	2.36E+04	2.87E+03
I-129	0.485	29.78	*	57.00	3.83E+02	7.62E+01
		33.60		13.20		
		39.58		7.52		
CS-137	0.999	661.65	*	85.12	9.62E+04	8.93E+03
PB-212	0.871	238.63	*	44.60	2.77E+01	2.08E+01
		300.09		3.41		
NP-237	0.863	86.50	*	12.60	5.21E+01	3.95E+01
AM-241	0.998	59.54	*	35.90	1.28E+03	9.59E+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 : 3/10/2016 5:06:21PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	2	21.73	1.22976E+01	3.13		
m	4	31.97	3.79089E+02	0.15		
	6	49.77	9.10143E-01	36.33	Tol.	TE-132 TH-227
	10	99.13	7.79550E-01	36.52		
M	12	187.70	8.06669E+00	5.66		
m	13	191.21	3.88488E+00	10.42		
M	15	470.80	9.56172E+00	7.01		
m	16	474.43	9.33670E+00	5.91		
	17	510.02	7.89849E-01	38.53		
	18	651.60	4.39420E-01	36.45		
	20	692.72	1.80113E+00	12.91		
	21	712.78	3.12100E-01	56.12		
	22	720.44	5.93832E-01	28.67	Sum	
	23	997.65	2.10389E-01	57.90		
M	24	1320.50	1.84605E+00	7.04		
m	25	1322.84	1.88478E+00	4.59	Sum	
	26	1601.52	9.67727E-02	39.97		
	27	1849.17	3.24409E-02	51.30		
	28	2047.82	3.67879E-02	38.35		
M	29	2243.21	8.68635E-03	35.03		
m	30	2249.88	7.82492E-03	96.09		
	31	2403.31	8.88889E-03	44.63		
	32	2445.27	9.26955E-03	45.91		
	33	2512.53	2.77778E-03	44.72		
	34	2521.63	5.55556E-03	31.62		
	35	2529.63	5.55556E-03	31.62		
	36	2614.37	3.24362E-02	25.53	Tol.	TL-208
	37	2714.48	2.45370E-03	65.03		
	38	2725.35	2.77778E-03	44.72		
	39	3196.42	3.33333E-03	40.82		

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

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
CO-57	0.75	122.06	*	85.51	5.26E+00	6.21E+00
		136.48		10.60		
GA-67	0.55	93.31	*	35.70	3.37E+01	4.59E+01
		208.95		2.24		
		300.22		16.00		
NB-93M	0.91	16.57	*	9.43	4.81E+03	8.36E+03
I-125	0.88	35.49	*	6.49	2.36E+04	2.87E+03
I-129	0.48	29.78	*	57.00	3.83E+02	7.62E+01
		33.60		13.20		
		39.58		7.52		
CS-137	0.99	661.65	*	85.12	9.62E+04	8.93E+03
PB-212	0.87	238.63	*	44.60	2.77E+01	2.08E+01
		300.09		3.41		
NP-237	0.86	86.50	*	12.60	5.21E+01	3.95E+01
AM-241	0.99	59.54	*	35.90	1.28E+03	9.59E+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
CO-57	0.754	5.26E+00	6.21E+00	
GA-67	0.554	3.37E+01	4.59E+01	
NB-93M	0.911	4.81E+03	8.36E+03	
I-125	0.882	2.36E+04	2.87E+03	
I-129	0.485	3.83E+02	7.62E+01	
CS-137	0.999	9.62E+04	8.93E+03	
PB-212	0.871	2.77E+01	2.08E+01	
NP-237	0.863	5.21E+01	3.95E+01	
AM-241	0.998	1.28E+03	9.59E+01	

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

? = 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 1603050-04

J1V8D3 SAF: RC-155

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/10/2016 5:06:21PM
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	21.73	1.22976E+01	3.13		
m	4	31.97	3.79089E+02	0.15		
	6	49.77	9.10143E-01	36.33	Tol.	TE-132 TH-227
	10	99.13	7.79550E-01	36.52		
M	12	187.70	8.06669E+00	5.66		
m	13	191.21	3.88488E+00	10.42		
M	15	470.80	9.56172E+00	7.01		
m	16	474.43	9.33670E+00	5.91		
	17	510.02	7.89849E-01	38.53		
	18	651.60	4.39420E-01	36.45		
	20	692.72	1.80113E+00	12.91		
	21	712.78	3.12100E-01	56.12		
	22	720.44	5.93832E-01	28.67	Sum	
	23	997.65	2.10389E-01	57.90		
M	24	1320.50	1.84605E+00	7.04		
m	25	1322.84	1.88478E+00	4.59	Sum	
	26	1601.52	9.67727E-02	39.97		
	27	1849.17	3.24409E-02	51.30		
	28	2047.82	3.67879E-02	38.35		
M	29	2243.21	8.68635E-03	35.03		
m	30	2249.88	7.82492E-03	96.09		
	31	2403.31	8.88889E-03	44.63		
	32	2445.27	9.26955E-03	45.91		
	33	2512.53	2.77778E-03	44.72		
	34	2521.63	5.55556E-03	31.62		
	35	2529.63	5.55556E-03	31.62		
	36	2614.37	3.24362E-02	25.53	Tol.	TL-208
	37	2714.48	2.45370E-03	65.03		
	38	2725.35	2.77778E-03	44.72		
	39	3196.42	3.33333E-03	40.82		

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

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	2.99E+02	2.48E+02	2.48E+02
+	NA-22	1274.54		99.94	6.39E+00	1.31E+01	1.31E+01
+	NA-24	1368.53		99.99	8.69E+01	2.40E+01	2.87E+02
		2754.09		99.86	-3.96E+00		2.40E+01
+	AL-26	1808.65		99.76	-1.48E-01	4.23E+00	4.23E+00
+	K-40	1460.81		10.67	1.99E+01	8.22E+01	8.22E+01
+	AR-41	1293.64		99.16	1.71E+12	1.18E+13	1.18E+13
+	TI-44	67.88		94.40	-1.26E-01	6.30E+00	6.64E+00
		78.34		96.00	1.52E+00		6.30E+00
+	SC-46	889.25		99.98	1.07E+01	1.53E+01	1.65E+01
		1120.51		99.99	1.65E+00		1.53E+01
+	V-48	983.52		99.98	3.92E-02	1.68E+01	1.79E+01
		1312.10		97.50	-5.33E+00		1.68E+01
+	CR-51	320.08		9.83	-4.13E+01	1.65E+02	1.65E+02
+	MN-54	834.83		99.97	8.60E+00	1.64E+01	1.64E+01
+	CO-56	846.75		99.96	9.37E-01	4.15E+00	1.68E+01
		1037.75		14.03	7.19E+01		1.14E+02
		1238.25		67.00	-7.06E+00		1.97E+01
		1771.40		15.51	-6.35E+00		2.98E+01
		2598.48		16.90	-3.72E+00		4.15E+00
+	CO-57	122.06	*	85.51	5.26E+00	1.02E+01	1.02E+01
		136.48		10.60	2.13E+01		8.01E+01
+	CO-58	810.76		99.40	1.53E+00	1.70E+01	1.70E+01
+	FE-59	1099.22		56.50	8.09E+00	2.82E+01	2.82E+01
		1291.56		43.20	-5.16E+00		3.23E+01
+	CO-60	1173.22		100.00	1.28E+01	1.09E+01	1.37E+01
		1332.49		100.00	6.79E+00		1.09E+01
+	ZN-65	1115.52		50.75	5.72E+00	2.99E+01	2.99E+01
+	GA-67	93.31	*	35.70	3.37E+01	3.65E+01	3.65E+01
		208.95		2.24	-4.70E+02		9.96E+02
		300.22		16.00	5.87E+01		1.69E+02
+	SE-75	121.11		16.70	-4.99E+00	1.45E+01	4.95E+01

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	SE-75	136.00		59.20	3.90E+00	1.45E+01	1.45E+01
		264.65		59.80	8.80E+00		2.22E+01
		279.53		25.20	1.83E+01		5.47E+01
		400.65		11.40	-9.52E+00		1.76E+02
+	RB-82	776.52		13.00	2.77E+01	1.39E+02	1.39E+02
+	RB-83	520.41		46.00	2.89E+01	4.16E+01	4.16E+01
		529.64		30.30	6.19E+01		6.07E+01
		552.65		16.40	3.35E+01		9.66E+01
+	KR-85	513.99		0.43	1.76E+03	4.38E+03	4.38E+03
+	SR-85	513.99		99.27	7.96E+00	1.98E+01	1.98E+01
+	Y-88	898.02		93.40	9.74E+00	3.99E+00	1.75E+01
		1836.01		99.38	1.29E-01		3.99E+00
+	NB-93M	16.57	*	9.43	4.81E+03	2.27E+03	2.27E+03
+	NB-94	702.63		100.00	-9.61E+00	1.62E+01	1.88E+01
		871.10		100.00	-9.75E-01		1.62E+01
+	NB-95	765.79		99.81	2.77E+00	1.78E+01	1.78E+01
+	NB-95M	235.69		25.00	9.22E+00	8.79E+01	8.79E+01
+	ZR-95	724.18		43.70	-4.47E+00	3.15E+01	4.16E+01
		756.72		55.30	-7.89E+00		3.15E+01
+	MO-99	181.06		6.20	-1.51E+03	2.86E+02	3.51E+02
		739.58		12.80	-1.12E+02		2.86E+02
		778.00		4.50	1.54E+02		7.94E+02
+	RU-103	497.08		89.00	2.05E+01	2.41E+01	2.41E+01
+	RU-106	621.84		9.80	-1.19E+02	1.66E+02	1.66E+02
+	AG-108M	433.93		89.90	-2.43E+01	1.79E+01	2.53E+01
		614.37		90.40	-3.83E+00		1.79E+01
		722.95		90.50	1.04E+00		1.96E+01
+	CD-109	88.03		3.72	7.11E+01	2.07E+02	2.07E+02
+	AG-110M	657.75		93.14	2.93E+04	2.28E+01	1.44E+02
		677.61		10.53	-3.30E+01		2.11E+02
		706.67		16.46	3.22E+01		1.14E+02
		763.93		21.98	5.38E+00		7.69E+01
		884.67		71.63	9.31E+00		2.28E+01
		1384.27		23.94	1.96E+00		4.10E+01
+	CD-113M	263.70		0.02	1.64E+04	5.68E+04	5.68E+04
+	SN-113	255.12		1.93	-3.32E+02	2.98E+01	6.75E+02
		391.69		64.90	-1.07E+00		2.98E+01
+	TE123M	159.00		84.10	-5.04E+00	1.09E+01	1.09E+01
+	SB-124	602.71		97.87	-1.49E+00	1.22E+01	1.72E+01
		645.85		7.26	-3.14E+02		2.38E+02
		722.78		11.10	8.77E+00		1.66E+02
		1691.02		49.00	3.23E+00		1.22E+01
+	I-125	35.49	*	6.49	2.36E+04	5.74E+02	5.74E+02
+	SB-125	176.33		6.89	-5.38E+01	7.56E+01	1.41E+02
		427.89		29.33	-3.02E+01		7.56E+01
		463.38		10.35	6.53E+01		2.54E+02
		600.56		17.80	-2.19E+01		9.14E+01
		635.90		11.32	-7.33E+00		1.44E+02

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	SB-126	414.70		83.30	-5.87E+00	2.43E+01	2.97E+01
		666.33		99.60	-5.06E+00		5.46E+01
		695.00		99.60	1.23E+01		2.43E+01
		720.50		53.80	5.65E+01		3.96E+01
+	SN-126	87.57		37.00	7.11E+00	2.07E+01	2.07E+01
+	SB-127	473.00		25.00	9.95E+02	1.03E+02	1.83E+02
		685.20		35.70	-8.88E+01		1.03E+02
		783.80		14.70	-1.24E+01		1.95E+02
+	I-129	29.78	*	57.00	3.83E+02	9.82E+01	9.82E+01
		33.60		13.20	-1.83E+04		1.55E+02
		39.58		7.52	-1.29E+03		1.36E+02
+	I-131	284.30		6.05	1.30E+02	2.75E+01	2.93E+02
		364.48		81.20	-1.69E+01		2.75E+01
		636.97		7.26	3.32E+01		2.91E+02
		722.89		1.80	6.78E+01		1.28E+03
+	TE-132	49.72		13.10	1.84E+02	2.63E+01	1.14E+02
		228.16		88.00	3.39E+00		2.63E+01
+	BA-133	81.00		33.00	6.51E+00	1.82E+01	1.82E+01
		302.84		17.80	4.78E+01		8.07E+01
		356.01		60.00	1.54E+01		2.80E+01
+	I-133	529.87		86.30	2.23E+02	2.32E+02	2.32E+02
+	XE-133	81.00		38.00	8.42E+00	2.35E+01	2.35E+01
+	CS-134	563.23		8.38	6.08E+01	1.67E+01	1.75E+02
		569.32		15.43	-8.75E+00		9.30E+01
		604.70		97.60	1.84E+00		1.67E+01
		795.84		85.40	-1.11E+01		1.93E+01
		801.93		8.73	3.59E+01		1.89E+02
+	CS-135	268.24		16.00	-2.52E+01	8.24E+01	8.24E+01
+	I-135	1131.51		22.50	1.70E+03	9.11E+04	1.29E+05
		1260.41		28.60	-1.79E+04		9.11E+04
		1678.03		9.54	4.48E+04		1.28E+05
+	CS-136	153.22		7.46	4.04E+01	1.92E+01	1.39E+02
		163.89		4.61	6.72E+01		2.33E+02
		176.55		13.56	-7.08E+01		8.41E+01
		273.65		12.66	-2.15E+01		1.23E+02
		340.57		48.50	1.12E-01		3.87E+01
		818.50		99.70	-9.52E-01		1.92E+01
		1048.07		79.60	1.94E+00		2.28E+01
		1235.34		19.70	-1.12E+01		7.67E+01
+	CS-137	661.65	*	85.12	9.62E+04	4.78E+01	4.78E+01
+	LA-138	788.74		34.00	-1.15E+01	1.35E+01	4.88E+01
		1435.80		66.00	-9.26E+00		1.35E+01
+	CE-139	165.85		80.35	-2.74E+00	1.17E+01	1.17E+01
+	BA-140	162.64		6.70	7.57E+01	8.08E+01	1.60E+02
		304.84		4.50	-1.59E+02		3.77E+02
		423.70		3.20	-3.03E+02		8.00E+02
		437.55		2.00	-1.23E+02		1.36E+03
		537.32		25.00	2.10E+01		8.08E+01
+	LA-140	328.77		20.50	-2.69E+01	9.04E+00	8.86E+01

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	LA-140	487.03	45.50	4.19E+00	9.04E+00	5.50E+01
		815.85	23.50	-1.61E+01		8.18E+01
		1596.49	95.49	1.82E+00		9.04E+00
+	CE-141	145.44	48.40	8.79E+00	1.91E+01	1.91E+01
+	CE-143	57.36	11.80	-1.55E+04	1.52E+02	2.75E+02
		293.26	42.00	-2.61E+00		1.52E+02
		664.55	5.20	6.28E+06		1.46E+04
+	CE-144	133.54	10.80	5.60E+01	7.82E+01	7.82E+01
+	PM-144	476.78	42.00	7.15E+01	1.65E+01	5.95E+01
		618.01	98.60	-2.91E-01		1.65E+01
		696.49	99.49	6.93E+00		2.03E+01
+	PM-145	36.85	21.70	5.86E+03	4.44E+01	8.32E+01
		37.36	39.70	3.13E+03		4.44E+01
		42.30	15.10	3.94E+01		6.15E+01
		72.40	2.31	-3.76E+01		2.67E+02
+	PM-146	453.90	39.94	-3.62E+01	6.30E+01	6.30E+01
		735.90	14.01	4.45E+01		1.23E+02
		747.13	13.10	-2.57E+01		1.30E+02
+	ND-147	91.11	28.90	-7.98E+00	3.23E+01	3.23E+01
		531.02	13.10	3.91E+01		1.64E+02
+	PM-149	285.90	3.10	-3.27E+02	1.14E+03	1.14E+03
+	EU-152	121.78	20.50	5.09E+01	3.97E+01	3.97E+01
		244.69	5.40	3.26E+01		2.32E+02
		344.27	19.13	-2.53E+01		8.44E+01
		778.89	9.20	1.70E+02		1.82E+02
		964.01	10.40	-3.64E+01		1.51E+02
		1085.78	7.22	4.52E-01		2.11E+02
		1112.02	9.60	-4.79E+01		1.56E+02
		1407.95	14.94	2.32E+01		6.42E+01
+	GD-153	97.43	31.30	-5.55E+00	2.48E+01	2.48E+01
		103.18	22.20	-7.59E+00		3.50E+01
+	EU-154	123.07	40.50	7.86E+00	2.02E+01	2.02E+01
		723.30	19.70	4.78E+00		9.03E+01
		873.19	11.50	6.13E+01		1.41E+02
		996.32	10.30	-1.01E+01		1.53E+02
		1004.76	17.90	5.32E+01		8.73E+01
		1274.45	35.50	1.80E+01		3.67E+01
+	EU-155	86.50	30.90	1.48E+01	2.49E+01	2.49E+01
		105.30	20.70	1.80E+01		3.75E+01
+	EU-156	811.77	10.40	-1.26E+01	1.69E+02	1.81E+02
		1153.47	7.20	5.83E+01		2.22E+02
		1230.71	8.90	5.29E+01		1.69E+02
+	HO-166M	184.41	72.60	-2.69E+01	1.50E+01	1.50E+01
		280.45	29.60	1.53E+01		4.59E+01
		410.94	11.10	-3.14E+00		1.85E+02
		711.69	54.10	4.84E+00		3.39E+01
+	TM-171	66.72	0.14	2.22E+02	4.52E+03	4.52E+03
+	HF-172	81.75	4.52	2.44E+01	7.28E+01	1.33E+02
		125.81	11.30	9.58E+00		7.28E+01

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	LU-172	181.53		20.60	-2.26E+02	3.33E+01	6.88E+01
		810.06		16.63	1.21E+01		1.35E+02
		912.12		15.25	-1.55E+01		1.43E+02
		1093.66		62.50	-1.36E+01		3.33E+01
+	LU-173	100.72		5.24	-1.43E+01	6.31E+01	1.47E+02
		272.11		21.20	1.97E+01		6.31E+01
+	HF-175	343.40		84.00	8.60E+00	1.98E+01	1.98E+01
+	LU-176	88.34		13.30	1.98E+01	1.35E+01	5.78E+01
		201.83		86.00	-2.15E+00		1.35E+01
		306.78		94.00	-1.60E+00		1.54E+01
+	TA-182	67.75		41.20	-2.93E-01	1.55E+01	1.55E+01
		1121.30		34.90	-1.53E+01		4.35E+01
		1189.05		16.23	1.34E+01		8.37E+01
		1221.41		26.98	-5.32E+00		4.89E+01
		1231.02		11.44	-3.02E+01		1.16E+02
+	IR-192	308.46		29.68	2.63E+00	5.05E+01	5.05E+01
		468.07		48.10	2.02E+01		5.71E+01
+	HG-203	279.19		77.30	2.11E+00	1.83E+01	1.83E+01
+	BI-207	569.67		97.72	-1.38E+00	1.46E+01	1.46E+01
		1063.62		74.90	-4.01E+00		2.05E+01
+	TL-208	583.14		30.22	4.83E+01	6.61E+00	5.52E+01
		860.37		4.48	-2.47E+02		3.62E+02
		2614.66		35.85	9.99E+00		6.61E+00
+	BI-210M	262.00		45.00	-1.15E+01	2.89E+01	2.89E+01
		300.00		23.00	2.15E+01		6.20E+01
+	PB-210	46.50		4.25	-2.44E+02	1.95E+02	1.95E+02
+	PB-211	404.84		2.90	-3.91E+02	5.65E+02	6.91E+02
		831.96		2.90	1.40E+02		5.65E+02
+	BI-212	727.17		11.80	-2.13E+01	1.48E+02	1.48E+02
		1620.62		2.75	-4.58E+01		2.52E+02
+	PB-212	238.63	*	44.60	2.77E+01	3.39E+01	3.39E+01
		300.09		3.41	1.45E+02		4.18E+02
+	BI-214	609.31		46.30	8.54E-01	2.94E+01	3.50E+01
		1120.29		15.10	1.06E+01		9.91E+01
		1764.49		15.80	2.09E+00		2.94E+01
		2204.22		4.98	-1.99E+01		3.18E+01
+	PB-214	295.21		19.19	-2.55E+01	4.46E+01	7.31E+01
		351.92		37.19	2.24E+01		4.46E+01
+	RN-219	401.80		6.50	9.90E+01	3.05E+02	3.05E+02
+	RA-223	323.87		3.88	1.07E+02	3.92E+02	3.92E+02
+	RA-224	240.98		3.95	1.86E+02	3.16E+02	3.16E+02
+	RA-225	40.00		31.00	-3.54E+02	3.73E+01	3.73E+01
+	RA-226	186.21		3.28	8.92E+02	3.46E+02	3.46E+02
+	TH-227	50.10		8.40	1.50E+02	9.33E+01	9.33E+01
		236.00		11.50	1.12E+01		1.07E+02
		256.20		6.30	-5.99E+01		2.04E+02
+	AC-228	338.32		11.40	-1.18E+02	5.76E+01	1.39E+02
		911.07		27.70	-1.11E+01		5.76E+01

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	AC-228	969.11		16.60	1.32E+01	5.76E+01	9.46E+01
+	TH-230	48.44		16.90	3.90E+01	4.77E+01	4.77E+01
		62.85		4.60	-2.74E+01		1.42E+02
		67.67		0.37	-3.21E+01		1.70E+03
+	PA-231	283.67		1.60	3.78E+02	6.24E+02	8.53E+02
		302.67		2.30	3.70E+02		6.24E+02
+	TH-231	25.64		14.70	-2.08E+02	9.35E+01	1.93E+02
		84.21		6.40	8.02E+00		9.35E+01
+	PA-233	311.98		38.60	-8.44E+00	4.12E+01	4.12E+01
+	PA-234	131.20		20.40	6.53E+00	4.08E+01	4.08E+01
		733.99		8.80	-6.18E+00		1.97E+02
		946.00		12.00	1.06E+02		1.33E+02
+	PA-234M	1001.03		0.92	-1.19E+02	1.69E+03	1.69E+03
+	TH-234	63.29		3.80	-3.30E+01	1.72E+02	1.72E+02
+	U-235	143.76		10.50	-5.33E+01	8.19E+01	8.19E+01
		163.35		4.70	9.18E+01		1.95E+02
		205.31		4.70	1.80E+01		2.49E+02
+	NP-237	86.50	*	12.60	5.21E+01	6.45E+01	6.45E+01
+	NP-239	106.10		22.70	4.39E+01	8.32E+01	8.32E+01
		228.18		10.70	3.57E+01		2.76E+02
		277.60		14.10	1.29E+02		2.33E+02
+	AM-241	59.54	*	35.90	1.28E+03	3.79E+01	3.79E+01
+	AM-243	74.67		66.00	2.19E+00	9.26E+00	9.26E+00
+	CM-243	209.75		3.29	2.84E+02	9.63E+01	3.58E+02
		228.14		10.60	1.48E+01		1.15E+02
		277.60		14.00	5.34E+01		9.63E+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

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	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	2.48E+02	2.48E+02	2.99E+02	1.24E+02
	NA-22	1274.54		99.94	1.31E+01	1.31E+01	6.39E+00	6.49E+00
	NA-24	1368.53		99.99	2.87E+02	2.40E+01	8.69E+01	1.42E+02
		2754.09		99.86	2.40E+01		-3.96E+00	9.94E+00
	AL-26	1808.65		99.76	4.23E+00	4.23E+00	-1.48E-01	2.06E+00
	K-40	1460.81		10.67	8.22E+01	8.22E+01	1.99E+01	4.07E+01
	AR-41	1293.64		99.16	1.18E+13	1.18E+13	1.71E+12	5.86E+12
	TI-44	67.88		94.40	6.64E+00	6.30E+00	-1.26E-01	3.31E+00
		78.34		96.00	6.30E+00		1.52E+00	3.14E+00
	SC-46	889.25		99.98	1.65E+01	1.53E+01	1.07E+01	8.22E+00
		1120.51		99.99	1.53E+01		1.65E+00	7.63E+00
	V-48	983.52		99.98	1.79E+01	1.68E+01	3.92E-02	8.89E+00
		1312.10		97.50	1.68E+01		-5.33E+00	8.37E+00
	CR-51	320.08		9.83	1.65E+02	1.65E+02	-4.13E+01	8.22E+01
	MN-54	834.83		99.97	1.64E+01	1.64E+01	8.60E+00	8.19E+00
	CO-56	846.75		99.96	1.68E+01	4.15E+00	9.37E-01	8.38E+00
		1037.75		14.03	1.14E+02		7.19E+01	5.67E+01
		1238.25		67.00	1.97E+01		-7.06E+00	9.78E+00
		1771.40		15.51	2.98E+01		-6.35E+00	1.45E+01
		2598.48		16.90	4.15E+00		-3.72E+00	1.65E+00
+	CO-57	122.06	*	85.51	1.02E+01	1.02E+01	5.26E+00	5.08E+00
		136.48		10.60	8.01E+01		2.13E+01	4.00E+01
	CO-58	810.76		99.40	1.70E+01	1.70E+01	1.53E+00	8.47E+00
	FE-59	1099.22		56.50	2.82E+01	2.82E+01	8.09E+00	1.40E+01
		1291.56		43.20	3.23E+01		-5.16E+00	1.60E+01
	CO-60	1173.22		100.00	1.37E+01	1.09E+01	1.28E+01	6.83E+00
		1332.49		100.00	1.09E+01		6.79E+00	5.40E+00
	ZN-65	1115.52		50.75	2.99E+01	2.99E+01	5.72E+00	1.49E+01
+	GA-67	93.31	*	35.70	3.65E+01	3.65E+01	3.37E+01	1.82E+01
		208.95		2.24	9.96E+02		-4.70E+02	4.97E+02
		300.22		16.00	1.69E+02		5.87E+01	8.46E+01
	SE-75	121.11		16.70	4.95E+01	1.45E+01	-4.99E+00	2.47E+01
		136.00		59.20	1.45E+01		3.90E+00	7.23E+00
		264.65		59.80	2.22E+01		8.80E+00	1.11E+01
		279.53		25.20	5.47E+01		1.83E+01	2.73E+01
		400.65		11.40	1.76E+02		-9.52E+00	8.79E+01
	RB-82	776.52		13.00	1.39E+02	1.39E+02	2.77E+01	6.94E+01
	RB-83	520.41		46.00	4.16E+01	4.16E+01	2.89E+01	2.07E+01
		529.64		30.30	6.07E+01		6.19E+01	3.03E+01
		552.65		16.40	9.66E+01		3.35E+01	4.82E+01
	KR-85	513.99		0.43	4.38E+03	4.38E+03	1.76E+03	2.19E+03
	SR-85	513.99		99.27	1.98E+01	1.98E+01	7.96E+00	9.88E+00
	Y-88	898.02		93.40	1.75E+01	3.99E+00	9.74E+00	8.71E+00
		1836.01		99.38	3.99E+00		1.29E-01	1.94E+00
+	NB-93M	16.57	*	9.43	2.27E+03	2.27E+03	4.81E+03	1.13E+03
	NB-94	702.63		100.00	1.88E+01	1.62E+01	-9.61E+00	9.40E+00
		871.10		100.00	1.62E+01		-9.75E-01	8.06E+00
	NB-95	765.79		99.81	1.78E+01	1.78E+01	2.77E+00	8.88E+00
	NB-95M	235.69		25.00	8.79E+01	8.79E+01	9.22E+00	4.39E+01
	ZR-95	724.18		43.70	4.16E+01	3.15E+01	-4.47E+00	2.08E+01
		756.72		55.30	3.15E+01		-7.89E+00	1.57E+01

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	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	3.51E+02	2.86E+02	-1.51E+03	1.75E+02
		739.58		12.80	2.86E+02		-1.12E+02	1.43E+02
		778.00		4.50	7.94E+02		1.54E+02	3.96E+02
	RU-103	497.08		89.00	2.41E+01	2.41E+01	2.05E+01	1.20E+01
	RU-106	621.84		9.80	1.66E+02	1.66E+02	-1.19E+02	8.27E+01
	AG-108M	433.93		89.90	2.53E+01	1.79E+01	-2.43E+01	1.26E+01
		614.37		90.40	1.79E+01		-3.83E+00	8.93E+00
		722.95		90.50	1.96E+01		1.04E+00	9.79E+00
	CD-109	88.03		3.72	2.07E+02	2.07E+02	7.11E+01	1.04E+02
	AG-110M	657.75		93.14	1.44E+02	2.28E+01	2.93E+04	7.20E+01
		677.61		10.53	2.11E+02		-3.30E+01	1.05E+02
		706.67		16.46	1.14E+02		3.22E+01	5.68E+01
		763.93		21.98	7.69E+01		5.38E+00	3.83E+01
		884.67		71.63	2.28E+01		9.31E+00	1.13E+01
		1384.27		23.94	4.10E+01		1.96E+00	2.03E+01
	CD-113M	263.70		0.02	5.68E+04	5.68E+04	1.64E+04	2.83E+04
	SN-113	255.12		1.93	6.75E+02	2.98E+01	-3.32E+02	3.37E+02
		391.69		64.90	2.98E+01		-1.07E+00	1.49E+01
	TE123M	159.00		84.10	1.09E+01	1.09E+01	-5.04E+00	5.44E+00
	SB-124	602.71		97.87	1.72E+01	1.22E+01	-1.49E+00	8.55E+00
		645.85		7.26	2.38E+02		-3.14E+02	1.18E+02
		722.78		11.10	1.66E+02		8.77E+00	8.26E+01
		1691.02		49.00	1.22E+01		3.23E+00	6.01E+00
+	I-125	35.49	*	6.49	5.74E+02	5.74E+02	2.36E+04	2.87E+02
	SB-125	176.33		6.89	1.41E+02	7.56E+01	-5.38E+01	7.04E+01
		427.89		29.33	7.56E+01		-3.02E+01	3.78E+01
		463.38		10.35	2.54E+02		6.53E+01	1.27E+02
		600.56		17.80	9.14E+01		-2.19E+01	4.56E+01
		635.90		11.32	1.44E+02		-7.33E+00	7.18E+01
	SB-126	414.70		83.30	2.97E+01	2.43E+01	-5.87E+00	1.48E+01
		666.33		99.60	5.46E+01		-5.06E+00	2.73E+01
		695.00		99.60	2.43E+01		1.23E+01	1.21E+01
		720.50		53.80	3.96E+01		5.65E+01	1.98E+01
	SN-126	87.57		37.00	2.07E+01	2.07E+01	7.11E+00	1.04E+01
	SB-127	473.00		25.00	1.83E+02	1.03E+02	9.95E+02	9.14E+01
		685.20		35.70	1.03E+02		-8.88E+01	5.14E+01
		783.80		14.70	1.95E+02		-1.24E+01	9.70E+01
+	I-129	29.78	*	57.00	9.82E+01	9.82E+01	3.83E+02	4.91E+01
		33.60		13.20	1.55E+02		-1.83E+04	7.76E+01
		39.58		7.52	1.36E+02		-1.29E+03	6.77E+01
	I-131	284.30		6.05	2.93E+02	2.75E+01	1.30E+02	1.46E+02
		364.48		81.20	2.75E+01		-1.69E+01	1.37E+01
		636.97		7.26	2.91E+02		3.32E+01	1.45E+02
		722.89		1.80	1.28E+03		6.78E+01	6.38E+02
	TE-132	49.72		13.10	1.14E+02	2.63E+01	1.84E+02	5.71E+01
		228.16		88.00	2.63E+01		3.39E+00	1.31E+01
	BA-133	81.00		33.00	1.82E+01	1.82E+01	6.51E+00	9.07E+00
		302.84		17.80	8.07E+01		4.78E+01	4.03E+01
		356.01		60.00	2.80E+01		1.54E+01	1.40E+01
	I-133	529.87		86.30	2.32E+02	2.32E+02	2.23E+02	1.16E+02
	XE-133	81.00		38.00	2.35E+01	2.35E+01	8.42E+00	1.17E+01
	CS-134	563.23		8.38	1.75E+02	1.67E+01	6.08E+01	8.70E+01
		569.32		15.43	9.30E+01		-8.75E+00	4.64E+01

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

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	1.67E+01	1.67E+01	1.84E+00	8.31E+00
	795.84	85.40	1.93E+01		-1.11E+01	9.61E+00
	801.93	8.73	1.89E+02		3.59E+01	9.43E+01
CS-135	268.24	16.00	8.24E+01	8.24E+01	-2.52E+01	4.11E+01
I-135	1131.51	22.50	1.29E+05	9.11E+04	1.70E+03	6.43E+04
	1260.41	28.60	9.11E+04		-1.79E+04	4.52E+04
	1678.03	9.54	1.28E+05		4.48E+04	6.29E+04
CS-136	153.22	7.46	1.39E+02	1.92E+01	4.04E+01	6.95E+01
	163.89	4.61	2.33E+02		6.72E+01	1.16E+02
	176.55	13.56	8.41E+01		-7.08E+01	4.20E+01
	273.65	12.66	1.23E+02		-2.15E+01	6.16E+01
	340.57	48.50	3.87E+01		1.12E-01	1.93E+01
	818.50	99.70	1.92E+01		-9.52E-01	9.57E+00
	1048.07	79.60	2.28E+01		1.94E+00	1.13E+01
	1235.34	19.70	7.67E+01		-1.12E+01	3.81E+01
+ CS-137	661.65 *	85.12	4.78E+01	4.78E+01	9.62E+04	2.39E+01
LA-138	788.74	34.00	4.88E+01	1.35E+01	-1.15E+01	2.43E+01
	1435.80	66.00	1.35E+01		-9.26E+00	6.67E+00
CE-139	165.85	80.35	1.17E+01	1.17E+01	-2.74E+00	5.82E+00
BA-140	162.64	6.70	1.60E+02	8.08E+01	7.57E+01	8.01E+01
	304.84	4.50	3.77E+02		-1.59E+02	1.88E+02
	423.70	3.20	8.00E+02		-3.03E+02	3.99E+02
	437.55	2.00	1.36E+03		-1.23E+02	6.81E+02
	537.32	25.00	8.08E+01		2.10E+01	4.03E+01
LA-140	328.77	20.50	8.86E+01	9.04E+00	-2.69E+01	4.42E+01
	487.03	45.50	5.50E+01		4.19E+00	2.75E+01
	815.85	23.50	8.18E+01		-1.61E+01	4.07E+01
	1596.49	95.49	9.04E+00		1.82E+00	4.45E+00
CE-141	145.44	48.40	1.91E+01	1.91E+01	8.79E+00	9.52E+00
CE-143	57.36	11.80	2.75E+02	1.52E+02	-1.55E+04	1.37E+02
	293.26	42.00	1.52E+02		-2.61E+00	7.61E+01
	664.55	5.20	1.46E+04		6.28E+06	7.31E+03
CE-144	133.54	10.80	7.82E+01	7.82E+01	5.60E+01	3.90E+01
PM-144	476.78	42.00	5.95E+01	1.65E+01	7.15E+01	2.97E+01
	618.01	98.60	1.65E+01		-2.91E-01	8.24E+00
	696.49	99.49	2.03E+01		6.93E+00	1.01E+01
PM-145	36.85	21.70	8.32E+01	4.44E+01	5.86E+03	4.15E+01
	37.36	39.70	4.44E+01		3.13E+03	2.22E+01
	42.30	15.10	6.15E+01		3.94E+01	3.07E+01
	72.40	2.31	2.67E+02		-3.76E+01	1.33E+02
PM-146	453.90	39.94	6.30E+01	6.30E+01	-3.62E+01	3.14E+01
	735.90	14.01	1.23E+02		4.45E+01	6.15E+01
	747.13	13.10	1.30E+02		-2.57E+01	6.47E+01
ND-147	91.11	28.90	3.23E+01	3.23E+01	-7.98E+00	1.61E+01
	531.02	13.10	1.64E+02		3.91E+01	8.16E+01
PM-149	285.90	3.10	1.14E+03	1.14E+03	-3.27E+02	5.69E+02
EU-152	121.78	20.50	3.97E+01	3.97E+01	5.09E+01	1.98E+01
	244.69	5.40	2.32E+02		3.26E+01	1.16E+02
	344.27	19.13	8.44E+01		-2.53E+01	4.21E+01
	778.89	9.20	1.82E+02		1.70E+02	9.05E+01
	964.01	10.40	1.51E+02		-3.64E+01	7.51E+01
	1085.78	7.22	2.11E+02		4.52E-01	1.05E+02
	1112.02	9.60	1.56E+02		-4.79E+01	7.78E+01

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	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	6.42E+01	3.97E+01	2.32E+01	3.18E+01
	GD-153	97.43		31.30	2.48E+01	2.48E+01	-5.55E+00	1.24E+01
		103.18		22.20	3.50E+01		-7.59E+00	1.75E+01
	EU-154	123.07		40.50	2.02E+01	2.02E+01	7.86E+00	1.01E+01
		723.30		19.70	9.03E+01		4.78E+00	4.50E+01
		873.19		11.50	1.41E+02		6.13E+01	7.03E+01
		996.32		10.30	1.53E+02		-1.01E+01	7.62E+01
		1004.76		17.90	8.73E+01		5.32E+01	4.35E+01
		1274.45		35.50	3.67E+01		1.80E+01	1.82E+01
	EU-155	86.50		30.90	2.49E+01	2.49E+01	1.48E+01	1.24E+01
		105.30		20.70	3.75E+01		1.80E+01	1.87E+01
	EU-156	811.77		10.40	1.81E+02	1.69E+02	-1.26E+01	9.02E+01
		1153.47		7.20	2.22E+02		5.83E+01	1.10E+02
		1230.71		8.90	1.69E+02		5.29E+01	8.38E+01
	HO-166M	184.41		72.60	1.50E+01	1.50E+01	-2.69E+01	7.50E+00
		280.45		29.60	4.59E+01		1.53E+01	2.29E+01
		410.94		11.10	1.85E+02		-3.14E+00	9.25E+01
		711.69		54.10	3.39E+01		4.84E+00	1.69E+01
	TM-171	66.72		0.14	4.52E+03	4.52E+03	2.22E+02	2.25E+03
	HF-172	81.75		4.52	1.33E+02	7.28E+01	2.44E+01	6.62E+01
		125.81		11.30	7.28E+01		9.58E+00	3.64E+01
	LU-172	181.53		20.60	6.88E+01	3.33E+01	-2.26E+02	3.43E+01
		810.06		16.63	1.35E+02		1.21E+01	6.72E+01
		912.12		15.25	1.43E+02		-1.55E+01	7.13E+01
		1093.66		62.50	3.33E+01		-1.36E+01	1.65E+01
	LU-173	100.72		5.24	1.47E+02	6.31E+01	-1.43E+01	7.35E+01
		272.11		21.20	6.31E+01		1.97E+01	3.15E+01
	HF-175	343.40		84.00	1.98E+01	1.98E+01	8.60E+00	9.87E+00
	LU-176	88.34		13.30	5.78E+01	1.35E+01	1.98E+01	2.89E+01
		201.83		86.00	1.35E+01		-2.15E+00	6.74E+00
		306.78		94.00	1.54E+01		-1.60E+00	7.69E+00
	TA-182	67.75		41.20	1.55E+01	1.55E+01	-2.93E-01	7.74E+00
		1121.30		34.90	4.35E+01		-1.53E+01	2.16E+01
		1189.05		16.23	8.37E+01		1.34E+01	4.16E+01
		1221.41		26.98	4.89E+01		-5.32E+00	2.43E+01
		1231.02		11.44	1.16E+02		-3.02E+01	5.76E+01
	IR-192	308.46		29.68	5.05E+01	5.05E+01	2.63E+00	2.52E+01
		468.07		48.10	5.71E+01		2.02E+01	2.85E+01
	HG-203	279.19		77.30	1.83E+01	1.83E+01	2.11E+00	9.14E+00
	BI-207	569.67		97.72	1.46E+01	1.46E+01	-1.38E+00	7.30E+00
		1063.62		74.90	2.05E+01		-4.01E+00	1.02E+01
	TL-208	583.14		30.22	5.52E+01	6.61E+00	4.83E+01	2.75E+01
		860.37		4.48	3.62E+02		-2.47E+02	1.80E+02
		2614.66		35.85	6.61E+00		9.99E+00	3.11E+00
	BI-210M	262.00		45.00	2.89E+01	2.89E+01	-1.15E+01	1.44E+01
		300.00		23.00	6.20E+01		2.15E+01	3.09E+01
	PB-210	46.50		4.25	1.95E+02	1.95E+02	-2.44E+02	9.75E+01
	PB-211	404.84		2.90	6.91E+02	5.65E+02	-3.91E+02	3.45E+02
		831.96		2.90	5.65E+02		1.40E+02	2.81E+02
	BI-212	727.17		11.80	1.48E+02	1.48E+02	-2.13E+01	7.39E+01
		1620.62		2.75	2.52E+02		-4.58E+01	1.24E+02
+	PB-212	238.63	*	44.60	3.39E+01	3.39E+01	2.77E+01	1.69E+01
		300.09		3.41	4.18E+02		1.45E+02	2.09E+02

Analysis Report for 1603050-04

J1V8D3 SAF: RC-155

	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	3.50E+01	2.94E+01	8.54E-01	1.75E+01
		1120.29		15.10	9.91E+01		1.06E+01	4.93E+01
		1764.49		15.80	2.94E+01		2.09E+00	1.43E+01
		2204.22		4.98	3.18E+01		-1.99E+01	1.46E+01
	PB-214	295.21		19.19	7.31E+01	4.46E+01	-2.55E+01	3.65E+01
		351.92		37.19	4.46E+01		2.24E+01	2.23E+01
	RN-219	401.80		6.50	3.05E+02	3.05E+02	9.90E+01	1.52E+02
	RA-223	323.87		3.88	3.92E+02	3.92E+02	1.07E+02	1.96E+02
	RA-224	240.98		3.95	3.16E+02	3.16E+02	1.86E+02	1.58E+02
	RA-225	40.00		31.00	3.73E+01	3.73E+01	-3.54E+02	1.86E+01
	RA-226	186.21		3.28	3.46E+02	3.46E+02	8.92E+02	1.73E+02
	TH-227	50.10		8.40	9.33E+01	9.33E+01	1.50E+02	4.66E+01
		236.00		11.50	1.07E+02		1.12E+01	5.35E+01
		256.20		6.30	2.04E+02		-5.99E+01	1.02E+02
	AC-228	338.32		11.40	1.39E+02	5.76E+01	-1.18E+02	6.95E+01
		911.07		27.70	5.76E+01		-1.11E+01	2.87E+01
		969.11		16.60	9.46E+01		1.32E+01	4.71E+01
	TH-230	48.44		16.90	4.77E+01	4.77E+01	3.90E+01	2.38E+01
		62.85		4.60	1.42E+02		-2.74E+01	7.10E+01
		67.67		0.37	1.70E+03		-3.21E+01	8.46E+02
	PA-231	283.67		1.60	8.53E+02	6.24E+02	3.78E+02	4.26E+02
		302.67		2.30	6.24E+02		3.70E+02	3.11E+02
	TH-231	25.64		14.70	1.93E+02	9.35E+01	-2.08E+02	9.63E+01
		84.21		6.40	9.35E+01		8.02E+00	4.66E+01
	PA-233	311.98		38.60	4.12E+01	4.12E+01	-8.44E+00	2.06E+01
	PA-234	131.20		20.40	4.08E+01	4.08E+01	6.53E+00	2.04E+01
		733.99		8.80	1.97E+02		-6.18E+00	9.82E+01
		946.00		12.00	1.33E+02		1.06E+02	6.61E+01
	PA-234M	1001.03		0.92	1.69E+03	1.69E+03	-1.19E+02	8.42E+02
	TH-234	63.29		3.80	1.72E+02	1.72E+02	-3.30E+01	8.58E+01
	U-235	143.76		10.50	8.19E+01	8.19E+01	-5.33E+01	4.09E+01
		163.35		4.70	1.95E+02		9.18E+01	9.72E+01
		205.31		4.70	2.49E+02		1.80E+01	1.24E+02
+	NP-237	86.50	*	12.60	6.45E+01	6.45E+01	5.21E+01	3.22E+01
	NP-239	106.10		22.70	8.32E+01	8.32E+01	4.39E+01	4.15E+01
		228.18		10.70	2.76E+02		3.57E+01	1.38E+02
		277.60		14.10	2.33E+02		1.29E+02	1.16E+02
+	AM-241	59.54	*	35.90	3.79E+01	3.79E+01	1.28E+03	1.89E+01
	AM-243	74.67		66.00	9.26E+00	9.26E+00	2.19E+00	4.62E+00
	CM-243	209.75		3.29	3.58E+02	9.63E+01	2.84E+02	1.79E+02
		228.14		10.60	1.15E+02		1.48E+01	5.73E+01
		277.60		14.00	9.63E+01		5.34E+01	4.81E+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 1603050-04

J1V8D3 SAF: RC-155

No Action Level results available for reporting purposes.

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

No Data Review Comments Entered.

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

Sample Title: J1V8D3 SAF: RC-155

Elapsed Live time: 1800
Elapsed Real Time: 2423

Channel								
1:	4	5	3	3	65	860	19061	31436
9:	31808	32880	33925	35226	37003	38946	37755	38670
17:	42966	42650	38403	41024	46288	55226	45546	40305
25:	40951	45563	46828	47597	56653	63037	137971	483288
33:	189873	52908	55723	135530	133280	60369	43935	44413
41:	44065	44061	44022	43310	43426	43683	43503	43922
49:	44897	44809	44369	43702	43923	43407	43187	43025
57:	43293	44269	91493	98283	42746	39992	40495	40099
65:	39074	38693	38541	38414	38249	38271	37860	37669
73:	37700	37590	37332	37047	36952	36409	36236	36092
81:	35925	35540	35389	35243	35655	35308	34857	34272
89:	34431	34299	33953	34444	34794	33883	33654	33440
97:	33015	33369	33239	32635	32490	31953	31872	31842
105:	32622	31982	31756	31757	31744	31697	31847	31814
113:	31574	31963	31707	31513	31282	31586	30956	31457
121:	31203	31447	31695	31120	30881	30906	30867	30612
129:	30632	30660	30560	30358	30423	30373	30055	30420
137:	29737	29752	29671	29473	29784	29588	29691	29490
145:	29228	29031	29542	28995	29266	28896	29056	28985
153:	28640	28972	29023	28790	28941	28387	28469	28488
161:	28495	28672	28422	28664	28405	28284	28317	28519
169:	28586	28739	28424	28809	28576	28706	28871	29317
177:	28845	29064	29444	29878	30818	31135	32828	34714
185:	36149	37706	37549	38212	37915	37370	37609	37066
193:	36810	36492	35574	35901	35297	35371	35218	34768
201:	34628	34318	34264	34273	34044	33966	33738	33669
209:	33513	33634	32919	33482	32745	32844	32806	32342
217:	32197	32493	32348	32195	32065	32099	31707	31890
225:	31580	31717	31611	31548	31418	31150	31349	31186
233:	30898	31003	30637	30328	30441	30955	30977	30384
241:	30627	30173	30271	29821	30104	29830	29845	29758
249:	29887	29358	29210	29773	29523	29133	29396	29494
257:	29077	29319	29299	28778	29147	29038	29045	28746
265:	28955	28853	28611	28479	28673	28842	28696	28469
273:	28786	28307	28402	28263	28381	28460	28271	28651
281:	28082	28372	28163	27912	28159	27901	27857	28396
289:	28133	28078	27801	27951	27913	28110	27483	27711
297:	27763	27895	27867	27823	28219	27911	27862	27730
305:	27690	27579	27753	27842	28111	27899	27905	28040
313:	27836	27843	27886	27911	27771	27913	27696	27719
321:	27677	28044	27981	27874	27606	28157	27944	28412
329:	27834	28000	27813	28073	28331	28299	28321	28180
337:	28236	28453	28143	28183	28678	28272	28617	28327
345:	28305	28356	28349	28396	28801	28436	28928	29098
353:	28633	29083	28562	28851	29085	29114	28819	29118
361:	29146	29043	28996	29228	29618	29271	29654	29457

369:	29790	29906	29777	29757	30061	30095	30006	30113

Sample Title: J1V8D3 SAF: RC-155

Channel								
377:	29945	30156	30254	30210	30841	30643	30636	30841
385:	30575	30838	31026	31122	31143	31238	31068	31458
393:	31609	31488	31548	32172	31923	31930	32245	32099
401:	32307	32574	32900	32792	32525	33180	33055	33459
409:	33358	33552	33549	33948	34111	33917	34113	34504
417:	34456	34774	34554	34845	35103	35405	35368	35328
425:	35809	36011	36232	36255	36327	36752	37048	37115
433:	37139	37086	37567	37820	38184	38400	38564	38671
441:	39007	38897	39456	39896	40084	40300	39816	40604
449:	40640	41126	41250	41400	41568	41769	42467	42773
457:	42841	43065	43172	43473	43632	44084	44277	44520
465:	44647	44443	44869	44733	45240	44768	44863	44541
473:	43727	42616	41657	39380	37841	35020	33329	31602
481:	30680	29421	28594	28344	27243	26707	26253	25965
489:	25698	25200	24734	24483	23943	24165	23785	23638
497:	22985	23001	22744	22366	22124	21684	21770	21412
505:	21464	20894	20697	20786	20630	20069	20236	19589
513:	19052	19326	18819	18581	18520	18318	18063	17887
521:	17809	17599	17139	17281	16741	16771	16335	16552
529:	15953	15872	15563	15350	14957	15025	14674	14480
537:	14253	14054	13763	13773	13534	13081	13112	12765
545:	12452	12164	11844	11906	11430	11346	11060	10986
553:	10916	10606	10392	10432	10133	10190	9789	9909
561:	9527	9668	9348	9260	9272	9159	8868	9011
569:	8997	8870	8608	8760	8589	8563	8653	8480
577:	8455	8509	8237	8240	8323	8116	8374	8250
585:	8023	8383	7889	7916	7959	7793	7750	7883
593:	7588	7622	7694	7550	7479	7341	7464	7297
601:	7443	7364	7254	7137	7380	7221	7290	7201
609:	7245	7066	6961	7011	6995	7105	6991	6855
617:	7177	7063	6861	6762	6837	6884	6825	6751
625:	6816	6780	6774	6775	6739	6671	6684	6656
633:	6595	6609	6611	6611	6784	6607	6578	6653
641:	6565	6666	6565	6723	6558	6520	6823	6945
649:	7015	7241	7857	7856	7564	7643	7875	8258
657:	8611	9276	24217	501789	2356337	1782567	242110	23857
665:	16926	15361	14217	13485	12851	12599	12188	11855
673:	11484	11349	11076	10936	10554	10604	10517	10404
681:	10270	10088	9996	9964	9787	9853	9592	9786
689:	9909	9654	9817	9969	10011	9041	8463	8178
697:	8194	7788	7528	7468	7360	7321	7179	7050
705:	7339	6955	6966	6848	6870	6700	6757	6790
713:	6744	6549	6440	6397	6462	6393	6495	6660
721:	6363	6132	6027	5945	6001	5886	5798	5904
729:	5789	5916	5829	5741	5743	5712	5645	5470
737:	5588	5585	5520	5376	5416	5287	5315	5470
745:	5251	5228	5156	5262	5245	5193	5198	5342
753:	5190	5150	5067	4907	5083	4958	5052	4994
761:	4918	4929	4951	4913	4875	4810	4942	4858
769:	4747	4841	4756	4649	4836	4594	4670	4715
777:	4627	4798	4722	4624	4719	4607	4676	4387
785:	4602	4478	4567	4522	4515	4434	4461	4650
793:	4440	4277	4339	4324	4365	4363	4292	4318

801:	4283	4332	4212	4357	4308	4225	4203	4222

Sample Title: J1V8D3 SAF: RC-155

Channel								
809:	4186	4134	4266	4169	4075	4099	4094	4189
817:	4104	3968	4034	4145	3889	4078	4023	4053
825:	3971	3835	3926	3953	4129	3934	3899	3904
833:	3950	3855	3994	3903	3924	3816	3766	3831
841:	3866	3765	3800	3856	3850	3838	3749	3886
849:	3756	3878	3745	3739	3767	3729	3722	3810
857:	3577	3647	3560	3733	3515	3618	3676	3712
865:	3555	3576	3542	3507	3513	3460	3549	3593
873:	3604	3433	3532	3481	3417	3485	3413	3413
881:	3414	3477	3393	3437	3292	3472	3431	3407
889:	3284	3313	3281	3242	3220	3220	3314	3330
897:	3190	3188	3194	3261	3281	3154	3199	3165
905:	3236	3158	3128	3230	3145	3066	3194	3184
913:	3056	3061	3204	3116	3108	3024	3008	3039
921:	3043	2985	3010	2993	3019	2934	3049	2940
929:	3018	3012	2955	2905	2966	2930	2855	2890
937:	2835	2912	2890	2944	2895	2869	2844	2858
945:	2971	2931	2887	2877	2916	2781	2771	2747
953:	2749	2778	2772	2869	2714	2781	2732	2774
961:	2714	2655	2750	2724	2653	2738	2732	2646
969:	2785	2641	2598	2654	2695	2625	2591	2612
977:	2645	2648	2493	2556	2656	2672	2505	2546
985:	2634	2596	2622	2604	2611	2528	2522	2542
993:	2588	2501	2600	2552	2568	2618	2505	2445
1001:	2385	2440	2534	2415	2597	2420	2541	2410
1009:	2467	2380	2425	2464	2356	2385	2392	2383
1017:	2454	2381	2372	2461	2378	2474	2327	2368
1025:	2352	2375	2383	2301	2393	2265	2294	2209
1033:	2268	2269	2312	2297	2343	2368	2307	2262
1041:	2297	2237	2260	2171	2185	2181	2203	2259
1049:	2262	2219	2287	2245	2205	2169	2145	2173
1057:	2239	2178	2183	2048	2175	2136	2191	2187
1065:	2138	2097	2068	2203	2167	2135	2067	2091
1073:	2057	2116	2095	2101	2079	2108	2064	2097
1081:	2035	2023	2041	2014	1976	1960	2057	2079
1089:	2004	1971	1983	1990	2034	2049	1958	1923
1097:	2011	1994	1975	1928	1968	1940	1914	1872
1105:	1859	1973	1891	1901	1853	1906	1901	1805
1113:	1897	1839	1919	1922	1876	1850	1823	1824
1121:	1844	1745	1878	1745	1767	1833	1721	1737
1129:	1765	1757	1730	1671	1606	1621	1692	1587
1137:	1633	1598	1588	1680	1614	1605	1528	1614
1145:	1553	1518	1559	1478	1567	1491	1515	1554
1153:	1533	1441	1430	1520	1418	1478	1420	1448
1161:	1456	1482	1420	1439	1448	1427	1429	1376
1169:	1336	1436	1414	1408	1447	1413	1381	1387
1177:	1333	1359	1353	1349	1362	1357	1309	1314
1185:	1298	1344	1349	1315	1269	1282	1246	1283
1193:	1267	1283	1224	1260	1302	1265	1336	1230
1201:	1245	1260	1245	1283	1137	1163	1216	1201
1209:	1128	1179	1212	1205	1204	1210	1245	1193
1217:	1143	1197	1102	1135	1200	1205	1138	1163
1225:	1140	1201	1218	1174	1165	1197	1171	1129

1233:	1137	1146	1128	1173	1069	1118	1110	1095

Sample Title: J1V8D3 SAF: RC-155

Channel								
1241:	1111	1123	1141	1108	1149	1072	1074	1107
1249:	1156	1038	1159	1063	1118	1098	1137	1063
1257:	1086	1149	1106	1090	1106	1124	1096	1158
1265:	1111	1119	1052	1055	1085	1025	1102	1092
1273:	1103	1082	1075	1022	1125	1056	1062	1088
1281:	1076	1068	1124	1044	1085	1103	1099	1102
1289:	1112	1114	1078	1091	1118	1114	1130	1116
1297:	1125	1065	1102	1158	1111	1114	1083	1147
1305:	1208	1236	1183	1169	1239	1162	1211	1246
1313:	1318	1287	1359	1347	1441	1422	1580	1724
1321:	2091	2522	2259	1179	726	695	654	711
1329:	735	684	671	688	705	713	675	636
1337:	674	655	670	625	608	632	621	610
1345:	625	658	627	617	616	634	607	586
1353:	591	597	581	609	633	626	612	597
1361:	576	581	571	546	570	583	572	575
1369:	546	575	558	552	555	529	535	576
1377:	550	534	539	535	479	540	530	528
1385:	518	531	505	507	496	526	494	487
1393:	494	475	521	502	491	526	529	472
1401:	473	481	490	471	487	502	486	495
1409:	469	504	461	468	435	466	449	446
1417:	454	460	427	457	457	415	434	413
1425:	429	431	438	408	407	420	456	386
1433:	440	406	388	414	384	422	443	406
1441:	401	394	393	403	389	381	386	407
1449:	412	418	374	366	380	398	372	406
1457:	365	382	370	393	389	380	394	355
1465:	368	362	374	366	336	336	355	341
1473:	312	334	351	359	361	343	341	325
1481:	344	319	354	327	304	307	321	322
1489:	308	335	301	288	308	323	342	329
1497:	298	341	359	298	279	336	312	279
1505:	290	322	289	314	299	307	284	271
1513:	291	279	310	277	263	280	284	285
1521:	262	271	264	256	293	296	281	268
1529:	266	294	254	252	266	229	246	256
1537:	266	233	246	234	240	246	235	236
1545:	233	230	236	233	241	235	246	238
1553:	236	234	236	206	231	246	222	220
1561:	225	218	233	215	229	210	189	230
1569:	199	205	195	208	215	213	201	214
1577:	198	186	194	223	182	188	174	223
1585:	200	168	175	190	201	162	171	186
1593:	186	166	162	172	159	175	193	193
1601:	198	198	180	167	145	164	158	141
1609:	161	183	175	145	168	165	166	152
1617:	159	146	159	156	154	147	159	153
1625:	144	158	161	162	148	139	140	141
1633:	156	126	149	142	138	144	158	128
1641:	129	131	111	143	147	141	137	132
1649:	130	132	135	140	122	131	134	136
1657:	122	111	102	103	127	119	116	111

1665:	118	94	120	113	120	109	119	97

Sample Title: J1V8D3 SAF: RC-155

Channel								
1673:	93	117	117	106	109	116	129	111
1681:	117	106	106	105	100	100	94	94
1689:	101	111	118	83	111	88	87	94
1697:	91	106	106	105	74	80	82	93
1705:	80	91	86	88	76	86	82	87
1713:	81	78	85	80	80	88	87	76
1721:	82	89	74	88	73	69	81	65
1729:	75	91	80	74	72	73	81	61
1737:	73	62	73	89	77	64	71	76
1745:	77	74	63	70	63	76	57	80
1753:	63	67	66	58	60	70	58	62
1761:	60	48	62	63	69	54	47	69
1769:	58	50	56	59	54	47	58	61
1777:	49	64	56	54	65	58	60	45
1785:	58	53	45	56	50	40	62	38
1793:	41	41	49	36	59	45	45	42
1801:	60	53	56	49	57	41	45	43
1809:	47	56	42	44	42	43	37	44
1817:	44	48	38	39	42	50	45	44
1825:	43	35	25	37	54	34	28	44
1833:	36	45	43	36	43	34	41	38
1841:	35	35	38	33	39	37	31	37
1849:	46	40	29	18	27	30	33	29
1857:	35	39	31	31	25	31	43	22
1865:	26	37	41	30	48	26	40	30
1873:	33	29	27	29	32	29	34	22
1881:	30	36	27	33	28	31	26	31
1889:	31	26	28	21	34	30	30	28
1897:	30	31	22	26	23	38	30	44
1905:	27	23	33	26	22	23	27	26
1913:	29	32	36	33	30	34	31	30
1921:	23	22	30	24	30	28	21	22
1929:	28	18	26	28	28	27	25	25
1937:	24	20	20	22	30	21	19	21
1945:	18	20	25	20	12	16	24	17
1953:	22	14	26	20	25	23	24	15
1961:	23	12	25	13	26	15	15	19
1969:	29	17	20	19	19	16	22	27
1977:	17	21	16	21	19	16	18	16
1985:	17	13	15	14	25	17	19	12
1993:	15	16	15	17	16	20	13	14
2001:	23	15	27	7	14	8	19	15
2009:	14	13	20	16	11	17	16	18
2017:	14	18	19	6	14	11	14	12
2025:	11	14	13	17	10	17	12	11
2033:	18	12	11	8	15	10	10	6
2041:	16	13	13	9	13	14	10	25
2049:	5	8	5	10	17	11	6	7
2057:	11	15	10	8	13	11	10	12
2065:	9	10	8	12	4	7	15	9
2073:	7	17	16	5	14	7	10	9
2081:	12	10	15	10	11	7	9	13
2089:	10	11	11	15	13	12	15	4

2097:	6	14	14	9	13	9	12	14

Sample Title: J1V8D3 SAF: RC-155

Channel								
2105:	19	12	11	13	14	13	8	5
2113:	9	9	3	9	9	7	8	13
2121:	9	9	9	8	10	9	5	13
2129:	8	7	7	6	4	16	3	5
2137:	6	6	8	9	9	3	9	9
2145:	10	11	13	7	5	9	9	9
2153:	6	5	3	9	11	8	4	7
2161:	5	8	5	10	11	4	6	5
2169:	10	8	3	6	5	5	5	1
2177:	7	9	6	6	3	7	9	4
2185:	4	7	7	5	8	9	5	5
2193:	6	4	4	5	7	5	10	3
2201:	4	5	3	4	7	6	4	5
2209:	10	4	5	3	2	4	6	5
2217:	2	6	6	3	6	8	2	3
2225:	5	2	1	2	6	4	3	7
2233:	6	4	5	5	6	2	2	1
2241:	2	8	8	4	2	4	4	5
2249:	7	8	3	4	5	4	9	6
2257:	6	3	2	3	4	3	7	4
2265:	4	3	5	5	2	3	3	4
2273:	2	3	1	1	6	5	3	5
2281:	4	2	7	2	7	2	1	10
2289:	9	6	1	6	3	4	5	2
2297:	2	3	7	2	3	2	3	3
2305:	3	1	2	2	1	5	1	2
2313:	6	5	5	1	4	4	3	5
2321:	4	3	2	1	2	6	4	4
2329:	0	4	2	4	2	6	1	6
2337:	3	2	1	3	2	6	7	5
2345:	1	5	3	3	4	1	5	2
2353:	4	1	2	3	0	3	6	3
2361:	3	2	1	3	1	3	4	1
2369:	2	4	4	3	1	4	1	2
2377:	5	1	5	3	0	1	0	0
2385:	2	6	2	2	3	6	4	6
2393:	4	1	2	5	0	2	1	2
2401:	2	5	6	5	1	2	0	2
2409:	1	3	1	1	1	1	0	3
2417:	1	2	3	1	3	0	1	2
2425:	2	3	1	3	0	1	2	1
2433:	4	3	2	0	0	3	0	1
2441:	1	2	9	1	2	1	3	1
2449:	1	1	3	1	1	1	1	4
2457:	3	4	1	2	0	2	2	2
2465:	5	3	2	2	3	1	2	0
2473:	0	3	1	1	2	0	3	0
2481:	1	1	1	2	2	1	2	2
2489:	0	3	0	3	2	2	1	1
2497:	1	2	1	2	3	1	1	5
2505:	1	0	0	0	0	0	2	2
2513:	1	0	0	0	0	2	0	1
2521:	3	2	2	0	0	0	1	3

2529:	2	4	0	0	1	1	0	0

Sample Title: J1V8D3 SAF: RC-155

Channel								
2537:	2	1	1	1	0	0	0	1
2545:	2	0	0	1	1	0	1	2
2553:	1	0	0	1	1	1	2	0
2561:	2	1	1	2	0	1	1	1
2569:	0	0	2	0	1	1	0	0
2577:	1	1	0	2	1	2	1	2
2585:	1	0	2	2	0	0	1	0
2593:	2	2	0	1	0	0	0	0
2601:	2	0	1	3	3	0	1	1
2609:	2	0	7	9	25	15	14	9
2617:	2	3	2	1	3	2	0	1
2625:	1	0	0	0	0	2	0	2
2633:	0	0	0	1	2	1	2	1
2641:	1	0	2	1	1	3	0	0
2649:	1	0	2	0	1	0	0	0
2657:	0	1	0	0	0	0	1	1
2665:	1	0	0	3	3	0	0	1
2673:	1	0	0	1	0	1	1	0
2681:	0	0	0	0	3	1	0	1
2689:	1	3	0	0	2	3	1	0
2697:	1	0	1	2	1	1	0	0
2705:	0	0	0	1	1	0	0	0
2713:	2	3	1	0	1	1	0	0
2721:	0	0	0	3	1	1	0	0
2729:	0	0	0	0	1	0	0	0
2737:	1	2	0	0	0	0	0	1
2745:	1	1	2	1	0	2	0	0
2753:	0	3	0	2	1	1	1	1
2761:	0	0	0	0	2	1	1	2
2769:	0	0	1	0	0	0	1	1
2777:	1	0	0	0	0	0	0	0
2785:	1	1	0	0	0	0	0	0
2793:	1	1	1	0	0	0	0	0
2801:	0	0	2	2	1	2	0	0
2809:	1	0	1	0	0	1	0	0
2817:	0	0	1	1	0	0	0	1
2825:	0	0	0	0	0	0	0	0
2833:	1	0	1	1	1	0	0	0
2841:	0	1	1	0	0	1	0	0
2849:	0	0	0	0	0	0	0	0
2857:	1	0	1	0	0	0	0	0
2865:	0	0	0	0	0	0	0	1
2873:	1	1	1	0	0	0	2	0
2881:	0	0	0	0	0	2	0	2
2889:	1	0	2	1	3	0	1	0
2897:	1	0	0	0	0	0	1	1
2905:	0	0	0	0	1	0	1	0
2913:	0	0	0	0	0	0	1	0
2921:	1	0	2	0	0	1	1	0
2929:	0	1	0	0	1	0	0	0
2937:	0	0	0	2	1	0	0	1
2945:	0	0	0	1	0	1	0	0
2953:	0	0	2	1	1	0	0	0

2961:	0	1	0	1	0	0	1	0

Sample Title: J1V8D3 SAF: RC-155

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

3393:	0	1	0	0	0	1	1	0

Sample Title: J1V8D3 SAF: RC-155

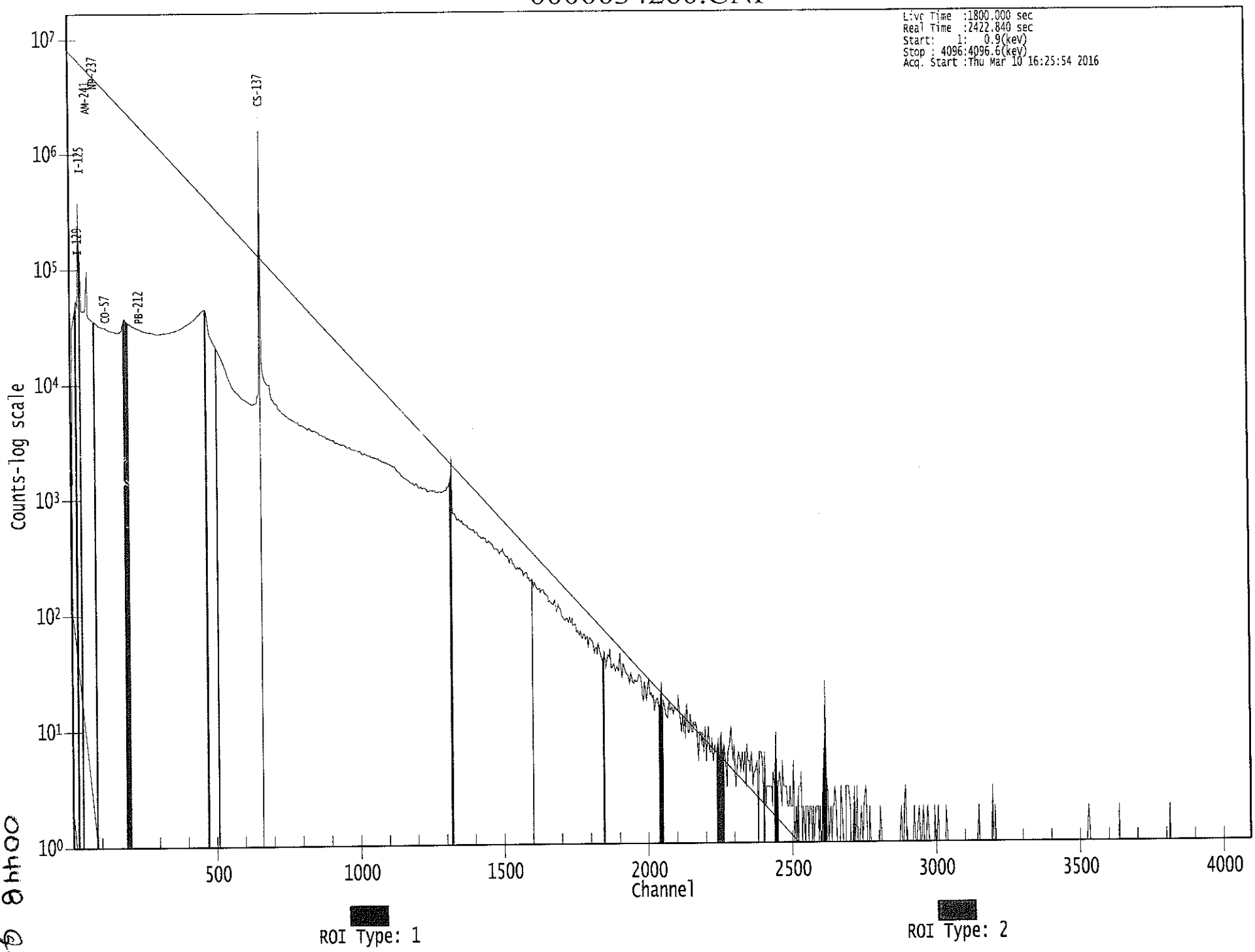
Channel								
3401:	0	0	0	1	0	0	0	1
3409:	1	1	0	1	0	0	0	0
3417:	0	0	0	0	0	0	0	0
3425:	1	0	0	0	0	0	0	0
3433:	0	0	0	0	0	0	1	0
3441:	0	0	0	0	1	0	0	0
3449:	0	0	0	0	0	0	0	0
3457:	0	0	0	0	0	0	0	0
3465:	0	0	1	0	0	0	0	0
3473:	0	0	0	0	0	0	1	0
3481:	0	0	0	0	0	0	0	0
3489:	0	0	0	0	0	0	0	0
3497:	0	0	1	0	0	0	0	0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

3825:	1	0	0	0	0	0	0	0

Sample Title: J1V8D3 SAF: RC-155

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	1
3857:	0	0	0	0	1	1	0	0
3865:	0	0	0	0	0	0	0	1
3873:	1	0	0	0	0	0	0	0
3881:	0	0	0	0	0	0	0	0
3889:	0	0	0	0	0	0	0	0
3897:	0	0	0	0	0	1	0	0
3905:	0	0	0	0	0	0	0	0
3913:	0	0	0	0	0	0	0	0
3921:	0	1	0	0	0	0	0	0
3929:	0	0	0	0	0	0	0	0
3937:	0	0	0	0	0	0	1	0
3945:	0	0	0	0	0	0	0	0
3953:	0	0	0	0	0	0	0	0
3961:	0	0	1	0	0	1	0	1
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	0	0	0
4025:	0	0	0	0	0	0	0	0
4033:	0	0	0	0	0	1	0	0
4041:	0	0	0	0	0	0	0	0
4049:	0	0	0	1	1	0	0	0
4057:	0	0	0	0	0	1	0	0
4065:	0	0	0	0	0	0	0	0
4073:	0	0	0	0	0	0	0	0
4081:	0	0	0	0	1	0	0	0
4089:	0	0	0	1	0	0	1	0

0000034260.CNF



****
***** G E N I E Q U A L I T Y A S S U R A N C E *****
****

Last Results Report
3/10/16 5:53:43 AM

QA File: \\OR-GAMMA1\ApexRoot\Countroom\QA\D0000000002B.QCK

Detector: GE2
Geometry: <None>
Certificate: <None>
Sample ID: QA Background Ch
Sample Desc: QA Count
Sample Quantity: 1.0000E+000
Sample Date: 3/10/16 5:38:32 AM
Measurement Date: 3/10/16 5:38:34 AM
Elapsed Live Time: 900.0 seconds
Elapsed Real Time: 900.1 seconds

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
DAILY BKG CT RATE GE2 [SD: 4.6004E+000+/- 0.386]	7.1911E+000	6.7145E+000 < : Ac: : >

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)

```
*************************************************************************
*****          G E N I E   Q U A L I T Y   A S S U R A N C E          *****
*************************************************************************
```

Last Results Report
3/10/16 5:26:40 AM

QA File: \\OR-GAMMA1\ApexRoot\Countroom\QA\D0000000002GAS-1401C.QC

Detector: GE2
Geometry: <None>
Certificate: GAS-1401
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: 3/10/16 5:11:03 AM
Elapsed Live Time: 900.0 seconds
Elapsed Real Time: 923.3 seconds

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
Peak centroid 59.54kev	6.0000E+001	
Boundary Limits: [5.800E+001, 6.100E+001]		< : : : >
Peak centroid 661.65 kev	6.6151E+002	
Boundary Limits: [6.600E+002, 6.640E+002]		< : : : >
Peak centroid 1332.49 ke	1.3323E+003	
Boundary Limits: [1.331E+003, 1.334E+003]		< : : : >
Peak centroid 1836.1 kev	1.8357E+003	
Boundary Limits: [1.834E+003, 1.838E+003]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
Peak FWHM Am-241	1.4626E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Peak FWHM Cs-137	2.1476E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
Peak FWHM Co-60	2.2253E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Peak FWHM Y-88	2.7334E+000	
Boundary Limits: [5.000E-001, 3.000E+000]		< : : : >
Decay corrected activity	1.5588E+005	
Boundary Limits: [1.224E-001, 1.836E-001]		< : : : >
Decay corrected activity	6.4114E+004	
Boundary Limits: [4.971E-002, 7.457E-002]		< : : : >

Decay corrected activity 1.0517E+005
Boundary Limits: [7.978E-002, 1.197E-001] < : : : >

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
Decay corrected activity Boundary Limits: [1.714E-001, 2.571E-001]	2.1751E+005	< : : : >

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)