BOSTON CHEMICAL DATA CORP.

Bridgeton / Alvarez

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #14-05116-OR

June 26, 2014

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN

WLLFOIA4312 - 001 - 0034859

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WLLFOIA4312 - 001 - 0034860

Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 14-05116

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

Date for Partial	Initials	Date	Initials	Checklist Items
		5/28/14	KC	Sample Log-In
		6/5/14	JG	Data Compilation
		6/16/14	[illegible]	First Technical Data Review
		6/17/14	[illegible]	Second Technical Data Review
		6/25/14	[illegible]	Data Entry/Electronic Deliverable
		6/25/14	[illegible]	Case Narrative
		6/25/14	KBS	Electronic Deliverable Proof
		6/25/14	[illegible]	Samples Analyzed within Holding Time Yes? X No?
		6/25/14	[illegible]	QA/QC Review
		06/27/14	[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] 6/26/14

Laboratory Manager Date

Copy No. _____

Radiochemistry Services

SECTION I

CHAIN OF CUSTODY

14-05116

CHAIN OF CUSTODY

ANALYTICAL SERVICES INC.
5555 North Service Road
Burlington, Ontario L7L 5H7

Toll Free: 1-800-668-0639
Tel: (905) 332-8788
Fax: (905) 332-9169

Page 1 of 1

CLIENT INFORMATION

Company Name: Boston Chemical Data Corp
Project Manager: Marco Kaltofen
Address: 2 Summer Street # 14
Natick Ma 01760
Phone #: 508 314 9334 Fax #:
Sampled by:

ANALYSIS REQUESTED

REC'D MAY 28 2014

PSC Use Only	Field Sample ID	# Bottles	Matrix	Date	Time	210Pb by	228, 230, 232 Th	234, 235, 238 U							Level of contamination (low, high, unknown)
	BMAC0004 4	1		5/27/14		X	X	X							
	BMAC0008 5	1		5/27/14		X	X	X							

TAT (Turnaround Time)

RUSH TAT MUST HAVE PRIOR APPROVAL

*some exceptions apply please contact Lab

- STD 10 Business Days ❑
- RUSH 5 Business Days ❑
- RUSH 2 Business Days ❑
- RUSH 1 Business Days ❑
- Other Business Days ____

PROJECT INFORMATION

Project #: Bridgetm / Alvarez
Site:
PO#:
PSC Quote #:
PSC Project #:
PSC Contact:

SPECIAL DETECTION LIMITS

MISA ❑

SPECIAL REQUIREMENTS / REGULATIONS

Bill to BCD
Standard T.A.

REMARKS

Client Signature: [signature]
Affiliation:
Date/Time: 5/27/14 2:05p

Received By: Kristen Carlsten
Affiliation: Eberline
Date/Time: 5/28/14 1000

Rec'd By:
Date/Time

WHITE - LAB / YELLOW - CLIENT

SEE OVER FOR COMPLETION & SAMPLING INSTRUCTIONS

WLLFOIA4312 - 001 - 0034863

EBERLINE SERVICES Oak Ridge Laboratory	Internal Chain of Custody	Work Order #	14-05116
		Lab Deadline	6/18/2014
		Analysis	UUISO - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	59	E1.3
	05	49	E1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1230	Kenny Scott	5-28-14
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 0755	Kenny Scott	5-29-14
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	5/30/14 0755
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	5/30/14 0915
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	5-30-14 0915
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	6-5-14 0827
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	C	6/1 0827
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	6/5/14 1510
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 #	14-05116
		Lab Deadline	6/18/2014
		Analysis	ThISO - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	59	E1.3
	05	49	E1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1230	Kenny Seij	5-28-14
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 0755	Kenny Seij	5-29-14
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JWDeS 5/29/14 0755	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JWDeS 5/30/14 0915	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	5-30-14 0915	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	6-5-14 0903	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	6/6 0900	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB 6/5/14 1512	
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 #	14-05116
		Lab Deadline	6/18/2014
		Analysis	GLEPS - Level 4
		Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Report Pb210	04	59	E1.3
	05	49	E1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1230	Kenyscly	5-28-14
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1340	Kenyscly	5-28-14
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	5/28/14 1350
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	5/29/14 1450
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
Boston Chemical Data Corp.	ENV	Environmental	05/28/2014	28	14-05116
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
ENV	Bridgeton/Alvarez	H	06/18/2014	06/24/2014	06/25/2014

Internal ID	Client ID	Sample Date	Matrix	Storage	GLEPS	ThISO	UUISO																						Ttl
01	LCS	05/28/14	SO	E1.3	X	X	X																						3
02	BLANK	05/28/14	SO	E1.3	X	X	X																						3
03	DUP	05/28/14	SO	E1.3	X	X	X																						3
04	BMAC0004	05/27/14 00:00	SO	E1.3	X	X	X																						3
05	BMAC0008	05/27/14 00:00	SO	E1.3	X	X	X																						3
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
																												0
Totals Per Analysis (non QA samples)					2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

Sample Log In Report

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

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

Invoice
Marco Kaltofen
Boston Chemical Data Corp.
2 Summer Street Suite 14
Natick, MA 01760
Voice 508-314-9334
Fax

Report Data
Marco Kaltofen
Boston Chemical Data Corp.
2 Summer St, Suite 14
Natick, MA 01760
Voice 508-314-9334
Fax

Contact
Marco Kaltofen
Voice 508-314-9334
Fax

WLLFOIA4312 - 001 - 0034868

Printed: 5/28/2014 11:35 AM

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 14-05116

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: Kristen Carlston DATE: 5/28/14

SECTION III

CASE NARRATIVE

EBERLINE SERVICES

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

EBS-OR-37455

June 26, 2014

Marco Kaltofen
Boston Chemical Data Corp.
2 Summer St., Suite 14
Natick, MA 01760

CASE NARRATIVE
Work Order # 14-05116-OR

SAMPLE RECEIPT

This work order contains two soil samples received 05/28/2014. Both samples were analyzed for Isotopic Uranium, Isotopic Thorium and Lead-210 by Gamma LEPS.

CLIENT ID	LAB ID
BMAC0004	14-05116-04
BMAC0008	14-05116-05

ANALYTICAL METHODS

Isotopic Uranium was analyzed using Method EML U-02 Modified. Isotopic Thorium was analyzed using Method EML Th-01 Modified. Gamma LEPS was performed using Method LANL ER-130 Modified.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

ISOTOPIC URANIUM

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. An aliquot was taken from each dilutions 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.

Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was acceptable for all samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 and Uranium-238 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-235 duplicate demonstrated a high

ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM CONTINUED

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 THORIUM

Samples were prepared by removing representative aliquots followed by mixed acid digestions and dilutions as appropriate. An aliquot was taken from each dilutions and Thorium was selectively extracted by ion exchange. Thorium 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 Thorium-228, Thorium-230 and Thorium-232. Chemical recovery was determined by the use of a Thorium-229 tracer. Activity of the Thorium-229 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Samples demonstrated acceptable results for all Thorium analyses. Chemical recovery was acceptable for all samples. The Thorium-228, Thorium-230 and Thorium-232 method blank demonstrated acceptable results. Results for the Thorium-228, Thorium-230 and Thorium-232 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Thorium-228, Thorium-230 and Thorium-232 laboratory control sample demonstrated an acceptable percent recovery.

LOW ENERGY PHOTON SPECTROSCOPY (LEPS)

A representative aliquot from each sample was placed into a Petri geometry container. Samples were then counted on a planar, low energy photon spectroscopy (LEPS) detector.

Samples demonstrated acceptable results for all Lead-210 analyses. The Lead-210 method blank demonstrated acceptable results. Results for the Lead-210 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Americium-241 and Cobalt-57 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: 6/26/2014

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

Eberline Analytical
Final Report of Analysis

Report To:

Marco Kaltofen
Boston Chemical Data Corp.
2 Summer St, Suite 14
Natick, MA 01760

Work Order Details:

SDG: **14-05116**
Project: Bridgeton / Alvarez
Analysis Category: ENVIRONMENTAL
Sample Matrix: SO

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
14-05116-01	LCS	KNOWN	05/28/14 00:00	5/28/2014	5/28/2014	14-05116	Americium-241	LANL ER-130 Modified	3.72E+03	1.30E+02			pCi/g
14-05116-01	LCS	KNOWN	05/28/14 00:00	5/28/2014	5/28/2014	14-05116	Cobalt-57	LANL ER-130 Modified	1.19E+03	4.88E+01			pCi/g
14-05116-01	LCS	SPIKE	05/28/14 00:00	5/28/2014	5/28/2014	14-05116	Americium-241	LANL ER-130 Modified	3.74E+03	3.62E+02	3.81E+02	1.20E+01	pCi/g
14-05116-01	LCS	SPIKE	05/28/14 00:00	5/28/2014	5/28/2014	14-05116	Cobalt-57	LANL ER-130 Modified	1.30E+03	1.19E+02	1.26E+02	2.15E+01	pCi/g
14-05116-02	MBL	BLANK	05/28/14 00:00	5/28/2014	5/29/2014	14-05116	Lead-210	LANL ER-130 Modified	-2.57E+00	3.91E+00	3.91E+00	2.07E+00	pCi/g
14-05116-03	DUP	BMAC0004	05/27/14 00:00	5/28/2014	5/28/2014	14-05116	Lead-210	LANL ER-130 Modified	9.01E+00	1.36E+00	1.39E+00	1.13E+00	pCi/g
14-05116-04	DO	BMAC0004	05/27/14 00:00	5/28/2014	5/28/2014	14-05116	Lead-210	LANL ER-130 Modified	1.09E+01	1.53E+00	1.57E+00	1.10E+00	pCi/g
14-05116-05	TRG	BMAC0008	05/27/14 00:00	5/28/2014	5/29/2014	14-05116	Lead-210	LANL ER-130 Modified	-2.25E-02	5.81E-01	5.81E-01	4.30E-01	pCi/g
14-05116-01	LCS	KNOWN	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-228	EML Th-01 Modified	4.97E+00	1.79E-01			pCi/g
14-05116-01	LCS	SPIKE	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-228	EML Th-01 Modified	4.66E+00	7.84E-01	8.98E-01	1.03E-01	pCi/g
14-05116-02	MBL	BLANK	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-228	EML Th-01 Modified	-2.89E-03	3.28E-02	3.28E-02	1.00E-01	pCi/g
14-05116-03	DUP	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-228	EML Th-01 Modified	4.60E-01	1.82E-01	1.87E-01	8.85E-02	pCi/g
14-05116-04	DO	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-228	EML Th-01 Modified	5.35E-01	1.87E-01	1.94E-01	9.16E-02	pCi/g
14-05116-05	TRG	BMAC0008	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-228	EML Th-01 Modified	4.42E-01	1.61E-01	1.66E-01	7.54E-02	pCi/g
14-05116-01	LCS	KNOWN	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-230	EML Th-01 Modified	5.48E+00	1.48E-01			pCi/g
14-05116-01	LCS	SPIKE	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-230	EML Th-01 Modified	5.59E+00	9.05E-01	1.14E+00	8.99E-02	pCi/g
14-05116-02	MBL	BLANK	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-230	EML Th-01 Modified	1.68E-01	1.07E-01	1.09E-01	9.15E-02	pCi/g
14-05116-03	DUP	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-230	EML Th-01 Modified	5.32E-01	1.99E-01	2.10E-01	1.08E-01	pCi/g
14-05116-04	DO	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-230	EML Th-01 Modified	6.63E-01	2.10E-01	2.25E-01	5.34E-02	pCi/g
14-05116-05	TRG	BMAC0008	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-230	EML Th-01 Modified	6.39E-01	1.98E-01	2.14E-01	4.95E-02	pCi/g
14-05116-01	LCS	KNOWN	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-232	EML Th-01 Modified	4.97E+00	1.79E-01			pCi/g
14-05116-01	LCS	SPIKE	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-232	EML Th-01 Modified	5.05E+00	8.33E-01	9.45E-01	7.17E-02	pCi/g
14-05116-02	MBL	BLANK	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-232	EML Th-01 Modified	1.26E-02	3.03E-02	3.04E-02	6.35E-02	pCi/g
14-05116-03	DUP	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-232	EML Th-01 Modified	4.46E-01	1.80E-01	1.84E-01	1.04E-01	pCi/g
14-05116-04	DO	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-232	EML Th-01 Modified	3.81E-01	1.50E-01	1.54E-01	5.33E-02	pCi/g
14-05116-05	TRG	BMAC0008	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Thorium-232	EML Th-01 Modified	3.42E-01	1.36E-01	1.39E-01	4.94E-02	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

EBERLINE SERVICES

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

Eberline Analytical
Final Report of Analysis

Report To:

Marco Kaltofen
Boston Chemical Data Corp.
2 Summer St, Suite 14
Natick, MA 01760

Work Order Details:

SDG: **14-05116**
Project: Bridgeton / Alvarez
Analysis Category: ENVIRONMENTAL
Sample Matrix: SO

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
14-05116-01	LCS	KNOWN	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-234	EML U-02 Modified	8.06E+00	2.90E-01			pCi/g
14-05116-01	LCS	SPIKE	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-234	EML U-02 Modified	7.07E+00	9.68E-01	1.09E+00	7.73E-02	pCi/g
14-05116-02	MBL	BLANK	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-234	EML U-02 Modified	6.74E-02	6.18E-02	6.20E-02	5.83E-02	pCi/g
14-05116-03	DUP	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-234	EML U-02 Modified	4.58E-01	1.56E-01	1.59E-01	7.23E-02	pCi/g
14-05116-04	DO	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-234	EML U-02 Modified	5.17E-01	1.75E-01	1.79E-01	7.61E-02	pCi/g
14-05116-05	TRG	BMAC0008	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-234	EML U-02 Modified	3.17E-01	1.18E-01	1.20E-01	6.09E-02	pCi/g
14-05116-01	LCS	SPIKE	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-235	EML U-02 Modified	7.44E-01	2.29E-01	2.35E-01	7.62E-02	pCi/g
14-05116-02	MBL	BLANK	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-235	EML U-02 Modified	8.61E-02	8.33E-02	8.35E-02	1.03E-01	pCi/g
14-05116-03	DUP	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-235	EML U-02 Modified	-5.05E-03	3.00E-02	3.00E-02	7.11E-02	pCi/g
14-05116-04	DO	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-235	EML U-02 Modified	0.00E+00	4.61E-02	4.61E-02	9.98E-02	pCi/g
14-05116-05	TRG	BMAC0008	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-235	EML U-02 Modified	5.63E-02	5.57E-02	5.59E-02	6.58E-02	pCi/g
14-05116-01	LCS	KNOWN	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-238	EML U-02 Modified	7.85E+00	2.83E-01			pCi/g
14-05116-01	LCS	SPIKE	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-238	EML U-02 Modified	7.61E+00	1.03E+00	1.16E+00	7.25E-02	pCi/g
14-05116-02	MBL	BLANK	05/28/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-238	EML U-02 Modified	9.50E-02	7.30E-02	7.33E-02	5.80E-02	pCi/g
14-05116-03	DUP	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-238	EML U-02 Modified	5.48E-01	1.70E-01	1.75E-01	5.74E-02	pCi/g
14-05116-04	DO	BMAC0004	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-238	EML U-02 Modified	5.87E-01	1.87E-01	1.92E-01	6.42E-02	pCi/g
14-05116-05	TRG	BMAC0008	05/27/14 00:00	5/28/2014	6/5/2014	14-05116	Uranium-238	EML U-02 Modified	4.18E-01	1.36E-01	1.39E-01	5.71E-02	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (2-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

EBERLINE SERVICES

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

WLLFOIA4312 - 001 - 0034875

0017

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

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RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 8/30/2013 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: August 20, 2014

Verified & Approved By _____ Date: 8/29/2013 0:00

QC Approval _____ Date: 9/4/13

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SECONDARY DILUTION RECERTIFICATION

MP-009

Solution Reference # IPL 479-50 **Date** 8/29/2013 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 $^{234, 235, 238}U$ **Reference Date** 1/1/1995 0:00
Parent Solution Conc. 1.7796E+04 dpm/ml

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: August 20, 2014

Verified & Approved By _____ Date: 8/29/2013 0:00

QC Approval _____ Date: 9/4/13

0021

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.**

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PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 12/7/2013 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: November 20, 2014

Verified & Approved By _____ Date: 12/7/2013 0:00

QC Approval _____ Date: 12/7/13

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SECONDARY DILUTION RECERTIFICATION

MP-009

Solution Reference # AEA/Amersham 92/232/67

Date 12/7/2013 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

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: November 20, 2014

Verified & Approved By _____ Date: 12/7/2013 0:00

QC Approval _____ Date: 12/7/13

Th-8

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Radionuclide:	Th-232	Customer:	TMA EBERLINE
Half Life:	(1.405 ± 0.006) x 10^10 years	P.O.No.:	VH1632
Catalog No.:	7232	Reference Date:	November 1 1993 12:00 PST.
Source No.:	435-104-2	Contained Radioactivity:	(Th-232) 0.0933 μCi.
		Contained Radioactivity:	(Th-232) 3.45 kBq.

Description of Solution

a. Mass of solution: 11.9712 g (in a 10 ml flame sealed ampoule)

b. Chemical form: Th(NO3)4 in water

c. Carrier content: None added

d. Density: Approx. 1.21 g/ml @ 20°C.

Radioimpurities None detected (other than daughters).

Radioactive Daughters

Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Po-212, Tl-208

Radionuclide Concentration

(Th-232) 0.00779 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).

Anna U. Khan
QUALITY CONTROL

Nov. 8, 1993
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
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(818) 843 - 7000

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PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 9/23/2013 0:00

SOLUTION REFERENCE #: IPL 435-104-2

SOLUTION #: Th-8

Principal Radionuclide	Half Life, Years	Half Life, Days
^{232}Th, ^{228}Th	1.405E+10	5.132E+12

Radionuclide: $^{232\&228}Th$

Reference Date: 11/1/1993 0:00

Certified Activity: 9.330E-02 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross	18.8415	Weight, Grams
Empty Ampoule	6.9296	Weight, Grams
Solution Net	11.9119	Weight, Grams
Total Activity in Ampoule	0.0933	µCi

Chemical Composition of Standard Solution

$Th(NO_3)_4$ in H2O

Dilution Instructions:

Dilution Solvent Used: 1% Nitric Acid

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.0933 µCi Which Equals 2.071E+05 dpm at the date listed above

And after dilution the activity of this solution is 2.071E+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: September 23, 2014

Verified & Approved By _____ Date: 9/23/2013 0:00

QC Approval _____ Date: 9/27/13

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SECONDARY DILUTION RECERTIFICATION

MP-009
Solution Reference # IPL 435-104-2

Date 9/23/2013 0:00
Solution # Th-8b

Principal Radionuclide	Half Life, Years	Half Life, Days
$^{228\&232}Th$	1.405E+10	5.132E+12

Radionuclide of Interest $^{228\&232}Th$
Parent Solution Conc. 2.07E+02 dpm/ml

Reference Date 11/1/1993 0:00

Chemical Composition of Standard Solution
$Th(NO_3)_4$ in 1% HNO_3

Dilution Instructions:

Dilution Solvent Used 1% Nitric Acid

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 500.0000 ml
Total Activity: 1.0355E+05 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 1.0355E+02 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 23, 2014

Verified & Approved By _____ Date: 9/23/2013 0:00

QC Approval _____ Date: 9/27/13

QA/QC REVIEWED
Date 10/14/91 Initials WT 10/14/91

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Received
OCT 14 1991
TMA/Eberline
Oak Ridge Lab

Radionuclide	Th-230	Customer:	TMA EBERLINE
Half Life:	(7.54 ± 0.03) x 10^4 years	P.O.No.:	TT4944
Catalog No.:	7230	Reference Date:	November 1 1991 12:00 PST.
Source No.:	388-116	Contained Radioactivity:	1.036 µCi.

Description of Solution

a. Mass of solution: 5.0042 grams.
b. Chemical form: Th(NO3)4 in 0.1N HNO3
c. Carrier content: None added
d. Density: 1.0016 gram/ml @ 20°C.

Radioimpurities

See attached technical data sheet

Radioactive Daughters

See attached technical data sheet

Radionuclide Concentration

0.207 µCi/gram.

Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration: ±2.0%
b. Random uncertainty in assay: ±0.5%
c. Random uncertainty in weighing(s): ±0.2%
d. Total uncertainty at the 99% confidence level: ±2.7%

NIST Traceability

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

Notes

1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia S. Shirley.
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)

QUALITY CONTROL

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EBERLINE SERVICES - OAK RIDGE LABORATORY
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PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 3/1/2014 0:00

SOLUTION REFERENCE #: IPL 388-116 SOLUTION #: Th-1

Principal Radionuclide	Half Life, Years	Half Life, Days
^{230}Th	7.540E+04	2.754E+07

Radionuclide: ^{230}Thorium Reference Date: 11/1/1991 0:00

Certified Activity: 1.036E+00 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross	9.2660	Weight, Grams
Empty Ampoule	4.6218	Weight, Grams
Solution Net	4.6442	Weight, Grams
Total Activity In Ampoule	1.0360	µCi

Chemical Composition of Standard Solution

$^{230}Th(NO_3)_4$ in 0.1N HNO_3

Dilution Instructions: Dilution Solvent Used: 0.1N HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0360 µCi Which Equals 2.300E+06 dpm at the date listed above

And after dilution the activity of this solution is 2.300E+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: February 24, 2015

Recertified By _____ Date: 3/1/2014 0:00

QC Approval _____ Date: 3/6/14

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SECONDARY DILUTION RECERTIFICATION

MP-009

Solution Reference # IPL 388-116 **Date** 3/1/2014 0:00 **Solution #** Th-1b

Principal Radionuclide	Half Life, Years	Half Life, Days
^{230}Th	7.540E+04	2.754E+07

Radionuclide of Interest ^{230}Thorium **Reference Date** 11/1/1991 0:00
Parent Solution Conc. 2.30E+03 dpm/ml

Chemical Composition of Standard Solution
$^{230}Th(NO_3)_4$ in 0.1N HNO_3

Dilution Instructions: **Dilution Solvent Used** 0.1N HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 10.0000 ml
Total Activity: 2.2999E+04 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 2.2999E+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.

Expiration Date: February 24, 2015

Recertified By _____ Date: 3/1/2014 0:00
Verified & Approved By _____ Date: 3/1/14
QC Approval _____ Date: 3/10/14

Th-18

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Radionuclide:	Th-229	**Customer:**	EBERLINE SERVICES
Half-life:	7340 ± 160 years	**P.O. No.:**	00009633
Catalog No.:	7229	**Reference Date:**	15-Jan-02 12:00 PST
Source No.:	867-54	**Contained Radioactivity: (Th-229 only)**	1.013 µCi 37.48 kBq

Physical Description:

A. Mass of solution: 5.0147 g in 5 mL flame-sealed ampoule
B. Chemical form: $Th(NO_3)_4$ in 0.1M HNO_3
C. Carrier content: 10µg Th/mL
D. Density: 1.0016 g/mL @ 20°C.

Radioimpurities:

None detected (daughters in equilibrium)

Radionuclide Concentration: 0.2020 µCi/g, 7.474 kBq/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in µCi/g was determined using gamma ray spectrometry.

Peak energy used for integration: 193.5 keV
Branching ratio used: 0.0441 gammas per decay

Uncertainty of Measurement:

A. Type A (random) uncertainty: ± 0.7 %
B. Type B (systematic) uncertainty: ± 3.0 %
C. Uncertainty in aliquot weighing: ± 0.0 %
D. Total uncertainty at the 99% confidence level: ± 3.1 %

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 IAEA Technical Report Series No. 261.
- This solution has a working life of 5 years.

Quality Control

9-Jan-02
Date Signed

IPL Ref. No.: 867-54

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

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RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 9/23/2013 0:00

SOLUTION REFERENCE #: IPL 867-54 SOLUTION #: Th-18

Principal Radionuclide	Half Life, Years	Half Life, Days
^{229}Th	7.340E+03	2.681E+06

Radionuclide: ^{229}Th Reference Date: 1/15/2002 0:00

Certified Activity: 1.013E+00 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross: 8.7752 Weight, Grams

Empty Ampoule: 3.7591 Weight, Grams

Solution Net: 5.0161 Weight, Grams

Total Activity in Ampoule: 1.0130 µCi

Chemical Composition of Standard Solution

$^{229}Th(NO_3)_4$ in 0.1M HNO_3

Dilution Instructions: Dilution Solvent Used: 0.1 M HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0130 µCi Which Equals 2.249E+06 dpm at the date listed above

And after dilution the activity of this solution is 2.249E+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: September 23, 2014

Verified & Approved By _____ Date: 9/23/2013 0:00

QC Approval _____ Date: 9/27/13

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
MP-009

Rev.7; 9/29/99
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EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

MP-009
Solution Reference # IPL 867-54

Date 9/23/2013 0:00
Solution # Th-18a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{229}Th	7.340E+03	2.681E+06

Radionuclide of Interest ^{229}Th
Parent Solution Conc. 2.25E+03 dpm/ml

Reference Date 1/15/2002 0:00

Chemical Composition of Standard Solution
$TH(NO_3)_4$ in 0.1M HNO_3

Dilution Instructions:

Dilution Solvent Used 0.1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 10.0000 ml
Total Activity: 2.2490E+04 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 2.2490E+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.

Expiration Date: September 23, 2014

Verified & Approved By _____ Date: 9/23/2013 0:00

QC Approval _____ Date: 9/27/13

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
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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

0034
WLLFOIA4312 - 001 - 0034892

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

Eberline Services
Analysis Control Chart

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
14-05116	UUISO	1	pCi	g	Boston Chemical Data Corp.

Laboratory Control Sample

Analyte	Normalized Difference	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	1.75	87.73%	15.44%	100.00%	3.60%	8.06E+00	2.90E-01	7.07E+00	1.09E+00	U-8a	3.52E+01	3.60E+00	5.08E-01
U-238	0.41	96.85%	15.27%	100.00%	3.60%	7.85E+00	2.83E-01	7.61E+00	1.16E+00	U-8a	3.44E+01	3.60E+00	5.08E-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 / QC Summary

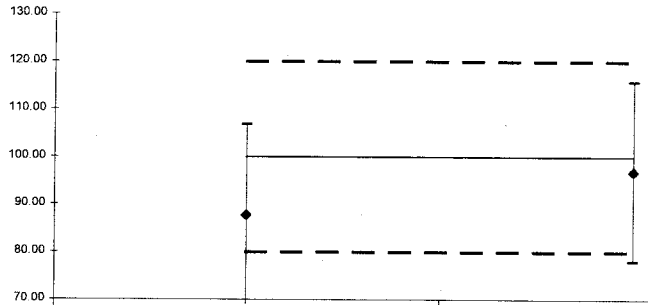
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
U-234	0.48	12.14	5.17E-01	1.79E-01	4.58E-01	1.59E-01	0.88	OK	OK			OK	OK
U-238	0.29	6.84	5.87E-01	1.92E-01	5.48E-01	1.75E-01	0.97	OK	OK			OK	OK
U-235	0.18	200.00	0.00E+00	4.61E-02	-5.05E-03	3.00E-02		OK	OK			OK	OK

Version

WLLFOIA4312 - 001 - 0034894
0036

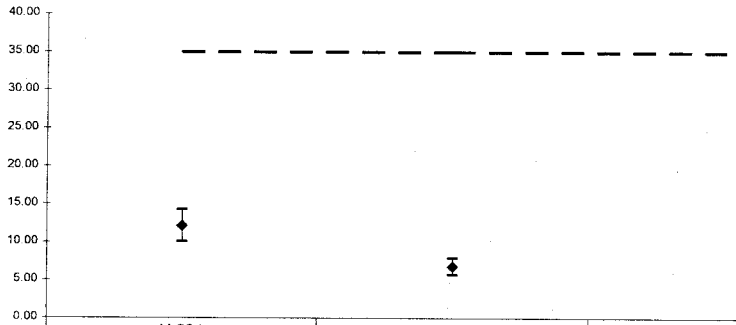
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
14-05116	UUISO	1	pCi	g	Boston Chemical Data Corp.

LCS % Recovery



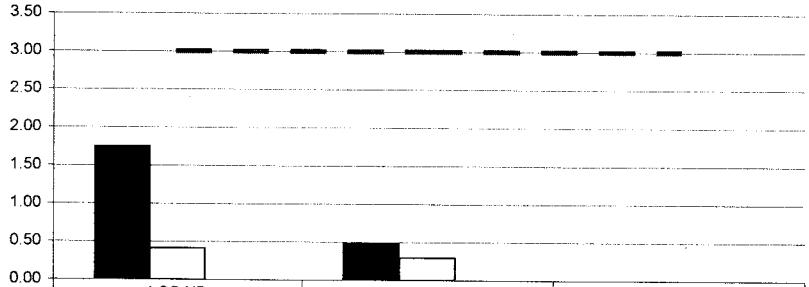
	U-234	U-238
Lower Error	68.69	77.98
Upper Error	106.78	115.73
%R	87.73	96.85
LCL	80	80
Mean	100	100
UCL	120	120

Replicate Sample RPD



	U-234	U-238	U-235
Lower Error	14.25	7.94	-1306.00
Upper Error	10.04	5.73	1706.00
RPD	12.14	6.84	200.00
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
U-234	1.75	0.48	0.00
U-238	0.41	0.29	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

Version

WLLFOIA4312 - 001 - 0034895

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
14-05116	ThISO	1	pCi	g	Boston Chemical Data Corp.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
TH-228	0.67	93.79%	19.27%	100.00%	3.60%	4.97E+00	1.79E-01	4.66E+00	8.98E-01	Th-8b	1.04E+02	3.60E+00	1.07E-01
TH-230	0.19	102.02%	20.37%	100.00%	2.70%	5.48E+00	1.48E-01	5.59E+00	1.14E+00	Th-1b	2.35E+01	2.70E+00	5.17E-01
TH-232	0.16	101.57%	18.72%	100.00%	3.60%	4.97E+00	1.79E-01	5.05E+00	9.45E-01	Th-8b	1.04E+02	3.60E+00	1.07E-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 / QC Summary

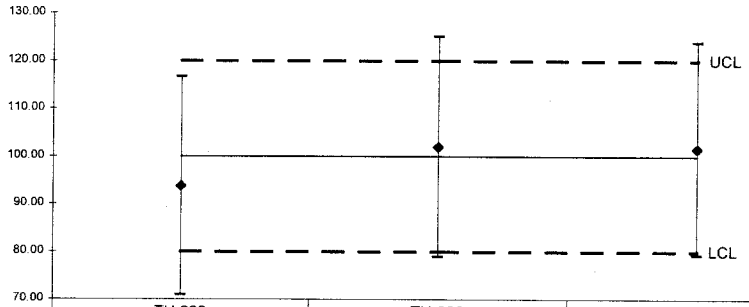
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
TH-228	0.54	14.94	5.35E-01	1.94E-01	4.60E-01	1.87E-01	0.94	OK	OK			OK	OK
TH-230	0.83	21.88	6.63E-01	2.25E-01	5.32E-01	2.10E-01	1.02	OK	OK			OK	OK
TH-232	0.53	15.74	3.81E-01	1.54E-01	4.46E-01	1.84E-01	1.02	OK	OK			OK	OK

Version

WLLFOIA4312 - 001 - 0034896
0038

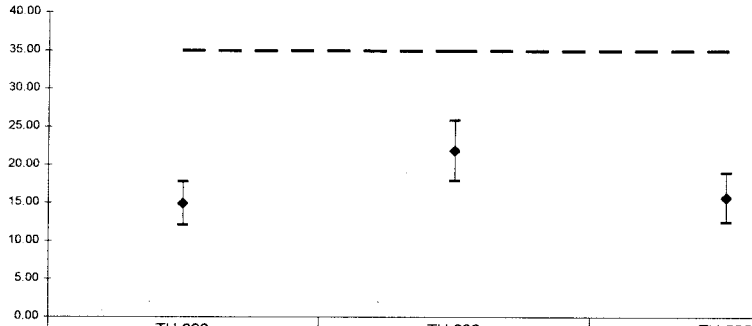
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
14-05116	ThISO	1	pCi	g	Boston Chemical Data Corp.

LCS % Recovery



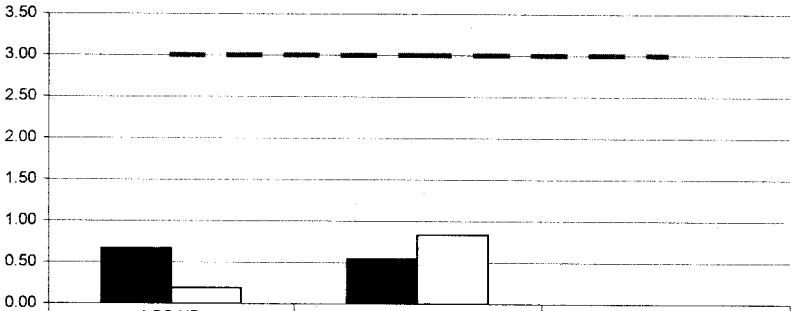
	TH-228	TH-230	TH-232
Lower Error	70.92	78.95	79.25
Upper Error	116.66	125.09	123.89
%R	93.79	102.02	101.57
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	17.80	25.86	18.96
Upper Error	12.08	17.89	12.53
RPD	14.94	21.88	15.74
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	0.67	0.54	0.00
TH-230	0.19	0.83	0.00
UCL	3	3	3

No Matrix Spike

Version

WLLFOIA4312 - 001 - 0034897

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
14-05116	GLEPS	1	pCi	g	Boston Chemical Data Corp.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
AM-241	0.11	100.60%	10.18%	100.00%	3.50%	3.72E+03	1.30E+02	3.74E+03	3.81E+02	LPGAS-12	3.72E+03	1.30E+02	4.00E+01
CO-57	1.68	109.32%	9.67%	100.00%	4.10%	1.19E+03	4.88E+01	1.30E+03	1.26E+02	LPGAS-12	1.19E+03	4.88E+01	4.00E+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
PB-210	1.75	18.85	1.09E+01	1.57E+00	9.01E+00	1.39E+00

QC Summary

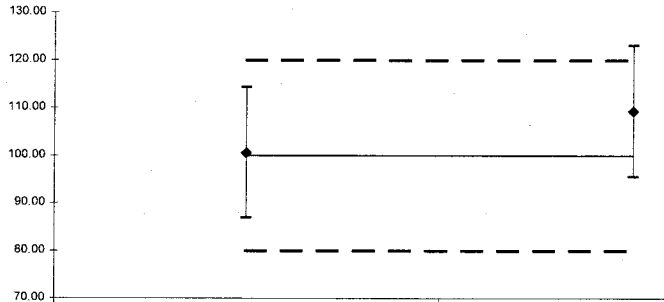
LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
1.01	OK	OK	<AM-241	PB-210>	NA	
1.09	OK	OK	<CO-57			

Version

WLLFOIA4312 - 001 - 0034898

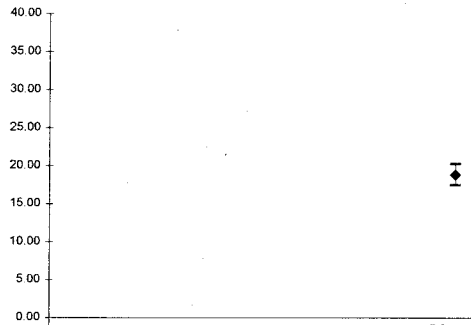
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
14-05116	GLEPS	1	pCi	g	Boston Chemical Data Corp.

LCS % Recovery



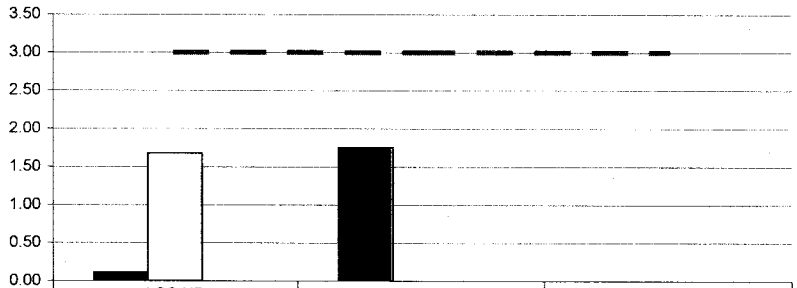
	AM-241	CO-57
Lower Error	86.92	95.56
Upper Error	114.28	123.09
%R	100.60	109.32
LCL	80	80
Mean	100	100
UCL	120	120

Replicate Sample RPD



	PB-210
Lower Error	20.25
Upper Error	17.45
RPD	18.85
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
AM-241	0.11	1.75	0.00
CO-57	1.68	0.00	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

Version

WLLFOIA4312 - 001 - 0034899

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	14-05116
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	05/30/14 09:01	PREP	JWOLFE	AFTER SAMPLES WERE MUFFLED- ADDED HF AND DRIED SAMPLES DOWN- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- ADDED HNO3 AND WATER AND CENTRIFUGED- DILUTED- ALIQUOTED FROM DILUTIONS AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED TO SEPARATIONS

JWOLFE
5/30/14

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	14-05116
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	05/30/14 09:01	PREP	JWOLFE	AFTER SAMPLES WERE MUFFLED- ADDED HF AND DRIED SAMPLES DOWN- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- ADDED HNO3 AND WATER AND CENTRIFUGED- DILUTED- ALIQUOTED FROM DILUTIONS AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED TO SEPARATIONS
2	06/04/14 16:13	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.

John Demelas
6/4/14

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	14-05116
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	05/30/14 09:01	PREP	JWOLFE	AFTER SAMPLES WERE MUFFLED- ADDED HF AND DRIED SAMPLES DOWN- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- ADDED HNO3 AND WATER AND CENTRIFUGED- DILUTED- ALIQUOTED FROM DILUTIONS AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED TO SEPARATIONS
2	06/04/14 16:13	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	06/05/14 05:47	CHEM	TSMITH	Followed steps 12.1.7 to 12.4.5 in AP-005 . (Precipitated and filtered samples for Uranium)

6-5-14
JJ

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
14-05116	
Analysis Code	Run
UUISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014633P	Hydrofluoric Acid	Reagent Grade	JWOLFE	5/30/2014
014866P	Nitric Acid	Reagent Grade	JWOLFE	5/30/2014
014832P	Perchloric Acid	Reagent Grade	JWOLFE	5/30/2014
009098P	Sulfuric Acid	Reagent Grade	JWOLFE	5/30/2014
014936P	Anion Exchange Resin	Reagent Grade	JDEMELAS	6/4/2014
015046S	HCl - HF	6.5N - 0.04N	JDEMELAS	6/4/2014
014955D01	Hydrochloric Acid	0.5N	JDEMELAS	6/4/2014
014980S	Hydrochloric Acid	6.5N	JDEMELAS	6/4/2014
014899P	Hydrochloric Acid	Reagent Grade	JDEMELAS	6/4/2014
015093S	Hydrochloric Acid	8N	JDEMELAS	6/4/2014
015110S	HCl - NH4I	8N - 0.1M	JDEMELAS	6/4/2014
014973P	Hydrofluoric Acid	Reagent Grade	TSMITH	6/5/2014
014932S	Neodymium Carrier	1 mg/ml	TSMITH	6/5/2014
014459P	Titanous Chloride	Reagent Grade	TSMITH	6/5/2014
015015P	Reagent Alcohol	Reagent Grade	TSMITH	6/5/2014
015105S	Carbon substrate	Solution	TSMITH	6/5/2014

Alpha #7

Date	Sample #	Client	Local Time	CT Time	Analysis	Stec
6/15	140509 8A(8-17)	TBE	0947	24hr	Rad	C
6/15	140513 4A(7)	UCON	0859	24hr	Pa250	C
6/15	140513 4ANT(4)	UCON	0859	24hr	PANT	C
6/15	1406007A(1-4)	USA	0900	24hr	UH250	C
6/15	1406007AU-5)	United	0900	24hr	UH250	C
6/15	1405116A(1-4)	Boston	0901	24hr	UH250	C

Alpha #1

Date	Sample #	Client	Prep Time	CT Time	Analyst	Stand
6/3/14	1405115A(1-4)	UCOR	0902	2hr	Am241	C
6/3/14	1405115A(1-4)	UCOR	0902	2hr	Am243	C
6/3/14	1405100A(1-6)	UCOR	1156	2hr50	Np	KB
6/3/14	1405100A(1-2)	UCOR	1157	2hr50	Th	KB
6/3/14	1405098A(14-17)	TBE	1449	2hr50	Th	KB
6/4	Daily Pulse	UAS	0516	10	VA	C
6/4	1404122A(1-8)	Feezor	0851	2hr	Th230	C
6/4/14	1405100A(5-6)	UCOR	1145	2hr50	Am243	KB
6/4/14	1405098A(1,16)	TBE	1146	2hr50	Th	KB
6/4/14	1405129A(1-4)	Feezor	1147	2hr50	Th	KB
6/4/14	1405128A(14-17)	Feezor	1441	2hr50	Th	KB
6/4/14	1406003A(1-4)	USA	1442	2hr50	Ra	KB
6/4/14	1405089A(1-8)	Utah Div. of Rad.	1745	2hr50	Np	KB
6/5	Daily Pulse	UAS	0522	1	VA	C
6/5	1405096A(9-17)	TBE	0547	2hr	Ra	C
6/5	1405088A(1-7)	TBE	0547	2hr	Ra	C
6/5	1405174A(1-4)	UCOR	~~0815~~ 0817	2hr	Am241	C
6/5/14	1405174A(1-4)	UCOR	0817	2hr	Am243	C
6/5/14	1405116A(5)	Boston	1154	2hr	U238	C
6/5/14	1405174A(1-4)	UCOR	1155	2hr	Np237	C
6/5/14	1405174A(1-7)	UCOR	1155	2hr	U238	C

ISO-TH 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	14-05116
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	05/30/14 09:01	PREP	JWOLFE	AFTER SAMPLES WERE MUFFLED- ADDED HF AND DRIED SAMPLES DOWN- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- ADDED HNO3 AND WATER AND CENTRIFUGED- DILUTED- ALIQUOTED FROM DILUTIONS AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED TO SEPARATIONS

JWolfe
5/30/14

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	14-05116
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	05/30/14 09:01	PREP	JWOLFE	AFTER SAMPLES WERE MUFFLED- ADDED HF AND DRIED SAMPLES DOWN- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- ADDED HNO3 AND WATER AND CENTRIFUGED- DILUTED- ALIQUOTED FROM DILUTIONS AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED TO SEPARATIONS
2	06/04/14 16:14	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N 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 deiononized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.

6/14 JM 6/4/14

6/4/14

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	14-05116
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	05/30/14 09:01	PREP	JWOLFE	AFTER SAMPLES WERE MUFFLED- ADDED HF AND DRIED SAMPLES DOWN- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- ADDED HNO3 AND WATER AND CENTRIFUGED- DILUTED- ALIQUOTED FROM DILUTIONS AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN AND SUBMITTED TO SEPARATIONS
2	06/04/14 16:14	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N 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 deiononized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.
3	06/05/14 05:48	CHEM	TSMITH	Followed steps 12.2.4 to 12.4.5 in AP-005 . (Precipitated and filtered samples for Thorium)

6-5-14
JW

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
14-05116	
Analysis Code	Run
ThISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014633P	Hydrofluoric Acid	Reagent Grade	JWOLFE	5/30/2014
014866P	Nitric Acid	Reagent Grade	JWOLFE	5/30/2014
014832P	Perchloric Acid	Reagent Grade	JWOLFE	5/30/2014
009098P	Sulfuric Acid	Reagent Grade	JWOLFE	5/30/2014
014936P	Anion Exchange Resin	Reagent Grade	JDEMELAS	6/4/2014
014899P	Hydrochloric Acid	Reagent Grade	JDEMELAS	6/4/2014
014866P	Nitric Acid	Reagent Grade	JDEMELAS	6/4/2014
015093S	Hydrochloric Acid	8N	JDEMELAS	6/4/2014
015100S	Nitric Acid	8N	JDEMELAS	6/4/2014
014827S	Cerrium Carrier	0.1mg/ml	TSMITH	6/5/2014
014973P	Hydrofluoric Acid	Reagent Grade	TSMITH	6/5/2014
015015P	Reagent Alcohol	Reagent Grade	TSMITH	6/5/2014
015105S	Carbon substrate	Solution	TSMITH	6/5/2014

Alpha #7

Date	Sample #	Client	Incd Time	CT Time	Analysis	Sec
6/5	140r098A(8-1A)	TBE	0947	24r	Rn	c
6/5	140r134A(7)	UCOR	0859	24r	Pa230	c
6/5	140r134ANT(4)	UCOR	0859	24r	PaNT	c
6/5	1406007A(1-4)	USA	0900	24r	U238	c
6/5	1406007AU-5)	Unitech	0900	24r	U238	c
6/5	140r116A(1-4)	Boston	0901	24r	U238	c
6/5/14	140r116A(4,5)	Boston	1154	24r	Th230	c
6/5/14	140r122A(1-5)	Grace	1157	24r	Th230	c
6/5/14	140r134A(1-4)	UCOR	1157	24r	Th230	c
6/5	140r134ANT(4)	UCOR	1157	24r	ThNT	c
6/5/14	140r134A(2)	UCOR	1158	24r	Am243	243

Alpha #2

Date	Sample #	Client	Tand Start	CT Start	Analysis	Stop
6/4/14	1405127A(9-12)	Feezor	0851	2hr	Th Fso	
6/4/14	1405129A(5-8)	Feezor	1147	2hr50	Th	1C
6/4/14	1405134A(1-4)	UCOR	1444	2hr50	Rake	1C
6/4/14	1405089A(9-12)	Utah Div. of Rad.	1744	2hr50	Np	1C
6/1	Daily Blank	UB	0522	1	Nb	
6/1	1405098A(4-7)	TAE	0947	2hr	Ra6	
6/5/14	1405134A(1-4)	UCOR	0858	2hr	Pa Z50	
6/5/14	1405134A(4)	UCOR	1155	2hr	U Z50	
6/5/14	1405116A(1-7)	Boston	1154	2hr	Th Z50	

GAMMA LEPS NOTES

GE 5

DATE	SAMPLE #	Client	Load Time	CT Time	Analysis	Tech
5/28/14	1405104-03	UCOR	0918	1 HR	I-129	AG
5/28/14	1405104-05	UCOR	1019	1hr	I129	KB
5/28/14	1405109-05	Accutest	1250	15mins	Ba	KB
5/28/14	1405104-04	UCOR	1309	15 mins	Ba	KB
5/28/14	1405112-04	USA	1334	15mins	Ba	KB
5/28/14	1405116-03	Boston Chemical	1355	2hrs	γ	KB
5/28/14	1405116-01	Boston Chemical	1558	30mins	γ	KB
5/28/14	1405116-04	Boston Chemical	1633	2hrs	γ	KB
5/29/14	DAILY BKGD	LAB	0626	15 MIN	γ	AG
5/29/14	LPC AG-13	LAB	0647	15 MIN	γ	AG
5/29/14	1405116-05	BOSTON CHEMICAL	0713	2 HR	γ	AG
5/29/14	1405053-01	UCOR	0915	30mins	I129	KB
5/29/14	1405053-02	UCOR	0945	1 hr	I129	KB
5/29/14	1405053-03	UCOR	1046	1hr	I129	KB
5/29/14	1405053-05	UCOR	1146	1hr	I129	KB
5/29/14	1405116-02	Boston Chemical	1248	2hrs	γ	KB

SECTION VIII

ANALYTICAL DATA (ISOTOPIC URANIUM)

14-05116
UUISO
Run 1

Work Order	14-05116
Analysis Code	UUISO
Run	1
Date Received	5/28/2014
Lab Deadline	6/18/2014
Client	Boston Chemical Data Corp.
Project	ENV
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)	18.893
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		05/28/14 00:00	1.0000E+00
02	MBL	BLANK		05/28/14 00:00	1.0000E+00
03	DUP	BMAC0004	59	05/27/14 00:00	1.0560E+00
04	DO	BMAC0004	59	05/27/14 00:00	1.0560E+00
05	TRG	BMAC0008	49	05/27/14 00:00	1.0940E+00

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

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

14-05116
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	0.6059	11.4		0.00								
02	MBL	0.6031	11.4		0.00								
03	DUP	0.6022	11.4		0.00								
04	DO	0.6026	11.4		0.00								
05	TRG	0.6014	11.4		0.00								

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

WLLFOIA4312 - 001 - 0034919
0061

14-05116
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			05/30/14 08:58	JWOLFE				
02	MBL			05/30/14 08:58	JWOLFE				
03	DUP			05/30/14 08:58	JWOLFE				
04	DO			05/30/14 08:58	JWOLFE				
05	TRG			05/30/14 08:58	JWOLFE				

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

Eberline Services
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 14-05116
Client: Boston Chemical Data Corp.

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	7.07E+00	9.68E-01	7.73E-02	8.06E+00	87.73	OK		OK	
02	U-234	MBL	BLANK	pCi/g	6.74E-02	6.18E-02	5.83E-02					OK	OK
03	U-234	DUP	BMAC0004	pCi/g	4.58E-01	1.56E-01	7.23E-02				OK	OK	
04	U-234	DO	BMAC0004	pCi/g	5.17E-01	1.75E-01	7.61E-02					OK	
05	U-234	TRG	BMAC0008	pCi/g	3.17E-01	1.18E-01	6.09E-02					OK	

Preliminary Data Report & Analytical Calculations
Work Order: 14-05116-UUISO-1

Client: Boston Chemical Data Corp.
Eberline Services Work Order: 14-05116
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	05/28/14 00:00	1.00E+00	109.65	0.00	0.00			
02	U-234	MBL	05/28/14 00:00	1.00E+00	109.98	0.00	0.00			
03	U-234	DUP	05/27/14 00:00	1.06E+00	123.74	0.00	0.00			
04	U-234	DO	05/27/14 00:00	1.06E+00	104.57	0.00	0.00			
05	U-234	TRG	05/27/14 00:00	1.09E+00	137.43	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Boston Chemical Data Corp.	14-05116	UUISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	06/05/14 09:01		A_Spec	Alpha_045	170	5.47 E+02	5.00 E-03	18.7
02	U-234	MBL	06/05/14 09:01		A_Spec	Alpha_046	170	4.83 E+00	1.00 E-03	17.3
03	U-234	DUP	06/05/14 09:01		A_Spec	Alpha_047	170	3.80 E+01	0.00 E+00	16.9
04	U-234	DO	06/05/14 09:01		A_Spec	Alpha_048	170	3.83 E+01	4.00 E-03	17.8
05	U-234	TRG	06/05/14 11:54		A_Spec	Alpha_003	170.02	3.11 E+01	5.00 E-03	17.4

Eberline Services
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 14-05116
Client: Boston Chemical Data Corp.

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	7.61E+00	1.03E+00	7.25E-02	7.85E+00	96.85	OK		OK	
02	U-238	MBL	BLANK	pCi/g	9.50E-02	7.30E-02	5.80E-02					OK	OK
03	U-238	DUP	BMAC0004	pCi/g	5.48E-01	1.70E-01	5.74E-02				OK	OK	
04	U-238	DO	BMAC0004	pCi/g	5.87E-01	1.87E-01	6.42E-02					OK	
05	U-238	TRG	BMAC0008	pCi/g	4.18E-01	1.36E-01	5.71E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Boston Chemical Data Corp.	14-05116	UUISO	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	05/28/14 00:00	1.00E+00	109.65	0.00	0.00			
02	U-238	MBL	05/28/14 00:00	1.00E+00	109.98	0.00	0.00			
03	U-238	DUP	05/27/14 00:00	1.06E+00	123.74	0.00	0.00			
04	U-238	DO	05/27/14 00:00	1.06E+00	104.57	0.00	0.00			
05	U-238	TRG	05/27/14 00:00	1.09E+00	137.43	0.00	0.00			

Preliminary Data Report & Analytical Calculations
Work Order: 14-05116-UUISO-1

Client: Boston Chemical Data Corp.
Eberline Services Work Order: 14-05116
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-238	LCS	06/05/14 09:01		A_Spec	Alpha_045	170	5.91 E+02	4.00 E-03	18.7
02	U-238	MBL	06/05/14 09:01		A_Spec	Alpha_046	170	6.83 E+00	1.00 E-03	17.3
03	U-238	DUP	06/05/14 09:01		A_Spec	Alpha_047	170	4.57 E+01	2.00 E-03	16.9
04	U-238	DO	06/05/14 09:01		A_Spec	Alpha_048	170	4.37 E+01	2.00 E-03	17.8
05	U-238	TRG	06/05/14 11:54		A_Spec	Alpha_003	170.02	4.13 E+01	4.00 E-03	17.4

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Boston Chemical Data Corp.	14-05116	UUISO	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	7.44E-01	2.29E-01	7.62E-02					OK	
02	U-235	MBL	BLANK	pCi/g	8.61E-02	8.33E-02	1.03E-01					OK	OK
03	U-235	DUP	BMAC0004	pCi/g	-5.05E-03	3.00E-02	7.11E-02				OK	OK	
04	U-235	DO	BMAC0004	pCi/g	0.00E+00	4.61E-02	9.98E-02					OK	
05	U-235	TRG	BMAC0008	pCi/g	5.63E-02	5.57E-02	6.58E-02					OK	

Preliminary Data Report & Analytical Calculations
Work Order: 14-05116-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Boston Chemical Data Corp.	14-05116	UUISO	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	05/28/14 00:00	1.00E+00	109.65	0.00	0.00			
02	U-235	MBL	05/28/14 00:00	1.00E+00	109.98	0.00	0.00			
03	U-235	DUP	05/27/14 00:00	1.06E+00	123.74	0.00	0.00			
04	U-235	DO	05/27/14 00:00	1.06E+00	104.57	0.00	0.00			
05	U-235	TRG	05/27/14 00:00	1.09E+00	137.43	0.00	0.00			

Preliminary Data Report & Analytical Calculations
Work Order: 14-05116-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Boston Chemical Data Corp.	14-05116	UUISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	06/05/14 09:01		A_Spec	Alpha_045	170	4.67 E+01	2.00 E-03	18.7
02	U-235	MBL	06/05/14 09:01		A_Spec	Alpha_046	170	5.00 E+00	0.00 E+00	17.3
03	U-235	DUP	06/05/14 09:01		A_Spec	Alpha_047	170	-3.40 E-01	2.00 E-03	16.9
04	U-235	DO	06/05/14 09:01		A_Spec	Alpha_048	170	1.00 E+00	0.00 E+00	17.8
05	U-235	TRG	06/05/14 11:54		A_Spec	Alpha_003	170.02	4.49 E+00	3.00 E-03	17.4

Count Room Report
Client: Boston Chemical Data Corp

14-05116-UUISO-1 (pCi/g) in SO
Tracer ID: U-10a

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	05/28/14 00:00	1.0000	0.6059	11.4473		0.00		
02	MBL	BLANK	05/28/14 00:00	1.0000	0.6031	11.3944		0.00		
03	DUP	BMAC0004	05/27/14 00:00	1.0560	0.6022	11.3774		0.00		
04	DO	BMAC0004	05/27/14 00:00	1.0560	0.6026	11.3849		0.00		
05	TRG	BMAC0008	05/27/14 00:00	1.0940	0.6014	11.3623		0.00		

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 5/30/2014 8:58 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
14-05116	1	UUISO	5/30/2014 8:58	JWOLFE	JW	

LCS & Matrix Spikes

Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	LCS Volume Used (g)	MS Volume Used (g)	LCSD Volume Used (g)	MSD Volume Used (g)	LCS Known pCi	LCS Error Estimate	MS Added pCi	MS Error Estimate	LCSD Known pCi	LCSD Error Estimate	MSD Added pCi	MSD Error Estimate
U-234	U-8a	35.240	5/30/2014	0.500	0.5075				8.06	0.290	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	5/30/2014	0.500	0.5075				7.85	0.283	0.00	0.000	0.00	0.000	0.00	0.000
Tc-99 MS	Tc-2a	22043.688	10/16/2013	0.1												

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	U-232	U-10a	18.893	5/30/2014	0.6059	0.6400
02	U-232	U-10a	18.893	5/30/2014	0.6031	0.6400
03	U-232	U-10a	18.893	5/30/2014	0.6022	0.6400
04	U-232	U-10a	18.893	5/30/2014	0.6026	0.6400
05	U-232	U-10a	18.893	5/30/2014	0.6014	0.6400

Balance Printer Tapes

Tracer

0.6059 g
0.6031 g
0.6022 g
0.6026 g
0.6014 g

LCS

0.5075 g

Matrix Spike

Version 2.0 08/99

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
14-05116	1	UUISO	grams	6/18/2014	JWOLFE

Lab Fraction	Boston Chemical Data Corp. 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	BMAC0004	DUP		1	18.94	5.28E-02	2.0000E+01	1.0560E+00				
04	BMAC0004	DO		1	18.94	5.28E-02	2.0000E+01	1.0560E+00				
05	BMAC0008	TRG		1	18.28	5.47E-02	2.0000E+01	1.0940E+00				

Comments	

Technician: JWolfe Date: 5/30/14

WLLFOIA4312 - 001 - 0034932

EBERLINE SERVICES

Dilution Worksheet	**Internal Work Order**	14-05116
	Fraction	**> 03 <**
	Analysis Code	**UUISO**
	Run Number	**1**
	Analyst	**JWOLFE**

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**5.28**	ml	from the original sample and diluted it to	**100**	ml	0.0528
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	**0.0528**
Dilution Factor	**18.93939394**

Diluted by: _____ Date: 5/30/14

WLLFOIA4312 - 001 - 0034933
0075

EBERLINE SERVICES	Internal Work Order	14-05116
	Fraction	> 04 <
Dilution Worksheet	Analysis Code	UUISO
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**5.28**	ml	from the original sample and diluted it to	**100**	ml	0.0528
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	**0.0528**
Dilution Factor	**18.93939394**

Diluted by: JW Date: 5/30/14

WLLFOIA4312 - 001 - 0034934
0076

EBERLINE SERVICES	Internal Work Order	14-05116
	Fraction	> 05 <
Dilution Worksheet	Analysis Code	UUISO
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**5.47**	ml	from the original sample and diluted it to	**100**	ml	0.0547
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	**0.0547**
Dilution Factor	**18.28153565**

Diluted by: JW Date: 5/30/14

WLLFOIA4312 - 001 - 0034935
00177

Eberline Services - Oak Ridge
Version 2.0 8/1999

Muffle Worksheet

Work Order	Aliquot Units	Lab Deadline	Technician
14-05116	grams	6/18/2014	KSALLINGS

Eberline Fraction	Boston Chemical Data Corp. Client ID	Tare Crucible Wt	Muffle Data Pre Wt/Vol	Muffle Data Post Wt/Vol	Muffle Calculations Pre Net Wt/Vol	Muffle Calculations Post-Net Wt/Vol	Muffle Calculations Ratio Post/Pre
04	BMAC0004	104.6100	109.8900		5.2800		
05	BMAC0008	99.4000	104.8700		5.4700		

Comments

Technician: Kenny Sallings Date: 5/28/14

Analysis: UUISO

WLLFOIA4312 - 001 - 0034936
NO72

KD 6/5/14

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-UU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_045
Chamber Serial Number: 04026482A
Detector Serial Number: 91131
Env. Background: System Bkgd 88299
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 6/5/2014 7:36:17 AM
Acquisition Date/Time: 6/5/2014 9:01:35 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.606 mL
Effective Efficiency: 0.2055 +/- 0.0113
Counting Efficiency: 0.1875 +/- 0.0033 on 1/11/2014 6:28:38 PM
Chem. Recovery Factor: 1.0965 +/- 0.0635

Control Certificate Name: NatU_U-8A
Chem. Recov. of Control: U-238 0.944138 +/- 0.070921
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	5.280	397.49	9.84	0.51	0.00E+000	38.3
U-234		4.733	547.15	8.39	0.85	0.00E+000	68.4
U-235		4.411	46.66	28.82	0.34	0.00E+000	4.5
U-238		4.153	591.32	8.07	0.68	0.00E+000	5.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
U-232	0.996	5302.50*	5.13E+000 +/- 5.56E-001	6.78E-002 +/- 7.34E-003
U-234	0.994	4761.50*	7.07E+000 +/- 9.68E-001	7.73E-002 +/- 8.37E-003
U-235	0.995	4385.50*	7.44E-001 +/- 2.29E-001	7.62E-002 +/- 8.25E-003
U-238	0.993	4184.40*	7.61E+000 +/- 1.03E+000	7.25E-002 +/- 7.85E-003

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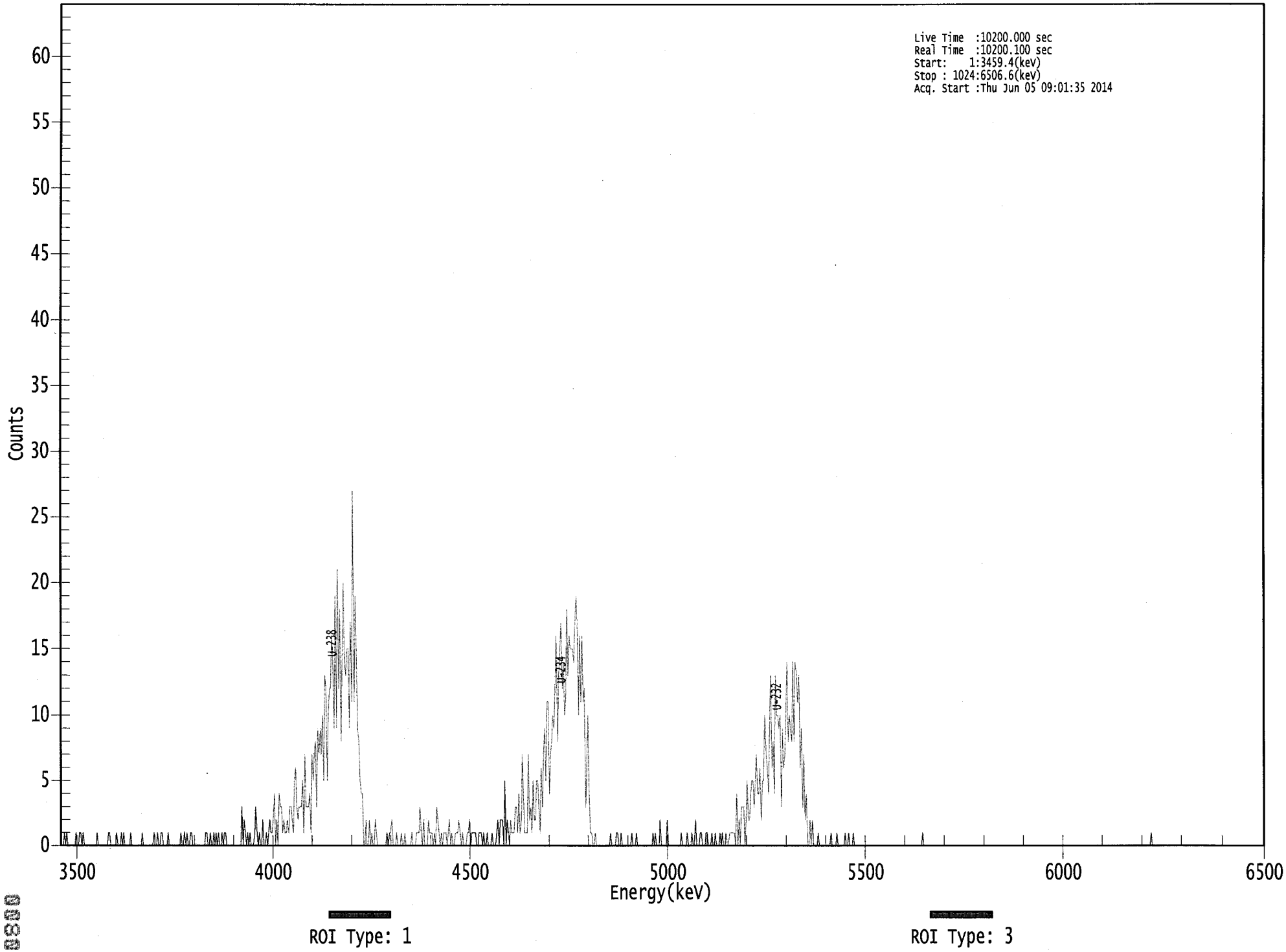
0000089834.CNF



WLLFOIA4312 - 001 - 0034938

****
***** 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	1	0	1	0	0
9:	0	0	0	0	0	1	0	0
17:	1	1	0	1	0	0	0	0
25:	0	0	0	0	0	0	0	1
33:	0	0	0	0	0	0	0	0
41:	0	1	1	0	0	0	0	0
49:	1	0	0	0	1	0	1	0
57:	0	0	0	0	1	0	0	0
65:	0	0	0	0	0	0	1	0
73:	0	0	0	0	0	0	0	0
81:	1	0	0	1	0	0	1	1
89:	0	0	0	0	1	0	0	0
97:	0	0	0	0	0	0	0	1
105:	0	0	1	0	1	0	0	1
113:	1	0	0	0	0	0	0	0
121:	0	0	0	0	1	1	0	0
129:	1	0	0	1	0	1	0	1
137:	0	0	1	0	1	1	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	3	0	2	1	0
161:	1	0	1	0	0	0	1	3
169:	1	0	1	0	0	2	0	0
177:	1	0	1	2	1	1	2	4
185:	0	2	0	4	3	3	1	2
193:	1	1	2	1	3	3	2	1
201:	5	6	3	2	3	3	3	5
209:	1	7	3	3	3	4	1	7
217:	5	7	8	3	9	7	9	7
225:	10	5	13	12	5	10	12	12
233:	16	14	9	19	9	21	12	18
241:	8	14	20	14	13	15	15	9
249:	17	11	27	11	19	14	9	8
257:	5	4	4	0	0	2	0	0
265:	2	0	1	0	0	2	1	0
273:	0	0	0	0	0	0	0	1
281:	0	1	1	2	0	0	0	1
289:	0	0	0	1	0	0	1	0
297:	0	0	0	0	1	0	0	0
305:	1	1	1	3	1	0	2	0
313:	0	0	2	1	1	1	0	1
321:	0	3	2	1	0	1	0	1
329:	1	1	0	1	2	0	1	0
337:	0	1	1	1	2	1	0	1
345:	0	0	0	1	1	2	0	1
353:	1	1	1	0	0	1	1	1
361:	0	1	0	0	1	0	0	0

369:	1	0	0	0	1	2	0	2

Sample Title: 01

Channel								
377:	2	2	0	5	0	2	1	0
385:	2	1	1	1	3	3	1	4
393:	1	2	7	3	1	1	1	7
401:	2	3	1	5	2	2	5	5
409:	3	1	6	3	7	9	5	11
417:	11	4	7	8	10	9	12	16
425:	8	13	15	17	12	14	10	11
433:	18	13	16	15	15	15	14	17
441:	19	17	10	16	11	16	11	12
449:	3	6	10	4	1	1	0	0
457:	1	0	0	0	0	0	0	0
465:	0	0	0	0	0	1	0	0
473:	0	0	1	1	0	0	1	0
481:	0	0	0	0	0	0	0	1
489:	0	0	0	1	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	1	0	1	0	0	0	2
513:	0	0	0	0	0	2	0	0
521:	0	0	0	0	0	0	0	0
529:	0	1	0	0	0	0	1	0
537:	0	0	1	0	0	2	0	0
545:	0	1	1	0	0	0	1	1
553:	0	0	0	1	0	0	1	0
561:	0	0	1	0	1	0	0	1
569:	0	0	1	1	1	1	1	0
577:	4	0	2	0	3	3	3	0
585:	2	5	2	2	4	5	5	3
593:	5	7	4	4	6	2	5	5
601:	10	7	6	4	9	13	6	8
609:	4	13	10	10	9	10	3	9
617:	6	7	10	14	8	10	9	8
625:	14	8	14	13	11	13	6	9
633:	3	7	2	4	0	0	2	0
641:	2	0	0	0	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	1	0	0	0	0	1	0	0
665:	0	0	0	0	1	0	0	1
673:	0	0	0	1	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	1	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: 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:	1	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™

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Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-UU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_046
Chamber Serial Number: 04026482B
Detector Serial Number: 58762
Env. Background: System Bkgd 88300
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 6/5/2014 7:36:17 AM
Acquisition Date/Time: 6/5/2014 9:01:37 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.603 mL
Effective Efficiency: 0.1901 +/- 0.0109
Counting Efficiency: 0.1729 +/- 0.0030 on 4/12/2014 1:44:32 PM
Chem. Recovery Factor: 1.0998 +/- 0.0658

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	5.294	366.00	10.26	0.00	0.00E+000	10.6
U-234		4.690	4.83	91.00	0.17	0.00E+000	3.0
U-235		4.403	5.00	96.02	0.00	0.00E+000	3.0
U-238		4.132	6.83	76.08	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
U-232	0.999	5302.50*	5.11E+000 +/- 5.73E-001	8.37E-002 +/- 9.38E-003
U-234	0.964	4761.50*	6.74E-002 +/- 6.18E-002	5.83E-002 +/- 6.53E-003
U-235	0.998	4385.50*	8.61E-002 +/- 8.33E-002	1.03E-001 +/- 1.16E-002
U-238	0.981	4184.40*	9.50E-002 +/- 7.30E-002	5.80E-002 +/- 6.50E-003

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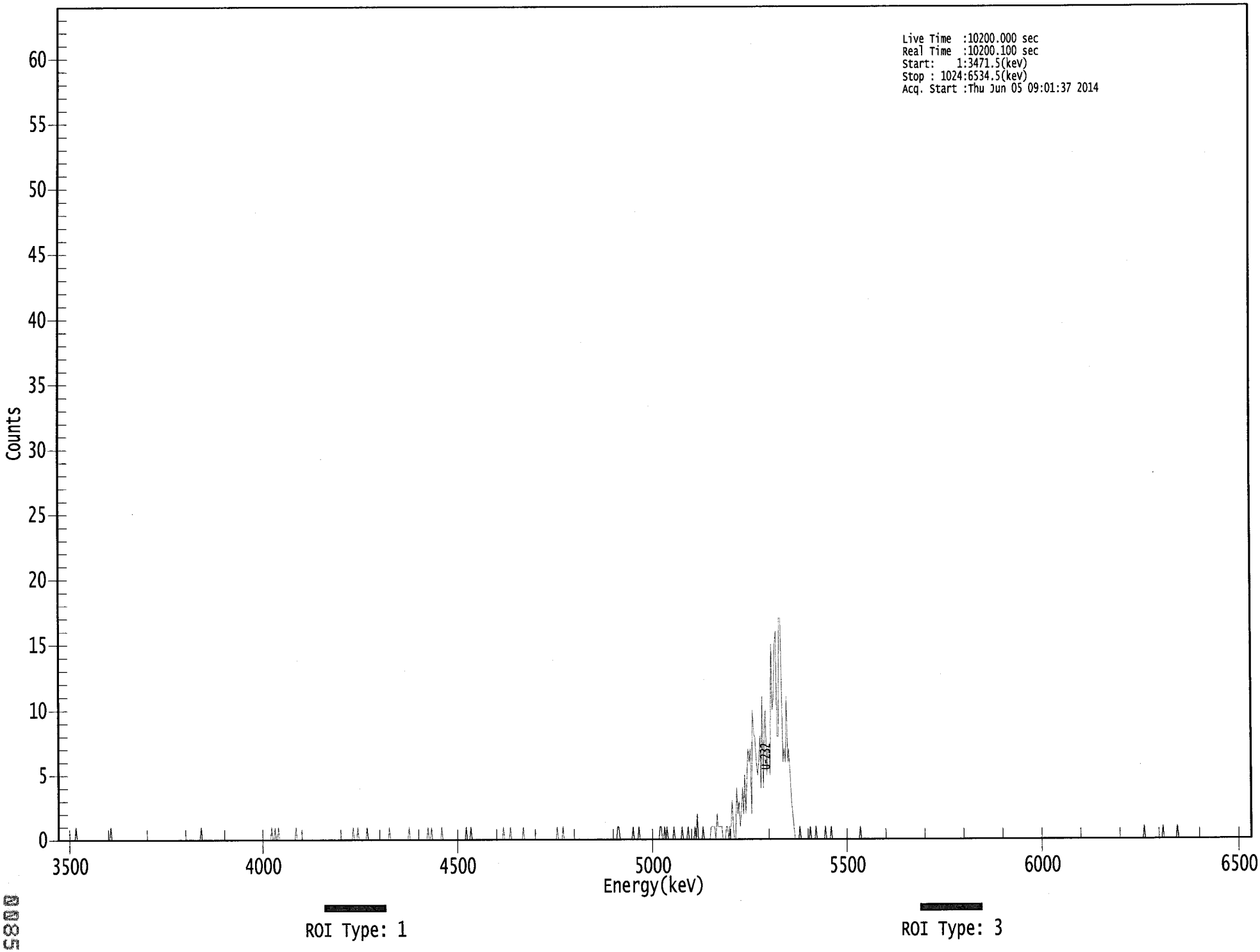

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0085

****
***** 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	0	0
9:	0	0	0	0	0	0	0	1
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	1	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	1	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	1	0	0	1	0	0	1	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	1	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	1	0
257:	0	0	1	0	0	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	1	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	1	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	1	0
321:	0	1	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	1
353:	0	0	0	1	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	1
385:	0	0	0	0	0	1	0	0
393:	0	0	0	0	0	0	0	0
401:	1	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	0	1	0	0
433:	0	0	1	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	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	1	1	0	0	0	0	0
489:	0	0	0	0	0	0	1	0
497:	0	0	0	1	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	1	1	0
521:	0	1	0	1	0	0	0	0
529:	0	1	0	0	0	0	0	0
537:	1	0	0	0	0	1	0	0
545:	0	0	0	1	0	2	0	0
553:	0	0	1	0	0	0	0	0
561:	0	1	1	1	1	0	2	1
569:	1	1	1	0	0	0	1	1
577:	0	1	1	3	1	0	0	4
585:	2	3	1	2	4	2	5	2
593:	5	7	6	7	2	10	8	8
601:	6	5	6	8	4	11	4	9
609:	10	5	7	7	5	15	10	11
617:	15	16	8	8	17	17	12	6
625:	7	6	11	6	7	5	3	2
633:	1	0	0	0	0	1	0	0
641:	0	0	0	0	0	0	1	0
649:	0	0	0	1	0	0	0	0
657:	0	0	0	1	0	0	0	0
665:	1	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	1	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: 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	1	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	1	0	0	0
953:	0	0	0	0	0	0	0	0
961:	1	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

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Apex-Alpha™

Sample Description: BMAC0004-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-UU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_047
Chamber Serial Number: 02030596A
Detector Serial Number: 91086
Env. Background: System Bkgd 88301
Reagent Blank: <not performed>

Sample Size: 1.056E+000 +/- 0.000E+000 gram
Sample Date/Time: 5/27/2014 7:36:17 AM
Acquisition Date/Time: 6/5/2014 9:01:32 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.602 mL
Effective Efficiency: 0.2086 +/- 0.0115
Counting Efficiency: 0.1686 +/- 0.0030 on 1/11/2014 6:28:51 PM
Chem. Recovery Factor: 1.2374 +/- 0.0715

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	5.257	401.00	9.80	0.00	0.00E+000	26.0
U-234		4.712	38.00	32.21	0.00	0.00E+000	5.9
U-235		4.397	-0.34	592.90	0.34	0.00E+000	0.0
U-238		4.128	45.66	29.13	0.34	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
U-232	0.986	5302.50*	4.83E+000 +/- 5.21E-001	7.23E-002 +/- 7.80E-003
U-234	0.983	4761.50*	4.58E-001 +/- 1.56E-001	7.23E-002 +/- 7.80E-003
U-235	0.999	4385.50*	-5.05E-003 +/- 3.00E-002	7.11E-002 +/- 7.67E-003
U-238	0.978	4184.40*	5.48E-001 +/- 1.70E-001	5.74E-002 +/- 6.19E-003

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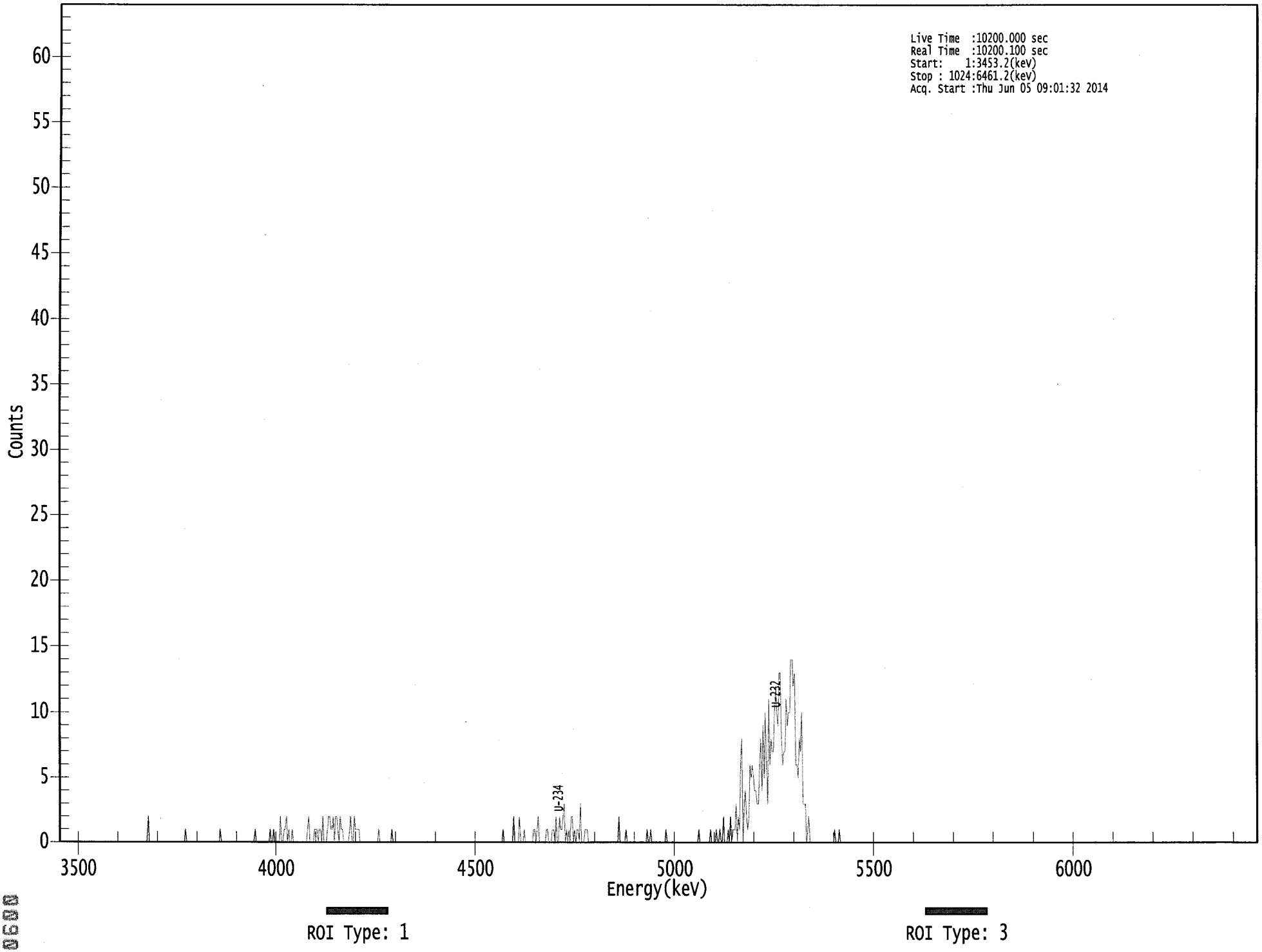


WLLFOIA4312 - 001 - 0034948

****
***** 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	2	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	1	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	1	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:	1	0	0	0	0	0	0	0
177:	0	0	0	0	0	1	0	0
185:	1	0	0	0	0	0	2	0
193:	0	1	1	2	0	1	0	0
201:	1	0	0	0	0	0	0	0
209:	0	0	0	0	0	1	2	0
217:	0	0	0	1	1	1	0	1
225:	1	0	2	0	0	0	1	2
233:	2	1	1	2	0	2	2	1
241:	0	2	1	1	0	0	0	0
249:	0	1	2	0	0	2	1	1
257:	1	1	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	1	0	0	0	0	0
281:	0	0	0	0	0	1	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: 03

Channel								
377:	0	0	0	0	1	0	0	0
385:	0	0	0	0	0	2	0	0
393:	0	0	2	0	0	0	1	0
401:	0	0	0	0	0	0	1	1
409:	0	1	2	0	0	0	0	0
417:	0	1	1	0	0	0	1	1
425:	0	2	0	0	2	1	1	2
433:	3	0	1	0	1	0	2	2
441:	0	1	0	1	1	0	3	0
449:	0	0	1	1	1	0	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	2
481:	0	0	0	0	0	1	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	1
505:	0	0	1	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	1	0	0	0	0
553:	0	0	0	0	0	1	0	0
561:	0	0	1	0	0	1	0	0
569:	2	0	0	0	1	0	2	0
577:	1	1	1	3	0	2	1	6
585:	8	0	3	4	2	1	2	6
593:	5	6	5	4	4	3	3	5
601:	8	4	9	5	10	6	3	11
609:	6	8	7	7	10	12	10	9
617:	13	13	8	6	7	7	11	9
625:	10	10	14	14	12	13	6	6
633:	5	8	7	10	3	3	3	0
641:	1	2	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	1
665:	0	0	0	1	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

Apex-Alpha™

KB 6/5/14

Sample Description: BMAC0004
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-UU
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_048
Chamber Serial Number: 02030596B
Detector Serial Number: 83111
Env. Background: System Bkgd 88302
Reagent Blank: <not performed>

Sample Size: 1.056E+000 +/- 0.000E+000 gram
Sample Date/Time: 5/27/2014 7:36:17 AM
Acquisition Date/Time: 6/5/2014 9:01:34 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.603 mL
Effective Efficiency: 0.1863 +/- 0.0107
Counting Efficiency: 0.1782 +/- 0.0031 on 1/12/2014 10:51:38 AM
Chem. Recovery Factor: 1.0457 +/- 0.0630

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	5.272	358.32	10.37	0.68	0.00E+000	12.5
U-234		4.724	38.32	31.99	0.68	0.00E+000	3.4
U-235		4.400	0.00	1960.0	0.00	0.00E+000	0.0
U-238		4.148	43.66	29.80	0.34	0.00E+000	2.9

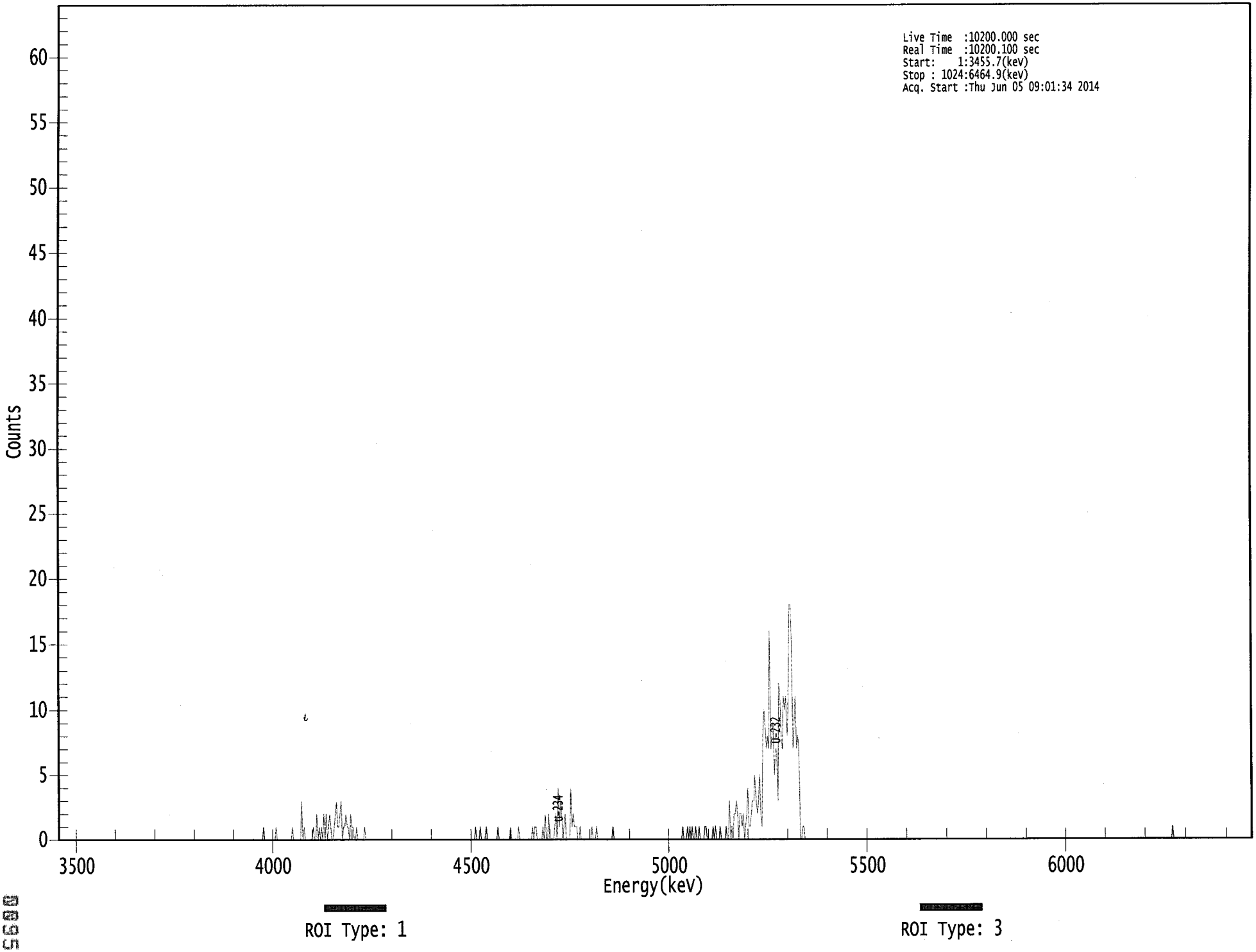
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
U-232	0.994	5302.50*	4.84E+000 +/- 5.47E-001	7.61E-002 +/- 8.61E-003
U-234	0.990	4761.50*	5.17E-001 +/- 1.75E-001	7.61E-002 +/- 8.61E-003
U-235	0.999	4385.50*	0.00E+000 +/- 4.61E-002	9.98E-002 +/- 1.13E-002
U-238	0.991	4184.40*	5.87E-001 +/- 1.87E-001	6.42E-002 +/- 7.26E-003

AG
6/6/14

0000089837.CNF



WLLFOIA4312 - 001 - 0034953

****
***** 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	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	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	1	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	1	0	0	0	0	0
209:	0	0	3	0	1	0	0	0
217:	0	0	0	0	1	0	0	2
225:	0	1	0	1	0	2	0	2
233:	0	1	2	1	0	0	1	2
241:	3	1	1	2	3	0	1	1
249:	2	1	1	0	2	1	1	0
257:	0	1	0	0	0	0	0	0
265:	1	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	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	1
361:	0	0	0	1	0	0	0	0

369:	1	0	0	0	0	0	0	0

Sample Title: 04

Channel								
377:	0	0	1	0	0	0	0	0
385:	0	0	0	0	0	1	0	0
393:	0	0	0	0	1	0	0	0
401:	0	0	0	0	0	0	0	0
409:	1	0	1	1	0	0	0	0
417:	0	1	0	2	0	0	2	0
425:	0	0	0	1	2	0	4	1
433:	3	2	0	1	2	0	0	0
441:	0	4	1	2	1	1	1	0
449:	0	1	0	0	0	0	0	0
457:	0	0	0	1	0	0	0	1
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	1	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	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	1	0	0	0	1	0	1
545:	0	1	0	0	1	0	0	1
553:	0	0	0	0	1	1	0	0
561:	0	0	0	1	0	1	0	0
569:	0	1	0	0	0	0	1	0
577:	0	3	0	1	0	2	2	3
585:	2	0	2	2	1	2	0	1
593:	2	4	1	1	2	3	3	5
601:	3	2	3	5	2	1	8	10
609:	9	7	8	7	16	7	8	9
617:	5	7	7	3	12	11	8	7
625:	11	10	11	8	10	18	18	15
633:	7	9	11	7	8	7	0	0
641:	1	1	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	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:	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	1	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 6/5/14

Apex-Alpha™

Sample Description: BMAC0008
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-UU
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_003
Chamber Serial Number:
Detector Serial Number: 3
Env. Background: System Bkgd 88275
Reagent Blank: <not performed>

Sample Size: 1.094E+000 +/- 0.000E+000 gram
Sample Date/Time: 5/27/2014 7:36:17 AM
Acquisition Date/Time: 6/5/2014 11:54:38 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.601 mL
Effective Efficiency: 0.2387 +/- 0.0124
Counting Efficiency: 0.1737 +/- 0.0031 on 1/11/2014 12:12:56 PM
Chem. Recovery Factor: 1.3743 +/- 0.0756

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	5.284	458.15	9.17	0.85	0.00E+000	20.8
U-234		4.736	31.15	35.67	0.85	0.00E+000	3.0
U-235		4.345	4.49	98.45	0.51	0.00E+000	3.0
U-238		4.155	41.32	30.78	0.68	0.00E+000	3.7

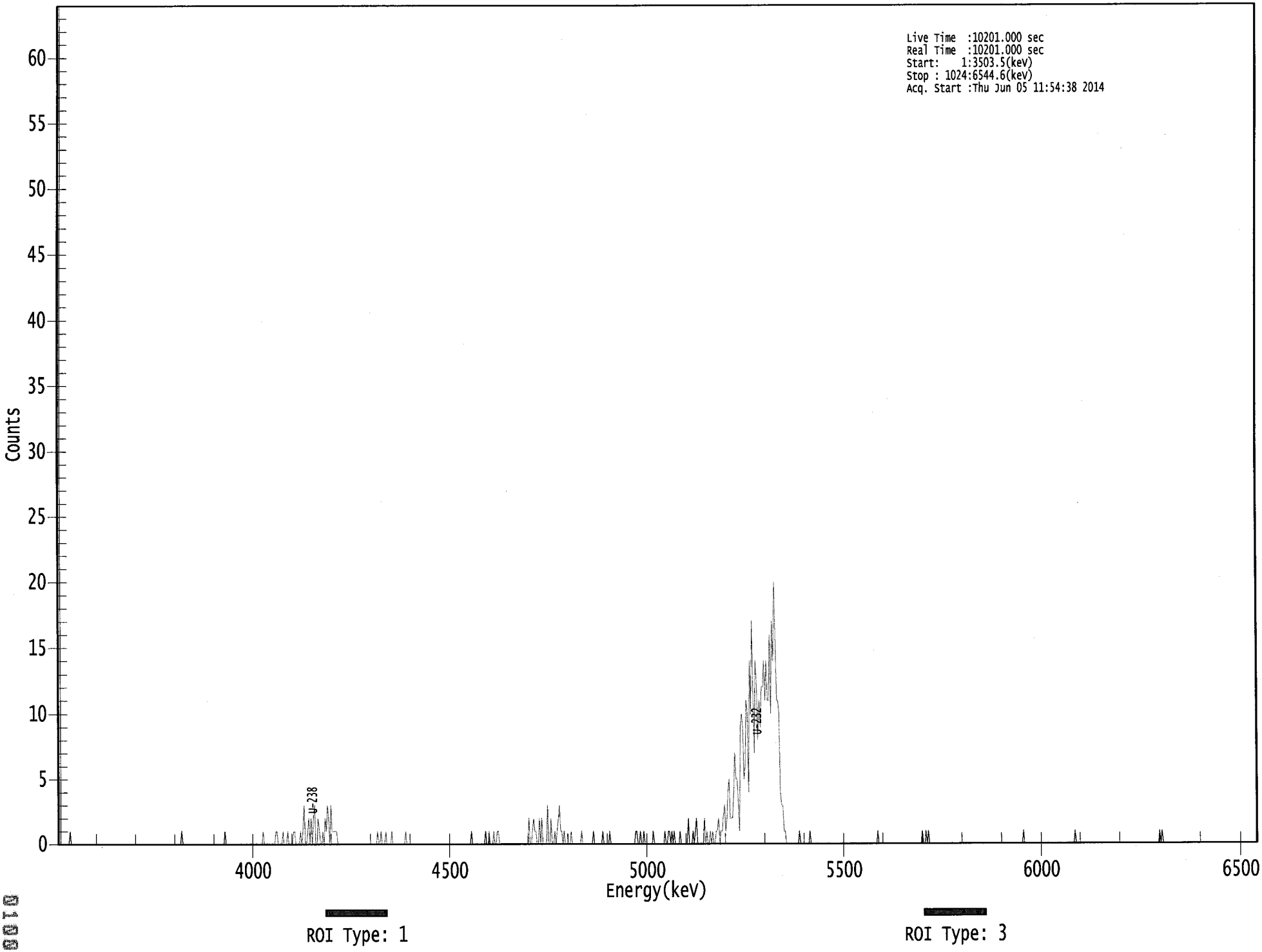
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
U-232	0.997	5302.50*	4.66E+000 +/- 4.76E-001	6.09E-002 +/- 6.22E-003
U-234	0.995	4761.50*	3.17E-001 +/- 1.18E-001	6.09E-002 +/- 6.22E-003
U-235	0.989	4385.50*	5.63E-002 +/- 5.57E-002	6.58E-002 +/- 6.72E-003
U-238	0.994	4184.40*	4.18E-001 +/- 1.36E-001	5.71E-002 +/- 5.83E-003

AG 6/6/14

0000089839.CNF



WLLFOIA4312 - 001 - 0034958

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

Sample Title: 05

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	1	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	1	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	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:	1	0	0	0	0	0	0	0
185:	0	0	0	1	1	0	0	0
193:	0	1	0	0	0	1	0	0
201:	0	0	1	1	0	0	0	0
209:	1	0	1	3	0	0	1	2
217:	0	2	0	2	3	0	0	2
225:	1	0	0	1	0	2	1	3
233:	2	0	3	1	1	1	1	1
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	1	0	0	1	0	0
281:	0	1	0	0	0	0	1	0
289:	0	0	0	0	0	0	0	0
297:	0	0	1	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	1	0	0	0	0	0
361:	0	0	0	0	0	0	1	0

369:	0	1	0	0	0	1	0	0

Sample Title: 05

Channel								
377:	1	1	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	2	0	0	1	2
409:	1	1	0	0	2	0	2	0
417:	0	0	0	3	0	0	2	0
425:	0	1	0	1	2	3	1	1
433:	0	1	0	0	0	0	0	1
441:	0	0	0	0	0	0	0	0
449:	1	0	0	0	0	0	0	0
457:	0	0	1	0	0	0	0	0
465:	0	0	1	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	1	1
497:	0	0	1	0	0	1	0	0
505:	0	0	0	0	0	1	0	0
513:	0	0	0	0	0	0	0	1
521:	0	0	1	1	0	1	0	1
529:	0	0	0	0	1	0	0	0
537:	0	0	0	2	0	0	0	1
545:	0	1	2	0	0	0	0	0
553:	0	2	0	1	0	0	1	0
561:	1	0	0	1	1	2	0	1
569:	1	2	3	1	2	4	5	2
577:	2	2	4	7	5	5	3	1
585:	9	10	9	5	6	11	10	4
593:	14	10	17	12	7	14	12	8
601:	11	9	12	12	14	11	14	11
609:	11	16	10	17	14	20	16	11
617:	11	10	4	3	3	1	1	0
625:	0	0	0	0	0	0	0	0
633:	0	0	1	0	0	0	0	0
641:	0	0	0	1	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	1	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	1	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: 05

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	1	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	1	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	1	0	1
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

6/5/2014 5:36:47 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 6/5/2014
Time : 5:36:47 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	6/5/2014 5:22:29 AM
Alpha_004	21f	ALL	Passed	6/5/2014 5:22:30 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	6/5/2014 5:22:31 AM
Alpha_011	21f	ALL	Passed	6/5/2014 5:22:32 AM
Alpha_012	21f	ALL	Passed	6/5/2014 5:22:32 AM
Alpha_013	21f	ALL	Passed	6/4/2014 5:16:27 AM
Alpha_014	21f	ALL	Passed	6/5/2014 5:22:34 AM
Alpha_015	21f	Peak FWHM	Action	6/5/2014 5:22:35 AM
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Not Done	
Alpha_019	AIM730	ALL	Not Done	
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Not Done	
Alpha_023	AIM730	ALL	Not Done	
Alpha_024	AIM730	ALL	Passed	6/5/2014 5:22:36 AM
Alpha_025	AIM730	ALL	Passed	6/5/2014 5:22:37 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Not Done	
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	6/5/2014 5:22:37 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Passed	6/5/2014 5:22:38 AM
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:39 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:41 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:42 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	6/4/2014 5:16:38 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:43 AM
Alpha_038	Alpha Analyst100DC	Peak Energy	Action	6/5/2014 5:22:45 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:47 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:48 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:50 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:51 AM

Review of QA Results - Pulser Check

6/5/2014 5:36:47 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	Peak CPS	Action	6/5/2014 5:22:53 AM
Alpha_044	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:54 AM
Alpha_045	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:56 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:57 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:59 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:23:00 AM

APPROVED BY: _____

APPROVAL DATE: 6/5/14

```
*********************************************************************
*****          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 THORIUM)

14-05116
ThISO
Run 1

Work Order	14-05116
Analysis Code	ThISO
Run	1
Date Received	5/28/2014
Lab Deadline	6/18/2014
Client	Boston Chemical Data Corp.
Project	ENV
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	EML Th-01 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Th-229
Radiometric Sol#	Th-18a
Tracer Act (dpm/g)	22.465
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		05/28/14 00:00	1.0000E+00
02	MBL	BLANK		05/28/14 00:00	1.0000E+00
03	DUP	BMAC0004	59	05/27/14 00:00	1.0560E+00
04	DO	BMAC0004	59	05/27/14 00:00	1.0560E+00
05	TRG	BMAC0008	49	05/27/14 00:00	1.0940E+00

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

14-05116
ThISO
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	0.4688	10.5		0.00								
02	MBL	0.2342	5.3		0.00								
03	DUP	0.2346	5.3		0.00								
04	DO	0.2340	5.3		0.00								
05	TRG	0.2340	5.3		0.00								

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

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0109

14-05116
ThISO
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			05/30/14 08:58	JWOLFE				
02	MBL			05/30/14 08:58	JWOLFE				
03	DUP			05/30/14 08:58	JWOLFE				
04	DO			05/30/14 08:58	JWOLFE				
05	TRG			05/30/14 08:58	JWOLFE				

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

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-ThISO-1

Client: Boston Chemical Data Corp.
Eberline Services Work Order: 14-05116
Analysis Code: ThISO
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	TH-228	LCS	LCS	pCi/g	4.66E+00	7.84E-01	1.03E-01	4.97E+00	93.79	OK		OK	
02	TH-228	MBL	BLANK	pCi/g	-2.89E-03	3.28E-02	1.00E-01					OK	OK
03	TH-228	DUP	BMAC0004	pCi/g	4.60E-01	1.82E-01	8.85E-02				OK	OK	
04	TH-228	DO	BMAC0004	pCi/g	5.35E-01	1.87E-01	9.16E-02					OK	
05	TH-228	TRG	BMAC0008	pCi/g	4.42E-01	1.61E-01	7.54E-02					OK	

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Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-ThISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Boston Chemical Data Corp.	14-05116	ThISO	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	TH-228	LCS	05/28/14 00:00	1.00E+00	100.05	0.00	0.00			
02	TH-228	MBL	05/28/14 00:00	1.00E+00	92.58	0.00	0.00			
03	TH-228	DUP	05/27/14 00:00	1.06E+00	123.00	0.00	0.00			
04	TH-228	DO	05/27/14 00:00	1.06E+00	112.42	0.00	0.00			
05	TH-228	TRG	05/27/14 00:00	1.09E+00	112.03	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-ThISO-1

Run: 1
Analysis Code: ThISO
Eberline Services Work Order: 14-05116
Client: Boston Chemical Data Corp.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	06/05/14 11:56		A_Spec	Alpha_025	170	3.11 E+02	8.00 E-03	17.7
02	TH-228	MBL	06/05/14 11:56		A_Spec	Alpha_029	170	-1.90 E-01	7.00 E-03	18.8
03	TH-228	DUP	06/05/14 11:56		A_Spec	Alpha_031	170	3.12 E+01	5.00 E-03	13.9
04	TH-228	DO	06/05/14 11:56		A_Spec	Alpha_033	170	4.15 E+01	9.00 E-03	17.5
05	TH-228	TRG	06/05/14 11:56		A_Spec	Alpha_034	170	3.70 E+01	6.00 E-03	18.2

Eberline Services
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-ThISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Boston Chemical Data Corp.	14-05116	ThISO	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	TH-230	LCS	LCS	pCi/g	5.59E+00	9.05E-01	8.99E-02	5.48E+00	102.02	OK		OK	
02	TH-230	MBL	BLANK	pCi/g	1.68E-01	1.07E-01	9.15E-02					OK	OK
03	TH-230	DUP	BMAC0004	pCi/g	5.32E-01	1.99E-01	1.08E-01				OK	OK	
04	TH-230	DO	BMAC0004	pCi/g	6.63E-01	2.10E-01	5.34E-02					OK	
05	TH-230	TRG	BMAC0008	pCi/g	6.39E-01	1.98E-01	4.95E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-ThISO-1

Client: Boston Chemical Data Corp.
Eberline Services Work Order: 14-05116
Analysis Code: ThISO
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	TH-230	LCS	05/28/14 00:00	1.00E+00	100.05	0.00	0.00			
02	TH-230	MBL	05/28/14 00:00	1.00E+00	92.58	0.00	0.00			
03	TH-230	DUP	05/27/14 00:00	1.06E+00	123.00	0.00	0.00			
04	TH-230	DO	05/27/14 00:00	1.06E+00	112.42	0.00	0.00			
05	TH-230	TRG	05/27/14 00:00	1.09E+00	112.03	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-ThISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Boston Chemical Data Corp.	14-05116	ThISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-230	LCS	06/05/14 11:56		A_Spec	Alpha_025	170	3.72 E+02	5.00 E-03	17.7
02	TH-230	MBL	06/05/14 11:56		A_Spec	Alpha_029	170	1.10 E+01	0.00 E+00	18.8
03	TH-230	DUP	06/05/14 11:56		A_Spec	Alpha_031	170	3.63 E+01	1.00 E-02	13.9
04	TH-230	DO	06/05/14 11:56		A_Spec	Alpha_033	170	5.18 E+01	1.00 E-03	17.5
05	TH-230	TRG	06/05/14 11:56		A_Spec	Alpha_034	170	5.38 E+01	1.00 E-03	18.2

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-ThISO-1

Run: 1
Analysis Code: ThISO
Eberline Services Work Order: 14-05116
Client: Boston Chemical Data Corp.

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	TH-232	LCS	LCS	pCi/g	5.05E+00	8.33E-01	7.17E-02	4.97E+00	101.57	OK		OK	
02	TH-232	MBL	BLANK	pCi/g	1.26E-02	3.03E-02	6.35E-02					OK	OK
03	TH-232	DUP	BMAC0004	pCi/g	4.46E-01	1.80E-01	1.04E-01				OK	OK	
04	TH-232	DO	BMAC0004	pCi/g	3.81E-01	1.50E-01	5.33E-02					OK	
05	TH-232	TRG	BMAC0008	pCi/g	3.42E-01	1.36E-01	4.94E-02					OK	

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Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-ThISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Boston Chemical Data Corp.	14-05116	ThISO	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	TH-232	LCS	05/28/14 00:00	1.00E+00	100.05	0.00	0.00			
02	TH-232	MBL	05/28/14 00:00	1.00E+00	92.58	0.00	0.00			
03	TH-232	DUP	05/27/14 00:00	1.06E+00	123.00	0.00	0.00			
04	TH-232	DO	05/27/14 00:00	1.06E+00	112.42	0.00	0.00			
05	TH-232	TRG	05/27/14 00:00	1.09E+00	112.03	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-ThISO-1

Run: 1
Analysis Code: ThISO
Eberline Services Work Order: 14-05116
Client: Boston Chemical Data Corp.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	06/05/14 11:56		A_Spec	Alpha_025	170	3.37 E+02	2.00 E-03	17.7
02	TH-232	MBL	06/05/14 11:56		A_Spec	Alpha_029	170	8.30 E-01	1.00 E-03	18.8
03	TH-232	DUP	06/05/14 11:56		A_Spec	Alpha_031	170	3.05 E+01	9.00 E-03	13.9
04	TH-232	DO	06/05/14 11:56		A_Spec	Alpha_033	170	2.98 E+01	1.00 E-03	17.5
05	TH-232	TRG	06/05/14 11:56		A_Spec	Alpha_034	170	2.88 E+01	1.00 E-03	18.2

Count Room Report
Client: Boston Chemical Data Corp

14-05116-ThISO-1 (pCi/g) in SO
Tracer ID: Th-18a

	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*
27	01	LCS	LCS	05/28/14 00:00	1.0000	0.4688	10.5316		0.00		
	02	MBL	BLANK	05/28/14 00:00	1.0000	0.2342	5.2613		0.00		
71	03	DUP	BMAC0004	05/27/14 00:00	1.0560	0.2346	5.2703		0.00		
37	04	DO	BMAC0004	05/27/14 00:00	1.0560	0.2340	5.2568		0.00		
74	05	TRG	BMAC0008	05/27/14 00:00	1.0940	0.2340	5.2568		0.00		

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 5/30/2014 8:58 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
14-05116	1	ThISO	5/30/2014 8:57	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
Th-228	Th-8b	103.560	5/30/2014	0.100	0.1065				4.97	0.179	0.00	0.000	0.00	0.000	0.00	0.000
Th-230	Th-1b	23.525	5/30/2014	0.500	0.5169				5.48	0.148	0.00	0.000	0.00	0.000	0.00	0.000
Th-232	Th-8b	103.560	5/30/2014	0.100	0.1065				4.97	0.179	0.00	0.000	0.00	0.000	0.00	0.000
Tc-99 MS	Tc-2a	22043.688	10/16/2013	0.1												

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Th-229	Th-18a	22.465	5/30/2014	0.4688	0.2200
02	Th-229	Th-18a	22.465	5/30/2014	0.2342	0.2200
03	Th-229	Th-18a	22.465	5/30/2014	0.2346	0.2200
04	Th-229	Th-18a	22.465	5/30/2014	0.2340	0.2200
05	Th-229	Th-18a	22.465	5/30/2014	0.2340	0.2200

Balance Printer Tapes

Tracer

0.4688 g
0.2342 g
0.2346 g
0.2340 g
0.2340 g

LCS

0.5169 g
0.1065 g

Matrix Spike

Version 2.0 08/99

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Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
14-05116	1	ThISO	grams	6/18/2014	JWOLFE

Lab Fraction	Boston Chemical Data Corp. 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	BMAC0004	DUP		1	18.94	5.28E-02	2.0000E+01	1.0560E+00				
04	BMAC0004	DO		1	18.94	5.28E-02	2.0000E+01	1.0560E+00				
05	BMAC0008	TRG		1	18.28	5.47E-02	2.0000E+01	1.0940E+00				

Comments	

Technician: _____ Date: ____/____/____

WLLFOIA4312 - 001 - 0034980
0122

EBERLINE SERVICES	Internal Work Order	14-05116
	Fraction	> 03 <
Dilution Worksheet	Analysis Code	ThISO
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**5.28**	ml	from the original sample and diluted it to	**100**	ml	0.0528
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	**0.0528**
Dilution Factor	**18.93939394**

Diluted by: JW Date: 5/30/14

WLLFOIA4312 - 001 - 0034981
0123

EBERLINE SERVICES	Internal Work Order	14-05116
	Fraction	> 04 <
Dilution Worksheet	Analysis Code	ThISO
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**5.28**	ml	from the original sample and diluted it to	**100**	ml	0.0528
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	**0.0528**
Dilution Factor	**18.93939394**

Diluted by: JW Date: 5/30/14

EBERLINE SERVICES	Internal Work Order	14-05116
	Fraction	> 05 <
Dilution Worksheet	Analysis Code	ThISO
	Run Number	1
	Analyst	JWOLFE

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	**5.47**	ml	from the original sample and diluted it to	**100**	ml	0.0547
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	**0.0547**
Dilution Factor	**18.28153565**

Diluted by: JW Date: 5/30/14

WLLFOIA4312 - 001 - 0034983
0125

Eberline Services - Oak Ridge
Version 2.0 8/1999

Muffle Worksheet

Work Order	Aliquot Units	Lab Deadline	Technician
14-05116	grams	6/18/2014	KSALLINGS

Eberline Fraction	Boston Chemical Data Corp. Client ID	Tare Crucible Wt	Muffle Data Pre Wt/Vol	Muffle Data Post Wt/Vol	Muffle Calculations Pre Net Wt/Vol	Muffle Calculations Post-Net Wt/Vol	Muffle Calculations Ratio Post/Pre
04	BMAC0004	104.6100	109.8900		5.2800		
05	BMAC0008	99.4000	104.8700		5.4700		

Comments

Technician: Henry Sales Date: 5/28/14

Analysis: ThISO

Apex-Alpha™

RB 6/5/14

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-TH
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_025
Chamber Serial Number:
Detector Serial Number: 25
Env. Background: System Bkgd 88284
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 6/5/2014 7:40:31 AM
Acquisition Date/Time: 6/5/2014 11:56:05 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.469 mL
Effective Efficiency: 0.1768 +/- 0.0114
Counting Efficiency: 0.1767 +/- 0.0031 on 1/11/2014 3:20:19 PM
Chem. Recovery Factor: 1.0005 +/- 0.0666

Control Certificate Name: NatTh_Th-8
Chem. Recov. of Control: TH-232 1.015676 +/- 0.090848
Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.863	19.83	44.23	0.17	0.00E+000	3.1
TH-228		5.336	310.64	11.15	1.36	0.00E+000	6.6
TH-229	T	4.861	316.49	11.03	0.51	0.00E+000	6.8
TH-230		4.607	372.15	10.17	0.85	0.00E+000	19.4
TH-232		3.932	336.66	10.69	0.34	0.00E+000	13.5

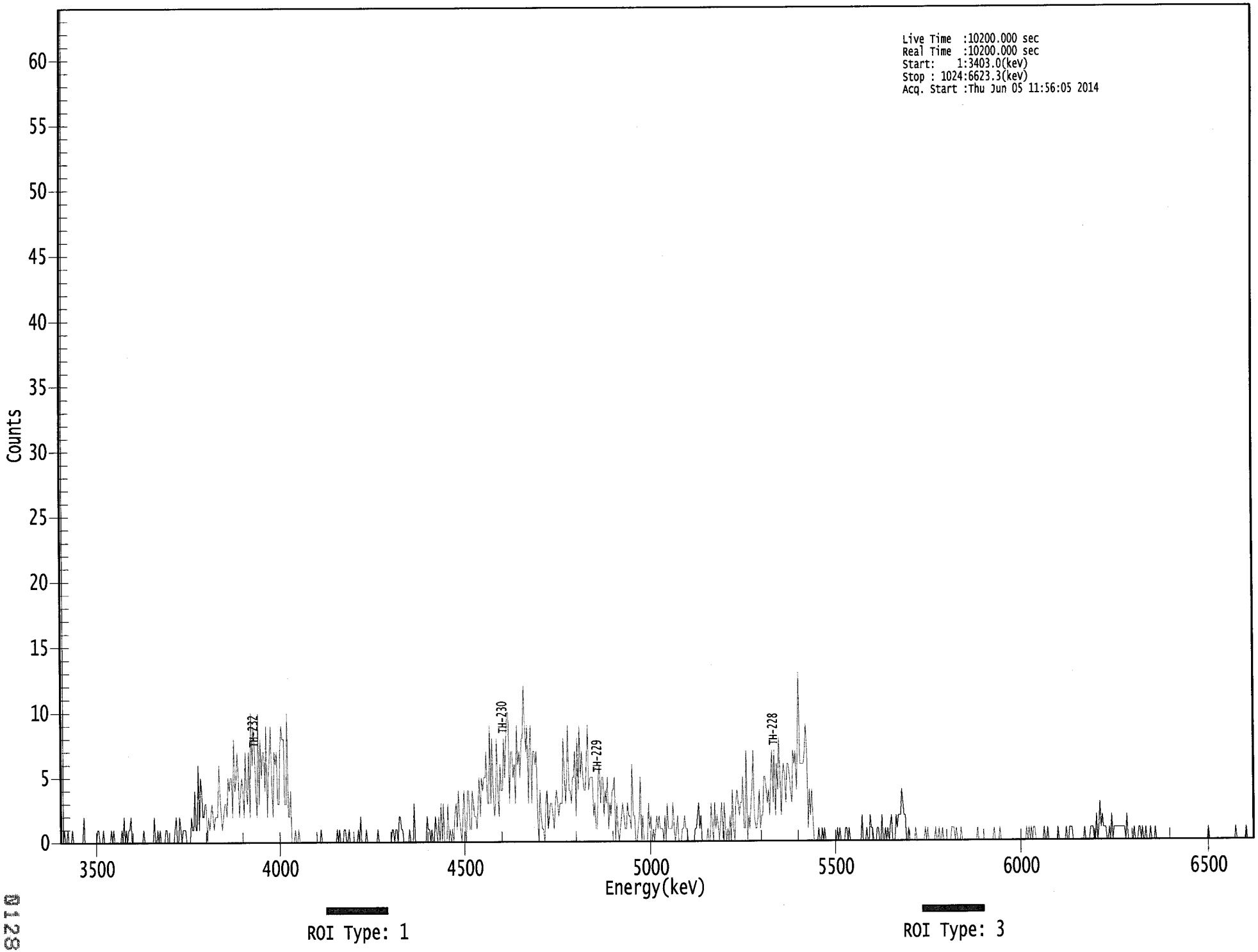
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
TH-227	0.999	5850.00*	3.05E-001 +/- 1.40E-001	6.42E-002 +/- 8.08E-003
TH-228	0.979	5400.00*	4.66E+000 +/- 7.84E-001	1.03E-001 +/- 1.29E-002
TH-229	0.999	4872.00*	4.77E+000 +/- 6.00E-001	7.90E-002 +/- 9.95E-003
TH-230	0.978	4672.00*	5.59E+000 +/- 9.05E-001	8.99E-002 +/- 1.13E-002
TH-232	0.978	3997.00*	5.05E+000 +/- 8.33E-001	7.17E-002 +/- 9.02E-003

AG 6/6/14

0000089848.CNF



WLLFOIA4312 - 001 - 0034986

****
***** 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:	10200	10200	0	1	0	0	1	0
9:	0	0	1	0	0	0	0	0
17:	0	0	0	0	2	0	0	0
25:	0	0	0	0	0	0	0	0
33:	1	1	0	0	0	1	0	0
41:	0	0	0	0	1	0	1	0
49:	0	0	0	0	0	1	0	2
57:	0	1	0	1	1	2	0	0
65:	0	0	0	0	0	0	0	0
73:	1	0	0	0	0	0	0	0
81:	0	2	0	0	1	0	1	0
89:	0	0	0	1	1	0	0	0
97:	0	0	0	1	2	0	0	2
105:	1	0	1	1	1	0	0	0
113:	0	2	1	1	4	1	1	6
121:	1	5	4	2	2	3	3	0
129:	2	1	2	3	2	1	2	2
137:	2	6	4	2	1	2	3	3
145:	2	5	4	5	5	2	8	4
153:	5	7	5	2	4	5	4	2
161:	7	4	3	7	2	10	6	9
169:	7	4	2	10	3	8	5	7
177:	7	4	9	2	5	7	9	4
185:	2	7	6	7	3	3	7	9
193:	8	8	3	3	10	2	2	4
201:	0	0	0	1	0	0	1	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	1
241:	0	1	0	0	0	1	1	0
249:	0	1	0	0	0	0	0	0
257:	0	1	0	2	0	0	0	0
265:	1	0	0	0	0	0	0	0
273:	0	0	1	0	0	0	0	0
281:	0	0	0	0	0	0	1	1
289:	0	1	1	0	2	2	1	1
297:	0	0	0	0	0	1	0	0
305:	0	3	0	0	0	0	0	0
313:	0	0	0	0	2	1	1	0
321:	1	0	0	2	1	0	2	0
329:	3	0	3	0	0	0	3	0
337:	1	0	1	0	2	3	1	4
345:	2	1	0	2	4	1	0	4
353:	4	1	1	4	3	2	2	1
361:	3	5	2	5	4	5	5	7

369:	3	3	9	3	8	4	2	3

Sample Title: 01

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

801:	0	0	1	0	0	0	0	1

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	1	0
833:	1	0	1	0	1	1	0	0
841:	0	0	0	0	0	1	0	0
849:	1	0	0	0	0	0	0	0
857:	0	1	0	0	0	0	0	0
865:	1	0	0	1	1	1	0	0
873:	0	0	0	0	0	0	0	0
881:	1	0	0	0	0	1	1	1
889:	0	0	2	0	1	3	1	2
897:	1	1	1	0	0	1	0	2
905:	0	1	1	1	1	1	1	1
913:	1	1	1	0	2	0	0	0
921:	0	0	1	0	0	0	1	1
929:	0	1	0	0	1	0	0	0
937:	1	0	0	0	1	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:	1	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	1
1009:	0	0	0	0	0	0	0	0
1017:	1	0	0	0	0	0	0	0

KB 6/5/14

Apex-Alpha™

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-TH
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_029
Chamber Serial Number:
Detector Serial Number: 29
Env. Background: System Bkgd 88285
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 gram
Sample Date/Time: 6/5/2014 7:40:31 AM
Acquisition Date/Time: 6/5/2014 11:56:06 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.234 mL
Effective Efficiency: 0.1740 +/- 0.0150
Counting Efficiency: 0.1880 +/- 0.0033 on 1/11/2014 3:20:19 PM
Chem. Recovery Factor: 0.9258 +/- 0.0815

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.765	0.98	294.84	1.02	0.00E+000	3.1
TH-228		5.344	-0.19	1131.2	1.19	0.00E+000	3.1
TH-229	T	4.875	155.64	15.79	1.36	0.00E+000	9.9
TH-230		4.659	11.00	61.72	0.00	0.00E+000	3.1
TH-232		3.827	0.83	239.53	0.17	0.00E+000	3.1

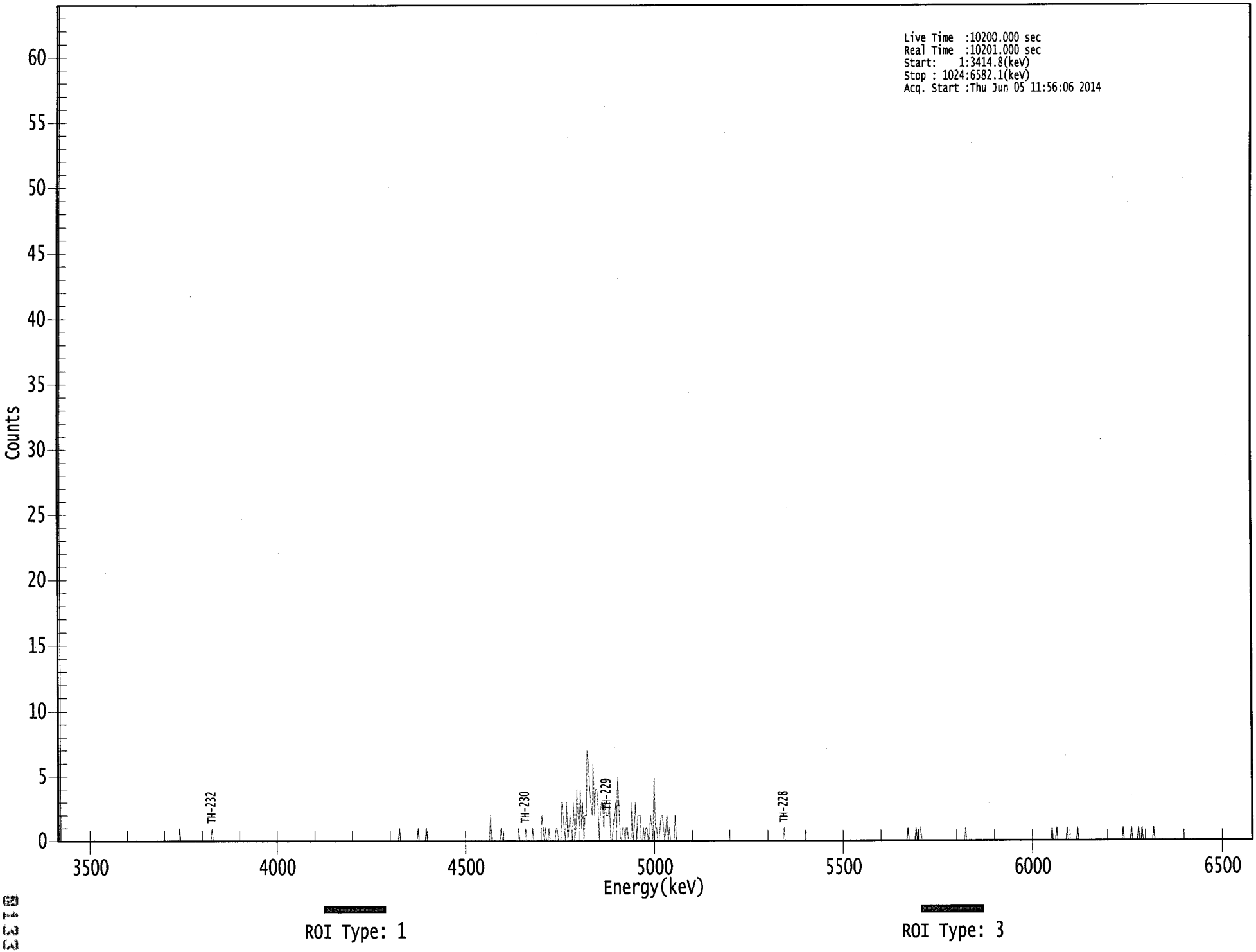
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
TH-227	0.963	5850.00*	1.53E-002 +/- 4.52E-002	9.84E-002 +/- 1.66E-002
TH-228	0.984	5400.00*	-2.89E-003 +/- 3.28E-002	1.00E-001 +/- 1.70E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 4.03E-001	1.05E-001 +/- 1.77E-002
TH-230	0.999	4672.00*	1.68E-001 +/- 1.07E-001	9.15E-002 +/- 1.55E-002
TH-232	0.859	3997.00*	1.26E-002 +/- 3.03E-002	6.35E-002 +/- 1.08E-002

AG 6/6/14

0000089849.CNF



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

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	10201	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	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	1	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	1	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	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	0	0	0	0
289:	0	0	0	0	0	0	1	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	1	0
313:	0	0	0	0	0	1	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	2	0	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	0	1	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	1	0	0	0
401:	0	0	1	0	0	0	0	0
409:	1	0	0	0	0	0	0	0
417:	2	1	0	1	0	0	1	0
425:	0	0	0	0	1	1	0	0
433:	0	3	2	1	0	3	0	1
441:	2	1	0	3	0	1	4	2
449:	1	4	1	3	0	2	2	7
457:	6	4	3	2	6	2	4	4
465:	3	0	2	3	3	1	3	2
473:	2	2	3	0	0	1	2	3
481:	1	5	3	0	0	1	1	0
489:	1	1	0	0	0	3	0	1
497:	3	0	2	2	2	0	0	1
505:	0	1	1	0	0	2	1	0
513:	5	1	1	0	0	1	2	2
521:	1	0	1	2	0	1	0	0
529:	0	0	2	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	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	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	1	0	0	0	0	0	0
737:	1	0	0	0	1	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	1	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	1	0	0	0
857:	1	0	0	0	0	0	0	0
865:	0	1	0	0	0	0	0	0
873:	0	0	1	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	1	0	0	0	0	0	0
921:	1	0	0	0	0	0	1	0
929:	0	1	0	0	0	0	0	0
937:	0	0	0	1	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™

ICB 6/5/14

Sample Description: BMAC0004-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-TH
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_031
Chamber Serial Number:
Detector Serial Number: 31
Env. Background: System Bkgd 88286
Reagent Blank: <not performed>

Sample Size: 1.056E+000 +/- 0.000E+000 gram
Sample Date/Time: 5/27/2014 7:40:31 AM
Acquisition Date/Time: 6/5/2014 11:56:07 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.235 mL
Effective Efficiency: 0.1715 +/- 0.0149
Counting Efficiency: 0.1394 +/- 0.0025 on 1/11/2014 3:24:01 PM
Chem. Recovery Factor: 1.2300 +/- 0.1091

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.827	5.15	94.34	0.85	0.00E+000	3.1
TH-228		5.352	31.15	35.67	0.85	0.00E+000	4.7
TH-229	T	4.873	153.64	15.89	1.36	0.00E+000	4.9
TH-230		4.625	36.30	33.41	1.70	0.00E+000	3.1
TH-232		3.969	30.47	36.54	1.53	0.00E+000	4.7

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
TH-227	0.997	5850.00*	7.73E-002 +/- 7.41E-002	8.99E-002 +/- 1.53E-002
TH-228	0.988	5400.00*	4.60E-001 +/- 1.82E-001	8.85E-002 +/- 1.51E-002
TH-229	1.000	4872.00*	2.26E+000 +/- 3.84E-001	1.01E-001 +/- 1.72E-002
TH-230	0.989	4672.00*	5.32E-001 +/- 1.99E-001	1.08E-001 +/- 1.83E-002
TH-232	0.996	3997.00*	4.46E-001 +/- 1.80E-001	1.04E-001 +/- 1.77E-002

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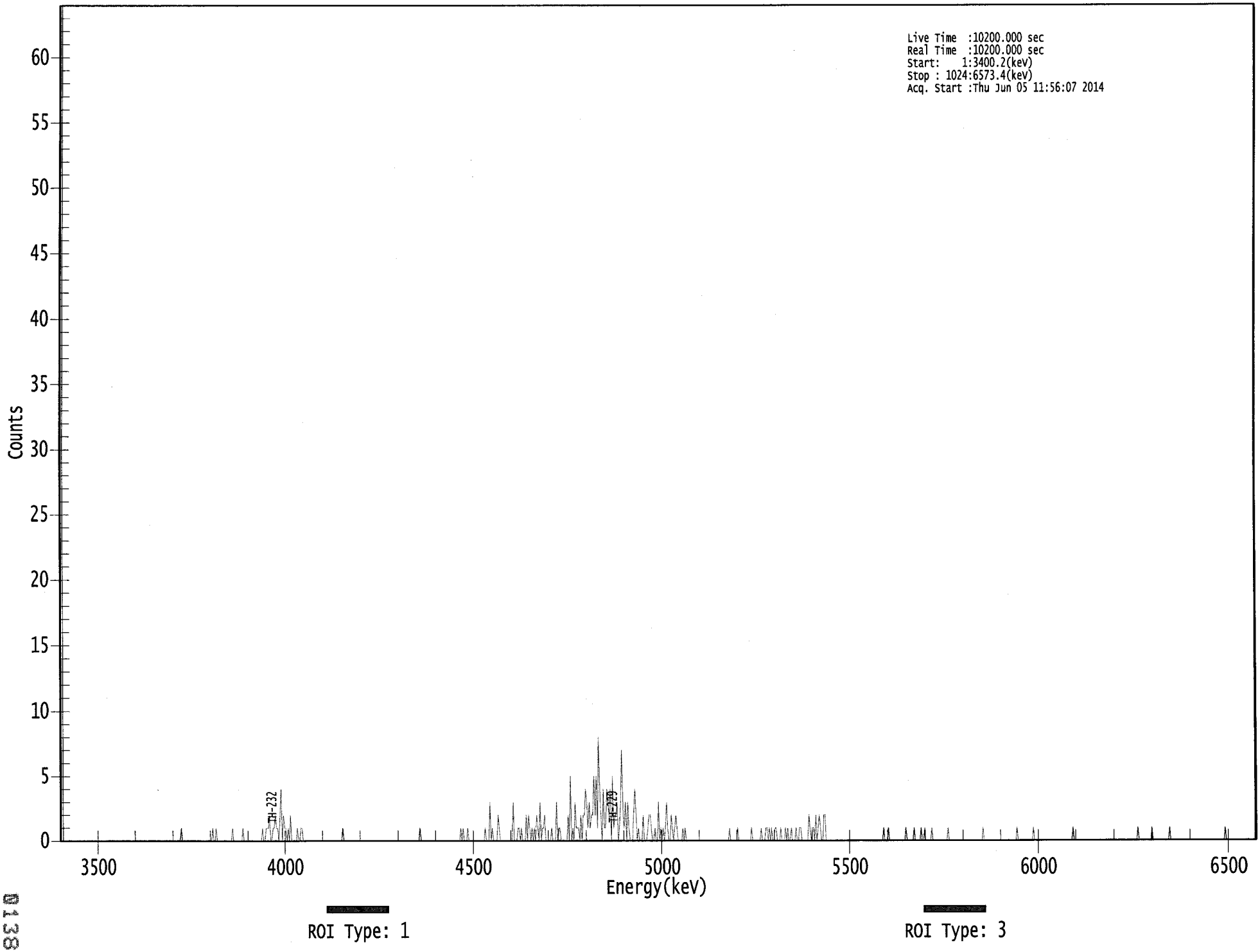
0000089850.CNF



WLLFOIA4312 - 001 - 0034996

****
***** 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:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	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	1	0	0	1	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	1	0	0	0
153:	0	0	0	0	0	1	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	0
177:	0	1	1	1	2	0	0	1
185:	1	2	1	1	0	2	4	0
193:	2	1	1	0	1	0	2	0
201:	0	0	0	0	1	0	0	1
209:	1	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	1	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	1	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:	1	0	1	0	0	0	1	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	1	0	0

369:	0	3	0	1	0	0	0	0

Sample Title: 03

Channel								
377:	2	1	0	0	0	0	0	0
385:	0	0	0	0	0	3	0	0
393:	0	1	1	0	1	0	0	0
401:	2	0	2	1	0	1	0	1
409:	0	2	1	0	3	0	1	1
417:	2	0	0	0	0	0	1	0
425:	0	0	3	0	1	1	0	0
433:	0	0	0	0	2	0	5	0
441:	1	0	3	1	1	1	0	2
449:	0	2	2	4	3	1	3	1
457:	2	2	5	2	5	1	8	4
465:	2	0	4	1	1	4	3	2
473:	4	0	5	1	2	2	3	0
481:	1	3	7	2	1	3	0	3
489:	1	0	0	0	2	4	2	0
497:	1	0	0	0	2	0	0	0
505:	1	2	2	1	0	0	1	0
513:	0	3	0	1	0	1	0	1
521:	3	1	0	0	2	1	0	1
529:	2	1	0	0	0	0	1	0
537:	1	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	1	0	0
585:	0	0	0	0	0	0	0	0
593:	0	1	0	0	0	0	0	0
601:	0	1	0	0	0	1	1	0
609:	1	0	1	0	0	1	1	0
617:	0	0	1	0	0	0	1	0
625:	1	0	0	1	0	0	0	1
633:	0	0	1	1	0	0	0	0
641:	0	0	2	1	0	1	1	0
649:	2	0	1	2	1	0	0	2
657:	2	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	1	0	0	0	1	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	1	0	0
729:	0	0	0	0	1	0	0	0
737:	0	0	1	0	0	1	0	0
745:	0	0	0	1	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	1
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	1	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	1	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	1	0	0	0	0
929:	0	0	0	0	0	0	0	1
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	1	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	1	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

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Apex-Alpha™

Sample Description: BMAC0004
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-TH
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_033
Chamber Serial Number: 04026479A
Detector Serial Number: 91132
Env. Background: System Bkgd 88287
Reagent Blank: <not performed>

Sample Size: 1.056E+000 +/- 0.000E+000 gram
Sample Date/Time: 5/27/2014 7:40:31 AM
Acquisition Date/Time: 6/5/2014 11:56:22 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.234 mL
Effective Efficiency: 0.1966 +/- 0.0161
Counting Efficiency: 0.1749 +/- 0.0031 on 1/11/2014 6:35:58 PM
Chem. Recovery Factor: 1.1242 +/- 0.0939

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.844	9.83	63.14	0.17	0.00E+000	3.0
TH-228		5.369	41.47	31.09	1.53	0.00E+000	3.5
TH-229	T	4.870	175.66	14.81	0.34	0.00E+000	4.5
TH-230		4.630	51.83	27.28	0.17	0.00E+000	3.0
TH-232		3.966	29.83	36.01	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
TH-227	1.000	5850.00*	1.29E-001 +/- 8.39E-002	5.47E-002 +/- 8.75E-003
TH-228	0.995	5400.00*	5.35E-001 +/- 1.87E-001	9.16E-002 +/- 1.47E-002
TH-229	1.000	4872.00*	2.25E+000 +/- 3.61E-001	6.13E-002 +/- 9.81E-003
TH-230	0.991	4672.00*	6.63E-001 +/- 2.10E-001	5.34E-002 +/- 8.54E-003
TH-232	0.995	3997.00*	3.81E-001 +/- 1.50E-001	5.33E-002 +/- 8.53E-003

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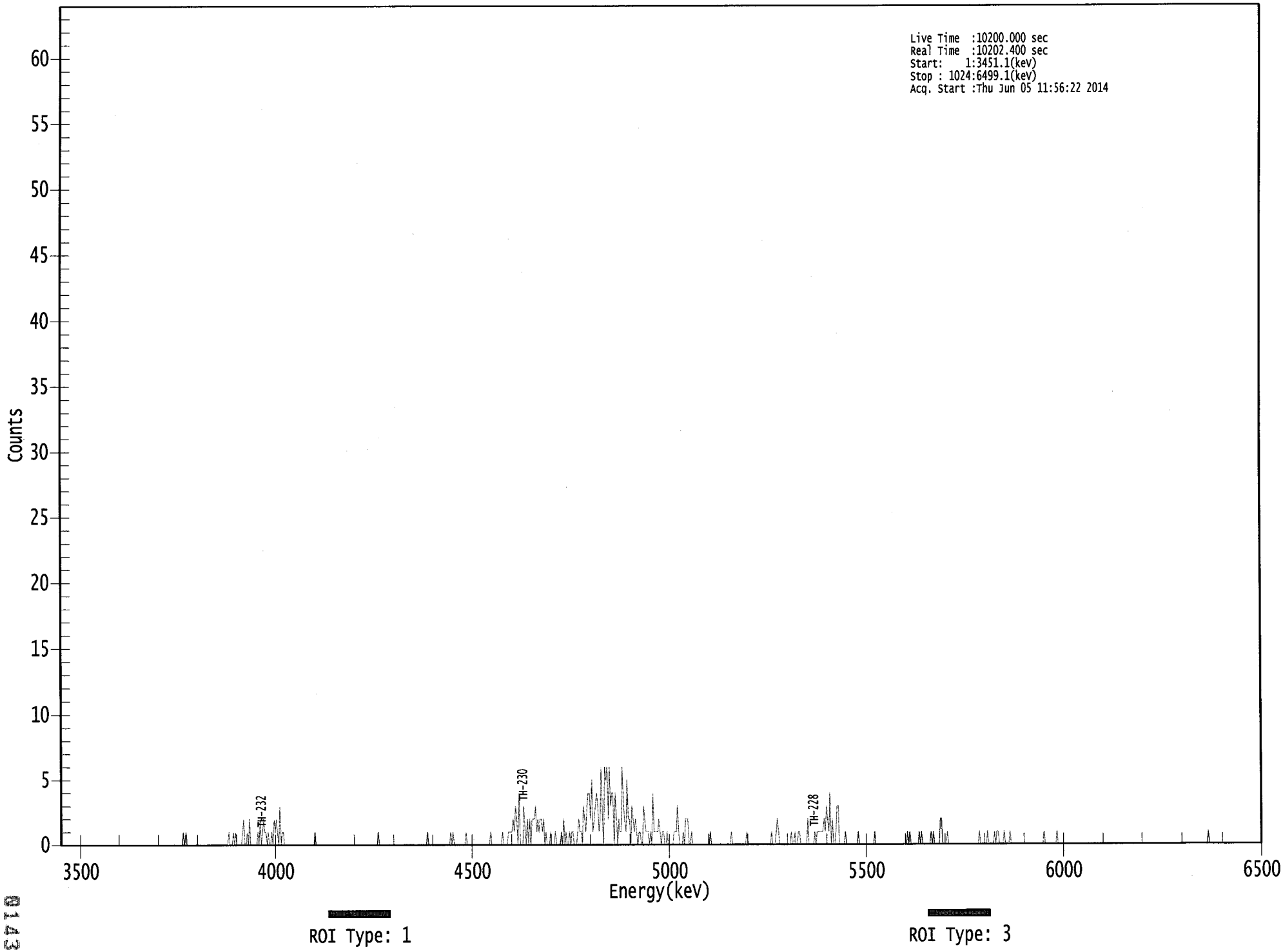
0000089851.CNF



WLLFOIA4312 - 001 - 0035001

****
***** 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: 10202

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	1	0	1	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	1	0	1	0
153:	0	0	0	0	1	2	0	0
161:	1	0	2	0	0	0	0	0
169:	0	1	0	2	0	1	2	1
177:	1	0	1	0	0	1	0	2
185:	1	2	1	0	3	0	1	1
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	1	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:	1	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	1	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	1	0
337:	1	0	0	0	0	0	0	0
345:	0	0	0	1	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	1	0	0	0	0	0	0	0

Sample Title: 04

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

801:	1	0	0	0	0	1	0	0

Sample Title: 04

Channel								
809:	0	0	1	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	1
841:	0	0	0	0	0	0	0	0
849:	0	0	1	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	1	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 6/5/14

Apex-Alpha™

Sample Description: BMAC0008
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000898
Batch Identification: 1405116A-TH
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_034
Chamber Serial Number: 04026479B
Detector Serial Number: 91136
Env. Background: System Bkgd 88288
Reagent Blank: <not performed>

Sample Size: 1.094E+000 +/- 0.000E+000 gram
Sample Date/Time: 5/27/2014 7:40:31 AM
Acquisition Date/Time: 6/5/2014 11:56:24 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.234 mL
Effective Efficiency: 0.2044 +/- 0.0164
Counting Efficiency: 0.1825 +/- 0.0032 on 4/12/2014 4:05:34 PM
Chem. Recovery Factor: 1.1203 +/- 0.0921

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.888	5.00	96.02	0.00	0.00E+000	3.0
TH-228		5.343	36.98	32.75	1.02	0.00E+000	5.2
TH-229	T	4.852	182.66	14.52	0.34	0.00E+000	7.4
TH-230		4.607	53.83	26.76	0.17	0.00E+000	4.4
TH-232		3.934	28.83	36.63	0.17	0.00E+000	5.9

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/gram)	MDA (pCi/gram)
TH-227	0.992	5850.00*	6.08E-002 +/- 5.92E-002	7.29E-002 +/- 1.15E-002
TH-228	0.983	5400.00*	4.42E-001 +/- 1.61E-001	7.54E-002 +/- 1.19E-002
TH-229	0.998	4872.00*	2.17E+000 +/- 3.42E-001	5.69E-002 +/- 8.96E-003
TH-230	0.978	4672.00*	6.39E-001 +/- 1.98E-001	4.95E-002 +/- 7.80E-003
TH-232	0.980	3997.00*	3.42E-001 +/- 1.36E-001	4.94E-002 +/- 7.78E-003

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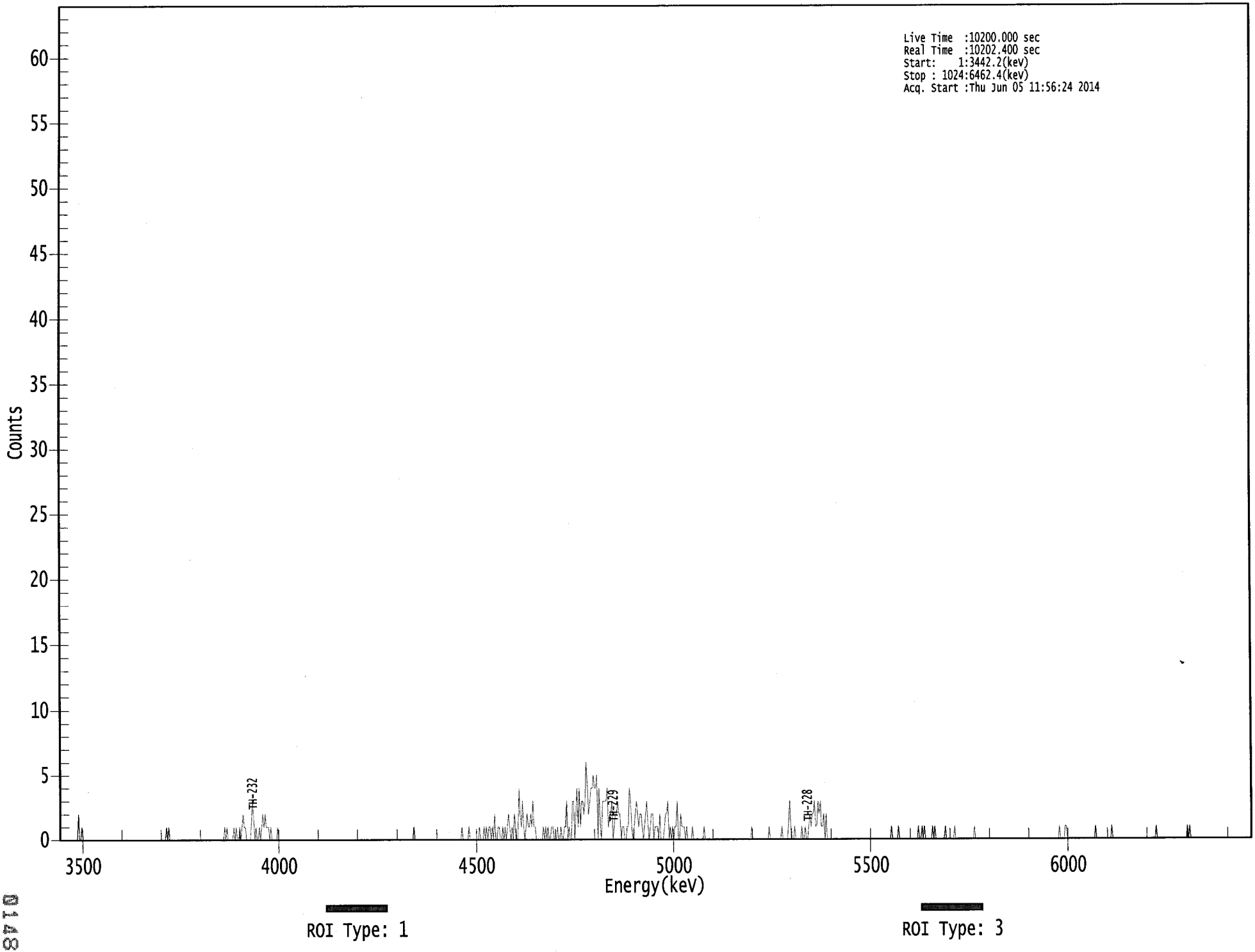
0000089852.CNF



WLLFOIA4312 - 001 - 0035006

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

Sample Title: 05

Elapsed Live time: 10200
Elapsed Real Time: 10202

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	2	0	0	1	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	1	0	1	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	1	0
145:	1	0	0	0	0	0	1	0
153:	1	0	0	1	0	1	2	1
161:	1	0	0	0	0	1	3	2
169:	0	1	0	0	1	0	1	2
177:	1	2	1	1	1	0	1	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	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	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	1	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:	1	0	0	0	0	0	0	0
361:	0	1	0	0	0	1	0	1

369:	0	1	1	0	1	0	2	0

Sample Title: 05

Channel								
377:	0	1	1	0	0	1	0	1
385:	0	1	2	1	0	1	0	2
393:	1	0	0	4	2	1	3	1
401:	0	1	2	1	1	2	1	3
409:	1	1	0	0	0	0	0	0
417:	1	0	1	0	1	0	0	1
425:	1	0	0	0	1	0	0	1
433:	0	0	1	1	3	0	1	0
441:	0	3	3	0	2	4	1	4
449:	1	3	3	2	3	6	4	2
457:	3	4	4	5	4	4	5	0
465:	4	1	0	3	3	3	3	4
473:	1	2	2	3	0	1	2	2
481:	3	2	2	0	1	1	0	0
489:	1	1	4	3	1	0	1	2
497:	3	2	1	2	2	1	0	1
505:	2	3	1	0	1	2	2	0
513:	1	1	1	0	2	0	0	0
521:	1	2	2	3	0	1	0	1
529:	0	1	1	3	0	0	2	1
537:	1	1	0	1	0	0	0	0
545:	1	0	0	0	0	0	0	0
553:	0	0	1	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	1	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	1	0	0	0	0	0
617:	0	0	0	0	0	1	0	0
625:	0	0	0	2	3	0	0	0
633:	1	0	0	0	0	0	1	0
641:	0	1	0	0	1	2	1	2
649:	2	3	1	1	3	2	3	1
657:	1	2	0	2	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	1	0	0	0	0
721:	0	1	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	1	0	0	1	0	1
745:	0	0	0	0	0	0	1	0
753:	1	0	0	0	0	0	0	0
761:	0	1	0	0	0	0	0	0
769:	0	1	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	1	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: 05

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	1	0	0	0	0
865:	1	1	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	1	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	1	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	1	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:	1	0	1	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

6/5/2014 5:36:47 AM

Apex-Alpha™

QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 6/5/2014
Time : 5:36:47 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	6/5/2014 5:22:29 AM
Alpha_004	21f	ALL	Passed	6/5/2014 5:22:30 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	6/5/2014 5:22:31 AM
Alpha_011	21f	ALL	Passed	6/5/2014 5:22:32 AM
Alpha_012	21f	ALL	Passed	6/5/2014 5:22:32 AM
Alpha_013	21f	ALL	Passed	6/4/2014 5:16:27 AM
Alpha_014	21f	ALL	Passed	6/5/2014 5:22:34 AM
Alpha_015	21f	Peak FWHM	Action	6/5/2014 5:22:35 AM
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Not Done	
Alpha_019	AIM730	ALL	Not Done	
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Not Done	
Alpha_023	AIM730	ALL	Not Done	
Alpha_024	AIM730	ALL	Passed	6/5/2014 5:22:36 AM
Alpha_025	AIM730	ALL	Passed	6/5/2014 5:22:37 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Not Done	
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	6/5/2014 5:22:37 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Passed	6/5/2014 5:22:38 AM
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:39 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:41 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:42 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	6/4/2014 5:16:38 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:43 AM
Alpha_038	Alpha Analyst100DC	Peak Energy	Action	6/5/2014 5:22:45 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:47 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:48 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:50 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:51 AM

Review of QA Results - Pulser Check

6/5/2014 5:36:47 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	Peak CPS	Action	6/5/2014 5:22:53 AM
Alpha_044	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:54 AM
Alpha_045	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:56 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:57 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:22:59 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	6/5/2014 5:23:00 AM

APPROVED BY: _____

APPROVAL DATE: 6/5/14

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

Nuclide Library Title: Thorium

Nuclide Library Description: Th-227,-228,-229,-230,-232

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert.(Abs.+-)
TH-227	6.873E+008	5850.000*	0.000	97.5000	0.0000
TH-228	6.034E+007	5400.000*	0.000	99.9400	0.0000
TH-229	2.487E+011	4872.000*	0.000	99.5200	0.0000
TH-230	2.379E+012	4672.000*	0.000	99.8200	0.0000
TH-232	4.434E+017	3997.000*	0.000	100.0000	0.0000

* = key line

TOTALS: 5 Nuclides 5 Energy Lines

SECTION X

ANALYTICAL DATA (GAMMA LEPS)

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

14-05116
GLEPS
Run 1

Work Order	14-05116
Analysis Code	GLEPS
Run	1
Date Received	5/28/2014
Lab Deadline	6/18/2014
Client	Boston Chemical Data Corp.
Project	ENV
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		05/28/14 00:00	1.0000E+00
02	MBL	BLANK		05/28/14 00:00	1.0000E+00
03	DUP	BMAC0004	59	05/27/14 00:00	6.0210E+01
04	DO	BMAC0004	59	05/27/14 00:00	6.0210E+01
05	TRG	BMAC0008	49	05/27/14 00:00	1.0097E+02

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

WLLFOIA4312 - 001 - 0035014
0155

14-05116
GLEPS
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								
05	TRG				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.

14-05116
GLEPS
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								
05	TRG								

* 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

Preliminary Data Report & Analytical Calculations

Work Order: 14-05116-GLEPS-1

Printed: 5/29/2014 3:04 PM

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	AM-241	LCS	LCS	pCi/g	3.74E+03	3.62E+02	1.20E+01	3.72E+03	100.60	OK		05/28/14 00:00	1.00E+00	05/28/14 15:58	YES
01	CO-57	LCS	LCS	pCi/g	1.30E+03	1.19E+02	2.15E+01	1.19E+03	109.32	OK		05/28/14 00:00	1.00E+00	05/28/14 15:58	YES
02	PB-210	MBL	BLANK	pCi/g	-2.57E+00	3.91E+00	2.07E+00					05/28/14 00:00	1.00E+00	05/29/14 12:48	NO
03	PB-210	DUP	BMAC0004	pCi/g	9.01E+00	1.36E+00	1.13E+00				NA	05/27/14 00:00	6.02E+01	05/28/14 13:55	YES
04	PB-210	DO	BMAC0004	pCi/g	1.09E+01	1.53E+00	1.10E+00					05/27/14 00:00	6.02E+01	05/28/14 16:33	YES
05	PB-210	TRG	BMAC0008	pCi/g	-2.25E-02	5.81E-01	4.30E-01					05/27/14 00:00	1.01E+02	05/29/14 07:12	NO

WLLFOIA4312 - 001 - 0035017
0159

Count Room Report
Client: Boston Chemical Data Corp

14-05116-GLEPS-1 (pCi/g) in SO
Tracer ID:

2hrs

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	05/28/14 00:00	1.0000				0.00		
02	MBL	BLANK	05/28/14 00:00	1.0000				0.00		
03	DUP	BMAC0004	05/27/14 00:00	60.2100				0.00		
04	DO	BMAC0004	05/27/14 00:00	60.2100				0.00		
05	TRG	BMAC0008	05/27/14 00:00	100.9700				0.00		

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
14-05116	1	GLEPS	grams	6/18/2014	KSALLINGS

Lab Fraction	Boston Chemical Data Corp. 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	BMAC0004	DUP					6.0210E+01	6.0210E+01				
04	BMAC0004	DO					6.0210E+01	6.0210E+01				
05	BMAC0008	TRG					1.0097E+02	1.0097E+02				

Comments	

Technician: Kenny Sally Date: 5/28/14

WLLFOIA4312 - 001 - 0035019

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

90065
Sand in Falcon Petri Filled to Top

GAS-1207
WPGAS-12

Customer: Eberline / Oak Ridge, TN
P.O. No.: 7393, Item 3
Reference Date: 01-Jan-2012 12:00 PM EST **Grams of Master Source:** 0.017132

409

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	———	1.975E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.677E+05	2.873E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.795E+04	1.507E+03	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.245E+05	2.133E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.707E+05	4.638E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.755E+05	3.007E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.128E+05	1.933E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.228E+05	7.243E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.084E+05	3.570E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.084E+05	3.571E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.476E+05	7.669E+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

0162
WLLFOIA4312 - 001 - 0035020

KB 5/28/14

Apex-Gamma

Analysis Report for 1405116-01
LPGAS 12

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1405116-01
Sample Description	: LPGAS 12
Sample Type	: SOIL
Sample Size	: 4.000E+01 grams
Facility	: Countroom
Sample Taken On	: 1/1/2012 3:57:09PM
Acquisition Started	: 5/28/2014 3:58:19PM
Procedure	: LPGAS-13 pCi
Operator	: Administrator
Detector Name	: GE5
Geometry	: LPGAS-13
Live Time	: 1800.0 seconds
Real Time	: 1943.9 seconds
Dead Time	: 7.40 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 31 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 12/2/2013
Efficiency Calibration Used Done On	: 8/24/2013
Efficiency Calibration Description	:
Sample Number	: 8025

AG
5/29/14

Analysis Report for 1405116-01

LPGAS 12

ENERGY CALIBRATION REPORT

Detector Name : GE5

ENERGY CALIBRATION COEFFICIENTS

Energy Calibrate Performed on : 12/2/2013 2:11:00PM
by : Administrator
Energy Calibrate Type : POLY

Energy (keV) = -0.802 + 0.104*ch + -5.16E-09*ch^2 + 0.00E+00*ch^3

SHAPE CALIBRATION COEFFICIENTS

Shape Calibrate Performed on : 12/2/2013 2:10:49PM
by : Administrator

FWHM = 0.586 + 3.02E-02*E^1/2

LOW TAIL = 0.00E+00 + 0.00E+00*E

ENERGY CALIBRATION RESULTS TABLE

Centroid Channel	Centroid error	Energy (keV)
0.00	0.00	59.54
0.00	0.00	88.00
0.00	0.00	122.06
0.00	0.00	165.85
0.00	0.00	391.69

SHAPE CALIBRATION RESULTS TABLE

Energy (keV)	FWHM channels	FWHM error	TAIL channels	TAIL error
59.54	0.00	0.00	0.00	0.00
88.00	0.00	0.00	0.00	0.00
122.06	0.00	0.00	0.00	0.00
165.85	0.00	0.00	0.00	0.00
391.69	0.00	0.00	0.00	0.00

Analysis Report for 1405116-01

LPGAS 12

EFFICIENCY CALIBRATION REPORT

Detector Name	:	GE5
Geometry Description	:	LPGAS-13
Efficiency Calibration Performed on	:	8/24/2013 10:08:51AM
by	:	Administrator
Efficiency Type Used	:	EMPIRICA
Certificate File	:	

Efficiency Triplets

Energy	% Efficiency	Error	Computed	Error	% Difference
59.54	1.36E+01	4.77E-01			
88.00	1.54E+01	7.25E-01			
122.06	1.25E+01	5.17E-01			
165.85	8.94E+00	3.51E-01			
391.69	3.38E+00	1.34E-01			

DUAL Efficiency Calibration Equation

Single Equation Terms

Offset :	-1.04E+01
Slope :	4.00E+00
Quadratic :	-4.73E-01
Cubic :	0.00E+00
4th Order :	0.00E+00
5th Order :	0.00E+00
6th Order :	0.00E+00
7th Order :	0.00E+00
8th Order :	0.00E+00
9th Order :	0.00E+00

EMPIRICAL Efficiency Calibration Equation

Empirical Equation Terms

Scaling :	2.26E+02
Offset :	-2.63E+00
Slope :	1.13E+00
Quadratic :	-4.73E-01
Cubic :	0.00E+00
4th Order :	0.00E+00
5th Order :	0.00E+00

Analysis Report for 1405116-01

LPGAS 12

LINEAR Efficiency Calibration Equation

Linear Equation Terms

Offset :	-2.22E-03
Slope :	-5.87E-01
Quadratic :	-7.80E+00
Cubic :	0.00E+00
4th Order :	0.00E+00
5th Order :	0.00E+00
6th Order :	0.00E+00
7th Order :	0.00E+00
8th Order :	0.00E+00
9th Order :	0.00E+00

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

PEAK LOCATE REPORT

Peak Locate Performed on	: 5/28/2014 4:30:47PM
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	4.03	46.18	0.0000	0.00
2	5.68	62.00	0.0000	0.00
3	6.78	72.56	0.0000	0.00
4	7.84	82.70	0.0000	0.00
5	11.24	115.20	0.0000	0.00
6	12.18	124.16	0.0000	0.00
7	13.89	140.48	0.0000	0.00
8	15.03	151.41	0.0000	0.00
9	16.93	169.62	0.0000	0.00
10	17.70	176.97	0.0000	0.00

Analysis Report for 1405116-01

LPGAS 12

Peak No.	Energy (keV)	Centroid Channel	Centroid Uncertainty	Peak Significance
11	21.98	217.85	0.0000	0.00
12	24.91	245.86	0.0000	0.00
13	26.21	258.37	0.0000	0.00
14	32.00	313.72	0.0000	0.00
15	33.28	325.92	0.0000	0.00
16	36.31	354.90	0.0000	0.00
17	37.22	363.66	0.0000	0.00
18	37.89	370.00	0.0000	0.00
19	43.46	423.28	0.0000	0.00
20	48.75	473.85	0.0000	0.00
21	49.60	482.04	0.0000	0.00
22	50.64	492.00	0.0000	0.00
23	51.56	500.76	0.0000	0.00
24	59.42	575.95	0.0000	0.00
25	78.08	754.41	0.0000	0.00
26	87.89	848.22	0.0000	0.00
27	98.61	950.76	0.0000	0.00
28	102.81	990.85	0.0000	0.00
29	121.89	1173.40	0.0000	0.00
30	136.28	1311.01	0.0000	0.00
31	165.63	1591.71	0.0000	0.00
32	198.67	1907.76	0.0000	0.00
33	199.32	1913.96	0.0000	0.00
34	310.30	2975.53	0.0000	0.00
35	391.30	3750.37	0.0000	0.00

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1405116-01

LPGAS 12

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/28/2014 4:30:47PM

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	4.03	39 -	56	46.18	1.22E+03	339.94	1.38E+04	0.73
	2	5.68	57 -	68	62.00	2.94E+02	250.80	1.03E+04	0.57
M	3	6.78	68 -	92	72.56	5.45E+02	217.10	8.79E+03	0.39
m	4	7.84	68 -	92	82.70	2.77E+03	451.26	2.13E+04	0.73
M	5	11.24	96 -	133	115.20	3.94E+04	1137.07	5.29E+04	1.33
m	6	12.18	96 -	133	124.16	7.76E+04	784.31	2.86E+04	0.64
M	7	13.89	134 -	161	140.48	1.08E+04	420.15	2.18E+04	0.63
m	8	15.03	134 -	161	151.41	1.89E+04	693.51	4.05E+04	0.85
M	9	16.93	163 -	186	169.62	6.13E+03	412.49	2.22E+04	0.71
m	10	17.70	163 -	186	176.97	2.03E+04	625.76	3.48E+04	0.65
	11	21.98	202 -	229	217.85	1.24E+06	2673.33	1.97E+05	0.71
M	12	24.91	231 -	266	245.86	3.45E+05	1458.03	6.77E+04	0.82
m	13	26.21	231 -	266	258.37	1.53E+04	760.36	1.45E+04	0.73
M	14	32.00	297 -	334	313.72	1.92E+04	510.06	1.66E+04	0.90
m	15	33.28	297 -	334	325.92	2.98E+03	365.80	1.09E+04	0.66
M	16	36.31	343 -	374	354.90	4.13E+03	376.37	1.31E+04	0.77
m	17	37.22	343 -	374	363.66	7.06E+02	302.50	1.04E+04	0.58
m	18	37.89	343 -	374	370.00	4.50E+02	185.52	6.24E+03	0.77
	19	43.46	414 -	436	423.28	7.26E+02	451.84	2.09E+04	0.56
M	20	48.75	456 -	517	473.85	1.01E+04	1021.05	5.77E+04	1.54
m	21	49.60	456 -	517	482.04	7.42E+03	732.18	4.29E+04	0.84
m	22	50.64	456 -	517	492.00	4.25E+03	757.36	5.11E+04	0.89
m	23	51.56	456 -	517	500.76	2.83E+03	746.27	5.67E+04	0.88
	24	59.42	558 -	592	575.95	5.01E+05	1718.48	6.94E+04	0.71
	25	78.08	748 -	762	754.41	3.56E+02	277.25	1.31E+04	0.48
	26	87.89	829 -	863	848.22	2.00E+05	1037.75	2.66E+04	0.74
	27	98.61	941 -	960	950.76	3.34E+02	228.63	7.28E+03	1.22
	28	102.81	981 -	999	990.85	4.24E+02	214.65	6.58E+03	1.15
	29	121.89	1153 -	1189	1173.40	3.74E+04	541.17	1.28E+04	0.81
	30	136.28	1296 -	1323	1311.01	4.49E+03	308.13	8.56E+03	0.84
	31	165.63	1575 -	1604	1591.71	4.34E+03	311.35	8.37E+03	0.79
M	32	198.67	1894 -	1919	1907.76	4.41E+02	251.23	7.39E+03	1.15
m	33	199.32	1894 -	1919	1913.96	1.96E+02	146.54	3.85E+03	0.60
	34	310.30	2966 -	2988	2975.53	3.20E+02	188.78	5.20E+03	0.92
	35	391.30	3737 -	3764	3750.37	9.20E+02	226.68	6.27E+03	0.81

Analysis Report for 1405116-01

LPGAS 12

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

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/28/2014 4:30:47PM

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	4.03	39 -	56	1.22E+03	339.94	1.38E+04	2.73E+02
	2	5.68	57 -	68	2.94E+02	250.80	1.03E+04	2.04E+02
M	3	6.78	68 -	92	5.45E+02	217.10	8.79E+03	1.54E+02
m	4	7.84	68 -	92	2.77E+03	451.26	2.13E+04	2.40E+02
M	5	11.24	96 -	133	3.94E+04	1137.07	5.29E+04	3.78E+02
m	6	12.18	96 -	133	7.76E+04	784.31	2.86E+04	2.78E+02
M	7	13.89	134 -	161	1.08E+04	420.15	2.18E+04	2.43E+02
m	8	15.03	134 -	161	1.89E+04	693.51	4.05E+04	3.31E+02
M	9	16.93	163 -	186	6.13E+03	412.49	2.22E+04	2.45E+02
m	10	17.70	163 -	186	2.03E+04	625.76	3.48E+04	3.07E+02
	11	21.98	202 -	229	1.24E+06	2673.33	1.97E+05	1.21E+03
M	12	24.91	231 -	266	3.45E+05	1458.03	6.77E+04	4.28E+02
m	13	26.21	231 -	266	1.53E+04	760.36	1.45E+04	1.98E+02
M	14	32.00	297 -	334	1.92E+04	510.06	1.66E+04	2.12E+02
m	15	33.28	297 -	334	2.98E+03	365.80	1.09E+04	1.72E+02
M	16	36.31	343 -	374	4.13E+03	376.37	1.31E+04	1.88E+02
m	17	37.22	343 -	374	7.06E+02	302.50	1.04E+04	1.68E+02
m	18	37.89	343 -	374	4.50E+02	185.52	6.24E+03	1.30E+02
	19	43.46	414 -	436	7.26E+02	451.84	2.09E+04	3.69E+02
M	20	48.75	456 -	517	1.01E+04	1021.05	5.77E+04	3.95E+02
m	21	49.60	456 -	517	7.42E+03	732.18	4.29E+04	3.40E+02
m	22	50.64	456 -	517	4.25E+03	757.36	5.11E+04	3.72E+02
m	23	51.56	456 -	517	2.83E+03	746.27	5.67E+04	3.92E+02
	24	59.42	558 -	592	5.01E+05	1718.48	6.94E+04	8.01E+02
	25	78.08	748 -	762	3.56E+02	277.25	1.31E+04	2.26E+02
	26	87.89	829 -	863	2.00E+05	1037.75	2.66E+04	4.33E+02
	27	98.61	941 -	960	3.34E+02	228.63	7.28E+03	1.86E+02
	28	102.81	981 -	999	4.24E+02	214.65	6.58E+03	1.73E+02
	29	121.89	1153 -	1189	3.74E+04	541.17	1.28E+04	3.11E+02
	30	136.28	1296 -	1323	4.49E+03	308.13	8.56E+03	2.28E+02
	31	165.63	1575 -	1604	4.34E+03	311.35	8.37E+03	2.32E+02

Analysis Report for 1405116-01

LPGAS 12

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
M	32	198.67	1894 -	1919	4.41E+02	251.23	7.39E+03	1.41E+02
m	33	199.32	1894 -	1919	1.96E+02	146.54	3.85E+03	1.02E+02
	34	310.30	2966 -	2988	3.20E+02	188.78	5.20E+03	1.52E+02
	35	391.30	3737 -	3764	9.20E+02	226.68	6.27E+03	1.80E+02

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

PEAK WITH NID REPORT

Peak Analysis Performed on : 5/28/2014 4:30:47PM

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

Tentative NID Library : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.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	4.03	39 -	56	46.18	1.22E+03	339.94	1.38E+04	.....
	2	5.68	57 -	68	62.00	2.94E+02	250.80	1.03E+04	FE-55
M	3	6.78	68 -	92	72.56	5.45E+02	217.10	8.79E+03	NI-59
									FE-55
m	4	7.84	68 -	92	82.70	2.77E+03	451.26	2.13E+04	NI-59
M	5	11.24	96 -	133	115.20	3.94E+04	1137.07	5.29E+04	PB-210
m	6	12.18	96 -	133	124.16	7.76E+04	784.31	2.86E+04	.....
M	7	13.89	134 -	161	140.48	1.08E+04	420.15	2.18E+04	.....
m	8	15.03	134 -	161	151.41	1.89E+04	693.51	4.05E+04	.....
M	9	16.93	163 -	186	169.62	6.13E+03	412.49	2.22E+04	MO-93
									NB-93M
m	10	17.70	163 -	186	176.97	2.03E+04	625.76	3.48E+04	MO-93
	11	21.98	202 -	229	217.85	1.24E+06	2673.33	1.97E+05	PA-234
M	12	24.91	231 -	266	245.86	3.45E+05	1458.03	6.77E+04	SN-119M
									TH-231
m	13	26.21	231 -	266	258.37	1.53E+04	760.36	1.45E+04	TH-231
M	14	32.00	297 -	334	313.72	1.92E+04	510.06	1.66E+04	.....
m	15	33.28	297 -	334	325.92	2.98E+03	365.80	1.09E+04	I-129
M	16	36.31	343 -	374	354.90	4.13E+03	376.37	1.31E+04	I-125
m	17	37.22	343 -	374	363.66	7.06E+02	302.50	1.04E+04	PA-234
m	18	37.89	343 -	374	370.00	4.50E+02	185.52	6.24E+03	PA-234
	19	43.46	414 -	436	423.28	7.26E+02	451.84	2.09E+04	.....

Analysis Report for 1405116-01

LPGAS 12

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
M	20	48.75	456 -	517	473.85	1.01E+04	1021.05	5.77E+04	.....
m	21	49.60	456 -	517	482.04	7.42E+03	732.18	4.29E+04	.....
m	22	50.64	456 -	517	492.00	4.25E+03	757.36	5.11E+04	.....
m	23	51.56	456 -	517	500.76	2.83E+03	746.27	5.67E+04	.....
	24	59.42	558 -	592	575.95	5.01E+05	1718.48	6.94E+04	AM-241
	25	78.08	748 -	762	754.41	3.56E+02	277.25	1.31E+04	.....
	26	87.89	829 -	863	848.22	2.00E+05	1037.75	2.66E+04	CD-109
	27	98.61	941 -	960	950.76	3.34E+02	228.63	7.28E+03	.....
	28	102.81	981 -	999	990.85	4.24E+02	214.65	6.58E+03	.....
	29	121.89	1153 -	1189	1173.40	3.74E+04	541.17	1.28E+04	CO-57
	30	136.28	1296 -	1323	1311.01	4.49E+03	308.13	8.56E+03	CO-57
	31	165.63	1575 -	1604	1591.71	4.34E+03	311.35	8.37E+03	CE-139
M	32	198.67	1894 -	1919	1907.76	4.41E+02	251.23	7.39E+03	.....
m	33	199.32	1894 -	1919	1913.96	1.96E+02	146.54	3.85E+03	.....
	34	310.30	2966 -	2988	2975.53	3.20E+02	188.78	5.20E+03	.....
	35	391.30	3737 -	3764	3750.37	9.20E+02	226.68	6.27E+03	.....

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

PEAK EFFICIENCY REPORT

Peak Analysis Performed on : 5/28/2014 4:30:47PM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
	1	4.03	1.22E+03	339.94	3.23E-03	1.39E-02
	2	5.68	2.94E+02	250.80	7.66E-03	1.39E-02
M	3	6.78	5.45E+02	217.10	1.15E-02	1.39E-02
m	4	7.84	2.77E+03	451.26	1.56E-02	1.39E-02
M	5	11.24	3.94E+04	1137.07	3.06E-02	1.39E-02
m	6	12.18	7.76E+04	784.31	3.50E-02	1.39E-02
M	7	13.89	1.08E+04	420.15	4.29E-02	1.39E-02
m	8	15.03	1.89E+04	693.51	4.82E-02	1.39E-02
M	9	16.93	6.13E+03	412.49	5.68E-02	1.39E-02
m	10	17.70	2.03E+04	625.76	6.02E-02	1.39E-02
	11	21.98	1.24E+06	2673.33	7.75E-02	1.39E-02
M	12	24.91	3.45E+05	1458.03	8.80E-02	1.39E-02
m	13	26.21	1.53E+04	760.36	9.22E-02	1.39E-02
M	14	32.00	1.92E+04	510.06	1.08E-01	1.39E-02

Analysis Report for 1405116-01

LPGAS 12

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
m	15	33.28	2.98E+03	365.80	1.11E-01	1.39E-02
M	16	36.31	4.13E+03	376.37	1.18E-01	1.39E-02
m	17	37.22	7.06E+02	302.50	1.19E-01	1.39E-02
m	18	37.89	4.50E+02	185.52	1.21E-01	1.39E-02
	19	43.46	7.26E+02	451.84	1.29E-01	1.39E-02
M	20	48.75	1.01E+04	1021.05	1.35E-01	1.39E-02
m	21	49.60	7.42E+03	732.18	1.35E-01	1.39E-02
m	22	50.64	4.25E+03	757.36	1.36E-01	1.39E-02
m	23	51.56	2.83E+03	746.27	1.37E-01	1.39E-02
	24	59.42	5.01E+05	1718.48	1.41E-01	1.39E-02
	25	78.08	3.56E+02	277.25	1.41E-01	2.85E-02
	26	87.89	2.00E+05	1037.75	1.38E-01	3.62E-02
	27	98.61	3.34E+02	228.63	1.33E-01	2.94E-02
	28	102.81	4.24E+02	214.65	1.31E-01	2.66E-02
	29	121.89	3.74E+04	541.17	1.21E-01	1.42E-02
	30	136.28	4.49E+03	308.13	1.13E-01	1.52E-02
	31	165.63	4.34E+03	311.35	9.76E-02	1.75E-02
M	32	198.67	4.41E+02	251.23	8.24E-02	1.54E-02
m	33	199.32	1.96E+02	146.54	8.21E-02	1.54E-02
	34	310.30	3.20E+02	188.78	4.77E-02	8.18E-03
	35	391.30	9.20E+02	226.68	3.33E-02	2.93E-03

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

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/28/2014 4:30:47PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	4.03	1.22E+03	339.94			1.22E+03	3.40E+02
	2	5.68	2.94E+02	250.80			2.94E+02	2.51E+02
M	3	6.78	5.45E+02	217.10			5.45E+02	2.17E+02
m	4	7.84	2.77E+03	451.26	2.06E+00	2.57E+00	2.77E+03	4.51E+02
M	5	11.24	3.94E+04	1137.07	7.96E+00	2.17E+00	3.94E+04	1.14E+03
m	6	12.18	7.76E+04	784.31	7.96E+00	2.17E+00	7.75E+04	7.84E+02
M	7	13.89	1.08E+04	420.15			1.08E+04	4.20E+02
m	8	15.03	1.89E+04	693.51			1.89E+04	6.94E+02
M	9	16.93	6.13E+03	412.49			6.13E+03	4.12E+02

Analysis Report for 1405116-01

LPGAS 12

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
m	10	17.70	2.03E+04	625.76			2.03E+04	6.26E+02
	11	21.98	1.24E+06	2673.33	1.38E+02	3.51E+00	1.24E+06	2.67E+03
M	12	24.91	3.45E+05	1458.03	2.92E+01	1.70E+00	3.45E+05	1.46E+03
m	13	26.21	1.53E+04	760.36			1.53E+04	7.60E+02
M	14	32.00	1.92E+04	510.06			1.92E+04	5.10E+02
m	15	33.28	2.98E+03	365.80	3.49E+00	1.49E+00	2.98E+03	3.66E+02
M	16	36.31	4.13E+03	376.37			4.13E+03	3.76E+02
m	17	37.22	7.06E+02	302.50			7.06E+02	3.03E+02
m	18	37.89	4.50E+02	185.52			4.50E+02	1.86E+02
	19	43.46	7.26E+02	451.84			7.26E+02	4.52E+02
M	20	48.75	1.01E+04	1021.05			1.01E+04	1.02E+03
m	21	49.60	7.42E+03	732.18			7.42E+03	7.32E+02
m	22	50.64	4.25E+03	757.36			4.25E+03	7.57E+02
m	23	51.56	2.83E+03	746.27			2.83E+03	7.46E+02
	24	59.42	5.01E+05	1718.48	7.01E+00	1.13E+00	5.01E+05	1.72E+03
	25	78.08	3.56E+02	277.25			3.56E+02	2.77E+02
	26	87.89	2.00E+05	1037.75	8.27E+00	1.43E+00	2.00E+05	1.04E+03
	27	98.61	3.34E+02	228.63			3.34E+02	2.29E+02
	28	102.81	4.24E+02	214.65			4.24E+02	2.15E+02
	29	121.89	3.74E+04	541.17	9.35E-01	1.01E+00	3.74E+04	5.41E+02
	30	136.28	4.49E+03	308.13			4.49E+03	3.08E+02
	31	165.63	4.34E+03	311.35	5.50E-01	8.46E-01	4.34E+03	3.11E+02
M	32	198.67	4.41E+02	251.23			4.41E+02	2.51E+02
m	33	199.32	1.96E+02	146.54			1.96E+02	1.47E+02
	34	310.30	3.20E+02	188.78			3.20E+02	1.89E+02
	35	391.30	9.20E+02	226.68	9.44E-01	5.75E-01	9.19E+02	2.27E+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 : 5/28/2014 4:30:47PM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.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	4.03	1.22E+03	339.94			1.22E+03	3.40E+02
2	5.68	2.94E+02	250.80			2.94E+02	2.51E+02

Analysis Report for 1405116-01

LPGAS 12

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Corrected Area	Corrected Uncert.
M	3	6.78	5.45E+02	217.10			5.45E+02	2.17E+02
m	4	7.84	2.77E+03	451.26	2.06E+00	2.57E+00	2.77E+03	4.51E+02
M	5	11.24	3.94E+04	1137.07	7.96E+00	2.17E+00	3.94E+04	1.14E+03
m	6	12.18	7.76E+04	784.31	7.96E+00	2.17E+00	7.75E+04	7.84E+02
M	7	13.89	1.08E+04	420.15			1.08E+04	4.20E+02
m	8	15.03	1.89E+04	693.51			1.89E+04	6.94E+02
M	9	16.93	6.13E+03	412.49			6.13E+03	4.12E+02
m	10	17.70	2.03E+04	625.76			2.03E+04	6.26E+02
	11	21.98	1.24E+06	2673.33	1.38E+02	3.51E+00	1.24E+06	2.67E+03
M	12	24.91	3.45E+05	1458.03	2.92E+01	1.70E+00	3.45E+05	1.46E+03
m	13	26.21	1.53E+04	760.36			1.53E+04	7.60E+02
M	14	32.00	1.92E+04	510.06			1.92E+04	5.10E+02
m	15	33.28	2.98E+03	365.80	3.49E+00	1.49E+00	2.98E+03	3.66E+02
M	16	36.31	4.13E+03	376.37			4.13E+03	3.76E+02
m	17	37.22	7.06E+02	302.50			7.06E+02	3.03E+02
m	18	37.89	4.50E+02	185.52			4.50E+02	1.86E+02
	19	43.46	7.26E+02	451.84			7.26E+02	4.52E+02
M	20	48.75	1.01E+04	1021.05			1.01E+04	1.02E+03
m	21	49.60	7.42E+03	732.18			7.42E+03	7.32E+02
m	22	50.64	4.25E+03	757.36			4.25E+03	7.57E+02
m	23	51.56	2.83E+03	746.27			2.83E+03	7.46E+02
	24	59.42	5.01E+05	1718.48	7.01E+00	1.13E+00	5.01E+05	1.72E+03
	25	78.08	3.56E+02	277.25			3.56E+02	2.77E+02
	26	87.89	2.00E+05	1037.75	8.27E+00	1.43E+00	2.00E+05	1.04E+03
	27	98.61	3.34E+02	228.63			3.34E+02	2.29E+02
	28	102.81	4.24E+02	214.65			4.24E+02	2.15E+02
	29	121.89	3.74E+04	541.17	9.35E-01	1.01E+00	3.74E+04	5.41E+02
	30	136.28	4.49E+03	308.13			4.49E+03	3.08E+02
	31	165.63	4.34E+03	311.35	5.50E-01	8.46E-01	4.34E+03	3.11E+02
M	32	198.67	4.41E+02	251.23			4.41E+02	2.51E+02
m	33	199.32	1.96E+02	146.54			1.96E+02	1.47E+02
	34	310.30	3.20E+02	188.78			3.20E+02	1.89E+02
	35	391.30	9.20E+02	226.68	9.44E-01	5.75E-01	9.19E+02	2.27E+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\WSRC.NLB

IDENTIFIED NUCLIDES

Analysis Report for 1405116-01

LPGAS 12

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
FE-55	0.989	5.89	*	24.50	1.09E+02	2.18E+02
CO-57	0.944	122.06	*	85.51	1.29E+03	1.52E+02
		136.48	*	10.60	1.33E+03	2.01E+02
NI-59	0.997	6.92	*	29.80	5.99E+01	1.17E+02
MO-93	0.964	16.59	*	52.90	7.66E+01	3.25E+01
		18.60	*	10.00	1.27E+03	1.30E+03
CD-109	0.979	88.03	*	3.72	5.44E+04	1.43E+04
SN-113	0.682	255.12		1.93		
		391.69	*	61.90	3.31E+03	8.66E+02
SN-119M	0.327	23.87		16.10		
		25.10	*	22.70	5.18E+04	8.17E+03
I-125	0.310	35.49	*	6.49	5.04E+06	7.51E+05
CE-139	0.810	165.85	*	80.35	1.73E+03	3.35E+02
TH-231	0.403	25.64	*	14.70	4.23E+02	6.71E+01
		84.21		6.40		
AM-241	0.998	59.54	*	35.90	3.74E+03	3.69E+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 : 5/28/2014 4:30:47PM
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	4.03	6.78577E-01	13.92		
m	4	7.84	1.53980E+00	8.14		
M	5	11.24	2.18668E+01	1.44	Sum	
m	6	12.18	4.30800E+01	0.51	Sum	
M	7	13.89	6.00721E+00	1.94	Sum	
m	8	15.03	1.05090E+01	1.83		
	11	21.98	6.90193E+02	0.11	Sum	
M	14	32.00	1.06654E+01	1.33	Sum	
m	15	33.28	1.65552E+00	6.14	Sum	
m	17	37.22	3.92423E-01	21.41	Tol.	PA-234
m	18	37.89	2.49892E-01	20.62	Tol.	PA-234
	19	43.46	4.03326E-01	31.12	Sum	
M	20	48.75	5.60300E+00	5.06		

Analysis Report for 1405116-01

LPGAS 12

	Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
m	21	49.60	4.12090E+00	4.94	Sum	
m	22	50.64	2.36023E+00	8.91	Sum	
m	23	51.56	1.57259E+00	13.18	Sum	
	25	78.08	1.97598E-01	38.97	Sum	
	27	98.61	1.85431E-01	34.25		
	28	102.81	2.35526E-01	25.32		
M	32	198.67	2.45172E-01	28.46		
m	33	199.32	1.08874E-01	37.39		
	34	310.30	1.77892E-01	29.48		

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\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
FE-55	0.98	5.89	*	24.50	1.09E+02	2.18E+02
CO-57	0.94	122.06	*	85.51	1.29E+03	1.52E+02
		136.48	*	10.60	1.33E+03	2.01E+02
NI-59	0.99	6.92	*	29.80	5.99E+01	1.17E+02
MO-93	0.96	16.59	*	52.90	7.66E+01	3.25E+01
		18.60	*	10.00	1.27E+03	1.30E+03
CD-109	0.97	88.03	*	3.72	5.44E+04	1.43E+04
SN-113	0.68	255.12		1.93		
		391.69	*	61.90	3.31E+03	8.66E+02
SN-119M	0.32	23.87		16.10		
		25.10	*	22.70	5.18E+04	8.17E+03
I-125	0.31	35.49	*	6.49	5.04E+06	7.51E+05
CE-139	0.81	165.85	*	80.35	1.73E+03	3.35E+02
TH-231	0.40	25.64	*	14.70	4.23E+02	6.71E+01
		84.21		6.40		
AM-241	0.99	59.54	*	35.90	3.74E+03	3.69E+02

Analysis Report for 1405116-01

LPGAS 12

* = 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
	FE-55	0.989	1.09E+02	2.18E+02	
	CO-57	0.944	1.30E+03	1.21E+02	
	NI-59	0.997	5.99E+01	1.17E+02	
	MO-93	0.964	7.73E+01	3.25E+01	
X	NB-93M	0.979			
	CD-109	0.979	5.44E+04	1.43E+04	
	SN-113	0.682	3.31E+03	8.66E+02	
	SN-119M	0.327	5.18E+04	8.17E+03	
	I-125	0.310	5.04E+06	7.51E+05	
	CE-139	0.810	1.73E+03	3.35E+02	
	TH-231	0.403	4.23E+02	6.71E+01	
	AM-241	0.998	3.74E+03	3.69E+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 1405116-01

LPGAS 12

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/28/2014 4:30:47PM
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	4.03	6.78577E-01	13.92		
m	4	7.84	1.53980E+00	8.14		
M	5	11.24	2.18668E+01	1.44	Sum	
m	6	12.18	4.30800E+01	0.51	Sum	
M	7	13.89	6.00721E+00	1.94	Sum	
m	8	15.03	1.05090E+01	1.83		
	11	21.98	6.90193E+02	0.11	Sum	
M	14	32.00	1.06654E+01	1.33	Sum	
m	15	33.28	1.65552E+00	6.14	Sum	
m	17	37.22	3.92423E-01	21.41	Tol.	PA-234
m	18	37.89	2.49892E-01	20.62	Tol.	PA-234
	19	43.46	4.03326E-01	31.12	Sum	
M	20	48.75	5.60300E+00	5.06		
m	21	49.60	4.12090E+00	4.94	Sum	
m	22	50.64	2.36023E+00	8.91	Sum	
m	23	51.56	1.57259E+00	13.18	Sum	
	25	78.08	1.97598E-01	38.97	Sum	
	27	98.61	1.85431E-01	34.25		
	28	102.81	2.35526E-01	25.32		
M	32	198.67	2.45172E-01	28.46		
m	33	199.32	1.08874E-01	37.39		
	34	310.30	1.77892E-01	29.48		

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\WSRC.NLB

Analysis Report for 1405116-01

LPGAS 12

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	FE-55	5.89	*	24.50	1.09E+02	1.52E+02	1.52E+02
+	CO-57	122.06	*	85.51	1.29E+03	2.15E+01	2.15E+01
		136.48	*	10.60	1.33E+03		1.36E+02
+	NI-59	6.92	*	29.80	5.99E+01	8.65E+01	8.65E+01
+	MO-93	16.59	*	52.90	7.66E+01	1.30E+01	1.30E+01
		18.60	*	10.00	1.27E+03		6.69E+01
+	NB-93M	16.57	*	9.43	4.81E+02	8.17E+01	8.17E+01
+	CD-109	88.03	*	3.72	5.44E+04	2.37E+02	2.37E+02
+	SN-113	255.12		1.93	4.02E+03	1.30E+03	1.90E+04
		391.69	*	61.90	3.31E+03		1.30E+03
+	SN-119M	23.87		16.10	-3.41E+05	2.89E+02	5.72E+02
		25.10	*	22.70	5.18E+04		2.89E+02
+	I-125	35.49	*	6.49	5.04E+06	9.69E+05	9.69E+05
+	I-129	29.78		57.00	-8.32E-01	2.64E+00	2.64E+00
		33.60		13.20	-7.53E+00		1.31E+01
		39.58		7.52	-2.44E+01		1.59E+01
+	BA-133	30.80		97.60	9.69E-02	2.61E+00	2.61E+00
		81.00		33.00	3.40E+00		4.70E+00
		302.84		17.80	2.25E+00		1.46E+01
		356.01		60.00	-1.16E+00		5.46E+00
		383.85		8.70	4.84E+00		4.23E+01
+	CE-139	165.85	*	80.35	1.73E+03	1.86E+02	1.86E+02
+	CE-144	133.54		10.80	-8.17E+01	7.87E+01	7.87E+01
+	HG-203	279.19		77.30	-2.68E+05	1.25E+06	1.25E+06
+	PB-210	10.80		9.57	-3.87E+03	3.98E+01	1.68E+02
		46.50		4.25	-5.52E+01		3.98E+01
+	PA-231	9.28		42.00	-1.16E+01	2.34E+01	2.34E+01
		10.11		20.20	-1.65E+01		5.96E+01
		283.67		1.60	-2.57E+01		1.31E+02
		302.67		2.30	2.85E+01		9.68E+01
+	TH-231	25.64	*	14.70	4.23E+02	2.14E+01	5.12E+01
		84.21		6.40	-4.38E+01		2.14E+01
+	PA-234	9.89		89.00	-6.00E+00	4.84E+00	1.25E+01
		21.72		64.90	9.23E+03		4.02E+01
		37.93		23.75	-6.75E-01		5.64E+00
		131.42		20.40	-3.36E-01		4.84E+00
+	TH-234	63.29		3.80	-3.51E+01	2.74E+01	2.74E+01
+	NP-237	29.37		14.00	-8.47E+00	1.06E+01	1.06E+01
		86.50		12.60	-1.28E+01		3.02E+01
+	@ U-237	97.08		16.30	1.00E+26	1.00E+26	1.00E+26
	@	101.07		26.30	1.00E+26		1.00E+26
	@	114.00		12.30	1.00E+26		1.00E+26
	@	208.01		22.00	1.00E+26		1.00E+26
+	AM-241	59.54	*	35.90	3.74E+03	1.20E+01	1.20E+01
+	AM-243	74.67		66.00	-1.51E+00	1.96E+00	1.96E+00

Analysis Report for 1405116-01

LPGAS 12

+ = 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\WSRC.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
+	FE-55	5.89	*	24.50	1.52E+02	1.52E+02	1.09E+02	7.57E+01
+	CO-57	122.06	*	85.51	2.15E+01	2.15E+01	1.29E+03	1.07E+01
		136.48	*	10.60	1.36E+02		1.33E+03	6.77E+01
+	NI-59	6.92	*	29.80	8.65E+01	8.65E+01	5.99E+01	4.31E+01
+	MO-93	16.59	*	52.90	1.30E+01	1.30E+01	7.66E+01	6.48E+00
		18.60	*	10.00	6.69E+01		1.27E+03	3.34E+01
	NB-93M	16.57	*	9.43	8.17E+01	8.17E+01	4.81E+02	4.07E+01
+	CD-109	88.03	*	3.72	2.37E+02	2.37E+02	5.44E+04	1.18E+02
+	SN-113	255.12		1.93	1.90E+04	1.30E+03	4.02E+03	9.44E+03
		391.69	*	61.90	1.30E+03		3.31E+03	6.47E+02
+	SN-119M	23.87		16.10	5.72E+02	2.89E+02	-3.41E+05	2.86E+02
		25.10	*	22.70	2.89E+02		5.18E+04	1.44E+02
+	I-125	35.49	*	6.49	9.69E+05	9.69E+05	5.04E+06	4.83E+05
	I-129	29.78		57.00	2.64E+00	2.64E+00	-8.32E-01	1.31E+00
		33.60		13.20	1.31E+01		-7.53E+00	6.53E+00
		39.58		7.52	1.59E+01		-2.44E+01	7.90E+00
	BA-133	30.80		97.60	2.61E+00	2.61E+00	9.69E-02	1.30E+00
		81.00		33.00	4.70E+00		3.40E+00	2.34E+00
		302.84		17.80	1.46E+01		2.25E+00	7.25E+00
		356.01		60.00	5.46E+00		-1.16E+00	2.70E+00
		383.85		8.70	4.23E+01		4.84E+00	2.10E+01
+	CE-139	165.85	*	80.35	1.86E+02	1.86E+02	1.73E+03	9.24E+01
	CE-144	133.54		10.80	7.87E+01	7.87E+01	-8.17E+01	3.90E+01
	HG-203	279.19		77.30	1.25E+06	1.25E+06	-2.68E+05	6.17E+05
	PB-210	10.80		9.57	1.68E+02	3.98E+01	-3.87E+03	8.38E+01
		46.50		4.25	3.98E+01		-5.52E+01	1.98E+01
	PA-231	9.28		42.00	2.34E+01	2.34E+01	-1.16E+01	1.16E+01
		10.11		20.20	5.96E+01		-1.65E+01	2.97E+01
		283.67		1.60	1.31E+02		-2.57E+01	6.48E+01

Analysis Report for 1405116-01

LPGAS 12

	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	9.68E+01	2.34E+01	2.85E+01	4.79E+01
+	TH-231	25.64	*	14.70	5.12E+01	2.14E+01	4.23E+02	2.56E+01
		84.21		6.40	2.14E+01		-4.38E+01	1.07E+01
	PA-234	9.89		89.00	1.25E+01	4.84E+00	-6.00E+00	6.24E+00
		21.72		64.90	4.02E+01		9.23E+03	2.01E+01
		37.93		23.75	5.64E+00		-6.75E-01	2.80E+00
		131.42		20.40	4.84E+00		-3.36E-01	2.40E+00
	TH-234	63.29		3.80	2.74E+01	2.74E+01	-3.51E+01	1.36E+01
	NP-237	29.37		14.00	1.06E+01	1.06E+01	-8.47E+00	5.26E+00
		86.50		12.60	3.02E+01		-1.28E+01	1.51E+01
@	U-237	97.08		16.30	1.00E+26	1.00E+26	1.00E+26	1.00E+20
@		101.07		26.30	1.00E+26		1.00E+26	1.00E+20
@		114.00		12.30	1.00E+26		1.00E+26	1.00E+20
@		208.01		22.00	1.00E+26		1.00E+26	1.00E+20
+	AM-241	59.54	*	35.90	1.20E+01	1.20E+01	3.74E+03	5.98E+00
	AM-243	74.67		66.00	1.96E+00	1.96E+00	-1.51E+00	9.75E-01

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

No Action Level results available for reporting purposes.

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

No Data Review Comments Entered.

Analysis Report for 1405116-01

LPGAS 12

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

Sample Title: LPGAS 12

Elapsed Live time: 1800
Elapsed Real Time: 1944

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	1	4
33:	31	249	380	442	395	422	386	438
41:	445	485	479	506	521	533	547	555
49:	470	433	428	444	376	355	363	354
57:	393	358	422	478	458	426	496	504
65:	480	482	480	480	474	503	576	613
73:	612	580	579	562	586	608	659	738
81:	799	866	904	896	756	700	631	592
89:	564	547	561	513	535	534	574	582
97:	667	662	673	744	750	843	898	980
105:	1037	1140	1285	1514	1901	2280	2830	3145
113:	3660	3749	3635	3434	3410	3608	4413	6099
121:	8476	10870	12734	13340	12712	10552	7820	5146
129:	3166	1937	1180	961	824	924	1039	1301
137:	1555	2040	2251	2560	2605	2339	2107	1820
145:	1583	1611	1714	2135	2652	3079	3254	3168
153:	2904	2457	2078	1790	1636	1427	1299	1107
161:	943	887	963	1026	1154	1379	1426	1684
169:	1767	1878	1919	2025	2287	2965	3505	3920
177:	3947	3755	3241	2523	1899	1435	1124	971
185:	877	859	926	938	1012	1081	1211	1272
193:	1352	1504	1671	1875	2137	2458	2909	3548
201:	4303	5113	6222	7357	8562	9490	10504	11639
209:	13225	15280	19325	25813	38528	57215	84124	116212
217:	145665	164476	164346	145383	113462	77753	46741	25752
225:	13088	6532	3854	2724	2469	2480	2558	2806
233:	2940	3253	3612	4032	4550	5568	7192	9966
241:	14806	20917	30018	37914	43580	44501	41117	33849
249:	26404	19528	14108	10189	6885	4579	3169	2514
257:	2332	2340	2403	2169	1857	1418	943	604
265:	473	347	349	352	299	294	310	272
273:	300	274	277	275	273	282	287	268
281:	286	282	274	291	291	305	319	290
289:	294	359	353	302	323	374	372	371
297:	330	358	352	374	385	396	426	476
305:	432	608	723	979	1228	1552	1865	2155
313:	2367	2529	2275	2139	1726	1312	950	728
321:	661	636	676	689	683	766	669	633
329:	500	411	360	319	286	255	294	278
337:	285	283	292	287	289	291	281	284
345:	296	305	311	342	388	470	508	594
353:	745	802	881	767	719	594	513	485
361:	388	427	467	432	415	419	388	386

369:	364	387	347	307	293	282	336	327

Sample Title: LPGAS 12

Channel								
377:	306	290	311	272	317	304	303	291
385:	301	292	304	304	318	308	299	338
393:	326	315	295	307	298	298	315	312
401:	351	338	333	356	378	353	372	390
409:	381	409	425	388	428	407	433	437
417:	427	443	453	490	559	537	543	542
425:	536	495	491	526	500	484	476	489
433:	501	446	482	463	536	492	457	489
441:	497	501	524	526	499	520	555	568
449:	545	532	579	595	608	615	626	656
457:	661	688	690	716	761	754	822	899
465:	907	962	1046	1069	1253	1260	1397	1377
473:	1480	1440	1498	1570	1691	1774	1828	1970
481:	2054	2011	2014	1867	1803	1746	1685	1601
489:	1582	1493	1571	1532	1539	1545	1524	1472
497:	1437	1470	1444	1494	1543	1456	1461	1415
505:	1417	1460	1457	1411	1425	1403	1417	1403
513:	1380	1406	1380	1422	1288	1345	1360	1415
521:	1380	1365	1395	1380	1375	1406	1388	1423
529:	1328	1411	1411	1404	1464	1485	1447	1476
537:	1374	1441	1426	1571	1499	1503	1500	1495
545:	1530	1506	1579	1492	1487	1599	1570	1568
553:	1645	1667	1668	1669	1746	1816	1875	2073
561:	2122	2392	2567	2767	2957	3516	4081	4935
569:	6743	9997	15424	24257	36760	49818	61780	68388
577:	66146	56994	43088	29069	17422	9285	4444	2084
585:	883	469	374	279	264	254	265	236
593:	239	244	215	255	261	250	224	253
601:	245	251	247	242	252	277	264	260
609:	266	269	288	284	283	294	265	286
617:	288	297	291	284	307	326	314	332
625:	316	292	334	342	369	351	399	399
633:	399	346	419	427	425	396	425	454
641:	430	487	466	473	464	522	515	503
649:	502	435	505	533	474	531	513	500
657:	468	508	474	495	485	501	458	483
665:	467	483	492	492	478	501	534	513
673:	446	445	522	482	508	479	450	473
681:	472	467	473	464	461	422	421	476
689:	463	473	484	476	471	453	465	458
697:	449	422	480	454	446	449	448	433
705:	441	462	459	482	456	444	466	453
713:	442	490	446	424	428	417	418	426
721:	443	432	391	474	432	416	452	461
729:	431	438	397	401	408	418	427	482
737:	436	415	484	468	428	417	469	476
745:	496	431	462	448	452	498	454	504
753:	464	468	530	492	456	424	457	414
761:	414	423	422	405	417	405	457	403
769:	420	408	422	384	434	441	459	418
777:	461	465	423	442	402	430	476	428
785:	472	460	442	487	477	468	455	429
793:	467	447	438	428	414	448	448	447

801:	461	434	417	458	450	450	443	471

Sample Title: LPGAS 12

Channel								
809:	453	464	496	497	481	418	444	504
817:	458	501	514	499	476	505	465	481
825:	513	508	518	557	567	534	638	626
833:	680	778	832	909	1030	1171	1367	1822
841:	2462	3674	5951	9123	13320	18566	22944	25574
849:	25531	23112	18624	13373	8632	4928	2749	1395
857:	657	399	234	212	204	204	192	216
865:	201	178	196	201	185	189	181	192
873:	220	184	198	179	196	173	182	210
881:	176	196	183	204	192	201	181	154
889:	220	179	184	217	194	203	180	187
897:	184	165	219	176	194	226	185	187
905:	153	192	173	183	177	194	206	167
913:	181	182	189	190	196	186	175	179
921:	193	158	183	166	178	185	196	206
929:	168	196	178	161	192	189	203	176
937:	166	199	170	189	156	184	213	182
945:	188	195	203	202	198	202	219	249
953:	219	222	214	168	210	187	176	187
961:	179	169	206	173	194	153	188	193
969:	190	202	184	187	181	185	192	204
977:	186	184	164	175	163	187	184	170
985:	184	187	192	208	219	223	223	219
993:	207	199	195	184	178	211	179	180
1001:	190	149	183	204	184	186	187	172
1009:	192	195	179	155	164	198	185	194
1017:	157	202	155	183	167	183	179	188
1025:	164	187	192	190	164	169	172	180
1033:	182	199	187	182	178	173	192	179
1041:	173	166	176	176	177	218	172	164
1049:	170	202	188	195	192	184	165	198
1057:	183	220	209	189	195	188	186	193
1065:	184	171	172	168	168	196	186	186
1073:	192	186	163	180	151	193	177	195
1081:	187	189	192	179	189	167	174	188
1089:	178	205	211	193	218	184	175	167
1097:	165	188	179	178	185	196	171	163
1105:	183	189	183	195	177	190	200	179
1113:	187	204	193	191	167	162	208	185
1121:	212	196	159	175	197	162	184	187
1129:	181	170	189	169	183	198	174	205
1137:	190	186	196	189	195	193	207	194
1145:	190	167	184	179	188	218	196	179
1153:	182	189	210	221	209	204	221	219
1161:	237	277	311	374	426	582	840	1259
1169:	1832	2623	3428	4027	4523	4637	4430	3585
1177:	2855	1988	1305	775	455	286	193	178
1185:	151	185	146	133	129	169	163	138
1193:	153	154	143	155	155	167	166	156
1201:	159	164	159	151	181	159	167	158
1209:	142	165	158	156	151	163	149	148
1217:	144	146	137	151	148	165	153	141
1225:	133	143	168	147	162	146	159	142

1233:	155	148	136	167	148	148	119	155

Sample Title: LPGAS 12

Channel								
1241:	174	150	149	184	149	148	155	140
1249:	144	147	175	145	125	158	168	144
1257:	137	156	163	147	158	161	174	173
1265:	145	150	157	157	150	154	172	167
1273:	157	157	153	144	164	162	180	153
1281:	173	163	138	150	167	139	158	139
1289:	155	155	153	139	153	164	167	137
1297:	160	159	185	173	176	209	188	222
1305:	208	294	361	483	556	676	677	668
1313:	638	517	477	343	273	190	180	164
1321:	155	158	139	155	150	157	143	166
1329:	146	156	161	133	162	138	152	158
1337:	160	156	158	131	153	163	142	160
1345:	147	144	151	144	162	139	138	130
1353:	143	154	164	138	142	154	140	151
1361:	137	146	150	160	154	139	178	160
1369:	165	154	146	141	140	137	148	150
1377:	144	151	148	153	158	172	138	164
1385:	149	161	176	111	161	148	141	151
1393:	145	157	146	155	141	155	141	152
1401:	160	153	127	144	148	149	167	173
1409:	171	138	151	154	158	135	153	171
1417:	147	156	163	148	143	159	147	162
1425:	160	151	151	149	160	145	164	148
1433:	145	167	174	136	142	160	161	156
1441:	142	134	111	165	144	138	157	142
1449:	146	163	151	145	174	150	147	162
1457:	161	159	140	147	148	144	155	114
1465:	136	136	136	133	135	143	137	141
1473:	167	139	130	145	146	169	136	169
1481:	142	146	130	150	136	145	145	139
1489:	145	137	132	161	150	152	153	146
1497:	128	138	137	140	137	148	165	142
1505:	131	130	133	132	119	160	121	155
1513:	129	159	146	139	154	151	146	157
1521:	130	153	161	147	128	142	147	110
1529:	129	142	140	158	156	161	160	147
1537:	136	164	150	142	151	141	143	152
1545:	130	151	145	154	142	154	149	155
1553:	117	118	144	129	133	134	142	165
1561:	129	141	154	152	146	124	136	155
1569:	147	137	143	131	137	146	138	147
1577:	135	161	148	136	151	162	161	176
1585:	205	276	308	376	502	541	621	654
1593:	604	569	489	369	316	256	183	174
1601:	140	166	139	124	151	153	137	145
1609:	122	129	136	146	133	146	156	153
1617:	131	145	128	153	162	138	152	133
1625:	122	163	138	140	138	146	138	125
1633:	130	140	128	130	116	141	123	152
1641:	142	135	148	139	132	132	152	121
1649:	149	121	162	125	158	142	122	131
1657:	117	142	120	134	130	132	144	146

1665:	118	135	132	130	133	146	160	114

Sample Title: LPGAS 12

Channel								
1673:	123	127	144	142	134	140	139	147
1681:	141	140	139	150	165	158	147	135
1689:	141	153	136	137	129	133	146	160
1697:	123	148	128	140	143	129	153	144
1705:	165	122	142	138	135	140	142	144
1713:	141	157	121	138	139	132	147	137
1721:	154	159	158	141	139	147	140	133
1729:	132	154	135	133	136	150	163	168
1737:	143	173	163	158	129	150	144	136
1745:	147	145	139	150	131	150	123	139
1753:	166	142	158	145	138	146	118	145
1761:	138	145	123	165	131	141	158	156
1769:	145	166	164	149	141	143	147	142
1777:	161	169	139	174	156	163	147	162
1785:	184	174	161	158	155	156	186	166
1793:	168	142	143	172	143	174	133	156
1801:	167	157	162	176	145	176	179	166
1809:	156	179	171	174	167	140	154	165
1817:	174	145	153	150	161	165	148	170
1825:	160	141	169	145	175	148	165	152
1833:	140	141	167	169	185	146	151	158
1841:	157	170	145	162	175	185	172	166
1849:	176	169	144	149	161	148	153	167
1857:	185	165	159	163	141	160	166	143
1865:	150	179	139	157	141	172	143	151
1873:	162	130	152	165	165	170	166	143
1881:	166	182	148	176	151	181	139	135
1889:	157	175	153	134	158	144	155	155
1897:	146	178	170	146	186	163	156	160
1905:	183	191	198	198	170	176	164	181
1913:	200	182	168	178	165	142	125	156
1921:	145	167	164	151	132	153	144	147
1929:	162	144	139	148	150	145	139	172
1937:	154	132	155	161	148	146	170	170
1945:	147	161	149	139	149	159	167	161
1953:	157	145	151	140	184	154	179	153
1961:	135	139	142	158	173	166	143	172
1969:	132	155	150	141	179	145	150	168
1977:	170	161	157	167	161	136	150	143
1985:	145	164	180	162	175	155	155	156
1993:	155	149	151	176	166	165	163	165
2001:	140	155	148	167	172	168	165	139
2009:	159	169	156	172	167	156	155	180
2017:	158	175	153	178	169	144	163	156
2025:	153	176	171	177	158	160	151	172
2033:	145	173	171	183	164	161	176	145
2041:	141	171	186	159	170	167	182	168
2049:	151	166	148	189	165	171	164	174
2057:	167	183	185	169	168	174	168	168
2065:	181	182	175	171	171	195	169	172
2073:	204	178	173	166	152	151	163	162
2081:	186	190	164	172	168	169	174	178
2089:	181	170	169	149	165	162	166	150

2097:	173	163	174	197	181	171	177	174

Sample Title: LPGAS 12

Channel								
2105:	187	164	174	161	163	153	167	155
2113:	168	177	144	152	202	172	163	148
2121:	173	159	168	149	185	158	189	172
2129:	166	166	154	185	174	174	164	172
2137:	158	171	179	168	179	179	176	145
2145:	165	174	169	166	181	159	182	185
2153:	179	156	155	148	161	164	165	160
2161:	149	173	154	161	159	170	193	191
2169:	151	164	159	186	145	166	160	183
2177:	160	185	166	161	157	146	162	148
2185:	155	155	167	168	146	177	161	145
2193:	180	157	143	137	157	145	170	175
2201:	158	184	152	163	166	178	175	157
2209:	161	159	172	163	143	161	152	167
2217:	174	158	175	154	158	168	170	150
2225:	169	160	146	177	142	194	158	160
2233:	152	173	155	164	154	153	158	163
2241:	144	138	182	168	182	164	164	152
2249:	136	144	145	158	151	155	152	129
2257:	137	162	144	154	149	160	150	163
2265:	177	154	137	162	150	152	165	150
2273:	144	165	152	155	156	135	135	159
2281:	161	156	175	151	139	163	145	149
2289:	132	144	155	150	145	164	155	147
2297:	174	165	159	176	149	159	151	170
2305:	156	149	147	151	147	130	131	151
2313:	154	132	152	157	141	153	138	144
2321:	155	144	155	174	154	132	165	147
2329:	162	151	145	150	138	137	128	160
2337:	147	151	163	151	140	166	158	157
2345:	156	170	145	154	143	131	131	155
2353:	153	155	133	136	160	144	131	139
2361:	141	162	143	124	139	152	145	138
2369:	145	142	150	125	137	159	149	144
2377:	130	143	143	150	141	123	141	148
2385:	143	127	155	153	133	167	147	142
2393:	155	132	152	149	156	144	128	126
2401:	143	140	148	135	123	123	140	159
2409:	133	147	173	141	154	123	130	144
2417:	155	127	141	139	128	148	158	148
2425:	138	140	134	115	139	131	122	123
2433:	120	136	125	139	134	167	133	131
2441:	134	131	138	148	126	141	155	137
2449:	141	147	130	127	119	140	164	151
2457:	141	145	152	149	128	119	137	151
2465:	133	114	121	136	132	150	143	143
2473:	151	130	117	128	123	149	132	152
2481:	133	157	125	141	114	125	137	152
2489:	144	146	137	136	119	145	158	120
2497:	124	146	154	137	129	134	152	133
2505:	126	153	135	153	140	134	137	129
2513:	128	132	129	141	112	116	141	122
2521:	141	124	148	132	123	139	143	145

2529:	133	135	134	130	128	134	142	143

Sample Title: LPGAS 12

Channel								
2537:	144	132	123	109	126	138	122	113
2545:	132	121	143	140	127	108	123	136
2553:	125	142	127	133	146	139	126	151
2561:	127	129	134	122	112	120	126	125
2569:	121	136	137	128	127	124	130	124
2577:	129	110	132	154	141	124	124	129
2585:	146	125	117	111	127	122	130	142
2593:	123	141	104	112	133	146	110	144
2601:	120	120	152	147	110	125	113	128
2609:	121	131	108	134	159	128	132	129
2617:	136	145	137	126	112	112	128	148
2625:	123	139	119	132	115	124	124	114
2633:	108	131	119	130	125	140	144	136
2641:	108	116	135	124	118	116	129	136
2649:	124	139	131	151	127	140	110	141
2657:	139	135	132	122	138	132	151	120
2665:	139	128	123	124	140	112	131	112
2673:	116	136	136	123	127	117	137	125
2681:	117	119	131	123	116	130	128	109
2689:	108	120	117	138	129	116	124	127
2697:	117	109	121	135	121	114	117	128
2705:	124	115	135	127	129	120	115	134
2713:	116	106	112	118	126	126	128	120
2721:	122	127	138	137	121	121	134	138
2729:	128	123	110	117	119	138	117	134
2737:	147	123	136	126	138	140	138	128
2745:	127	128	135	134	112	118	130	97
2753:	127	106	129	115	128	132	116	133
2761:	117	140	135	122	135	104	116	114
2769:	123	135	125	111	113	128	121	117
2777:	131	100	124	143	127	116	126	100
2785:	114	114	132	132	120	120	111	132
2793:	121	120	121	112	118	139	115	99
2801:	123	135	122	117	141	103	111	107
2809:	108	123	115	144	119	109	117	112
2817:	118	118	116	127	110	112	131	109
2825:	126	130	128	123	132	130	137	113
2833:	127	101	121	126	105	93	135	111
2841:	143	123	121	135	109	96	112	130
2849:	123	118	120	134	114	105	106	115
2857:	118	127	128	115	111	127	113	110
2865:	114	111	129	128	135	126	111	101
2873:	124	108	120	121	111	132	113	109
2881:	122	103	98	111	115	132	130	114
2889:	120	102	112	134	130	125	105	117
2897:	131	129	119	120	119	120	105	96
2905:	110	134	97	104	128	127	111	116
2913:	116	123	93	110	136	112	150	111
2921:	109	121	106	132	122	100	107	115
2929:	134	115	117	92	107	119	106	143
2937:	111	136	103	107	135	115	110	114
2945:	115	116	105	117	116	102	129	114
2953:	108	115	111	113	126	126	128	124

2961:	118	118	120	122	111	104	118	141

Sample Title: LPGAS 12

Channel								
2969:	130	135	132	121	122	168	126	147
2977:	158	124	137	133	128	147	105	110
2985:	112	114	115	94	97	121	116	129
2993:	101	133	126	108	120	125	135	122
3001:	108	127	120	131	101	122	123	127
3009:	126	108	109	123	112	98	116	105
3017:	126	118	128	113	106	98	137	104
3025:	103	120	119	106	112	119	106	101
3033:	106	110	101	110	114	119	117	112
3041:	105	104	110	116	108	133	138	111
3049:	110	123	120	121	107	114	121	105
3057:	111	122	100	107	106	113	113	128
3065:	106	113	112	133	119	103	108	101
3073:	109	100	112	117	94	103	124	121
3081:	117	99	117	107	106	117	97	115
3089:	128	112	110	108	105	105	107	127
3097:	108	123	107	96	117	128	123	132
3105:	118	108	113	96	114	114	93	114
3113:	109	107	111	110	119	102	95	115
3121:	128	120	102	120	115	123	92	119
3129:	120	106	132	119	115	113	117	110
3137:	130	102	111	113	98	113	123	119
3145:	110	106	105	106	115	118	106	107
3153:	97	132	116	112	119	124	116	115
3161:	114	111	122	110	101	103	118	108
3169:	95	124	126	116	109	113	117	102
3177:	100	115	89	95	119	101	109	115
3185:	104	121	116	117	146	109	119	103
3193:	104	117	134	102	98	103	111	100
3201:	123	101	96	104	126	99	118	114
3209:	139	112	100	132	102	110	107	104
3217:	134	129	101	122	110	99	121	98
3225:	98	112	94	116	101	107	105	95
3233:	117	109	106	107	114	98	113	95
3241:	104	118	117	111	107	124	107	113
3249:	119	121	119	108	112	100	102	98
3257:	119	103	108	121	106	109	123	129
3265:	109	104	117	116	114	104	116	131
3273:	102	115	124	118	104	109	117	93
3281:	79	112	121	113	92	117	107	123
3289:	111	93	108	120	115	104	110	125
3297:	97	99	103	114	90	86	113	112
3305:	109	113	112	112	98	97	99	120
3313:	123	108	111	115	109	107	98	98
3321:	113	82	93	124	95	109	128	112
3329:	121	101	108	123	105	98	104	101
3337:	116	112	97	139	107	108	117	110
3345:	105	100	117	102	104	99	115	101
3353:	117	101	100	111	122	112	116	102
3361:	126	118	90	108	106	110	106	111
3369:	103	112	104	116	98	128	105	87
3377:	96	111	107	124	121	114	122	104
3385:	121	110	114	108	98	120	107	108

3393:	119	106	109	120	118	106	107	107

Sample Title: LPGAS 12

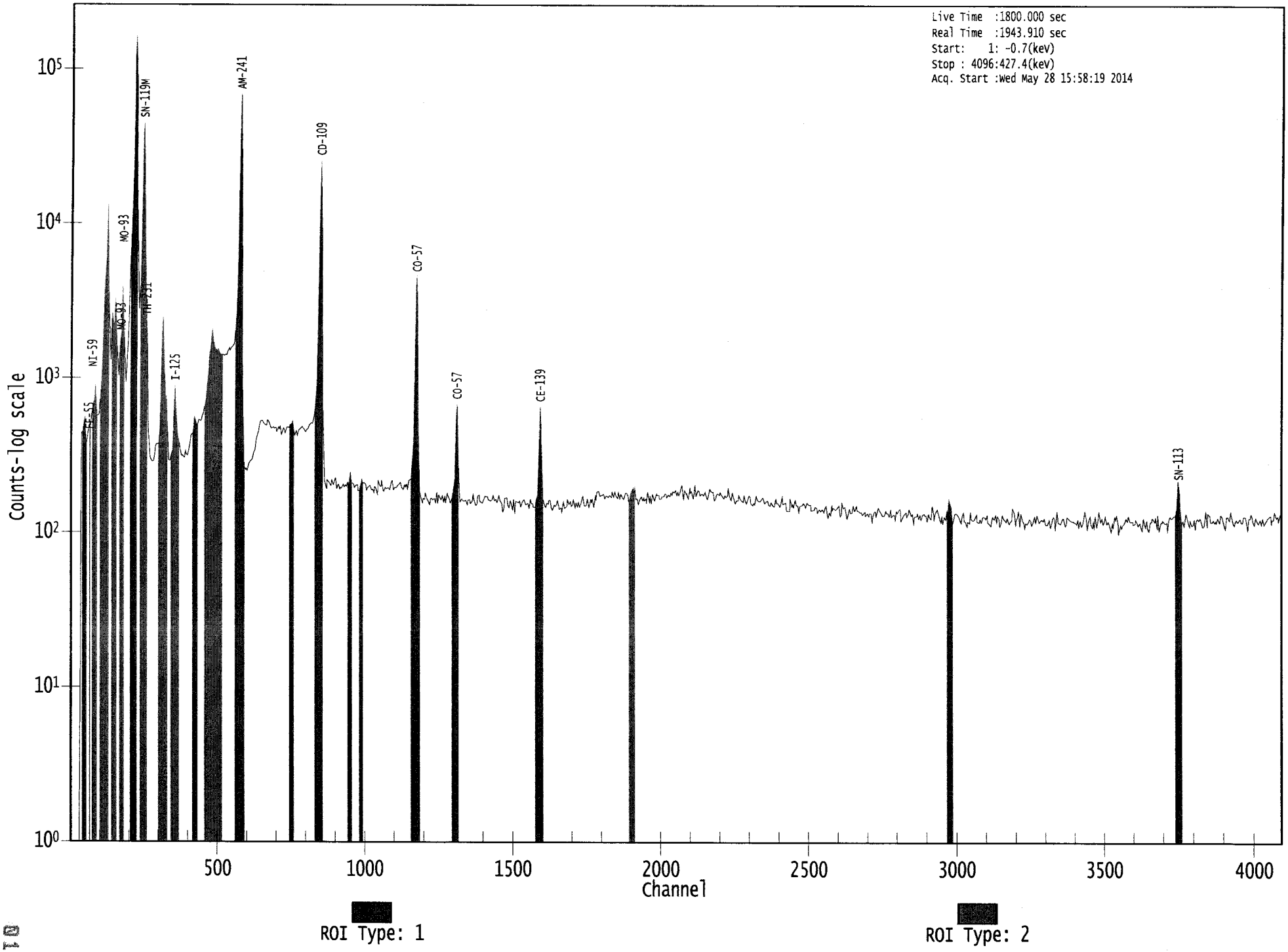
Channel								
3401:	106	116	104	117	98	94	114	111
3409:	116	123	95	113	109	107	104	108
3417:	111	121	113	105	95	96	111	100
3425:	111	102	81	117	116	114	100	103
3433:	106	139	103	114	108	107	93	123
3441:	103	105	98	99	100	119	95	112
3449:	92	100	103	130	101	115	110	101
3457:	97	100	88	109	104	104	119	116
3465:	107	108	94	95	129	95	102	113
3473:	95	87	110	105	111	94	124	89
3481:	94	138	104	108	111	114	106	118
3489:	98	107	104	126	93	112	113	114
3497:	116	99	98	118	109	96	105	130
3505:	125	98	117	104	115	101	101	108
3513:	107	120	88	115	93	95	111	105
3521:	91	101	101	102	105	93	96	117
3529:	93	109	105	108	100	115	94	128
3537:	100	109	122	90	101	132	118	109
3545:	100	114	98	114	99	97	97	88
3553:	98	108	114	114	94	98	108	88
3561:	113	107	102	103	109	106	115	101
3569:	99	99	108	121	94	125	116	103
3577:	100	92	119	103	109	130	92	104
3585:	92	92	119	89	84	109	108	119
3593:	107	111	104	119	102	114	106	111
3601:	109	88	109	116	112	123	100	100
3609:	95	102	108	116	112	112	112	94
3617:	98	95	103	117	102	91	112	97
3625:	104	93	103	104	114	115	109	125
3633:	119	122	101	115	100	107	109	97
3641:	119	97	121	90	106	109	102	108
3649:	92	88	103	93	105	106	118	113
3657:	107	110	88	120	94	126	112	95
3665:	124	106	113	111	99	86	118	104
3673:	127	105	101	109	99	101	108	105
3681:	132	99	101	106	104	93	96	102
3689:	106	117	109	118	105	100	117	108
3697:	122	98	94	100	117	102	117	108
3705:	108	114	106	116	107	111	116	118
3713:	102	100	97	88	105	122	105	102
3721:	90	129	116	128	123	125	94	95
3729:	111	126	119	120	104	92	130	122
3737:	119	111	98	130	125	110	124	147
3745:	159	135	165	187	219	207	209	203
3753:	165	190	159	144	143	131	119	115
3761:	115	111	110	107	102	121	119	105
3769:	111	107	102	110	109	116	92	134
3777:	116	130	110	105	92	92	120	95
3785:	105	98	108	110	122	106	87	103
3793:	85	103	112	105	104	94	112	114
3801:	97	101	123	105	97	97	106	100
3809:	100	120	111	119	108	125	100	109
3817:	96	103	121	111	90	126	93	87

3825:	123	113	102	116	100	102	110	110

Sample Title: LPGAS 12

Channel								
3833:	104	109	109	112	115	106	97	86
3841:	113	138	113	93	90	99	110	100
3849:	135	118	127	117	103	104	101	130
3857:	108	118	116	114	113	115	113	118
3865:	103	111	107	122	114	88	103	117
3873:	108	117	121	118	116	111	109	94
3881:	126	94	102	94	114	109	117	117
3889:	119	117	109	132	92	102	130	111
3897:	130	99	111	112	105	103	112	87
3905:	97	91	106	104	112	128	128	118
3913:	91	101	128	123	113	115	120	121
3921:	120	111	109	138	114	113	131	118
3929:	103	114	99	117	106	93	108	112
3937:	117	113	96	114	115	111	123	97
3945:	113	118	111	104	112	113	104	122
3953:	98	125	101	96	113	101	90	117
3961:	108	111	118	103	107	128	117	125
3969:	116	110	103	128	115	109	121	120
3977:	105	105	97	105	105	95	126	125
3985:	118	106	125	105	109	105	134	119
3993:	111	129	107	108	120	103	102	116
4001:	98	113	108	105	123	127	119	119
4009:	117	122	121	93	96	84	116	104
4017:	105	115	105	101	123	112	118	115
4025:	114	108	112	90	125	110	106	104
4033:	112	114	110	97	113	110	104	92
4041:	121	113	113	116	112	126	106	109
4049:	113	103	128	112	108	108	129	131
4057:	114	115	105	115	123	100	106	119
4065:	117	123	108	109	138	113	120	121
4073:	105	114	96	126	102	111	122	130
4081:	96	119	101	107	115	116	109	134
4089:	112	131	122	110	95	104	110	122

0000008025.CNF



KB 5/29/14

Apex-Gamma

Analysis Report for 1405116-02

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GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1405116-02
Sample Description	: BLANK
Sample Type	: SOIL
Sample Size	: 1.383E+01 grams
Facility	: Countroom
Sample Taken On	: 5/29/2014 3:57:32PM
Acquisition Started	: 5/29/2014 12:48:41PM
Procedure	: LPGAS-13 pCi
Operator	: Administrator
Detector Name	: GE5
Geometry	: LPGAS-13
Live Time	: 7200.0 seconds
Real Time	: 7207.8 seconds
Dead Time	: 0.11 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 32 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 12/2/2013
Efficiency Calibration Used Done On	: 8/24/2013
Efficiency Calibration Description	:
Sample Number	: 8081

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5/29/14

Analysis Report for 1405116-02

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ENERGY CALIBRATION REPORT

Detector Name : GE5

ENERGY CALIBRATION COEFFICIENTS

Energy Calibrate Performed on : 12/2/2013 2:11:00PM
by : Administrator
Energy Calibrate Type : POLY

Energy (keV) = -0.802 + 0.104*ch + -5.16E-09*ch^2 + 0.00E+00*ch^3

SHAPE CALIBRATION COEFFICIENTS

Shape Calibrate Performed on : 12/2/2013 2:10:49PM
by : Administrator

FWHM = 0.586 + 3.02E-02*E^1/2

LOW TAIL = 0.00E+00 + 0.00E+00*E

ENERGY CALIBRATION RESULTS TABLE

Centroid Channel	Centroid error	Energy (keV)
0.00	0.00	59.54
0.00	0.00	88.00
0.00	0.00	122.06
0.00	0.00	165.85
0.00	0.00	391.69

SHAPE CALIBRATION RESULTS TABLE

Energy (keV)	FWHM channels	FWHM error	TAIL channels	TAIL error
59.54	0.00	0.00	0.00	0.00
88.00	0.00	0.00	0.00	0.00
122.06	0.00	0.00	0.00	0.00
165.85	0.00	0.00	0.00	0.00
391.69	0.00	0.00	0.00	0.00

Analysis Report for 1405116-02

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EFFICIENCY CALIBRATION REPORT

Detector Name	:	GE5
Geometry Description	:	LPGAS-13
Efficiency Calibration Performed on	:	8/24/2013 10:08:51AM
by	:	Administrator
Efficiency Type Used	:	EMPIRICA
Certificate File	:	

Efficiency Triplets

Energy	% Efficiency	Error	Computed	Error	% Difference
59.54	1.36E+01	4.77E-01			
88.00	1.54E+01	7.25E-01			
122.06	1.25E+01	5.17E-01			
165.85	8.94E+00	3.51E-01			
391.69	3.38E+00	1.34E-01			

DUAL Efficiency Calibration Equation

Single Equation Terms

Offset :	-1.04E+01
Slope :	4.00E+00
Quadratic :	-4.73E-01
Cubic :	0.00E+00
4th Order :	0.00E+00
5th Order :	0.00E+00
6th Order :	0.00E+00
7th Order :	0.00E+00
8th Order :	0.00E+00
9th Order :	0.00E+00

EMPIRICAL Efficiency Calibration Equation

Empirical Equation Terms

Scaling :	2.26E+02
Offset :	-2.63E+00
Slope :	1.13E+00
Quadratic :	-4.73E-01
Cubic :	0.00E+00
4th Order :	0.00E+00
5th Order :	0.00E+00

Analysis Report for 1405116-02

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LINEAR Efficiency Calibration Equation

Linear Equation Terms

Offset :	-2.22E-03
Slope :	-5.87E-01
Quadratic :	-7.80E+00
Cubic :	0.00E+00
4th Order :	0.00E+00
5th Order :	0.00E+00
6th Order :	0.00E+00
7th Order :	0.00E+00
8th Order :	0.00E+00
9th Order :	0.00E+00

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

PEAK LOCATE REPORT

Peak Locate Performed on	: 5/29/2014 2:48:52PM
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	29.52	290.00	0.0000	0.00
2	46.05	448.03	0.0000	0.00
3	46.58	453.15	0.0000	0.00
4	62.61	606.45	0.0000	0.00
5	74.75	722.49	0.0000	0.00
6	77.02	744.22	0.0000	0.00
7	185.79	1784.50	0.0000	0.00
8	238.43	2288.07	0.0000	0.00
9	294.79	2827.14	0.0000	0.00
10	351.42	3368.80	0.0000	0.00

Analysis Report for 1405116-02

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? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1405116-02

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PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/29/2014 2:48:52PM

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	29.52	279 -	303	290.00	1.24E+02	33.13	7.33E+01	0.75
M	2	46.05	445 -	459	448.03	1.32E+01	9.80	1.25E+01	0.64
m	3	46.58	445 -	459	453.15	4.00E+01	19.81	3.28E+01	0.78
	4	62.61	593 -	620	606.45	3.98E+01	36.36	1.02E+02	2.14
M	5	74.75	710 -	757	722.49	1.51E+02	35.10	5.53E+01	1.15
m	6	77.02	710 -	757	744.22	1.95E+02	39.29	9.97E+01	0.89
	7	185.79	1768 -	1799	1784.50	4.95E+01	28.91	6.29E+01	1.51
	8	238.43	2276 -	2299	2288.07	1.21E+02	28.47	4.78E+01	0.62
	9	294.79	2816 -	2839	2827.14	3.90E+01	21.96	4.80E+01	0.73
	10	351.42	3353 -	3380	3368.80	7.28E+01	21.48	2.24E+01	1.14

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

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/29/2014 2:48:52PM

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	29.52	279 -	303	1.24E+02	33.13	7.33E+01	1.41E+01
M	2	46.05	445 -	459	1.32E+01	9.80	1.25E+01	5.81E+00
m	3	46.58	445 -	459	4.00E+01	19.81	3.28E+01	9.42E+00
	4	62.61	593 -	620	3.98E+01	36.36	1.02E+02	2.80E+01
M	5	74.75	710 -	757	1.51E+02	35.10	5.53E+01	1.22E+01

Analysis Report for 1405116-02

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	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
m	6	77.02	710 -	757	1.95E+02	39.29	9.97E+01	1.64E+01
	7	185.79	1768 -	1799	4.95E+01	28.91	6.29E+01	2.08E+01
	8	238.43	2276 -	2299	1.21E+02	28.47	4.78E+01	1.48E+01
	9	294.79	2816 -	2839	3.90E+01	21.96	4.80E+01	1.49E+01
	10	351.42	3353 -	3380	7.28E+01	21.48	2.24E+01	1.07E+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 : 5/29/2014 2:48:52PM

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

Tentative NID Library : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.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	29.52	279 -	303	290.00	1.24E+02	33.13	7.33E+01	NP-237
									I-129
M	2	46.05	445 -	459	448.03	1.32E+01	9.80	1.25E+01	PB-210
m	3	46.58	445 -	459	453.15	4.00E+01	19.81	3.28E+01	PB-210
	4	62.61	593 -	620	606.45	3.98E+01	36.36	1.02E+02	TH-234
M	5	74.75	710 -	757	722.49	1.51E+02	35.10	5.53E+01	AM-243
m	6	77.02	710 -	757	744.22	1.95E+02	39.29	9.97E+01	.....
	7	185.79	1768 -	1799	1784.50	4.95E+01	28.91	6.29E+01	.....
	8	238.43	2276 -	2299	2288.07	1.21E+02	28.47	4.78E+01	.....
	9	294.79	2816 -	2839	2827.14	3.90E+01	21.96	4.80E+01	.....
	10	351.42	3353 -	3380	3368.80	7.28E+01	21.48	2.24E+01	.....

Analysis Report for 1405116-02

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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

PEAK EFFICIENCY REPORT

Peak Analysis Performed on : 5/29/2014 2:48:52PM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
M	1	29.52	1.24E+02	33.13	1.02E-01	1.39E-02
M	2	46.05	1.32E+01	9.80	1.32E-01	1.39E-02
m	3	46.58	4.00E+01	19.81	1.33E-01	1.39E-02
	4	62.61	3.98E+01	36.36	1.41E-01	1.63E-02
M	5	74.75	1.51E+02	35.10	1.41E-01	2.58E-02
m	6	77.02	1.95E+02	39.29	1.41E-01	2.76E-02
	7	185.79	4.95E+01	28.91	8.80E-02	1.63E-02
	8	238.43	1.21E+02	28.47	6.74E-02	1.28E-02
	9	294.79	3.90E+01	21.96	5.13E-02	9.19E-03
	10	351.42	7.28E+01	21.48	3.96E-02	5.52E-03

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

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/29/2014 2:48:52PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	29.52	1.24E+02	33.13	4.72E+01	6.61E+00	7.69E+01	3.38E+01

Analysis Report for 1405116-02

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	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	2	46.05	1.32E+01	9.80			1.32E+01	9.80E+00
m	3	46.58	4.00E+01	19.81			4.00E+01	1.98E+01
	4	62.61	3.98E+01	36.36			3.98E+01	3.64E+01
M	5	74.75	1.51E+02	35.10	4.55E-01	3.15E+00	1.50E+02	3.52E+01
m	6	77.02	1.95E+02	39.29			1.95E+02	3.93E+01
	7	185.79	4.95E+01	28.91			4.95E+01	2.89E+01
	8	238.43	1.21E+02	28.47			1.21E+02	2.85E+01
	9	294.79	3.90E+01	21.96			3.90E+01	2.20E+01
	10	351.42	7.28E+01	21.48			7.28E+01	2.15E+01

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

AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 5/29/2014 2:48:52PM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.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	29.52	1.24E+02	33.13	4.72E+01	6.61E+00	7.69E+01	3.38E+01
M	2	46.05	1.32E+01	9.80			1.32E+01	9.80E+00
m	3	46.58	4.00E+01	19.81			4.00E+01	1.98E+01
	4	62.61	3.98E+01	36.36			3.98E+01	3.64E+01
M	5	74.75	1.51E+02	35.10	4.55E-01	3.15E+00	1.50E+02	3.52E+01
m	6	77.02	1.95E+02	39.29			1.95E+02	3.93E+01
	7	185.79	4.95E+01	28.91			4.95E+01	2.89E+01
	8	238.43	1.21E+02	28.47			1.21E+02	2.85E+01
	9	294.79	3.90E+01	21.96			3.90E+01	2.20E+01
	10	351.42	7.28E+01	21.48			7.28E+01	2.15E+01

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

Analysis Report for 1405116-02

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NUCLIDE IDENTIFICATION REPORT

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

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
I-129	0.546	29.78	*	57.00	3.59E-01	1.65E-01
		33.60		13.20		
		39.58		7.52		
TH-234	0.929	63.29	*	3.80	2.01E+00	1.85E+00
AM-243	0.999	74.67	*	66.00	4.37E-01	1.36E-01

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

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/29/2014 2:48:52PM
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	2	46.05	1.83004E-03	37.18	Tol.	PB-210
m	3	46.58	5.55812E-03	24.75	Tol.	PB-210
m	6	77.02	2.70636E-02	10.08		
	7	185.79	6.88100E-03	29.18		
	8	238.43	1.68224E-02	11.75		
	9	294.79	5.41667E-03	28.16		
	10	351.42	1.01111E-02	14.75		

Analysis Report for 1405116-02

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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\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
I-129	0.54	29.78	*	57.00	3.59E-01	1.65E-01
		33.60		13.20		
		39.58		7.52		
TH-234	0.92	63.29	*	3.80	2.01E+00	1.85E+00
AM-243	0.99	74.67	*	66.00	4.37E-01	1.36E-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
I-129	0.546	3.59E-01	1.65E-01	

Analysis Report for 1405116-02

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Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
TH-234	0.929	2.01E+00	1.85E+00	
AM-243	0.999	4.37E-01	1.36E-01	

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

Errors quoted at 2.000sigma

Analysis Report for 1405116-02

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UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/29/2014 2:48:52PM
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	2	46.05	1.83004E-03	37.18	Tol.	PB-210
m	3	46.58	5.55812E-03	24.75	Tol.	PB-210
m	6	77.02	2.70636E-02	10.08		
	7	185.79	6.88100E-03	29.18		
	8	238.43	1.68224E-02	11.75		
	9	294.79	5.41667E-03	28.16		
	10	351.42	1.01111E-02	14.75		

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\WSRC.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	FE-55	5.89	24.50	-5.63E+00	8.70E+00	8.70E+00
+	CO-57	122.06	85.51	1.51E-02	9.94E-02	9.94E-02
		136.48	10.60	3.74E-01		8.58E-01
+	NI-59	6.92	29.80	3.72E-01	4.82E+00	4.82E+00
+	MO-93	16.59	52.90	3.48E-02	5.10E-01	5.10E-01
		18.60	10.00	-1.45E-01		2.15E+00
+	NB-93M	16.57	9.43	1.95E-01	2.86E+00	2.86E+00
+	CD-109	88.03	3.72	1.68E+00	3.09E+00	3.09E+00
+	SN-113	255.12	1.93	6.24E-01	3.36E-01	6.57E+00
		391.69	61.90	-2.09E-02		3.36E-01
+	SN-119M	23.87	16.10	-7.34E+00	8.18E-01	1.16E+00

Analysis Report for 1405116-02

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	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	SN-119M	25.10		22.70	8.48E-01	8.18E-01	8.18E-01
+	I-125	35.49		6.49	-1.34E+00	1.16E+00	1.16E+00
+	I-129	29.78	*	57.00	3.59E-01	2.64E-01	2.64E-01
		33.60		13.20	4.34E-01		8.27E-01
		39.58		7.52	1.71E-01		1.22E+00
+	BA-133	30.80		97.60	-8.74E-03	1.37E-01	1.37E-01
		81.00		33.00	7.21E-02		2.31E-01
		302.84		17.80	4.18E-01		8.70E-01
		356.01		60.00	1.87E-01		3.38E-01
		383.85		8.70	2.95E-01		2.35E+00
+	CE-139	165.85		80.35	1.05E-02	1.23E-01	1.23E-01
+	CE-144	133.54		10.80	9.99E-02	7.29E-01	7.29E-01
+	HG-203	279.19		77.30	-7.33E-02	1.84E-01	1.84E-01
+	PB-210	10.80		9.57	-2.57E+00	2.07E+00	5.44E+00
		46.50		4.25	1.24E+00		2.07E+00
+	PA-231	9.28		42.00	3.76E-01	1.74E+00	1.74E+00
		10.11		20.20	-1.14E+00		2.88E+00
		283.67		1.60	1.54E+00		8.57E+00
		302.67		2.30	4.15E+00		6.83E+00
+	TH-231	25.64		14.70	1.05E+00	1.20E+00	1.20E+00
		84.21		6.40	5.00E-01		1.25E+00
+	PA-234	9.89		89.00	-1.41E-01	3.40E-01	6.99E-01
		21.72		64.90	1.43E+00		5.06E-01
		37.93		23.75	-2.84E-01		3.40E-01
		131.42		20.40	-3.95E-02		3.82E-01
+	TH-234	63.29	*	3.80	2.01E+00	2.97E+00	2.97E+00
+	NP-237	29.37		14.00	1.30E+00	8.57E-01	1.10E+00
		86.50		12.60	6.93E-01		8.57E-01
+	U-237	97.08		16.30	-2.35E-01	2.66E-01	4.06E-01
		101.07		26.30	4.32E-02		2.66E-01
		114.00		12.30	5.32E-02		6.11E-01
		208.01		22.00	-1.50E-01		5.44E-01
+	AM-241	59.54		35.90	2.17E-01	2.54E-01	2.54E-01
+	AM-243	74.67	*	66.00	4.37E-01	2.22E-01	2.22E-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

Analysis Report for 1405116-02

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NUCLIDE MDA REPORT

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

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	FE-55	5.89		24.50	8.70E+00	8.70E+00	-5.63E+00	4.17E+00
	CO-57	122.06		85.51	9.94E-02	9.94E-02	1.51E-02	4.62E-02
		136.48		10.60	8.58E-01		3.74E-01	3.98E-01
	NI-59	6.92		29.80	4.82E+00	4.82E+00	3.72E-01	2.31E+00
	MO-93	16.59		52.90	5.10E-01	5.10E-01	3.48E-02	2.42E-01
		18.60		10.00	2.15E+00		-1.45E-01	1.02E+00
	NB-93M	16.57		9.43	2.86E+00	2.86E+00	1.95E-01	1.36E+00
	CD-109	88.03		3.72	3.09E+00	3.09E+00	1.68E+00	1.48E+00
	SN-113	255.12		1.93	6.57E+00	3.36E-01	6.24E-01	2.98E+00
		391.69		61.90	3.36E-01		-2.09E-02	1.50E-01
	SN-119M	23.87		16.10	1.16E+00	8.18E-01	-7.34E+00	5.51E-01
		25.10		22.70	8.18E-01		8.48E-01	3.91E-01
	I-125	35.49		6.49	1.16E+00	1.16E+00	-1.34E+00	5.29E-01
+	I-129	29.78	*	57.00	2.64E-01	2.64E-01	3.59E-01	1.26E-01
		33.60		13.20	8.27E-01		4.34E-01	3.89E-01
		39.58		7.52	1.22E+00		1.71E-01	5.69E-01
	BA-133	30.80		97.60	1.37E-01	1.37E-01	-8.74E-03	6.50E-02
		81.00		33.00	2.31E-01		7.21E-02	1.08E-01
		302.84		17.80	8.70E-01		4.18E-01	3.93E-01
		356.01		60.00	3.38E-01		1.87E-01	1.53E-01
		383.85		8.70	2.35E+00		2.95E-01	1.05E+00
	CE-139	165.85		80.35	1.23E-01	1.23E-01	1.05E-02	5.70E-02
	CE-144	133.54		10.80	7.29E-01	7.29E-01	9.99E-02	3.35E-01
	HG-203	279.19		77.30	1.84E-01	1.84E-01	-7.33E-02	8.35E-02
	PB-210	10.80		9.57	5.44E+00	2.07E+00	-2.57E+00	2.58E+00
		46.50		4.25	2.07E+00		1.24E+00	9.71E-01
	PA-231	9.28		42.00	1.74E+00	1.74E+00	3.76E-01	8.29E-01
		10.11		20.20	2.88E+00		-1.14E+00	1.37E+00
		283.67		1.60	8.57E+00		1.54E+00	3.86E+00
		302.67		2.30	6.83E+00		4.15E+00	3.09E+00
	TH-231	25.64		14.70	1.20E+00	1.20E+00	1.05E+00	5.72E-01
		84.21		6.40	1.25E+00		5.00E-01	5.86E-01
	PA-234	9.89		89.00	6.99E-01	3.40E-01	-1.41E-01	3.33E-01
		21.72		64.90	5.06E-01		1.43E+00	2.45E-01
		37.93		23.75	3.40E-01		-2.84E-01	1.57E-01
		131.42		20.40	3.82E-01		-3.95E-02	1.76E-01
+	TH-234	63.29	*	3.80	2.97E+00	2.97E+00	2.01E+00	1.42E+00
	NP-237	29.37		14.00	1.10E+00	8.57E-01	1.30E+00	5.25E-01
		86.50		12.60	8.57E-01		6.93E-01	4.07E-01
	U-237	97.08		16.30	4.06E-01	2.66E-01	-2.35E-01	1.86E-01
		101.07		26.30	2.66E-01		4.32E-02	1.22E-01
		114.00		12.30	6.11E-01		5.32E-02	2.82E-01

Analysis Report for 1405116-02

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	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	U-237	208.01		22.00	5.44E-01	2.66E-01	-1.50E-01	2.51E-01
	AM-241	59.54		35.90	2.54E-01	2.54E-01	2.17E-01	1.20E-01
+	AM-243	74.67	*	66.00	2.22E-01	2.22E-01	4.37E-01	1.07E-01

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

No Action Level results available for reporting purposes.

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: BLANK

Elapsed Live time: 7200
Elapsed Real Time: 7208

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	2
33:	33	213	180	163	113	75	70	67
41:	48	48	38	27	37	20	25	16
49:	12	29	13	12	10	19	10	18
57:	18	6	12	10	9	8	6	10
65:	9	10	8	4	10	5	11	11
73:	7	16	8	2	8	11	8	0
81:	7	10	8	7	12	3	6	9
89:	8	6	11	8	9	6	5	8
97:	7	5	3	6	3	8	7	2
105:	14	9	7	2	3	8	7	4
113:	5	5	9	5	6	8	3	5
121:	5	13	10	3	11	9	7	6
129:	7	16	8	5	8	8	8	5
137:	4	4	6	3	8	8	4	4
145:	3	8	3	4	3	5	8	4
153:	7	9	7	10	4	7	7	6
161:	10	2	9	6	2	11	8	2
169:	7	6	6	4	5	3	6	5
177:	7	5	7	3	9	3	5	3
185:	6	4	3	5	5	4	10	1
193:	4	3	2	12	0	5	5	9
201:	5	3	9	7	5	6	1	7
209:	0	4	8	3	5	13	18	38
217:	45	51	55	37	26	23	14	13
225:	1	4	1	1	3	6	8	5
233:	3	7	6	5	5	3	3	4
241:	6	5	9	20	8	17	11	11
249:	11	7	6	6	6	2	2	5
257:	6	0	2	3	3	1	1	3
265:	3	5	1	6	4	5	3	6
273:	3	2	4	5	2	0	3	1
281:	1	5	3	3	5	2	6	7
289:	12	18	11	10	15	9	10	3
297:	2	2	4	8	3	3	0	3
305:	2	3	4	3	5	3	3	4
313:	2	4	8	3	2	1	4	5
321:	5	2	6	3	3	4	3	7
329:	7	6	5	1	7	4	3	2
337:	0	1	2	2	2	1	0	3
345:	2	1	3	2	3	0	1	1
353:	3	1	4	2	2	2	1	2
361:	4	1	0	3	2	2	3	8

369:	3	1	0	2	4	4	1	2

Sample Title: BLANK

Channel								
377:	1	2	1	2	2	2	5	5
385:	5	7	4	5	5	5	3	2
393:	4	5	0	2	0	1	4	0
401:	1	4	3	4	4	3	1	3
409:	1	1	1	5	1	0	1	3
417:	1	4	2	4	0	0	2	1
425:	2	3	2	3	0	3	0	0
433:	1	2	5	1	7	1	1	4
441:	0	4	3	0	0	1	2	6
449:	6	2	2	6	9	8	6	3
457:	2	6	1	1	2	2	3	2
465:	4	2	1	1	2	0	0	0
473:	1	2	2	1	3	4	2	2
481:	3	5	6	3	2	3	4	3
489:	1	3	1	0	3	3	1	6
497:	3	1	0	3	0	3	1	3
505:	1	1	1	2	3	1	2	2
513:	2	3	1	4	4	4	2	4
521:	2	3	4	1	2	3	3	1
529:	1	0	1	1	2	2	1	1
537:	1	0	1	3	0	2	3	1
545:	2	2	0	2	2	1	3	1
553:	1	1	5	4	4	2	1	2
561:	1	1	2	3	5	2	3	3
569:	1	2	3	4	3	5	11	7
577:	6	3	4	3	7	2	2	5
585:	1	2	5	2	1	1	2	2
593:	0	5	4	1	2	5	2	3
601:	2	1	1	2	2	6	7	6
609:	5	5	3	6	2	5	4	3
617:	3	2	4	0	3	4	3	2
625:	5	4	4	1	1	4	0	3
633:	1	0	3	2	1	0	2	0
641:	1	4	2	4	2	7	4	1
649:	2	3	3	0	3	4	1	1
657:	0	1	3	2	0	1	4	2
665:	1	1	4	4	4	0	3	1
673:	1	2	2	0	3	1	1	0
681:	2	2	2	6	8	3	0	2
689:	2	1	2	2	0	3	3	3
697:	1	0	4	4	1	4	4	1
705:	2	3	1	1	1	0	4	0
713:	2	3	3	2	7	9	6	9
721:	17	19	28	15	12	5	10	7
729:	3	2	5	7	2	4	3	2
737:	5	6	7	15	14	22	22	35
745:	33	12	19	18	7	6	4	7
753:	3	1	2	3	0	5	2	3
761:	1	5	0	2	2	1	6	2
769:	3	2	1	4	3	3	3	1
777:	0	2	2	5	1	4	3	2
785:	3	2	4	1	4	3	3	1
793:	3	2	3	2	0	0	2	1

801:	1	2	3	3	2	3	1	2

Sample Title: BLANK

Channel								
809:	5	1	2	6	5	5	1	3
817:	0	4	3	3	3	4	0	2
825:	4	2	3	1	1	1	6	0
833:	6	3	6	3	3	5	10	10
841:	7	8	10	11	12	6	6	7
849:	8	5	5	5	1	1	3	4
857:	4	1	3	3	4	4	8	3
865:	6	6	4	3	6	4	1	2
873:	1	2	1	2	3	1	5	1
881:	0	2	3	1	5	5	3	1
889:	2	8	7	5	5	6	3	9
897:	4	7	6	5	4	3	6	5
905:	3	1	1	3	1	0	1	4
913:	5	3	3	0	4	3	6	1
921:	0	3	1	1	2	1	0	0
929:	2	1	0	2	3	1	3	1
937:	3	3	2	2	2	1	1	3
945:	1	2	2	1	1	1	5	0
953:	2	2	2	1	3	3	2	2
961:	1	3	2	2	0	2	1	4
969:	0	1	0	3	2	3	0	2
977:	0	2	3	2	1	3	1	3
985:	2	1	2	3	0	1	0	1
993:	0	3	2	0	2	2	2	2
1001:	1	2	1	2	3	4	3	1
1009:	1	2	2	2	0	2	1	0
1017:	1	2	0	0	5	2	0	1
1025:	0	3	1	2	0	2	3	0
1033:	3	2	3	1	2	4	2	0
1041:	2	1	1	5	1	2	3	2
1049:	4	1	1	0	1	1	5	3
1057:	0	2	2	4	5	1	1	3
1065:	3	3	0	1	4	1	1	1
1073:	2	0	3	3	1	0	1	4
1081:	1	3	0	3	1	1	2	1
1089:	0	2	4	2	2	3	2	3
1097:	1	2	0	1	1	2	1	6
1105:	1	2	2	1	4	0	1	0
1113:	0	4	1	2	3	1	3	0
1121:	5	3	3	2	1	0	4	2
1129:	2	0	1	2	1	0	2	2
1137:	0	3	2	1	2	2	2	5
1145:	1	1	1	3	1	2	2	4
1153:	4	0	2	3	2	2	5	4
1161:	1	4	1	2	3	0	1	1
1169:	1	0	2	1	3	2	2	6
1177:	5	1	2	5	3	1	1	1
1185:	2	4	2	1	0	0	2	1
1193:	1	2	0	2	3	2	0	0
1201:	0	2	4	2	1	3	2	1
1209:	0	0	2	0	2	5	4	2
1217:	2	1	2	3	3	1	2	3
1225:	1	0	1	1	1	1	0	1

1233:	2	1	2	2	2	1	2	4

Sample Title: BLANK

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

1665:	2	3	1	0	2	2	2	2

Sample Title: BLANK

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

2097:	1	2	1	1	2	1	1	0

Sample Title: BLANK

Channel								
2105:	1	1	0	2	2	2	1	2
2113:	1	1	1	0	1	2	1	1
2121:	1	2	1	1	2	2	2	2
2129:	0	3	0	1	0	1	0	1
2137:	0	1	0	1	1	0	2	0
2145:	1	2	1	0	1	1	3	2
2153:	0	1	0	2	0	1	2	1
2161:	2	0	1	1	0	1	1	0
2169:	2	0	1	1	3	2	1	2
2177:	2	1	1	1	0	1	1	2
2185:	1	1	2	2	2	0	1	1
2193:	0	0	1	2	1	1	3	3
2201:	1	0	0	1	1	1	1	1
2209:	1	0	0	2	1	0	2	2
2217:	0	0	0	1	1	2	0	1
2225:	0	2	1	1	3	1	0	0
2233:	1	1	0	1	1	2	0	2
2241:	1	2	0	3	2	1	1	2
2249:	3	2	0	1	1	1	0	0
2257:	2	0	2	2	2	0	0	4
2265:	2	1	0	0	1	1	2	2
2273:	2	1	2	0	0	1	3	6
2281:	1	3	5	6	13	17	18	12
2289:	13	12	7	6	9	4	1	4
2297:	2	2	0	2	0	1	0	0
2305:	2	2	3	3	3	3	3	5
2313:	3	3	4	0	5	2	4	4
2321:	2	4	3	2	2	1	1	0
2329:	1	0	2	0	1	1	1	1
2337:	0	1	1	0	1	0	1	2
2345:	1	0	2	2	0	3	1	0
2353:	1	3	1	0	0	1	1	0
2361:	2	0	0	1	2	1	0	3
2369:	0	1	1	1	4	0	2	1
2377:	1	0	0	0	1	1	2	1
2385:	1	2	0	0	0	0	2	0
2393:	1	1	3	0	0	2	0	2
2401:	1	1	0	0	1	0	1	1
2409:	0	0	1	0	2	1	0	2
2417:	1	1	1	0	1	0	1	0
2425:	0	1	0	0	0	4	1	1
2433:	0	0	2	2	0	2	2	1
2441:	0	1	0	1	0	0	2	2
2449:	0	3	0	1	0	2	0	1
2457:	0	3	3	0	3	1	0	1
2465:	1	2	2	0	2	1	0	2
2473:	0	2	1	0	1	1	1	0
2481:	3	2	2	0	3	2	1	2
2489:	1	1	3	0	1	3	0	0
2497:	1	2	1	2	1	0	1	2
2505:	2	0	1	0	0	0	1	2
2513:	2	1	1	2	3	0	1	1
2521:	0	0	1	1	0	1	0	1

2529:	1	1	2	0	2	1	1	0

Sample Title: BLANK

Channel								
2537:	0	1	0	1	0	1	1	0
2545:	2	1	0	2	0	1	0	1
2553:	0	0	0	0	0	1	2	1
2561:	0	2	3	1	2	1	0	1
2569:	1	1	0	0	2	0	1	1
2577:	1	3	0	0	0	0	3	2
2585:	5	1	2	0	2	2	3	0
2593:	2	4	2	1	0	2	0	0
2601:	1	1	1	0	0	0	1	0
2609:	0	2	0	1	1	1	2	1
2617:	0	2	2	1	3	2	2	1
2625:	0	1	2	0	0	2	3	0
2633:	1	0	2	1	2	2	2	2
2641:	4	0	2	2	1	0	2	1
2649:	1	1	1	1	0	2	0	3
2657:	5	2	3	0	2	2	0	1
2665:	0	0	1	1	2	0	0	0
2673:	1	1	0	0	1	2	4	0
2681:	1	0	0	1	1	0	1	3
2689:	1	2	3	1	1	1	2	2
2697:	1	0	0	0	2	0	0	0
2705:	0	1	0	0	0	0	1	1
2713:	0	1	1	0	0	0	1	1
2721:	2	1	0	0	2	3	1	2
2729:	1	0	0	4	1	0	1	2
2737:	1	0	0	1	2	0	2	0
2745:	1	0	1	0	1	1	2	0
2753:	2	2	1	2	1	1	2	4
2761:	4	1	3	0	1	0	0	0
2769:	1	1	0	0	3	0	0	2
2777:	0	1	1	1	1	1	0	0
2785:	1	2	1	1	0	2	1	0
2793:	1	0	1	4	1	2	1	0
2801:	2	2	0	0	1	0	0	0
2809:	0	2	2	0	3	2	0	0
2817:	2	3	1	1	2	0	8	3
2825:	3	2	6	2	9	2	4	4
2833:	4	3	1	1	1	1	0	0
2841:	2	2	1	0	0	1	0	1
2849:	0	0	0	0	1	1	1	0
2857:	0	0	0	0	0	2	0	0
2865:	2	1	0	3	2	2	2	0
2873:	0	1	0	0	0	1	0	1
2881:	1	0	0	1	0	0	2	0
2889:	0	2	2	2	0	0	0	0
2897:	0	0	2	2	1	2	1	2
2905:	1	1	0	0	3	3	1	0
2913:	2	1	0	0	0	0	1	1
2921:	1	0	0	1	1	0	0	0
2929:	1	0	1	0	0	0	0	1
2937:	2	0	3	2	1	3	1	2
2945:	1	1	0	3	1	0	3	1
2953:	1	1	1	0	0	1	1	1

2961:	2	0	1	0	0	1	0	0

Sample Title: BLANK

Channel								
2969:	0	1	1	1	1	2	0	1
2977:	2	0	2	0	2	1	2	1
2985:	0	2	0	0	0	1	0	1
2993:	1	0	1	0	1	0	1	1
3001:	2	0	2	0	0	1	0	1
3009:	2	2	0	0	2	0	1	0
3017:	0	0	0	0	2	0	0	0
3025:	0	1	1	0	1	0	1	0
3033:	0	0	1	3	3	0	1	0
3041:	0	2	1	3	0	1	1	1
3049:	1	3	1	0	3	0	0	0
3057:	0	2	0	1	0	0	0	1
3065:	1	0	2	1	2	0	1	0
3073:	0	1	1	0	1	1	0	1
3081:	1	0	1	0	0	0	0	1
3089:	0	1	0	1	1	0	2	0
3097:	1	0	0	1	0	1	1	0
3105:	0	2	0	3	0	2	2	2
3113:	0	0	0	0	0	1	1	0
3121:	0	1	0	0	0	0	1	1
3129:	0	0	1	0	2	1	2	1
3137:	0	0	0	0	2	0	1	2
3145:	2	2	3	2	0	1	0	0
3153:	1	0	0	2	0	1	1	0
3161:	1	2	1	0	0	0	1	0
3169:	2	0	3	2	1	2	1	1
3177:	3	1	0	1	2	1	2	2
3185:	0	0	0	1	1	0	0	1
3193:	1	0	0	0	3	1	0	2
3201:	0	1	1	2	0	1	1	0
3209:	0	2	1	2	0	0	1	0
3217:	0	0	1	1	0	0	0	0
3225:	2	0	1	0	0	4	0	0
3233:	1	2	1	0	3	2	2	2
3241:	4	4	5	6	2	2	0	0
3249:	3	1	1	1	0	0	2	3
3257:	2	0	0	1	1	0	1	1
3265:	3	1	0	0	1	0	1	0
3273:	0	2	0	1	1	0	0	1
3281:	1	1	2	3	1	0	0	0
3289:	0	0	0	0	1	0	2	0
3297:	1	0	1	0	0	3	2	1
3305:	1	0	0	1	0	2	0	0
3313:	3	0	1	1	1	0	3	1
3321:	3	3	1	1	2	2	0	0
3329:	0	0	0	4	0	2	2	1
3337:	2	1	0	1	0	0	1	1
3345:	1	1	0	0	1	0	1	0
3353:	0	2	1	0	2	2	1	0
3361:	2	1	3	1	7	4	4	7
3369:	7	7	6	4	6	2	10	2
3377:	2	0	1	0	0	0	1	1
3385:	2	0	1	0	0	1	0	1

3393:	0	0	0	1	0	0	1	3

Sample Title: BLANK

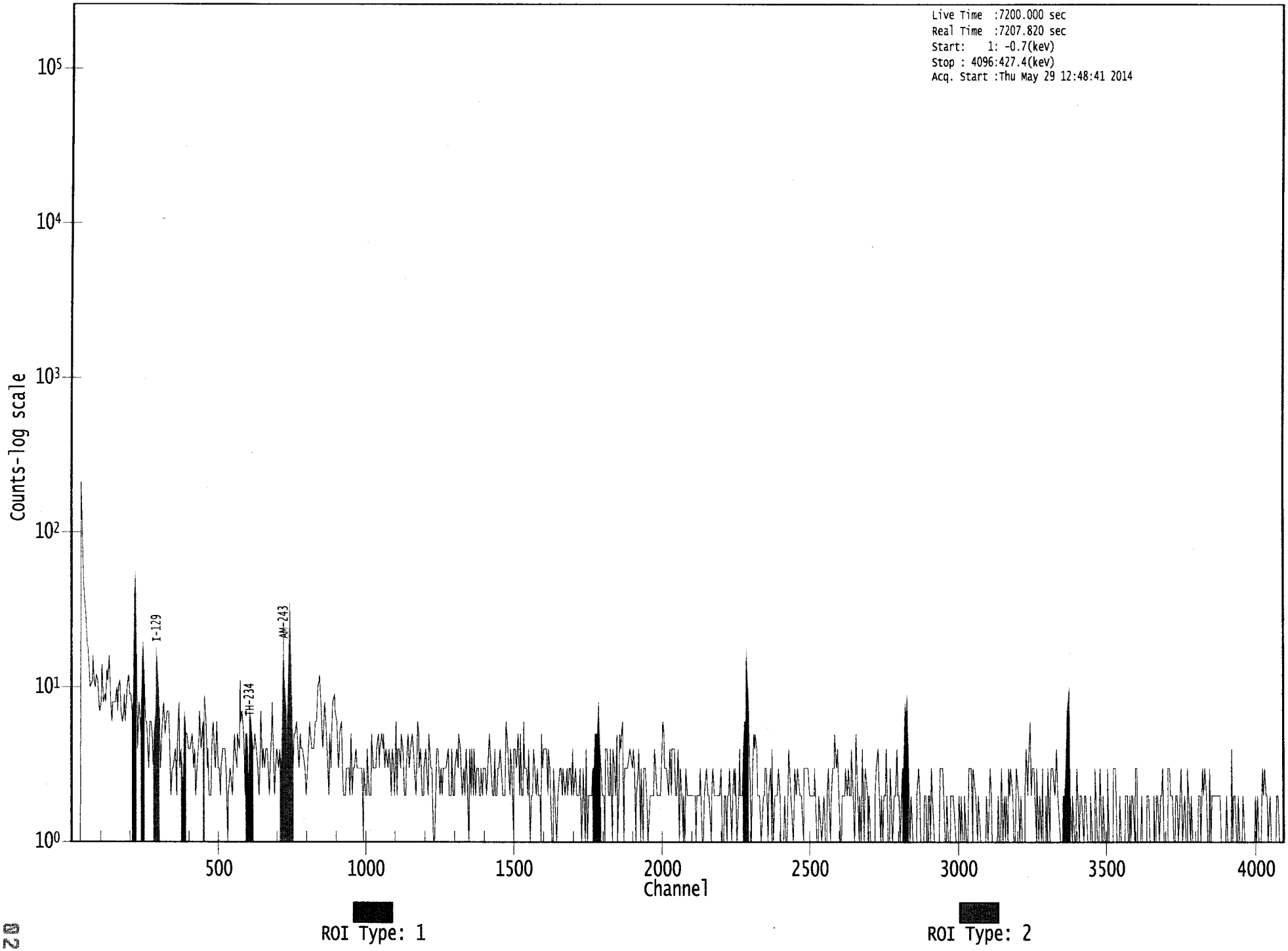
Channel								
3401:	1	1	2	1	0	1	1	1
3409:	0	1	2	1	1	0	0	2
3417:	2	0	0	0	0	1	1	1
3425:	1	2	0	1	1	2	1	0
3433:	1	1	0	1	0	0	0	1
3441:	0	0	0	0	1	1	2	1
3449:	1	1	1	1	0	0	0	1
3457:	0	0	0	0	2	3	0	2
3465:	2	0	1	1	1	0	0	0
3473:	1	0	1	0	1	0	3	1
3481:	0	0	0	1	0	0	1	1
3489:	2	0	1	0	1	1	1	0
3497:	0	0	0	1	0	1	1	1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

3825:	1	2	2	0	1	2	3	1

Sample Title: BLANK

Channel								
3833:	1	0	1	2	2	1	0	0
3841:	0	0	0	0	0	1	3	1
3849:	0	1	1	0	0	2	0	0
3857:	0	0	1	2	0	0	0	2
3865:	2	0	1	0	0	0	1	2
3873:	0	1	0	2	0	2	0	1
3881:	2	1	0	0	1	0	0	0
3889:	0	0	0	0	0	0	1	0
3897:	0	0	0	1	1	0	2	1
3905:	0	1	0	0	0	1	1	0
3913:	0	0	0	0	3	0	1	4
3921:	1	1	1	0	0	1	2	0
3929:	1	2	2	1	1	1	0	1
3937:	0	1	1	0	1	2	1	0
3945:	0	1	0	0	0	1	1	0
3953:	0	1	0	0	0	2	0	0
3961:	1	0	1	0	1	0	0	1
3969:	0	1	1	0	0	0	1	0
3977:	1	1	0	0	0	0	1	1
3985:	0	0	0	0	0	0	0	0
3993:	0	1	1	1	1	0	2	1
4001:	1	0	1	0	0	2	0	0
4009:	0	0	1	0	0	1	0	0
4017:	1	1	0	0	1	0	3	1
4025:	0	2	0	1	1	3	0	0
4033:	1	0	2	0	0	2	0	1
4041:	1	0	0	0	0	1	1	2
4049:	1	0	1	1	0	1	1	0
4057:	0	0	1	0	1	0	0	0
4065:	1	0	1	0	0	2	1	1
4073:	1	2	0	1	0	0	1	0
4081:	0	0	0	0	1	1	0	0
4089:	1	0	0	1	1	0	1	0

0000008081.CNF



WLLFOIA4312 - 001 - 0035078

NB 12814

Apex-Gamma

Analysis Report for 1405116-03
BMAC0004

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1405116-03
Sample Description	: BMAC0004
Sample Type	: SOIL
Sample Size	: 6.021E+01 grams
Facility	: Countroom
Sample Taken On	: 5/27/2014 1:54:27PM
Acquisition Started	: 5/28/2014 1:55:11PM
Procedure	: LPGAS-13 pCi
Operator	: Administrator
Detector Name	: GE5
Geometry	: LPGAS-13
Live Time	: 7200.0 seconds
Real Time	: 7210.5 seconds
Dead Time	: 0.15 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 32 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 12/2/2013
Efficiency Calibration Used Done On	: 8/24/2013
Efficiency Calibration Description	:
Sample Number	: 8008

AG
5/29/14

Analysis Report for 1405116-03

BMAC0004

ENERGY CALIBRATION REPORT

Detector Name : GE5

ENERGY CALIBRATION COEFFICIENTS

Energy Calibrate Performed on : 12/2/2013 2:11:00PM
by : Administrator
Energy Calibrate Type : POLY

Energy (keV) = -0.802 + 0.104*ch + -5.16E-09*ch^2 + 0.00E+00*ch^3

SHAPE CALIBRATION COEFFICIENTS

Shape Calibrate Performed on : 12/2/2013 2:10:49PM
by : Administrator

FWHM = 0.586 + 3.02E-02*E^1/2

LOW TAIL = 0.00E+00 + 0.00E+00*E

ENERGY CALIBRATION RESULTS TABLE

Centroid Channel	Centroid error	Energy (keV)
0.00	0.00	59.54
0.00	0.00	88.00
0.00	0.00	122.06
0.00	0.00	165.85
0.00	0.00	391.69

SHAPE CALIBRATION RESULTS TABLE

Energy (keV)	FWHM channels	FWHM error	TAIL channels	TAIL error
59.54	0.00	0.00	0.00	0.00
88.00	0.00	0.00	0.00	0.00
122.06	0.00	0.00	0.00	0.00
165.85	0.00	0.00	0.00	0.00
391.69	0.00	0.00	0.00	0.00

Analysis Report for 1405116-03

BMAC0004

EFFICIENCY CALIBRATION REPORT

Detector Name	:	GE5
Geometry Description	:	LPGAS-13
Efficiency Calibration Performed on	:	8/24/2013 10:08:51AM
by	:	Administrator
Efficiency Type Used	:	EMPIRICA
Certificate File	:	

Efficiency Triplets

Energy	% Efficiency	Error	Computed	Error	% Difference
59.54	1.36E+01	4.77E-01			
88.00	1.54E+01	7.25E-01			
122.06	1.25E+01	5.17E-01			
165.85	8.94E+00	3.51E-01			
391.69	3.38E+00	1.34E-01			

DUAL Efficiency Calibration Equation

Single Equation Terms

Offset	:	-1.04E+01
Slope	:	4.00E+00
Quadratic	:	-4.73E-01
Cubic	:	0.00E+00
4th Order	:	0.00E+00
5th Order	:	0.00E+00
6th Order	:	0.00E+00
7th Order	:	0.00E+00
8th Order	:	0.00E+00
9th Order	:	0.00E+00

EMPIRICAL Efficiency Calibration Equation

Empirical Equation Terms

Scaling	:	2.26E+02
Offset	:	-2.63E+00
Slope	:	1.13E+00
Quadratic	:	-4.73E-01
Cubic	:	0.00E+00
4th Order	:	0.00E+00
5th Order	:	0.00E+00

Analysis Report for 1405116-03

BMAC0004

LINEAR Efficiency Calibration Equation

Linear Equation Terms

Offset :	-2.22E-03
Slope :	-5.87E-01
Quadratic :	-7.80E+00
Cubic :	0.00E+00
4th Order :	0.00E+00
5th Order :	0.00E+00
6th Order :	0.00E+00
7th Order :	0.00E+00
8th Order :	0.00E+00
9th Order :	0.00E+00

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

PEAK LOCATE REPORT

Peak Locate Performed on	: 5/28/2014 3:55:24PM
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	10.83	111.28	0.0000	0.00
2	12.88	130.86	0.0000	0.00
3	15.63	157.15	0.0000	0.00
4	35.05	342.91	0.0000	0.00
5	36.50	356.72	0.0000	0.00
6	46.48	452.21	0.0000	0.00
7	74.73	722.31	0.0000	0.00
8	77.14	745.42	0.0000	0.00
9	87.03	840.00	0.0000	0.00
10	129.08	1242.14	0.0000	0.00

Analysis Report for 1405116-03

BMAC0004

Peak No.	Energy (keV)	Centroid Channel	Centroid Uncertainty	Peak Significance
11	185.78	1784.42	0.0000	0.00
12	238.33	2287.11	0.0000	0.00
13	294.85	2827.74	0.0000	0.00
14	337.53	3236.00	0.0000	0.00
15	338.16	3242.00	0.0000	0.00
16	351.45	3369.17	0.0000	0.00

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1405116-03

BMAC0004

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/28/2014 3:55:24PM

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	10.83	101 -	142	111.28	1.26E+02	51.97	2.45E+02	0.91
m	2	12.88	101 -	142	130.86	2.30E+02	65.47	3.23E+02	1.01
	3	15.63	144 -	170	157.15	1.49E+02	66.02	3.41E+02	0.40
	4	35.05	331 -	351	342.91	3.62E+01	36.59	1.32E+02	0.35
	5	36.50	351 -	364	356.72	3.59E+01	28.24	9.82E+01	0.59
	6	46.48	440 -	465	452.21	1.59E+03	100.22	3.35E+02	0.56
	7	74.73	715 -	731	722.31	8.50E+01	39.58	1.98E+02	0.50
	8	77.14	734 -	757	745.42	1.95E+02	49.84	2.04E+02	0.52
M	9	87.03	828 -	854	840.00	1.03E+02	39.52	1.49E+02	0.87
	10	129.08	1232 -	1256	1242.14	2.82E+01	29.83	9.55E+01	0.41
	11	185.78	1769 -	1793	1784.42	4.45E+01	34.77	1.25E+02	0.79
	12	238.33	2272 -	2297	2287.11	1.89E+02	37.82	9.48E+01	0.69
	13	294.85	2811 -	2839	2827.74	6.68E+01	32.89	1.04E+02	0.67
M	14	337.53	3229 -	3249	3236.00	1.16E+01	14.42	1.41E+01	1.14
m	15	338.16	3229 -	3249	3242.00	9.50E+01	14.83	9.63E+00	1.14
	16	351.45	3351 -	3383	3369.17	9.88E+01	24.94	2.64E+01	0.88

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

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/28/2014 3:55:24PM

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

Analysis Report for 1405116-03

BMAC0004

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
M	1	10.83	101 -	142	1.26E+02	51.97	2.45E+02	2.57E+01
m	2	12.88	101 -	142	2.30E+02	65.47	3.23E+02	2.95E+01
	3	15.63	144 -	170	1.49E+02	66.02	3.41E+02	5.04E+01
	4	35.05	331 -	351	3.62E+01	36.59	1.32E+02	2.84E+01
	5	36.50	351 -	364	3.59E+01	28.24	9.82E+01	2.10E+01
	6	46.48	440 -	465	1.59E+03	100.22	3.35E+02	4.98E+01
	7	74.73	715 -	731	8.50E+01	39.58	1.98E+02	2.88E+01
	8	77.14	734 -	757	1.95E+02	49.84	2.04E+02	3.39E+01
M	9	87.03	828 -	854	1.03E+02	39.52	1.49E+02	2.01E+01
	10	129.08	1232 -	1256	2.82E+01	29.83	9.55E+01	2.29E+01
	11	185.78	1769 -	1793	4.45E+01	34.77	1.25E+02	2.64E+01
	12	238.33	2272 -	2297	1.89E+02	37.82	9.48E+01	2.14E+01
	13	294.85	2811 -	2839	6.68E+01	32.89	1.04E+02	2.35E+01
M	14	337.53	3229 -	3249	1.16E+01	14.42	1.41E+01	6.17E+00
m	15	338.16	3229 -	3249	9.50E+01	14.83	9.63E+00	5.10E+00
	16	351.45	3351 -	3383	9.88E+01	24.94	2.64E+01	1.24E+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 : 5/28/2014 3:55:24PM

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

Tentative NID Library : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.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	10.83	101 -	142	111.28	1.26E+02	51.97	2.45E+02	PB-210 PA-231 PA-234
m	2	12.88	101 -	142	130.86	2.30E+02	65.47	3.23E+02	.....
	3	15.63	144 -	170	157.15	1.49E+02	66.02	3.41E+02	NB-93M MO-93
	4	35.05	331 -	351	342.91	3.62E+01	36.59	1.32E+02	I-125
	5	36.50	351 -	364	356.72	3.59E+01	28.24	9.82E+01	.....
	6	46.48	440 -	465	452.21	1.59E+03	100.22	3.35E+02	PB-210

Analysis Report for 1405116-03

BMAC0004

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	7	74.73	715 -	731	722.31	8.50E+01	39.58	1.98E+02	AM-243
	8	77.14	734 -	757	745.42	1.95E+02	49.84	2.04E+02	.....
M	9	87.03	828 -	854	840.00	1.03E+02	39.52	1.49E+02	NP-237 CD-109
	10	129.08	1232 -	1256	1242.14	2.82E+01	29.83	9.55E+01	.....
	11	185.78	1769 -	1793	1784.42	4.45E+01	34.77	1.25E+02	.....
	12	238.33	2272 -	2297	2287.11	1.89E+02	37.82	9.48E+01	.....
	13	294.85	2811 -	2839	2827.74	6.68E+01	32.89	1.04E+02	.....
M	14	337.53	3229 -	3249	3236.00	1.16E+01	14.42	1.41E+01	.....
m	15	338.16	3229 -	3249	3242.00	9.50E+01	14.83	9.63E+00	.....
	16	351.45	3351 -	3383	3369.17	9.88E+01	24.94	2.64E+01	.....

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

PEAK EFFICIENCY REPORT

Peak Analysis Performed on : 5/28/2014 3:55:24PM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
M	1	10.83	1.26E+02	51.97	2.87E-02	1.39E-02
m	2	12.88	2.30E+02	65.47	3.82E-02	1.39E-02
	3	15.63	1.49E+02	66.02	5.10E-02	1.39E-02
	4	35.05	3.62E+01	36.59	1.15E-01	1.39E-02
	5	36.50	3.59E+01	28.24	1.18E-01	1.39E-02
	6	46.48	1.59E+03	100.22	1.32E-01	1.39E-02
	7	74.73	8.50E+01	39.58	1.41E-01	2.58E-02
	8	77.14	1.95E+02	49.84	1.41E-01	2.77E-02
M	9	87.03	1.03E+02	39.52	1.38E-01	3.55E-02
	10	129.08	2.82E+01	29.83	1.17E-01	1.46E-02
	11	185.78	4.45E+01	34.77	8.80E-02	1.63E-02
	12	238.33	1.89E+02	37.82	6.74E-02	1.29E-02
	13	294.85	6.68E+01	32.89	5.13E-02	9.19E-03
M	14	337.53	1.16E+01	14.42	4.21E-02	6.42E-03
m	15	338.16	9.50E+01	14.83	4.20E-02	6.38E-03
	16	351.45	9.88E+01	24.94	3.96E-02	5.52E-03

Analysis Report for 1405116-03

BMAC0004

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

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/28/2014 3:55:24PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	10.83	1.26E+02	51.97			1.26E+02	5.20E+01
m	2	12.88	2.30E+02	65.47	3.19E+01	8.66E+00	1.98E+02	6.60E+01
	3	15.63	1.49E+02	66.02			1.49E+02	6.60E+01
	4	35.05	3.62E+01	36.59			3.62E+01	3.66E+01
	5	36.50	3.59E+01	28.24			3.59E+01	2.82E+01
	6	46.48	1.59E+03	100.22			1.59E+03	1.00E+02
	7	74.73	8.50E+01	39.58	4.55E-01	3.15E+00	8.45E+01	3.97E+01
	8	77.14	1.95E+02	49.84			1.95E+02	4.98E+01
M	9	87.03	1.03E+02	39.52			1.03E+02	3.95E+01
	10	129.08	2.82E+01	29.83			2.82E+01	2.98E+01
	11	185.78	4.45E+01	34.77			4.45E+01	3.48E+01
	12	238.33	1.89E+02	37.82			1.89E+02	3.78E+01
	13	294.85	6.68E+01	32.89			6.68E+01	3.29E+01
M	14	337.53	1.16E+01	14.42			1.16E+01	1.44E+01
m	15	338.16	9.50E+01	14.83			9.50E+01	1.48E+01
	16	351.45	9.88E+01	24.94			9.88E+01	2.49E+01

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

Analysis Report for 1405116-03

BMAC0004

AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 5/28/2014 3:55:24PM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.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	10.83	1.26E+02	51.97			1.26E+02	5.20E+01
m	2	12.88	2.30E+02	65.47	3.19E+01	8.66E+00	1.98E+02	6.60E+01
	3	15.63	1.49E+02	66.02			1.49E+02	6.60E+01
	4	35.05	3.62E+01	36.59			3.62E+01	3.66E+01
	5	36.50	3.59E+01	28.24			3.59E+01	2.82E+01
	6	46.48	1.59E+03	100.22			1.59E+03	1.00E+02
	7	74.73	8.50E+01	39.58	4.55E-01	3.15E+00	8.45E+01	3.97E+01
	8	77.14	1.95E+02	49.84			1.95E+02	4.98E+01
M	9	87.03	1.03E+02	39.52			1.03E+02	3.95E+01
	10	129.08	2.82E+01	29.83			2.82E+01	2.98E+01
	11	185.78	4.45E+01	34.77			4.45E+01	3.48E+01
	12	238.33	1.89E+02	37.82			1.89E+02	3.78E+01
	13	294.85	6.68E+01	32.89			6.68E+01	3.29E+01
M	14	337.53	1.16E+01	14.42			1.16E+01	1.44E+01
m	15	338.16	9.50E+01	14.83			9.50E+01	1.48E+01
	16	351.45	9.88E+01	24.94			9.88E+01	2.49E+01

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

NUCLIDE IDENTIFICATION REPORT

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

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
MO-93	0.613	16.59	*	52.90	3.46E-01	2.15E-01
		18.60		10.00		

Analysis Report for 1405116-03

BMAC0004

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
NB-93M	0.868	16.57	*	9.43	1.94E+00	1.01E+00
CD-109	0.853	88.03	*	3.72	1.25E+00	5.79E-01
I-125	0.970	35.49	*	6.49	3.06E-01	3.11E-01
PB-210	1.000	10.80	*	9.57	2.87E+00	1.82E+00
		46.50	*	4.25	1.76E+01	2.16E+00
AM-243	0.999	74.67	*	66.00	5.65E-02	2.89E-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 : 5/28/2014 3:55:24PM
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	2	12.88	2.75288E-02	16.66		
	5	36.50	4.98584E-03	39.33		
	8	77.14	2.70539E-02	12.79		
	10	129.08	3.92041E-03	52.84		
	11	185.78	6.18056E-03	39.07		
	12	238.33	2.61944E-02	10.03		
	13	294.85	9.27778E-03	24.62		
M	14	337.53	1.60756E-03	62.30		
m	15	338.16	1.31896E-02	7.81		
	16	351.45	1.37222E-02	12.62		

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 1405116-03

BMAC0004

NUCLIDE IDENTIFICATION REPORT

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

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
MO-93	0.61	16.59	*	52.90	3.46E-01	2.15E-01
		18.60		10.00		
NB-93M	0.86	16.57	*	9.43	1.94E+00	1.01E+00
CD-109	0.85	88.03	*	3.72	1.25E+00	5.79E-01
I-125	0.97	35.49	*	6.49	3.06E-01	3.11E-01
PB-210	1.00	10.80	*	9.57	2.87E+00	1.82E+00
		46.50	*	4.25	1.76E+01	2.16E+00
AM-243	0.99	74.67	*	66.00	5.65E-02	2.89E-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
?	MO-93	0.613	3.46E-01	2.15E-01	
?	NB-93M	0.868	1.94E+00	1.01E+00	
	CD-109	0.853	1.25E+00	5.79E-01	
	I-125	0.970	3.06E-01	3.11E-01	
	PB-210	1.000	9.01E+00	1.39E+00	
	AM-243	0.999	5.65E-02	2.89E-02	

Analysis Report for 1405116-03

BMAC0004

? = 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 1405116-03

BMAC0004

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/28/2014 3:55:24PM
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	2	12.88	2.75288E-02	16.66		
	5	36.50	4.98584E-03	39.33		
	8	77.14	2.70539E-02	12.79		
	10	129.08	3.92041E-03	52.84		
	11	185.78	6.18056E-03	39.07		
	12	238.33	2.61944E-02	10.03		
	13	294.85	9.27778E-03	24.62		
M	14	337.53	1.60756E-03	62.30		
m	15	338.16	1.31896E-02	7.81		
	16	351.45	1.37222E-02	12.62		

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\WSRC.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	FE-55	5.89		24.50	1.09E-01	2.18E+00	2.18E+00
+	CO-57	122.06		85.51	5.01E-03	2.67E-02	2.67E-02
		136.48		10.60	3.14E-02		2.26E-01
+	NI-59	6.92		29.80	-1.12E+00	1.17E+00	1.17E+00
+	MO-93	16.59	*	52.90	3.46E-01	2.40E-01	2.40E-01
		18.60		10.00	6.18E-02		5.33E-01
+	NB-93M	16.57	*	9.43	1.94E+00	1.34E+00	1.34E+00

Analysis Report for 1405116-03

BMAC0004

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	CD-109	88.03	*	3.72	1.25E+00	7.80E-01	7.80E-01
+	SN-113	255.12		1.93	-5.63E-01	9.21E-02	1.83E+00
		391.69		61.90	-2.93E-02		9.21E-02
+	SN-119M	23.87		16.10	-1.58E+00	2.03E-01	2.94E-01
		25.10		22.70	1.72E-01		2.03E-01
+	I-125	35.49	*	6.49	3.06E-01	5.02E-01	5.02E-01
+	I-129	29.78		57.00	3.21E-02	6.30E-02	6.30E-02
		33.60		13.20	-3.54E-02		2.23E-01
		39.58		7.52	1.43E-01		4.63E-01
+	BA-133	30.80		97.60	-1.24E-02	3.45E-02	3.45E-02
		81.00		33.00	-7.64E-03		6.68E-02
		302.84		17.80	2.77E-02		2.62E-01
		356.01		60.00	-2.43E-02		6.43E-02
		383.85		8.70	-1.07E-01		6.13E-01
+	CE-139	165.85		80.35	1.66E-02	3.71E-02	3.71E-02
+	CE-144	133.54		10.80	1.16E-01	2.33E-01	2.33E-01
+	HG-203	279.19		77.30	-2.06E-02	5.61E-02	5.61E-02
+	PB-210	10.80	*	9.57	2.87E+00	1.13E+00	3.39E+00
		46.50	*	4.25	1.76E+01		1.13E+00
+	PA-231	9.28		42.00	2.33E-01	4.38E-01	4.38E-01
		10.11		20.20	6.53E-02		9.33E-01
		283.67		1.60	2.98E-01		2.73E+00
		302.67		2.30	-4.26E-01		1.95E+00
+	TH-231	25.64		14.70	3.35E-01	3.08E-01	3.08E-01
		84.21		6.40	3.28E-01		3.88E-01
+	PA-234	9.89		89.00	8.23E-03	1.08E-01	2.15E-01
		21.72		64.90	3.86E-01		1.22E-01
		37.93		23.75	-8.06E-02		1.23E-01
		131.42		20.40	-3.95E-02		1.08E-01
+	TH-234	63.29		3.80	8.11E-01	7.43E-01	7.43E-01
+	NP-237	29.37		14.00	2.64E-01	2.10E-01	2.67E-01
		86.50		12.60	-2.80E-02		2.10E-01
+	U-237	97.08		16.30	3.49E-02	9.33E-02	1.52E-01
		101.07		26.30	1.13E-02		9.33E-02
		114.00		12.30	-2.99E-02		1.88E-01
		208.01		22.00	3.43E-02		1.82E-01
+	AM-241	59.54		35.90	3.99E-02	6.44E-02	6.44E-02
+	AM-243	74.67	*	66.00	5.65E-02	4.05E-02	4.05E-02

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

Analysis Report for 1405116-03

BMAC0004

NUCLIDE MDA REPORT

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

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	FE-55	5.89		24.50	2.18E+00	2.18E+00	1.09E-01	1.05E+00
	CO-57	122.06		85.51	2.67E-02	2.67E-02	5.01E-03	1.25E-02
		136.48		10.60	2.26E-01		3.14E-02	1.06E-01
	NI-59	6.92		29.80	1.17E+00	1.17E+00	-1.12E+00	5.63E-01
+	MO-93	16.59	*	52.90	2.40E-01	2.40E-01	3.46E-01	1.17E-01
		18.60		10.00	5.33E-01		6.18E-02	2.53E-01
+	NB-93M	16.57	*	9.43	1.34E+00	1.34E+00	1.94E+00	6.55E-01
+	CD-109	88.03	*	3.72	7.80E-01	7.80E-01	1.25E+00	3.73E-01
	SN-113	255.12		1.93	1.83E+00	9.21E-02	-5.63E-01	8.44E-01
		391.69		61.90	9.21E-02		-2.93E-02	4.19E-02
	SN-119M	23.87		16.10	2.94E-01	2.03E-01	-1.58E+00	1.41E-01
		25.10		22.70	2.03E-01		1.72E-01	9.72E-02
+	I-125	35.49	*	6.49	5.02E-01	5.02E-01	3.06E-01	2.40E-01
	I-129	29.78		57.00	6.30E-02	6.30E-02	3.21E-02	3.00E-02
		33.60		13.20	2.23E-01		-3.54E-02	1.06E-01
		39.58		7.52	4.63E-01		1.43E-01	2.23E-01
	BA-133	30.80		97.60	3.45E-02	3.45E-02	-1.24E-02	1.64E-02
		81.00		33.00	6.68E-02		-7.64E-03	3.16E-02
		302.84		17.80	2.62E-01		2.77E-02	1.21E-01
		356.01		60.00	6.43E-02		-2.43E-02	2.85E-02
		383.85		8.70	6.13E-01		-1.07E-01	2.78E-01
	CE-139	165.85		80.35	3.71E-02	3.71E-02	1.66E-02	1.75E-02
	CE-144	133.54		10.80	2.33E-01	2.33E-01	1.16E-01	1.10E-01
	HG-203	279.19		77.30	5.61E-02	5.61E-02	-2.06E-02	2.60E-02
+	PB-210	10.80	*	9.57	3.39E+00	1.13E+00	2.87E+00	1.66E+00
		46.50	*	4.25	1.13E+00		1.76E+01	5.52E-01
	PA-231	9.28		42.00	4.38E-01	4.38E-01	2.33E-01	2.10E-01
		10.11		20.20	9.33E-01		6.53E-02	4.50E-01
		283.67		1.60	2.73E+00		2.98E-01	1.27E+00
		302.67		2.30	1.95E+00		-4.26E-01	9.02E-01
	TH-231	25.64		14.70	3.08E-01	3.08E-01	3.35E-01	1.48E-01
		84.21		6.40	3.88E-01		3.28E-01	1.85E-01
	PA-234	9.89		89.00	2.15E-01	1.08E-01	8.23E-03	1.03E-01
		21.72		64.90	1.22E-01		3.86E-01	5.95E-02
		37.93		23.75	1.23E-01		-8.06E-02	5.88E-02
		131.42		20.40	1.08E-01		-3.95E-02	5.04E-02
	TH-234	63.29		3.80	7.43E-01	7.43E-01	8.11E-01	3.56E-01
	NP-237	29.37		14.00	2.67E-01	2.10E-01	2.64E-01	1.28E-01
		86.50		12.60	2.10E-01		-2.80E-02	1.00E-01
	U-237	97.08		16.30	1.52E-01	9.33E-02	3.49E-02	7.18E-02

Analysis Report for 1405116-03

BMAC0004

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	U-237	101.07		26.30	9.33E-02	9.33E-02	1.13E-02	4.39E-02
		114.00		12.30	1.88E-01		-2.99E-02	8.78E-02
		208.01		22.00	1.82E-01		3.43E-02	8.56E-02
	AM-241	59.54		35.90	6.44E-02	6.44E-02	3.99E-02	3.05E-02
+	AM-243	74.67	*	66.00	4.05E-02	4.05E-02	5.65E-02	1.94E-02

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

No Action Level results available for reporting purposes.

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

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: BMAC0004

Elapsed Live time: 7200
Elapsed Real Time: 7211

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	5
33:	44	211	176	145	104	106	75	51
41:	41	44	32	33	33	29	23	20
49:	17	15	15	9	18	15	7	15
57:	16	17	15	11	9	11	13	12
65:	8	11	3	16	15	8	12	8
73:	10	7	16	7	8	4	8	10
81:	9	8	6	6	14	12	10	15
89:	12	8	5	8	10	12	8	11
97:	9	5	6	8	4	4	6	6
105:	8	6	11	11	22	25	33	27
113:	13	18	10	12	8	13	8	8
121:	9	8	18	13	10	19	19	18
129:	26	36	28	20	38	31	18	16
137:	15	16	6	6	6	7	7	6
145:	8	10	8	5	7	12	12	13
153:	10	30	19	21	20	12	16	14
161:	15	15	7	10	11	15	7	9
169:	5	3	6	9	6	4	5	10
177:	8	7	7	6	4	4	2	1
185:	8	4	10	0	5	8	3	8
193:	8	2	9	11	8	6	6	5
201:	4	7	5	3	7	9	8	6
209:	5	4	4	7	15	15	29	35
217:	37	53	49	53	33	25	11	6
225:	5	5	5	7	3	8	4	4
233:	4	4	6	6	3	4	6	7
241:	7	10	10	11	20	20	14	11
249:	6	8	8	6	2	5	8	3
257:	2	3	7	7	9	5	0	8
265:	5	6	3	4	6	3	4	5
273:	4	2	6	6	4	3	10	4
281:	6	2	6	6	11	5	5	9
289:	9	9	16	7	7	14	11	6
297:	1	5	2	3	5	1	1	4
305:	6	7	4	6	6	3	6	7
313:	8	7	6	12	5	3	8	2
321:	4	5	4	6	2	7	8	9
329:	4	6	2	4	6	5	4	6
337:	4	4	6	7	4	6	4	3
345:	7	8	9	9	0	2	2	2
353:	3	7	6	11	10	6	10	6
361:	7	6	4	5	7	5	5	3

369:	2	6	8	3	7	8	10	5

Sample Title: BMAC0004

Channel								
377:	4	6	7	4	7	5	13	6
385:	12	8	9	13	13	13	9	9
393:	7	11	10	15	7	12	11	12
401:	7	14	9	11	6	12	7	5
409:	2	10	8	10	7	6	7	10
417:	4	0	7	7	7	8	6	6
425:	11	5	7	6	6	11	10	6
433:	18	8	12	9	8	9	11	9
441:	7	6	14	10	17	17	41	75
449:	98	186	255	278	238	177	136	83
457:	50	25	12	5	4	4	5	7
465:	1	9	1	4	3	4	0	2
473:	2	4	7	7	1	8	4	7
481:	7	2	4	3	4	7	7	3
489:	3	3	4	4	5	3	4	4
497:	1	6	4	3	2	4	2	2
505:	5	5	3	4	4	6	2	6
513:	2	4	4	4	4	8	3	6
521:	7	4	3	3	3	5	4	4
529:	4	6	4	5	8	4	5	2
537:	4	1	5	8	5	4	1	2
545:	4	2	3	2	5	1	2	4
553:	4	2	5	8	5	1	4	5
561:	2	5	3	6	6	5	4	4
569:	8	4	3	7	4	9	4	8
577:	4	4	7	5	4	2	5	1
585:	2	3	4	2	4	5	4	0
593:	2	2	5	2	2	4	6	4
601:	6	5	7	2	7	6	3	9
609:	9	11	11	7	14	9	8	9
617:	5	5	9	4	4	7	5	9
625:	3	10	6	3	2	7	4	1
633:	6	8	7	2	5	1	4	3
641:	2	7	2	7	2	8	3	1
649:	6	3	2	3	0	9	8	2
657:	6	6	3	7	6	1	4	5
665:	8	4	5	1	10	5	3	7
673:	5	8	9	2	2	6	6	6
681:	6	3	4	4	3	1	5	5
689:	7	4	3	5	5	4	2	6
697:	5	6	1	6	3	2	4	1
705:	3	3	5	5	7	4	7	5
713:	7	4	3	3	7	10	9	14
721:	19	20	28	12	20	11	8	5
729:	4	4	7	8	8	4	7	5
737:	6	9	10	11	13	27	30	27
745:	27	36	10	17	8	10	12	7
753:	6	3	3	3	6	0	1	2
761:	6	3	5	9	3	6	7	4
769:	2	0	1	6	4	2	3	3
777:	7	6	3	6	3	6	4	5
785:	2	3	5	8	4	3	5	8
793:	2	2	2	2	5	2	7	3

801:	4	4	3	2	2	8	3	6

Sample Title: BMAC0004

Channel								
809:	5	5	9	8	9	6	5	5
817:	7	7	4	7	5	3	2	6
825:	3	1	4	3	3	3	7	0
833:	6	4	9	3	3	9	10	15
841:	9	8	5	7	6	8	10	9
849:	9	2	6	2	5	3	2	2
857:	6	3	4	2	3	4	12	7
865:	7	7	7	8	7	6	9	3
873:	2	4	2	2	3	5	1	3
881:	4	3	2	2	2	10	5	5
889:	8	11	6	4	5	11	8	12
897:	6	7	8	7	5	7	5	1
905:	6	4	3	2	2	4	4	2
913:	5	4	1	5	1	8	1	3
921:	2	2	4	5	4	3	4	0
929:	5	6	4	6	5	0	0	7
937:	5	1	2	2	2	3	3	3
945:	5	2	5	5	3	2	3	2
953:	2	5	5	3	4	4	3	5
961:	6	6	6	1	4	2	4	0
969:	3	4	2	1	1	2	3	3
977:	2	3	7	5	2	2	3	6
985:	5	4	2	7	1	2	5	2
993:	2	1	2	1	0	2	5	4
1001:	3	3	3	5	2	1	2	5
1009:	4	3	6	4	3	4	3	3
1017:	3	0	5	4	1	3	1	3
1025:	6	4	4	1	2	1	3	0
1033:	1	3	2	3	1	5	4	3
1041:	1	1	1	5	0	3	2	3
1049:	5	1	4	2	2	5	3	5
1057:	4	4	0	8	8	4	2	2
1065:	3	1	2	2	3	9	4	6
1073:	1	1	4	5	3	2	2	0
1081:	4	4	1	4	1	5	7	1
1089:	5	3	3	3	0	2	1	2
1097:	3	3	0	2	4	1	2	3
1105:	3	1	4	0	4	2	5	3
1113:	6	1	3	2	5	2	2	2
1121:	3	3	0	2	3	3	2	1
1129:	4	0	3	2	4	3	2	2
1137:	5	1	1	1	4	1	5	4
1145:	6	2	1	2	7	1	4	4
1153:	2	5	1	5	2	3	5	1
1161:	5	4	2	3	3	1	3	4
1169:	1	5	3	4	2	6	2	3
1177:	2	7	4	3	5	1	1	2
1185:	2	3	0	3	1	3	2	4
1193:	3	1	2	2	1	3	3	2
1201:	6	0	3	5	2	4	1	2
1209:	1	4	2	2	2	3	2	0
1217:	5	0	1	2	0	0	6	3
1225:	4	2	4	1	0	2	2	0

1233:	1	1	3	2	3	5	4	7

Sample Title: BMAC0004

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

1665:	1	5	1	1	3	4	3	5

Sample Title: BMAC0004

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

2097:	1	3	4	0	2	1	3	1

Sample Title: BMAC0004

Channel								
2105:	1	3	3	1	1	5	1	4
2113:	1	1	1	2	2	1	5	5
2121:	4	2	2	3	1	1	0	3
2129:	0	4	2	3	4	1	0	3
2137:	1	2	3	0	1	0	7	2
2145:	0	4	1	0	2	4	2	1
2153:	3	0	3	0	1	0	1	2
2161:	2	3	3	2	0	4	3	3
2169:	1	0	3	3	1	3	0	2
2177:	5	3	2	0	2	3	3	0
2185:	1	2	2	1	6	1	3	1
2193:	0	2	4	2	3	1	2	1
2201:	1	1	2	1	1	3	1	1
2209:	0	2	4	2	1	0	4	4
2217:	2	1	2	1	0	1	2	2
2225:	1	3	2	0	0	3	2	4
2233:	5	2	2	1	0	3	0	3
2241:	1	1	2	4	1	1	0	1
2249:	3	2	1	5	0	1	2	3
2257:	2	1	1	0	1	1	1	1
2265:	2	2	3	2	1	3	3	1
2273:	1	2	4	5	2	4	6	3
2281:	4	7	12	11	20	25	20	23
2289:	19	24	12	12	9	6	3	1
2297:	0	0	1	5	2	1	3	0
2305:	3	4	3	3	2	3	4	2
2313:	4	4	5	5	4	5	6	2
2321:	3	6	5	4	5	1	2	1
2329:	4	4	1	2	0	0	3	3
2337:	0	1	2	3	2	7	4	3
2345:	2	2	0	1	3	2	1	2
2353:	1	3	4	4	2	1	2	2
2361:	1	1	2	2	1	1	1	2
2369:	2	5	2	4	3	3	1	4
2377:	2	0	3	2	4	6	2	1
2385:	0	4	2	2	3	2	5	3
2393:	2	6	2	3	0	1	1	2
2401:	1	1	1	1	1	5	0	1
2409:	0	0	2	1	1	2	1	0
2417:	4	0	1	3	0	3	1	1
2425:	3	2	3	2	2	1	1	2
2433:	1	2	3	1	0	0	1	1
2441:	2	2	1	4	0	2	3	1
2449:	1	1	1	1	1	3	1	3
2457:	1	0	1	1	2	3	4	3
2465:	1	0	2	1	2	3	4	0
2473:	4	1	0	2	0	3	3	3
2481:	1	5	4	1	1	4	0	4
2489:	1	0	1	0	2	2	1	1
2497:	0	4	4	0	3	2	0	5
2505:	2	3	3	0	0	2	2	2
2513:	3	5	2	1	0	2	0	3
2521:	2	4	2	3	0	0	4	2

2529:	1	2	5	1	1	0	2	1

Sample Title: BMAC0004

Channel								
2537:	0	2	1	2	0	0	2	1
2545:	0	1	0	1	1	1	2	2
2553:	1	2	1	3	0	0	6	0
2561:	1	3	3	0	4	2	2	1
2569:	1	0	0	1	2	3	2	0
2577:	3	2	4	1	0	2	3	1
2585:	4	3	2	2	2	5	3	2
2593:	1	5	2	1	0	4	2	4
2601:	2	1	1	3	1	3	2	2
2609:	1	2	1	1	3	3	2	2
2617:	2	0	1	2	0	1	5	2
2625:	1	1	1	3	1	2	2	1
2633:	2	2	1	4	2	0	1	0
2641:	2	2	1	2	3	1	1	2
2649:	2	2	5	1	0	3	3	2
2657:	2	6	2	4	4	2	3	3
2665:	2	2	0	2	1	3	0	1
2673:	3	1	1	2	2	4	6	1
2681:	0	0	1	5	1	1	0	1
2689:	1	2	1	3	1	1	3	2
2697:	1	2	2	2	4	1	0	0
2705:	1	2	1	1	1	2	2	0
2713:	3	2	0	3	1	3	1	1
2721:	2	2	3	3	1	3	2	1
2729:	1	4	2	2	1	1	0	2
2737:	3	0	3	2	2	2	2	1
2745:	2	0	1	2	0	2	0	1
2753:	4	3	0	2	2	2	2	4
2761:	1	3	1	3	3	1	1	2
2769:	0	2	1	1	0	1	1	1
2777:	3	3	3	3	4	0	0	1
2785:	3	1	4	2	2	2	1	1
2793:	0	1	0	1	0	1	0	0
2801:	1	2	2	2	0	3	1	2
2809:	1	1	4	1	0	1	0	1
2817:	3	2	1	5	4	4	3	3
2825:	5	6	10	10	11	9	8	11
2833:	3	2	4	3	3	2	0	3
2841:	4	1	1	1	2	2	1	1
2849:	2	1	2	3	1	1	4	0
2857:	4	3	4	1	2	1	0	2
2865:	2	0	2	2	2	1	5	3
2873:	0	2	3	3	4	2	4	0
2881:	3	2	0	0	1	2	0	0
2889:	2	1	1	1	0	0	3	2
2897:	1	1	1	0	1	3	1	4
2905:	1	0	2	1	5	3	2	2
2913:	3	3	1	1	1	2	1	4
2921:	2	3	1	1	0	0	3	0
2929:	1	2	2	0	2	1	2	1
2937:	2	1	4	2	2	2	4	1
2945:	4	0	0	2	2	1	0	0
2953:	4	1	1	2	1	0	3	3

2961:	1	1	4	1	5	3	2	1

Sample Title: BMAC0004

Channel								
2969:	1	0	0	2	0	0	3	0
2977:	1	0	3	1	1	0	2	1
2985:	4	2	3	2	1	2	1	3
2993:	1	3	1	0	1	2	1	0
3001:	0	2	0	2	2	0	0	0
3009:	2	2	3	1	0	2	4	0
3017:	0	2	2	3	4	2	2	0
3025:	1	1	1	0	2	1	1	3
3033:	1	1	2	1	1	2	1	2
3041:	5	3	2	3	2	0	0	2
3049:	4	3	1	1	0	2	2	1
3057:	2	2	1	0	3	3	0	1
3065:	2	0	1	1	2	0	1	1
3073:	0	0	1	1	0	1	0	2
3081:	0	3	1	2	1	1	3	0
3089:	3	2	2	2	0	2	1	5
3097:	2	3	1	1	2	0	2	2
3105:	1	2	1	1	0	0	0	3
3113:	0	0	0	0	1	2	1	1
3121:	1	4	2	2	0	2	0	0
3129:	1	1	1	2	2	2	1	1
3137:	1	4	1	0	4	3	2	0
3145:	2	2	0	0	2	2	1	2
3153:	0	1	1	0	1	2	2	1
3161:	1	1	2	0	2	1	1	2
3169:	2	0	2	1	1	0	0	1
3177:	3	1	0	0	1	0	0	1
3185:	3	0	1	4	2	1	0	0
3193:	1	1	3	2	1	1	0	1
3201:	0	0	1	0	2	1	4	5
3209:	0	0	0	0	1	0	4	3
3217:	0	1	3	1	1	1	2	1
3225:	1	0	0	2	0	1	0	0
3233:	2	1	3	3	9	4	5	2
3241:	4	8	1	2	1	1	2	1
3249:	0	0	0	0	1	2	1	1
3257:	2	0	1	1	0	2	1	4
3265:	0	1	2	1	2	1	0	0
3273:	0	0	3	1	1	1	1	1
3281:	0	0	2	0	0	2	2	0
3289:	1	0	1	0	0	3	0	0
3297:	0	0	1	3	0	2	0	0
3305:	1	0	2	0	0	0	1	0
3313:	0	2	2	3	0	1	1	0
3321:	1	3	4	1	3	1	1	0
3329:	1	1	0	2	2	1	2	1
3337:	1	1	2	0	2	2	0	3
3345:	3	2	0	2	0	0	0	1
3353:	1	1	1	0	2	1	1	2
3361:	2	4	4	2	4	8	4	10
3369:	7	13	9	4	6	7	5	4
3377:	1	2	1	1	1	3	0	1
3385:	0	1	0	0	3	1	0	1

3393:	1	1	1	0	0	0	0	0

Sample Title: BMAC0004

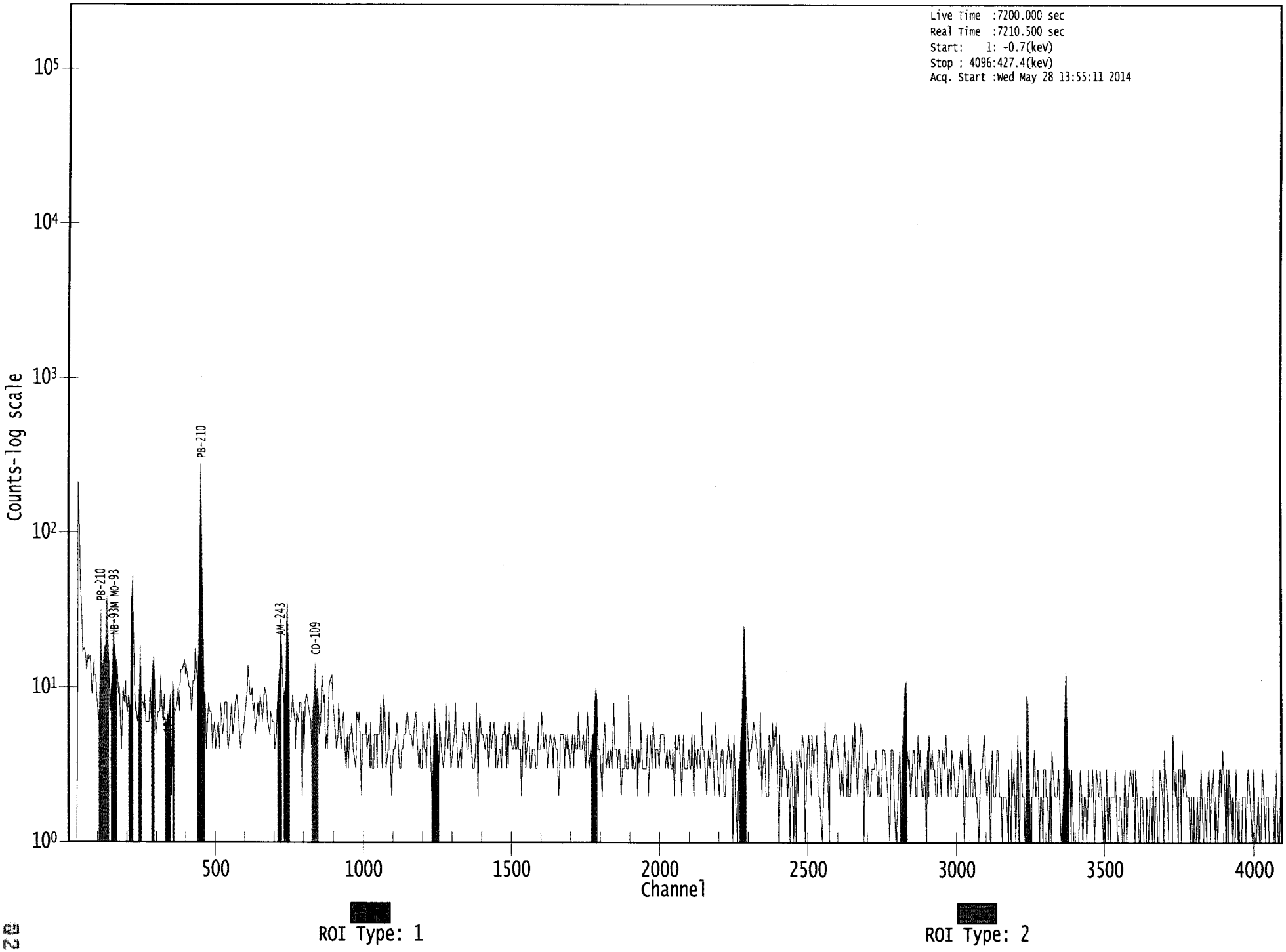
Channel								
3401:	0	1	1	0	1	1	0	0
3409:	1	1	1	1	0	1	0	2
3417:	0	3	1	1	1	0	2	0
3425:	1	0	0	0	1	0	1	2
3433:	1	0	2	0	1	1	1	1
3441:	0	0	0	2	3	2	0	1
3449:	2	0	0	1	1	0	0	2
3457:	0	1	0	3	2	2	2	0
3465:	1	1	0	0	2	2	2	0
3473:	3	1	0	0	2	0	0	2
3481:	0	0	1	2	3	0	0	2
3489:	1	1	2	1	0	0	0	1
3497:	0	1	1	2	0	1	0	0
3505:	3	1	1	3	0	0	1	0
3513:	0	1	2	2	1	0	0	1
3521:	0	2	0	0	2	1	0	1
3529:	0	1	1	2	2	1	2	1
3537:	3	0	0	2	0	1	0	1
3545:	1	1	0	1	2	2	1	1
3553:	0	2	1	0	0	0	0	1
3561:	0	0	0	0	2	1	2	0
3569:	3	1	1	0	0	0	1	0
3577:	1	1	0	2	1	2	2	1
3585:	0	0	0	3	3	1	1	1
3593:	1	1	2	2	3	2	0	1
3601:	1	0	1	0	3	0	0	1
3609:	0	2	1	0	0	1	1	1
3617:	1	1	0	1	0	2	0	1
3625:	2	0	2	0	1	2	1	0
3633:	0	0	0	0	1	1	0	1
3641:	1	2	1	0	0	1	1	1
3649:	1	1	1	2	0	1	0	2
3657:	0	1	1	1	0	1	0	3
3665:	1	1	1	1	0	0	1	2
3673:	0	2	1	2	0	1	0	0
3681:	0	1	1	0	0	3	1	0
3689:	3	0	0	1	0	2	2	2
3697:	1	1	1	0	0	4	1	2
3705:	3	1	1	0	2	0	0	2
3713:	0	0	0	1	0	1	0	1
3721:	1	1	1	1	0	0	1	1
3729:	1	2	0	5	2	3	1	0
3737:	0	1	2	0	3	1	1	0
3745:	1	1	0	1	0	3	0	1
3753:	1	0	0	3	0	1	0	0
3761:	3	4	0	1	0	1	2	1
3769:	3	0	0	0	2	0	2	2
3777:	1	1	2	1	1	0	1	2
3785:	0	0	1	0	2	0	1	2
3793:	0	0	0	0	0	1	1	2
3801:	0	0	1	0	0	0	1	0
3809:	0	0	0	2	1	1	1	0
3817:	1	0	1	0	0	2	0	1

3825:	3	3	0	1	0	0	0	1

Sample Title: BMAC0004

Channel								
3833:	1	0	0	1	2	1	1	0
3841:	0	1	1	1	2	1	1	0
3849:	2	0	1	3	0	1	1	0
3857:	0	2	0	0	2	0	0	1
3865:	2	3	1	1	1	1	0	1
3873:	2	1	1	1	1	0	1	1
3881:	0	1	1	0	2	0	3	0
3889:	2	2	3	2	2	0	1	0
3897:	4	0	1	0	2	0	1	2
3905:	0	0	0	0	0	3	0	0
3913:	0	1	1	0	1	3	1	1
3921:	0	2	2	0	0	0	0	1
3929:	1	2	0	1	1	1	0	0
3937:	1	1	0	0	0	2	3	1
3945:	0	0	1	1	0	1	1	2
3953:	1	0	0	0	1	0	0	1
3961:	0	0	2	1	0	2	1	0
3969:	1	2	0	2	0	1	0	0
3977:	1	0	0	0	2	3	1	0
3985:	0	1	0	2	1	0	2	1
3993:	1	1	1	1	2	1	0	3
4001:	0	1	0	1	0	0	1	1
4009:	0	1	1	0	1	0	2	2
4017:	0	0	1	0	0	1	1	0
4025:	0	1	0	0	3	1	2	0
4033:	0	2	1	1	1	0	1	0
4041:	2	1	0	0	1	0	2	2
4049:	0	0	0	0	1	0	1	1
4057:	0	1	0	1	1	0	1	1
4065:	0	2	0	1	1	0	0	0
4073:	0	3	0	0	0	0	0	1
4081:	1	1	1	1	0	0	1	2
4089:	0	2	0	0	1	0	1	0

0000008008.CNF



WLLFOIA4312 - 001 - 0035106

Apex-Gamma

Analysis Report for 1405116-04
BMAC0004

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1405116-04
Sample Description	: BMAC0004
Sample Type	: SOIL
Sample Size	: 6.021E+01 grams
Facility	: Countroom
Sample Taken On	: 5/27/2014 1:54:56PM
Acquisition Started	: 5/28/2014 4:33:43PM
Procedure	: LPGAS-13 pCi
Operator	: Administrator
Detector Name	: GE5
Geometry	: LPGAS-13
Live Time	: 7200.0 seconds
Real Time	: 7208.0 seconds
Dead Time	: 0.11 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 33 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 12/2/2013
Efficiency Calibration Used Done On	: 8/24/2013
Efficiency Calibration Description	:
Sample Number	: 8034

AG
5/29/14

Analysis Report for 1405116-04

BMAC0004

ENERGY CALIBRATION REPORT

Detector Name : GE5

ENERGY CALIBRATION COEFFICIENTS

Energy Calibrate Performed on : 12/2/2013 2:11:00PM
by : Administrator
Energy Calibrate Type : POLY

Energy (keV) = -0.802 + 0.104*ch + -5.16E-09*ch^2 + 0.00E+00*ch^3

SHAPE CALIBRATION COEFFICIENTS

Shape Calibrate Performed on : 12/2/2013 2:10:49PM
by : Administrator

FWHM = 0.586 + 3.02E-02*E^1/2

LOW TAIL = 0.00E+00 + 0.00E+00*E

ENERGY CALIBRATION RESULTS TABLE

Centroid Channel	Centroid error	Energy (keV)
0.00	0.00	59.54
0.00	0.00	88.00
0.00	0.00	122.06
0.00	0.00	165.85
0.00	0.00	391.69

SHAPE CALIBRATION RESULTS TABLE

Energy (keV)	FWHM channels	FWHM error	TAIL channels	TAIL error
59.54	0.00	0.00	0.00	0.00
88.00	0.00	0.00	0.00	0.00
122.06	0.00	0.00	0.00	0.00
165.85	0.00	0.00	0.00	0.00
391.69	0.00	0.00	0.00	0.00

Analysis Report for 1405116-04

BMAC0004

EFFICIENCY CALIBRATION REPORT

Detector Name	:	GE5
Geometry Description	:	LPGAS-13
Efficiency Calibration Performed on	:	8/24/2013 10:08:51AM
by	:	Administrator
Efficiency Type Used	:	EMPIRICA
Certificate File	:	

Efficiency Triplets

Energy	% Efficiency	Error	Computed	Error	% Difference
59.54	1.36E+01	4.77E-01			
88.00	1.54E+01	7.25E-01			
122.06	1.25E+01	5.17E-01			
165.85	8.94E+00	3.51E-01			
391.69	3.38E+00	1.34E-01			

DUAL Efficiency Calibration Equation

Single Equation Terms

Offset	:	-1.04E+01
Slope	:	4.00E+00
Quadratic	:	-4.73E-01
Cubic	:	0.00E+00
4th Order	:	0.00E+00
5th Order	:	0.00E+00
6th Order	:	0.00E+00
7th Order	:	0.00E+00
8th Order	:	0.00E+00
9th Order	:	0.00E+00

EMPIRICAL Efficiency Calibration Equation

Empirical Equation Terms

Scaling	:	2.26E+02
Offset	:	-2.63E+00
Slope	:	1.13E+00
Quadratic	:	-4.73E-01
Cubic	:	0.00E+00
4th Order	:	0.00E+00
5th Order	:	0.00E+00

Analysis Report for 1405116-04

BMAC0004

LINEAR Efficiency Calibration Equation

Linear Equation Terms

Offset :	-2.22E-03
Slope :	-5.87E-01
Quadratic :	-7.80E+00
Cubic :	0.00E+00
4th Order :	0.00E+00
5th Order :	0.00E+00
6th Order :	0.00E+00
7th Order :	0.00E+00
8th Order :	0.00E+00
9th Order :	0.00E+00

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

PEAK LOCATE REPORT

Peak Locate Performed on	: 5/28/2014 6:33:54PM
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	10.60	109.08	0.0000	0.00
2	12.93	131.35	0.0000	0.00
3	16.01	160.80	0.0000	0.00
4	46.48	452.13	0.0000	0.00
5	53.19	516.36	0.0000	0.00
6	73.44	710.00	0.0000	0.00
7	74.60	721.09	0.0000	0.00
8	77.16	745.61	0.0000	0.00
9	87.36	843.09	0.0000	0.00
10	89.72	865.69	0.0000	0.00

Analysis Report for 1405116-04

BMAC0004

Peak No.	Energy (keV)	Centroid Channel	Centroid Uncertainty	Peak Significance
11	92.68	894.02	0.0000	0.00
12	129.04	1241.79	0.0000	0.00
13	146.55	1409.24	0.0000	0.00
14	185.80	1784.67	0.0000	0.00
15	238.44	2288.13	0.0000	0.00
16	294.57	2825.00	0.0000	0.00
17	295.19	2831.00	0.0000	0.00
18	337.85	3239.00	0.0000	0.00
19	338.47	3245.00	0.0000	0.00
20	351.53	3369.85	0.0000	0.00

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1405116-04

BMAC0004

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/28/2014 6:33:54PM

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	10.60	98 -	117	109.08	1.51E+02	55.49	2.82E+02	0.51
	2	12.93	121 -	142	131.35	2.46E+02	61.99	3.00E+02	0.47
	3	16.01	146 -	183	160.80	1.81E+02	79.20	3.67E+02	1.15
	4	46.48	438 -	463	452.13	1.64E+03	99.94	3.30E+02	0.61
	5	53.19	510 -	525	516.36	3.37E+01	26.73	7.66E+01	0.34
M	6	73.44	707 -	752	710.00	3.55E+01	12.95	3.87E+01	0.85
m	7	74.60	707 -	752	721.09	1.48E+02	45.42	1.72E+02	1.11
m	8	77.16	707 -	752	745.61	2.64E+02	35.12	7.40E+01	1.05
	9	87.36	832 -	855	843.09	7.92E+01	40.15	1.62E+02	0.88
	10	89.72	856 -	875	865.69	4.62E+01	30.82	1.08E+02	1.03
	11	92.68	883 -	906	894.02	8.24E+01	39.75	1.57E+02	0.83
	12	129.04	1234 -	1249	1241.79	2.26E+01	25.77	9.48E+01	0.62
	13	146.55	1396 -	1423	1409.24	2.68E+01	30.41	9.03E+01	1.31
	14	185.80	1765 -	1805	1784.67	9.92E+01	47.71	1.52E+02	0.35
	15	238.44	2274 -	2301	2288.13	1.40E+02	37.57	1.11E+02	0.90
M	16	294.57	2814 -	2844	2825.00	3.09E+01	25.65	6.75E+01	1.11
m	17	295.19	2814 -	2844	2831.00	4.72E+01	30.16	9.10E+01	1.11
M	18	337.85	3227 -	3252	3239.00	1.16E+01	21.47	4.05E+01	1.14
m	19	338.47	3227 -	3252	3245.00	7.33E+01	16.52	3.71E+01	1.14
	20	351.53	3356 -	3380	3369.85	7.50E+01	25.50	5.00E+01	0.35

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

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/28/2014 6:33:54PM

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

Analysis Report for 1405116-04

BMAC0004

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
	1	10.60	98 -	117	1.51E+02	55.49	2.82E+02	4.09E+01
	2	12.93	121 -	142	2.46E+02	61.99	3.00E+02	4.40E+01
	3	16.01	146 -	183	1.81E+02	79.20	3.67E+02	6.12E+01
	4	46.48	438 -	463	1.64E+03	99.94	3.30E+02	4.82E+01
	5	53.19	510 -	525	3.37E+01	26.73	7.66E+01	1.98E+01
M	6	73.44	707 -	752	3.55E+01	12.95	3.87E+01	1.02E+01
m	7	74.60	707 -	752	1.48E+02	45.42	1.72E+02	2.16E+01
m	8	77.16	707 -	752	2.64E+02	35.12	7.40E+01	1.41E+01
	9	87.36	832 -	855	7.92E+01	40.15	1.62E+02	2.96E+01
	10	89.72	856 -	875	4.62E+01	30.82	1.08E+02	2.27E+01
	11	92.68	883 -	906	8.24E+01	39.75	1.57E+02	2.91E+01
	12	129.04	1234 -	1249	2.26E+01	25.77	9.48E+01	1.97E+01
	13	146.55	1396 -	1423	2.68E+01	30.41	9.03E+01	2.35E+01
	14	185.80	1765 -	1805	9.92E+01	47.71	1.52E+02	3.56E+01
	15	238.44	2274 -	2301	1.40E+02	37.57	1.11E+02	2.40E+01
M	16	294.57	2814 -	2844	3.09E+01	25.65	6.75E+01	1.35E+01
m	17	295.19	2814 -	2844	4.72E+01	30.16	9.10E+01	1.57E+01
M	18	337.85	3227 -	3252	1.16E+01	21.47	4.05E+01	1.05E+01
m	19	338.47	3227 -	3252	7.33E+01	16.52	3.71E+01	1.00E+01
	20	351.53	3356 -	3380	7.50E+01	25.50	5.00E+01	1.54E+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 : 5/28/2014 6:33:54PM

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

Tentative NID Library : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.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	10.60	98 -	117	109.08	1.51E+02	55.49	2.82E+02	PB-210 PA-231 PA-234

Analysis Report for 1405116-04

BMAC0004

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	2	12.93	121 -	142	131.35	2.46E+02	61.99	3.00E+02	.....
	3	16.01	146 -	183	160.80	1.81E+02	79.20	3.67E+02	NB-93M MO-93
	4	46.48	438 -	463	452.13	1.64E+03	99.94	3.30E+02	PB-210
	5	53.19	510 -	525	516.36	3.37E+01	26.73	7.66E+01	.....
M	6	73.44	707 -	752	710.00	3.55E+01	12.95	3.87E+01	.....
m	7	74.60	707 -	752	721.09	1.48E+02	45.42	1.72E+02	AM-243
m	8	77.16	707 -	752	745.61	2.64E+02	35.12	7.40E+01	.....
	9	87.36	832 -	855	843.09	7.92E+01	40.15	1.62E+02	CD-109 NP-237
	10	89.72	856 -	875	865.69	4.62E+01	30.82	1.08E+02	.....
	11	92.68	883 -	906	894.02	8.24E+01	39.75	1.57E+02	.....
	12	129.04	1234 -	1249	1241.79	2.26E+01	25.77	9.48E+01	.....
	13	146.55	1396 -	1423	1409.24	2.68E+01	30.41	9.03E+01	.....
	14	185.80	1765 -	1805	1784.67	9.92E+01	47.71	1.52E+02	.....
	15	238.44	2274 -	2301	2288.13	1.40E+02	37.57	1.11E+02	.....
M	16	294.57	2814 -	2844	2825.00	3.09E+01	25.65	6.75E+01	.....
m	17	295.19	2814 -	2844	2831.00	4.72E+01	30.16	9.10E+01	.....
M	18	337.85	3227 -	3252	3239.00	1.16E+01	21.47	4.05E+01	.....
m	19	338.47	3227 -	3252	3245.00	7.33E+01	16.52	3.71E+01	.....
	20	351.53	3356 -	3380	3369.85	7.50E+01	25.50	5.00E+01	.....

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

PEAK EFFICIENCY REPORT

Peak Analysis Performed on : 5/28/2014 6:33:54PM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
	1	10.60	1.51E+02	55.49	2.76E-02	1.39E-02
	2	12.93	2.46E+02	61.99	3.85E-02	1.39E-02
	3	16.01	1.81E+02	79.20	5.27E-02	1.39E-02
	4	46.48	1.64E+03	99.94	1.32E-01	1.39E-02
	5	53.19	3.37E+01	26.73	1.38E-01	1.39E-02
M	6	73.44	3.55E+01	12.95	1.42E-01	2.48E-02
m	7	74.60	1.48E+02	45.42	1.41E-01	2.57E-02
m	8	77.16	2.64E+02	35.12	1.41E-01	2.78E-02
	9	87.36	7.92E+01	40.15	1.38E-01	3.58E-02

Analysis Report for 1405116-04

BMAC0004

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
	10	89.72	4.62E+01	30.82	1.37E-01	3.52E-02
	11	92.68	8.24E+01	39.75	1.36E-01	3.32E-02
	12	129.04	2.26E+01	25.77	1.17E-01	1.46E-02
	13	146.55	2.68E+01	30.41	1.07E-01	1.60E-02
	14	185.80	9.92E+01	47.71	8.80E-02	1.63E-02
	15	238.44	1.40E+02	37.57	6.74E-02	1.28E-02
M	16	294.57	3.09E+01	25.65	5.13E-02	9.20E-03
m	17	295.19	4.72E+01	30.16	5.12E-02	9.16E-03
M	18	337.85	1.16E+01	21.47	4.21E-02	6.40E-03
m	19	338.47	7.33E+01	16.52	4.20E-02	6.36E-03
	20	351.53	7.50E+01	25.50	3.96E-02	5.51E-03

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

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/28/2014 6:33:54PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	10.60	1.51E+02	55.49			1.51E+02	5.55E+01
	2	12.93	2.46E+02	61.99	3.19E+01	8.66E+00	2.14E+02	6.26E+01
	3	16.01	1.81E+02	79.20			1.81E+02	7.92E+01
	4	46.48	1.64E+03	99.94			1.64E+03	9.99E+01
	5	53.19	3.37E+01	26.73	1.93E+00	2.64E+00	3.18E+01	2.69E+01
M	6	73.44	3.55E+01	12.95			3.55E+01	1.30E+01
m	7	74.60	1.48E+02	45.42			1.48E+02	4.54E+01
m	8	77.16	2.64E+02	35.12			2.64E+02	3.51E+01
	9	87.36	7.92E+01	40.15	3.31E+01	5.72E+00	4.61E+01	4.06E+01
	10	89.72	4.62E+01	30.82			4.62E+01	3.08E+01
	11	92.68	8.24E+01	39.75			8.24E+01	3.97E+01
	12	129.04	2.26E+01	25.77			2.26E+01	2.58E+01
	13	146.55	2.68E+01	30.41			2.68E+01	3.04E+01
	14	185.80	9.92E+01	47.71			9.92E+01	4.77E+01
	15	238.44	1.40E+02	37.57			1.40E+02	3.76E+01
M	16	294.57	3.09E+01	25.65			3.09E+01	2.56E+01
m	17	295.19	4.72E+01	30.16			4.72E+01	3.02E+01
M	18	337.85	1.16E+01	21.47			1.16E+01	2.15E+01
m	19	338.47	7.33E+01	16.52			7.33E+01	1.65E+01

Analysis Report for 1405116-04

BMAC0004

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
20	351.53	7.50E+01	25.50	7.52E+00	2.49E+00	6.75E+01	2.56E+01

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

AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 5/28/2014 6:33:54PM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.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	10.60	1.51E+02	55.49			1.51E+02	5.55E+01
	2	12.93	2.46E+02	61.99	3.19E+01	8.66E+00	2.14E+02	6.26E+01
	3	16.01	1.81E+02	79.20			1.81E+02	7.92E+01
	4	46.48	1.64E+03	99.94			1.64E+03	9.99E+01
	5	53.19	3.37E+01	26.73	1.93E+00	2.64E+00	3.18E+01	2.69E+01
M	6	73.44	3.55E+01	12.95			3.55E+01	1.30E+01
m	7	74.60	1.48E+02	45.42			1.48E+02	4.54E+01
m	8	77.16	2.64E+02	35.12			2.64E+02	3.51E+01
	9	87.36	7.92E+01	40.15	3.31E+01	5.72E+00	4.61E+01	4.06E+01
	10	89.72	4.62E+01	30.82			4.62E+01	3.08E+01
	11	92.68	8.24E+01	39.75			8.24E+01	3.97E+01
	12	129.04	2.26E+01	25.77			2.26E+01	2.58E+01
	13	146.55	2.68E+01	30.41			2.68E+01	3.04E+01
	14	185.80	9.92E+01	47.71			9.92E+01	4.77E+01
	15	238.44	1.40E+02	37.57			1.40E+02	3.76E+01
M	16	294.57	3.09E+01	25.65			3.09E+01	2.56E+01
m	17	295.19	4.72E+01	30.16			4.72E+01	3.02E+01
M	18	337.85	1.16E+01	21.47			1.16E+01	2.15E+01
m	19	338.47	7.33E+01	16.52			7.33E+01	1.65E+01
	20	351.53	7.50E+01	25.50	7.52E+00	2.49E+00	6.75E+01	2.56E+01

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

Analysis Report for 1405116-04

BMAC0004

NUCLIDE IDENTIFICATION REPORT

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

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
MO-93	0.686	16.59	*	52.90	4.05E-01	2.49E-01
		18.60		10.00		
NB-93M	0.951	16.57	*	9.43	2.28E+00	1.16E+00
CD-109	0.930	88.03	*	3.72	5.62E-01	5.15E-01
PB-210	0.996	10.80	*	9.57	3.56E+00	2.21E+00
		46.50	*	4.25	1.81E+01	2.20E+00
AM-243	0.999	74.67	*	66.00	9.92E-02	3.65E-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 : 5/28/2014 6:33:54PM
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	12.93	2.97375E-02	14.62		
	5	53.19	4.41561E-03	42.25		
M	6	73.44	4.92834E-03	18.25		
m	8	77.16	3.67040E-02	6.65		
	10	89.72	6.41250E-03	33.38	Sum	
	11	92.68	1.14488E-02	24.11	Sum	
	12	129.04	3.14087E-03	56.97		
	13	146.55	3.72589E-03	56.69		
	14	185.80	1.37800E-02	24.04		
	15	238.44	1.94938E-02	13.38		

Analysis Report for 1405116-04

BMAC0004

Peak No.		Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	16	294.57	4.29711E-03	41.45		
m	17	295.19	6.56186E-03	31.92		
M	18	337.85	1.60792E-03	92.73		
m	19	338.47	1.01849E-02	11.27		
	20	351.53	9.37202E-03	18.98		

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\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
MO-93	0.68	16.59	*	52.90	4.05E-01	2.49E-01
		18.60		10.00		
NB-93M	0.95	16.57	*	9.43	2.28E+00	1.16E+00
CD-109	0.93	88.03	*	3.72	5.62E-01	5.15E-01
PB-210	0.99	10.80	*	9.57	3.56E+00	2.21E+00
		46.50	*	4.25	1.81E+01	2.20E+00
AM-243	0.99	74.67	*	66.00	9.92E-02	3.65E-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

Analysis Report for 1405116-04

BMAC0004

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
?	MO-93	0.686	4.05E-01	2.49E-01	
?	NB-93M	0.951	2.28E+00	1.16E+00	
	CD-109	0.930	5.62E-01	5.15E-01	
	PB-210	0.996	1.09E+01	1.56E+00	
	AM-243	0.999	9.92E-02	3.65E-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 1405116-04

BMAC0004

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/28/2014 6:33:54PM
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	12.93	2.97375E-02	14.62		
	5	53.19	4.41561E-03	42.25		
M	6	73.44	4.92834E-03	18.25		
m	8	77.16	3.67040E-02	6.65		
	10	89.72	6.41250E-03	33.38	Sum	
	11	92.68	1.14488E-02	24.11	Sum	
	12	129.04	3.14087E-03	56.97		
	13	146.55	3.72589E-03	56.69		
	14	185.80	1.37800E-02	24.04		
	15	238.44	1.94938E-02	13.38		
M	16	294.57	4.29711E-03	41.45		
m	17	295.19	6.56186E-03	31.92		
M	18	337.85	1.60792E-03	92.73		
m	19	338.47	1.01849E-02	11.27		
	20	351.53	9.37202E-03	18.98		

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\WSRC.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	FE-55	5.89	24.50	-7.21E-01	2.24E+00	2.24E+00
+	CO-57	122.06	85.51	-1.90E-03	2.59E-02	2.59E-02

Analysis Report for 1405116-04

BMAC0004

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	CO-57	136.48		10.60	-7.15E-02	2.59E-02	1.95E-01
+	NI-59	6.92		29.80	-2.04E-01	1.26E+00	1.26E+00
+	MO-93	16.59	*	52.90	4.05E-01	2.80E-01	2.80E-01
		18.60		10.00	3.99E-02		5.35E-01
+	NB-93M	16.57	*	9.43	2.28E+00	1.57E+00	1.57E+00
+	CD-109	88.03	*	3.72	5.62E-01	7.99E-01	7.99E-01
+	SN-113	255.12		1.93	4.37E-02	8.06E-02	1.85E+00
		391.69		61.90	-5.73E-03		8.06E-02
+	SN-119M	23.87		16.10	-1.36E+00	1.99E-01	2.90E-01
		25.10		22.70	1.04E-01		1.99E-01
+	I-125	35.49		6.49	2.51E-01	5.13E-01	5.13E-01
+	I-129	29.78		57.00	1.85E-02	6.09E-02	6.09E-02
		33.60		13.20	-9.93E-02		2.19E-01
		39.58		7.52	8.01E-02		4.35E-01
+	BA-133	30.80		97.60	6.93E-03	3.39E-02	3.39E-02
		81.00		33.00	2.19E-02		6.99E-02
		302.84		17.80	-8.56E-02		2.55E-01
		356.01		60.00	-1.30E-02		7.55E-02
		383.85		8.70	3.51E-02		5.60E-01
+	CE-139	165.85		80.35	-3.72E-03	3.79E-02	3.79E-02
+	CE-144	133.54		10.80	1.25E-01	2.19E-01	2.19E-01
+	HG-203	279.19		77.30	1.11E-03	5.39E-02	5.39E-02
+	PB-210	10.80	*	9.57	3.56E+00	1.10E+00	1.99E+00
		46.50	*	4.25	1.81E+01		1.10E+00
+	PA-231	9.28		42.00	-1.20E-01	4.40E-01	4.40E-01
		10.11		20.20	-1.28E-01		9.84E-01
		283.67		1.60	-8.95E-02		2.68E+00
		302.67		2.30	-6.79E-01		1.99E+00
+	TH-231	25.64		14.70	2.54E-01	3.01E-01	3.01E-01
		84.21		6.40	3.86E-01		3.82E-01
+	PA-234	9.89		89.00	-5.67E-02	1.15E-01	2.26E-01
		21.72		64.90	3.67E-01		1.23E-01
		37.93		23.75	-1.64E-01		1.22E-01
		131.42		20.40	-3.58E-02		1.15E-01
+	TH-234	63.29		3.80	4.02E-01	6.85E-01	6.85E-01
+	NP-237	29.37		14.00	7.71E-02	2.19E-01	2.52E-01
		86.50		12.60	-4.48E-02		2.19E-01
+	U-237	97.08		16.30	2.80E-02	8.98E-02	1.52E-01
		101.07		26.30	1.23E-02		8.98E-02
		114.00		12.30	4.37E-02		2.06E-01
		208.01		22.00	-8.20E-03		1.80E-01
+	AM-241	59.54		35.90	1.64E-02	6.65E-02	6.65E-02
+	AM-243	74.67	*	66.00	9.92E-02	6.58E-02	6.58E-02

Analysis Report for 1405116-04

BMAC0004

+ = 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\WSRC.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	FE-55	5.89		24.50	2.24E+00	2.24E+00	-7.21E-01	1.08E+00
	CO-57	122.06		85.51	2.59E-02	2.59E-02	-1.90E-03	1.21E-02
		136.48		10.60	1.95E-01		-7.15E-02	9.02E-02
	NI-59	6.92		29.80	1.26E+00	1.26E+00	-2.04E-01	6.07E-01
+	MO-93	16.59	*	52.90	2.80E-01	2.80E-01	4.05E-01	1.37E-01
		18.60		10.00	5.35E-01		3.99E-02	2.54E-01
+	NB-93M	16.57	*	9.43	1.57E+00	1.57E+00	2.28E+00	7.69E-01
+	CD-109	88.03	*	3.72	7.99E-01	7.99E-01	5.62E-01	3.83E-01
	SN-113	255.12		1.93	1.85E+00	8.06E-02	4.37E-02	8.53E-01
		391.69		61.90	8.06E-02		-5.73E-03	3.62E-02
	SN-119M	23.87		16.10	2.90E-01	1.99E-01	-1.36E+00	1.39E-01
		25.10		22.70	1.99E-01		1.04E-01	9.51E-02
	I-125	35.49		6.49	5.13E-01	5.13E-01	2.51E-01	2.45E-01
	I-129	29.78		57.00	6.09E-02	6.09E-02	1.85E-02	2.90E-02
		33.60		13.20	2.19E-01		-9.93E-02	1.04E-01
		39.58		7.52	4.35E-01		8.01E-02	2.08E-01
	BA-133	30.80		97.60	3.39E-02	3.39E-02	6.93E-03	1.61E-02
		81.00		33.00	6.99E-02		2.19E-02	3.31E-02
		302.84		17.80	2.55E-01		-8.56E-02	1.18E-01
		356.01		60.00	7.55E-02		-1.30E-02	3.41E-02
		383.85		8.70	5.60E-01		3.51E-02	2.52E-01
	CE-139	165.85		80.35	3.79E-02	3.79E-02	-3.72E-03	1.79E-02
	CE-144	133.54		10.80	2.19E-01	2.19E-01	1.25E-01	1.03E-01
	HG-203	279.19		77.30	5.39E-02	5.39E-02	1.11E-03	2.49E-02
+	PB-210	10.80	*	9.57	1.99E+00	1.10E+00	3.56E+00	9.65E-01
		46.50	*	4.25	1.10E+00		1.81E+01	5.34E-01
	PA-231	9.28		42.00	4.40E-01	4.40E-01	-1.20E-01	2.11E-01
		10.11		20.20	9.84E-01		-1.28E-01	4.76E-01
		283.67		1.60	2.68E+00		-8.95E-02	1.24E+00

Analysis Report for 1405116-04

BMAC0004

	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	1.99E+00	4.40E-01	-6.79E-01	9.20E-01
	TH-231	25.64		14.70	3.01E-01	3.01E-01	2.54E-01	1.44E-01
		84.21		6.40	3.82E-01		3.86E-01	1.82E-01
	PA-234	9.89		89.00	2.26E-01	1.15E-01	-5.67E-02	1.09E-01
		21.72		64.90	1.23E-01		3.67E-01	5.99E-02
		37.93		23.75	1.22E-01		-1.64E-01	5.81E-02
		131.42		20.40	1.15E-01		-3.58E-02	5.40E-02
	TH-234	63.29		3.80	6.85E-01	6.85E-01	4.02E-01	3.27E-01
	NP-237	29.37		14.00	2.52E-01	2.19E-01	7.71E-02	1.20E-01
		86.50		12.60	2.19E-01		-4.48E-02	1.04E-01
	U-237	97.08		16.30	1.52E-01	8.98E-02	2.80E-02	7.19E-02
		101.07		26.30	8.98E-02		1.23E-02	4.21E-02
		114.00		12.30	2.06E-01		4.37E-02	9.67E-02
		208.01		22.00	1.80E-01		-8.20E-03	8.45E-02
	AM-241	59.54		35.90	6.65E-02	6.65E-02	1.64E-02	3.16E-02
+	AM-243	74.67	*	66.00	6.58E-02	6.58E-02	9.92E-02	3.20E-02

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

No Action Level results available for reporting purposes.

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

No Data Review Comments Entered.

Analysis Report for 1405116-04

BMAC0004

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

Sample Title: BMAC0004

Elapsed Live time: 7200
Elapsed Real Time: 7208

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:	28	193	181	131	106	100	82	69
41:	46	48	43	38	32	29	21	26
49:	19	14	22	17	16	12	17	14
57:	17	11	8	13	17	14	10	10
65:	8	14	15	11	8	15	14	5
73:	10	13	9	15	12	9	7	12
81:	1	13	9	13	17	10	15	7
89:	9	4	10	7	6	5	8	2
97:	9	6	5	12	9	4	12	14
105:	8	13	17	23	22	33	28	25
113:	12	16	18	9	6	7	13	8
121:	6	16	10	16	18	17	21	21
129:	21	34	31	34	37	17	19	15
137:	15	15	10	6	11	6	4	5
145:	11	2	6	8	12	8	8	19
153:	13	8	21	19	15	16	19	18
161:	11	16	11	12	11	6	6	10
169:	7	8	8	5	6	4	3	6
177:	10	6	8	7	2	7	3	5
185:	4	8	6	6	7	5	7	5
193:	7	5	7	5	3	6	6	4
201:	2	5	10	4	9	6	4	7
209:	5	10	9	5	14	21	25	34
217:	38	41	45	50	30	28	25	8
225:	7	11	4	8	7	11	5	5
233:	2	7	4	9	8	3	9	2
241:	8	10	8	7	11	16	6	10
249:	7	5	9	6	5	11	4	11
257:	7	6	4	5	5	8	10	4
265:	5	5	3	6	7	1	5	4
273:	12	9	3	7	4	5	4	6
281:	6	3	6	7	2	6	8	5
289:	7	6	9	7	12	7	10	5
297:	4	5	5	4	5	4	4	1
305:	5	8	3	8	6	4	7	4
313:	4	3	3	9	5	3	4	6
321:	6	2	4	5	9	5	6	5
329:	8	7	3	2	6	3	3	5
337:	2	7	5	6	7	2	8	10
345:	6	5	9	2	7	8	7	9
353:	9	11	5	15	9	4	10	6
361:	8	3	7	8	5	3	8	7

369:	4	5	10	6	4	3	7	4

Sample Title: BMAC0004

Channel								
377:	2	7	5	4	6	5	11	5
385:	16	9	10	8	6	5	8	11
393:	8	15	8	11	7	10	9	6
401:	13	10	7	9	16	3	10	13
409:	5	12	5	8	3	10	7	7
417:	8	11	5	9	9	5	11	7
425:	9	9	14	6	10	6	7	6
433:	12	9	6	9	12	7	10	9
441:	12	9	7	13	13	18	45	77
449:	133	201	229	272	225	197	135	96
457:	41	26	9	8	6	3	1	6
465:	2	2	6	1	3	3	3	4
473:	3	3	4	4	5	4	3	7
481:	3	8	9	4	9	3	3	6
489:	3	7	5	3	4	8	1	7
497:	4	1	1	2	3	2	1	1
505:	5	6	5	2	3	4	6	6
513:	4	3	5	5	11	7	7	6
521:	2	2	3	1	0	2	4	5
529:	1	1	3	1	3	4	3	2
537:	4	5	4	2	3	2	2	1
545:	3	3	3	3	4	4	7	0
553:	8	7	3	3	8	7	4	6
561:	1	4	3	3	6	4	5	3
569:	4	5	4	6	4	2	9	5
577:	5	2	8	6	4	5	1	6
585:	4	6	5	6	6	3	4	3
593:	4	6	3	8	2	7	7	4
601:	6	4	5	2	0	7	8	5
609:	6	10	4	11	6	9	9	9
617:	3	3	8	6	6	7	3	5
625:	5	3	4	5	6	2	3	3
633:	5	5	6	4	4	6	5	4
641:	3	7	4	3	3	7	1	3
649:	4	5	3	3	5	3	5	3
657:	3	4	7	6	4	4	4	3
665:	3	2	5	3	1	6	2	2
673:	3	5	4	8	2	4	3	2
681:	6	2	2	6	1	5	6	3
689:	4	2	4	3	2	4	1	6
697:	5	5	3	4	8	4	8	3
705:	7	2	1	4	7	8	7	2
713:	4	3	4	5	8	13	20	12
721:	22	14	17	17	15	7	15	6
729:	6	4	2	1	5	5	3	5
737:	7	10	14	7	14	24	31	33
745:	30	24	26	10	11	10	4	0
753:	3	1	6	4	2	1	5	4
761:	4	4	0	4	11	4	4	5
769:	5	5	4	4	6	1	3	3
777:	4	4	2	7	9	6	4	4
785:	4	7	7	4	3	3	7	5
793:	1	4	2	2	2	2	2	5

801:	2	7	3	2	3	10	3	3

Sample Title: BMAC0004

Channel								
809:	10	5	10	4	7	4	7	3
817:	8	4	4	5	2	1	7	7
825:	3	2	4	1	3	6	2	3
833:	3	4	5	3	5	10	14	7
841:	10	14	9	12	8	9	6	7
849:	5	7	4	3	6	2	4	2
857:	2	5	1	11	4	4	5	7
865:	12	2	11	8	9	5	2	6
873:	2	2	0	1	3	4	4	3
881:	3	2	2	4	5	4	2	5
889:	6	5	16	14	9	9	11	8
897:	9	12	8	3	7	7	6	3
905:	3	3	5	4	4	2	8	8
913:	3	7	6	6	3	4	3	3
921:	2	3	1	4	1	1	2	2
929:	5	2	4	6	6	3	6	1
937:	3	3	4	4	3	5	6	1
945:	6	8	3	1	1	4	0	2
953:	3	3	2	1	4	5	5	3
961:	3	4	3	1	6	1	2	7
969:	5	5	3	2	5	1	1	3
977:	2	2	3	2	5	3	4	4
985:	0	1	2	2	3	5	1	2
993:	0	3	4	2	4	1	6	3
1001:	2	1	0	5	4	1	4	7
1009:	1	2	3	2	1	6	3	3
1017:	6	1	4	6	2	5	3	4
1025:	4	4	5	7	2	6	2	4
1033:	6	4	1	5	3	0	1	2
1041:	2	3	3	2	2	4	3	5
1049:	2	4	5	2	4	2	5	3
1057:	0	3	4	3	3	5	1	3
1065:	3	2	2	4	2	5	3	4
1073:	3	2	4	3	1	2	1	6
1081:	2	4	2	2	2	3	3	2
1089:	2	5	3	1	3	2	6	1
1097:	4	5	2	2	0	5	2	4
1105:	3	6	5	4	4	2	2	3
1113:	2	6	2	3	1	2	2	5
1121:	4	6	5	0	0	2	2	3
1129:	3	0	3	2	3	4	3	6
1137:	2	2	4	3	4	2	2	0
1145:	3	2	4	1	1	5	4	3
1153:	9	3	5	1	0	5	4	2
1161:	2	2	1	3	4	3	2	5
1169:	0	1	4	3	5	5	4	6
1177:	2	3	2	1	2	1	3	1
1185:	0	5	3	3	1	2	5	2
1193:	1	2	2	2	4	1	1	4
1201:	2	1	2	2	1	4	3	5
1209:	5	0	1	3	1	2	2	2
1217:	0	4	4	5	3	2	3	3
1225:	4	1	0	4	1	6	4	1

1233:	5	4	1	4	2	5	8	5

Sample Title: BMAC0004

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

1665:	2	3	2	2	3	3	3	0

Sample Title: BMAC0004

Channel								
1673:	4	5	4	3	1	3	3	4
1681:	1	0	3	5	3	2	2	0
1689:	2	3	3	2	3	5	1	5
1697:	1	3	7	3	1	2	2	4
1705:	2	2	2	3	4	1	5	3
1713:	1	2	5	0	3	3	3	1
1721:	4	3	1	3	1	1	2	3
1729:	4	1	5	0	2	2	3	3
1737:	4	3	3	0	1	1	1	3
1745:	1	2	6	1	1	4	2	8
1753:	2	3	3	3	2	1	2	3
1761:	3	3	4	0	2	2	4	3
1769:	2	3	1	6	4	7	4	6
1777:	2	4	2	2	8	8	8	8
1785:	10	15	10	7	4	5	4	2
1793:	4	1	1	4	5	2	2	4
1801:	1	1	4	1	2	1	1	2
1809:	2	2	1	5	0	6	4	4
1817:	1	2	3	3	1	2	1	3
1825:	2	2	3	1	4	1	2	2
1833:	2	3	4	4	1	2	3	3
1841:	2	2	3	1	4	5	0	2
1849:	1	4	4	5	3	2	0	4
1857:	3	1	2	2	5	4	2	4
1865:	4	1	2	3	1	0	1	3
1873:	3	4	4	3	2	3	1	4
1881:	4	4	1	0	2	2	2	3
1889:	2	2	3	3	3	3	2	4
1897:	3	7	3	2	4	2	4	2
1905:	2	3	3	1	2	2	3	3
1913:	3	2	2	1	3	1	3	2
1921:	3	2	3	2	1	1	0	1
1929:	1	3	0	3	3	0	4	0
1937:	2	1	5	2	2	2	4	2
1945:	2	3	2	6	4	2	4	1
1953:	2	4	2	2	2	2	1	2
1961:	3	1	0	3	3	2	2	3
1969:	2	0	3	6	4	2	5	1
1977:	1	0	0	3	3	3	1	2
1985:	3	3	5	3	1	2	2	1
1993:	0	5	3	2	0	3	3	1
2001:	5	1	2	0	3	6	2	7
2009:	4	3	3	1	1	1	4	4
2017:	8	1	1	4	1	3	5	4
2025:	5	1	3	1	1	3	1	1
2033:	5	0	2	1	3	2	0	2
2041:	5	0	4	1	3	5	4	6
2049:	0	4	6	1	1	5	2	5
2057:	1	1	1	2	2	1	4	2
2065:	3	2	2	3	1	0	0	0
2073:	4	2	2	2	3	3	3	0
2081:	1	2	2	7	3	4	3	0
2089:	3	1	4	3	2	3	4	0

2097:	1	3	3	2	1	3	3	4

Sample Title: BMAC0004

Channel								
2105:	1	0	5	3	2	3	3	1
2113:	6	6	3	2	0	3	3	4
2121:	2	3	2	2	2	2	3	4
2129:	1	1	1	4	2	0	4	1
2137:	1	1	3	2	1	4	1	2
2145:	4	2	0	1	0	1	1	6
2153:	2	1	1	1	5	2	2	1
2161:	4	3	2	1	0	1	3	0
2169:	1	2	4	3	3	2	3	1
2177:	2	2	3	3	4	3	2	5
2185:	3	1	2	2	2	1	3	3
2193:	3	3	2	3	2	0	1	2
2201:	2	2	5	4	2	2	1	4
2209:	4	1	2	4	1	0	0	1
2217:	1	1	1	1	1	4	3	1
2225:	2	2	2	1	7	2	2	3
2233:	3	1	4	2	4	1	2	2
2241:	1	4	5	3	1	0	2	4
2249:	2	1	5	0	2	0	1	2
2257:	2	1	2	0	2	6	0	6
2265:	2	2	3	2	1	2	5	1
2273:	3	2	1	3	0	3	3	3
2281:	9	8	9	7	16	11	17	17
2289:	16	12	17	12	9	4	3	3
2297:	2	3	3	2	1	2	2	1
2305:	1	3	5	1	3	6	6	2
2313:	4	8	4	5	3	4	3	3
2321:	8	4	3	1	1	2	3	1
2329:	0	1	0	3	3	1	6	2
2337:	1	1	0	2	2	0	1	2
2345:	5	2	1	1	3	0	1	3
2353:	0	0	2	3	2	3	2	1
2361:	1	1	1	2	2	0	0	0
2369:	1	0	3	2	5	2	1	2
2377:	2	1	1	0	1	1	1	1
2385:	3	3	2	4	0	3	3	0
2393:	2	4	0	0	4	3	2	3
2401:	2	3	1	0	1	3	1	1
2409:	2	2	2	1	0	3	0	4
2417:	0	0	1	3	0	1	2	1
2425:	4	1	1	2	0	4	0	1
2433:	3	2	1	1	0	1	0	0
2441:	3	2	1	1	2	3	0	1
2449:	3	1	2	1	3	2	0	1
2457:	0	2	1	4	1	4	3	1
2465:	1	4	1	1	2	1	0	2
2473:	2	1	4	1	4	1	3	0
2481:	1	3	0	1	5	3	0	2
2489:	1	1	3	0	2	2	1	2
2497:	1	1	1	0	2	2	2	3
2505:	0	2	2	1	2	1	2	4
2513:	4	0	2	2	1	1	4	1
2521:	5	2	4	3	2	0	3	1

2529:	2	1	1	2	3	2	4	2

Sample Title: BMAC0004

Channel								
2537:	0	3	4	5	2	2	2	2
2545:	0	1	0	2	4	1	5	0
2553:	1	1	0	1	3	3	0	0
2561:	1	2	2	0	3	3	0	1
2569:	0	3	2	2	1	2	0	1
2577:	2	1	1	1	0	4	1	2
2585:	0	3	2	0	4	3	1	1
2593:	2	2	3	2	2	1	0	4
2601:	4	5	1	3	4	0	5	1
2609:	3	3	3	1	1	2	2	0
2617:	0	6	1	1	2	3	1	2
2625:	4	2	2	3	4	3	3	0
2633:	1	1	2	2	1	3	4	1
2641:	0	2	1	2	1	2	3	2
2649:	3	3	3	2	1	1	2	2
2657:	2	2	0	2	2	1	4	2
2665:	0	0	1	2	3	0	0	1
2673:	1	1	2	2	4	2	0	1
2681:	2	1	1	2	1	0	1	2
2689:	2	2	4	1	4	2	1	3
2697:	2	1	0	3	2	1	0	2
2705:	1	2	2	0	2	2	4	1
2713:	1	3	3	1	1	0	2	0
2721:	4	0	1	2	3	2	2	1
2729:	1	2	1	1	1	2	3	3
2737:	1	3	2	2	1	2	2	2
2745:	3	2	0	1	1	1	2	0
2753:	1	0	7	3	4	0	3	1
2761:	0	0	1	3	0	4	2	2
2769:	1	0	2	0	1	3	3	2
2777:	1	3	1	2	1	2	1	0
2785:	1	5	2	2	2	3	2	1
2793:	0	4	4	2	1	0	1	1
2801:	1	1	0	3	0	3	0	2
2809:	1	1	4	1	1	0	2	3
2817:	2	2	2	1	2	2	3	5
2825:	6	8	4	7	6	6	7	8
2833:	5	4	2	3	3	3	4	2
2841:	1	2	2	0	3	0	3	3
2849:	0	2	2	1	1	1	1	3
2857:	0	3	3	4	2	1	1	3
2865:	0	3	0	2	1	3	1	6
2873:	2	6	2	3	1	3	1	2
2881:	3	0	6	1	2	1	3	0
2889:	4	2	2	2	1	2	1	1
2897:	2	2	3	1	0	1	0	0
2905:	2	0	1	0	0	1	1	4
2913:	3	2	2	4	3	0	2	2
2921:	2	3	1	3	2	2	3	1
2929:	1	0	1	1	1	1	1	4
2937:	1	3	2	5	3	2	3	2
2945:	4	2	2	1	2	1	0	1
2953:	6	1	2	2	4	1	0	2

2961:	0	0	3	0	1	2	1	0

Sample Title: BMAC0004

Channel								
2969:	3	2	1	0	2	2	2	0
2977:	3	1	1	4	0	2	1	0
2985:	1	0	0	3	3	2	1	2
2993:	0	1	2	1	3	4	1	2
3001:	1	3	0	3	0	4	0	1
3009:	1	1	1	1	0	0	1	0
3017:	1	2	1	2	0	2	1	0
3025:	3	1	2	1	0	2	2	1
3033:	1	0	1	2	1	3	2	1
3041:	1	3	0	0	3	1	2	1
3049:	1	0	3	1	2	2	3	1
3057:	1	1	0	1	0	1	2	2
3065:	0	3	1	2	1	2	2	1
3073:	0	0	0	4	0	2	0	1
3081:	0	2	0	2	1	3	1	0
3089:	1	0	1	2	0	2	4	0
3097:	2	2	0	3	3	2	2	1
3105:	1	1	2	1	0	0	0	2
3113:	1	2	2	1	1	0	0	1
3121:	0	2	1	3	3	0	1	1
3129:	0	1	1	1	0	0	1	1
3137:	0	2	2	2	2	5	0	1
3145:	0	1	0	0	2	2	0	0
3153:	2	3	0	0	1	0	2	0
3161:	2	1	2	2	1	1	0	2
3169:	3	2	0	2	0	0	2	2
3177:	2	3	1	3	0	3	2	0
3185:	3	0	2	0	3	1	2	0
3193:	1	0	0	1	0	0	3	2
3201:	0	1	2	3	0	1	3	2
3209:	3	1	2	0	1	2	1	3
3217:	2	2	0	1	1	1	0	0
3225:	0	1	0	0	1	0	0	3
3233:	2	0	0	4	2	4	4	7
3241:	4	6	3	4	8	4	0	0
3249:	0	1	2	1	2	2	1	2
3257:	0	3	0	1	0	1	2	0
3265:	1	3	1	0	3	1	1	2
3273:	0	1	1	2	0	0	0	1
3281:	0	1	2	1	0	0	0	2
3289:	0	1	0	0	2	1	0	0
3297:	2	1	2	0	0	1	1	2
3305:	1	0	1	0	1	3	0	1
3313:	1	0	1	3	1	2	0	0
3321:	1	0	0	0	1	2	1	0
3329:	0	1	2	0	2	1	2	0
3337:	1	0	0	4	1	1	0	3
3345:	0	2	2	1	2	2	0	1
3353:	2	1	1	0	0	0	3	2
3361:	2	3	0	2	2	7	6	9
3369:	5	15	8	8	8	7	5	3
3377:	1	2	2	0	2	0	2	1
3385:	2	1	0	0	2	2	2	1

3393:	2	1	0	0	2	1	0	1

Sample Title: BMAC0004

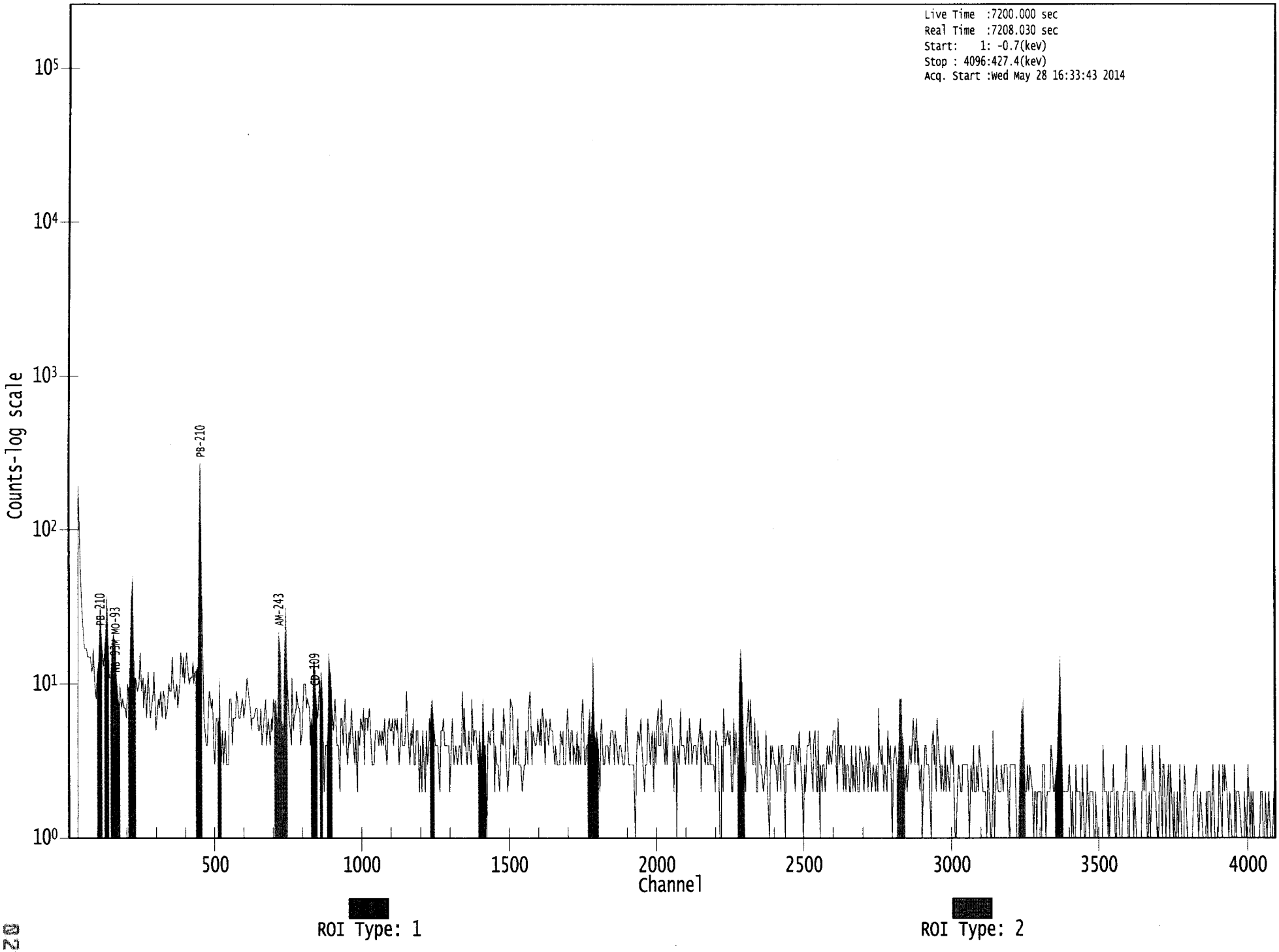
Channel								
3401:	3	1	1	0	0	1	0	1
3409:	0	2	2	1	0	1	1	1
3417:	0	0	0	0	0	0	2	3
3425:	1	2	0	1	2	0	1	0
3433:	1	2	0	2	0	1	1	0
3441:	1	1	2	2	3	1	0	0
3449:	1	0	1	0	1	0	1	0
3457:	0	0	0	2	3	0	0	0
3465:	0	0	1	1	2	2	0	1
3473:	1	1	2	1	1	1	0	2
3481:	0	2	0	1	0	0	0	0
3489:	0	2	1	1	1	1	1	0
3497:	1	0	1	0	1	0	0	1
3505:	0	0	1	1	1	1	1	1
3513:	1	1	3	4	1	0	2	0
3521:	0	2	0	0	2	1	2	1
3529:	1	0	1	1	2	1	0	0
3537:	1	0	0	0	2	1	1	0
3545:	1	1	0	2	2	3	0	1
3553:	0	1	0	1	0	0	0	1
3561:	2	1	0	0	2	0	0	1
3569:	1	0	1	0	1	0	1	0
3577:	1	1	0	0	0	1	1	2
3585:	0	2	0	1	2	1	0	0
3593:	0	0	4	1	0	1	0	1
3601:	0	0	0	1	0	2	1	1
3609:	2	2	0	1	1	0	0	2
3617:	0	1	0	0	0	1	2	1
3625:	0	1	1	0	0	1	0	0
3633:	1	0	1	0	0	1	0	1
3641:	1	0	0	1	1	1	0	0
3649:	0	4	1	2	0	2	0	1
3657:	0	0	3	1	0	1	0	1
3665:	1	0	0	1	1	0	2	0
3673:	0	1	1	0	1	1	0	2
3681:	2	1	4	1	0	0	0	2
3689:	0	2	0	0	2	0	0	0
3697:	0	1	0	0	1	1	0	0
3705:	0	2	1	4	0	0	2	0
3713:	0	0	1	1	0	3	1	0
3721:	3	2	2	1	0	0	1	0
3729:	0	2	0	2	2	1	1	3
3737:	0	0	0	1	1	1	3	1
3745:	3	1	1	0	0	0	0	1
3753:	0	1	2	0	1	1	0	0
3761:	0	1	1	0	1	2	1	1
3769:	1	0	0	0	0	0	3	0
3777:	1	0	1	0	1	0	1	0
3785:	0	0	1	0	1	3	0	0
3793:	2	2	0	0	0	0	1	0
3801:	1	0	0	0	0	1	0	0
3809:	1	1	1	0	1	1	1	1
3817:	1	1	1	2	1	1	0	2

3825:	0	0	2	1	2	0	3	1

Sample Title: BMAC0004

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

0000008034.CNF



WLLFOIA4312 - 001 - 0035135

Apex-Gamma

Analysis Report for 1405116-05
BMAC0008

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 1405116-05
Sample Description	: BMAC0008
Sample Type	: SOIL
Sample Size	: 1.010E+02 grams
Facility	: Countroom
Sample Taken On	: 5/27/2014 3:57:57PM
Acquisition Started	: 5/29/2014 7:12:45AM
Procedure	: LPGAS-13 pCi
Operator	: Administrator
Detector Name	: GE5
Geometry	: LPGAS-13
Live Time	: 7200.0 seconds
Real Time	: 7210.0 seconds
Dead Time	: 0.14 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 1 - 4096
Peak Area Range (in channels)	: 32 - 4096
Identification Energy Tolerance	: 1.000 keV
Energy Calibration Used Done On	: 12/2/2013
Efficiency Calibration Used Done On	: 8/24/2013
Efficiency Calibration Description	:
Sample Number	: 8056

AG
5/29/14

Analysis Report for 1405116-05

BMAC0008

ENERGY CALIBRATION REPORT

Detector Name : GE5

ENERGY CALIBRATION COEFFICIENTS

Energy Calibrate Performed on : 12/2/2013 2:11:00PM
by : Administrator
Energy Calibrate Type : POLY

Energy (keV) = -0.802 + 0.104*ch + -5.16E-09*ch^2 + 0.00E+00*ch^3

SHAPE CALIBRATION COEFFICIENTS

Shape Calibrate Performed on : 12/2/2013 2:10:49PM
by : Administrator

FWHM = 0.586 + 3.02E-02*E^1/2

LOW TAIL = 0.00E+00 + 0.00E+00*E

ENERGY CALIBRATION RESULTS TABLE

Centroid Channel	Centroid error	Energy (keV)
0.00	0.00	59.54
0.00	0.00	88.00
0.00	0.00	122.06
0.00	0.00	165.85
0.00	0.00	391.69

SHAPE CALIBRATION RESULTS TABLE

Energy (keV)	FWHM channels	FWHM error	TAIL channels	TAIL error
59.54	0.00	0.00	0.00	0.00
88.00	0.00	0.00	0.00	0.00
122.06	0.00	0.00	0.00	0.00
165.85	0.00	0.00	0.00	0.00
391.69	0.00	0.00	0.00	0.00

Analysis Report for 1405116-05

BMAC0008

EFFICIENCY CALIBRATION REPORT

Detector Name	:	GE5
Geometry Description	:	LPGAS-13
Efficiency Calibration Performed on	:	8/24/2013 10:08:51AM
by	:	Administrator
Efficiency Type Used	:	EMPIRICA
Certificate File	:	

Efficiency Triplets

Energy	*% Efficiency*	*Error*	*Computed*	*Error*	*% Difference*
59.54	1.36E+01	4.77E-01			
88.00	1.54E+01	7.25E-01			
122.06	1.25E+01	5.17E-01			
165.85	8.94E+00	3.51E-01			
391.69	3.38E+00	1.34E-01			

DUAL Efficiency Calibration Equation

Single Equation Terms

Offset	:	-1.04E+01
Slope	:	4.00E+00
Quadratic	:	-4.73E-01
Cubic	:	0.00E+00
4th Order	:	0.00E+00
5th Order	:	0.00E+00
6th Order	:	0.00E+00
7th Order	:	0.00E+00
8th Order	:	0.00E+00
9th Order	:	0.00E+00

EMPIRICAL Efficiency Calibration Equation

Empirical Equation Terms

Scaling	:	2.26E+02
Offset	:	-2.63E+00
Slope	:	1.13E+00
Quadratic	:	-4.73E-01
Cubic	:	0.00E+00
4th Order	:	0.00E+00
5th Order	:	0.00E+00

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BMAC0008

LINEAR Efficiency Calibration Equation

Linear Equation Terms

Offset :	-2.22E-03
Slope :	-5.87E-01
Quadratic :	-7.80E+00
Cubic :	0.00E+00
4th Order :	0.00E+00
5th Order :	0.00E+00
6th Order :	0.00E+00
7th Order :	0.00E+00
8th Order :	0.00E+00
9th Order :	0.00E+00

PEAK-TO-TOTAL CALIBRATION REPORT

Peak-to-Total Efficiency Calibration Equation

PEAK LOCATE REPORT

Peak Locate Performed on	: 5/29/2014 9:12:57AM
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	46.53	452.61	0.0000	0.00
2	63.26	612.65	0.0000	0.00
3	74.73	722.35	0.0000	0.00
4	77.05	744.57	0.0000	0.00
5	87.13	840.92	0.0000	0.00
6	153.73	1477.91	0.0000	0.00
7	154.36	1483.92	0.0000	0.00
8	185.70	1783.69	0.0000	0.00
9	209.13	2007.74	0.0000	0.00
10	238.34	2287.14	0.0000	0.00

Analysis Report for 1405116-05

BMAC0008

Peak No.	Energy (keV)	Centroid Channel	Centroid Uncertainty	Peak Significance
11	241.57	2318.04	0.0000	0.00
12	294.99	2829.07	0.0000	0.00
13	338.00	3240.45	0.0000	0.00
14	351.33	3368.00	0.0000	0.00
15	352.12	3375.57	0.0000	0.00
16	365.31	3501.71	0.0000	0.00

? = Adjacent peak noted
Errors quoted at 2.000sigma

Analysis Report for 1405116-05

BMAC0008

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/29/2014 9:12:57AM

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	46.53	442 -	463	452.61	1.08E+02	41.64	1.40E+02	0.54
	2	63.26	600 -	622	612.65	9.45E+01	39.55	1.23E+02	0.33
	3	74.73	707 -	731	722.35	1.82E+02	55.72	2.90E+02	0.30
	4	77.05	734 -	756	744.57	3.78E+02	55.36	1.97E+02	0.65
	5	87.13	824 -	855	840.92	1.34E+02	54.88	2.46E+02	1.52
M	6	153.73	1472 -	1489	1477.91	2.31E+01	15.68	3.85E+01	0.95
m	7	154.36	1472 -	1489	1483.92	2.53E+01	18.76	4.55E+01	0.94
	8	185.70	1767 -	1800	1783.69	1.09E+02	36.42	8.50E+01	0.77
	9	209.13	1996 -	2016	2007.74	2.31E+01	26.40	8.18E+01	0.33
	10	238.34	2267 -	2298	2287.14	2.47E+02	44.29	1.18E+02	0.85
	11	241.57	2304 -	2329	2318.04	8.50E+01	28.77	6.80E+01	1.36
	12	294.99	2817 -	2839	2829.07	1.18E+02	27.85	4.56E+01	0.91
	13	338.00	3222 -	3255	3240.45	6.92E+01	25.25	4.15E+01	1.02
M	14	351.33	3356 -	3382	3368.00	1.82E+02	31.16	6.57E+01	1.15
m	15	352.12	3356 -	3382	3375.57	3.24E+01	23.96	2.77E+01	1.04
	16	365.31	3493 -	3510	3501.71	1.11E+01	12.03	1.78E+01	0.86

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

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 5/29/2014 9:12:57AM

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

Analysis Report for 1405116-05

BMAC0008

	Peak No.	Energy (keV)	ROI start	ROI end	Net Peak Area	Net Area Uncertainty	Continuum Counts	Critical Level
	1	46.53	442 -	463	1.08E+02	41.64	1.40E+02	2.96E+01
	2	63.26	600 -	622	9.45E+01	39.55	1.23E+02	2.83E+01
	3	74.73	707 -	731	1.82E+02	55.72	2.90E+02	4.01E+01
	4	77.05	734 -	756	3.78E+02	55.36	1.97E+02	3.24E+01
	5	87.13	824 -	855	1.34E+02	54.88	2.46E+02	4.09E+01
M	6	153.73	1472 -	1489	2.31E+01	15.68	3.85E+01	1.02E+01
m	7	154.36	1472 -	1489	2.53E+01	18.76	4.55E+01	1.11E+01
	8	185.70	1767 -	1800	1.09E+02	36.42	8.50E+01	2.46E+01
	9	209.13	1996 -	2016	2.31E+01	26.40	8.18E+01	2.02E+01
	10	238.34	2267 -	2298	2.47E+02	44.29	1.18E+02	2.56E+01
	11	241.57	2304 -	2329	8.50E+01	28.77	6.80E+01	1.81E+01
	12	294.99	2817 -	2839	1.18E+02	27.85	4.56E+01	1.43E+01
	13	338.00	3222 -	3255	6.92E+01	25.25	4.15E+01	1.56E+01
M	14	351.33	3356 -	3382	1.82E+02	31.16	6.57E+01	1.33E+01
m	15	352.12	3356 -	3382	3.24E+01	23.96	2.77E+01	8.65E+00
	16	365.31	3493 -	3510	1.11E+01	12.03	1.78E+01	8.24E+00

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

PEAK WITH NID REPORT

Peak Analysis Performed on : 5/29/2014 9:12:57AM

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

Tentative NID Library : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.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	46.53	442 -	463	452.61	1.08E+02	41.64	1.40E+02	PB-210
	2	63.26	600 -	622	612.65	9.45E+01	39.55	1.23E+02	TH-234
	3	74.73	707 -	731	722.35	1.82E+02	55.72	2.90E+02	AM-243
	4	77.05	734 -	756	744.57	3.78E+02	55.36	1.97E+02	.....
	5	87.13	824 -	855	840.92	1.34E+02	54.88	2.46E+02	NP-237
									CD-109
M	6	153.73	1472 -	1489	1477.91	2.31E+01	15.68	3.85E+01	.....
m	7	154.36	1472 -	1489	1483.92	2.53E+01	18.76	4.55E+01	.....
	8	185.70	1767 -	1800	1783.69	1.09E+02	36.42	8.50E+01	.....

Analysis Report for 1405116-05

BMAC0008

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	9	209.13	1996 -	2016	2007.74	2.31E+01	26.40	8.18E+01	.....
	10	238.34	2267 -	2298	2287.14	2.47E+02	44.29	1.18E+02	.....
	11	241.57	2304 -	2329	2318.04	8.50E+01	28.77	6.80E+01	.....
	12	294.99	2817 -	2839	2829.07	1.18E+02	27.85	4.56E+01	.....
	13	338.00	3222 -	3255	3240.45	6.92E+01	25.25	4.15E+01	.....
M	14	351.33	3356 -	3382	3368.00	1.82E+02	31.16	6.57E+01	.....
m	15	352.12	3356 -	3382	3375.57	3.24E+01	23.96	2.77E+01	.....
	16	365.31	3493 -	3510	3501.71	1.11E+01	12.03	1.78E+01	.....

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

PEAK EFFICIENCY REPORT

Peak Analysis Performed on : 5/29/2014 9:12:57AM

	Peak No.	Energy (keV)	Net Peak Area	Net Area Uncertainty	Peak Efficiency	Efficiency Uncertainty
	1	46.53	1.08E+02	41.64	1.33E-01	1.39E-02
	2	63.26	9.45E+01	39.55	1.42E-01	1.68E-02
	3	74.73	1.82E+02	55.72	1.41E-01	2.58E-02
	4	77.05	3.78E+02	55.36	1.41E-01	2.77E-02
	5	87.13	1.34E+02	54.88	1.38E-01	3.56E-02
M	6	153.73	2.31E+01	15.68	1.04E-01	1.66E-02
m	7	154.36	2.53E+01	18.76	1.03E-01	1.66E-02
	8	185.70	1.09E+02	36.42	8.80E-02	1.63E-02
	9	209.13	2.31E+01	26.40	7.81E-02	1.47E-02
	10	238.34	2.47E+02	44.29	6.74E-02	1.29E-02
	11	241.57	8.50E+01	28.77	6.64E-02	1.26E-02
	12	294.99	1.18E+02	27.85	5.12E-02	9.18E-03
	13	338.00	6.92E+01	25.25	4.20E-02	6.39E-03
M	14	351.33	1.82E+02	31.16	3.96E-02	5.52E-03
m	15	352.12	3.24E+01	23.96	3.95E-02	5.47E-03
	16	365.31	1.11E+01	12.03	3.73E-02	4.62E-03

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

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 5/29/2014 9:12:57AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	46.53	1.08E+02	41.64			1.08E+02	4.16E+01
	2	63.26	9.45E+01	39.55			9.45E+01	3.96E+01
	3	74.73	1.82E+02	55.72	4.55E-01	3.15E+00	1.81E+02	5.58E+01
	4	77.05	3.78E+02	55.36			3.78E+02	5.54E+01
	5	87.13	1.34E+02	54.88			1.34E+02	5.49E+01
M	6	153.73	2.31E+01	15.68			2.31E+01	1.57E+01
m	7	154.36	2.53E+01	18.76			2.53E+01	1.88E+01
	8	185.70	1.09E+02	36.42			1.09E+02	3.64E+01
	9	209.13	2.31E+01	26.40			2.31E+01	2.64E+01
	10	238.34	2.47E+02	44.29			2.47E+02	4.43E+01
	11	241.57	8.50E+01	28.77	2.17E+00	2.78E+00	8.28E+01	2.89E+01
	12	294.99	1.18E+02	27.85			1.18E+02	2.78E+01
	13	338.00	6.92E+01	25.25			6.92E+01	2.52E+01
M	14	351.33	1.82E+02	31.16			1.82E+02	3.12E+01
m	15	352.12	3.24E+01	23.96	7.52E+00	2.49E+00	2.49E+01	2.41E+01
	16	365.31	1.11E+01	12.03			1.11E+01	1.20E+01

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

Analysis Report for 1405116-05

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AREA CORRECTION REPORT
REFERENCE PEAK / BKG. SUBTRACT

Peak Analysis Performed on : 5/29/2014 9:12:57AM

Ref. Peak Energy : 0.00 Reference Date :
Peak Ratio : 0.00 Uncertainty : 0.00
Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000007950.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	46.53	1.08E+02	41.64			1.08E+02	4.16E+01
	2	63.26	9.45E+01	39.55			9.45E+01	3.96E+01
	3	74.73	1.82E+02	55.72	4.55E-01	3.15E+00	1.81E+02	5.58E+01
	4	77.05	3.78E+02	55.36			3.78E+02	5.54E+01
	5	87.13	1.34E+02	54.88			1.34E+02	5.49E+01
M	6	153.73	2.31E+01	15.68			2.31E+01	1.57E+01
m	7	154.36	2.53E+01	18.76			2.53E+01	1.88E+01
	8	185.70	1.09E+02	36.42			1.09E+02	3.64E+01
	9	209.13	2.31E+01	26.40			2.31E+01	2.64E+01
	10	238.34	2.47E+02	44.29			2.47E+02	4.43E+01
	11	241.57	8.50E+01	28.77	2.17E+00	2.78E+00	8.28E+01	2.89E+01
	12	294.99	1.18E+02	27.85			1.18E+02	2.78E+01
	13	338.00	6.92E+01	25.25			6.92E+01	2.52E+01
M	14	351.33	1.82E+02	31.16			1.82E+02	3.12E+01
m	15	352.12	3.24E+01	23.96	7.52E+00	2.49E+00	2.49E+01	2.41E+01
	16	365.31	1.11E+01	12.03			1.11E+01	1.20E+01

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

NUCLIDE IDENTIFICATION REPORT

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

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
CD-109	0.878	88.03	*	3.72	9.75E-01	4.72E-01
TH-234	1.000	63.29	*	3.80	6.53E-01	2.84E-01

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Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
AM-243	0.999	74.67	*	66.00	7.23E-02	2.67E-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 : 5/29/2014 9:12:57AM
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	46.53	1.50346E-02	19.23	Tol.	PB-210
	4	77.05	5.25365E-02	7.32		
M	6	153.73	3.20150E-03	34.01		
m	7	154.36	3.50860E-03	37.13		
	8	185.70	1.50694E-02	16.78		
	9	209.13	3.20530E-03	57.20		
	10	238.34	3.43177E-02	8.96		
	11	241.57	1.15052E-02	17.44		
	12	294.99	1.64190E-02	11.78		
	13	338.00	9.61667E-03	18.23		
M	14	351.33	2.52939E-02	8.56		
m	15	352.12	3.45999E-03	48.34		
	16	365.31	1.53889E-03	54.30		

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 1405116-05

BMAC0008

NUCLIDE IDENTIFICATION REPORT

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

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/grams)	Activity Uncertainty
CD-109	0.87	88.03	*	3.72	9.75E-01	4.72E-01
TH-234	1.00	63.29	*	3.80	6.53E-01	2.84E-01
AM-243	0.99	74.67	*	66.00	7.23E-02	2.67E-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
CD-109	0.878	9.75E-01	4.72E-01	
TH-234	1.000	6.53E-01	2.84E-01	
AM-243	0.999	7.23E-02	2.67E-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 1405116-05

BMAC0008

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/29/2014 9:12:57AM
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	46.53	1.50346E-02	19.23	Tol.	PB-210
	4	77.05	5.25365E-02	7.32		
M	6	153.73	3.20150E-03	34.01		
m	7	154.36	3.50860E-03	37.13		
	8	185.70	1.50694E-02	16.78		
	9	209.13	3.20530E-03	57.20		
	10	238.34	3.43177E-02	8.96		
	11	241.57	1.15052E-02	17.44		
	12	294.99	1.64190E-02	11.78		
	13	338.00	9.61667E-03	18.23		
M	14	351.33	2.52939E-02	8.56		
m	15	352.12	3.45999E-03	48.34		
	16	365.31	1.53889E-03	54.30		

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\WSRC.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	FE-55	5.89	24.50	-3.86E-01	1.40E+00	1.40E+00
+	CO-57	122.06	85.51	3.50E-04	1.67E-02	1.67E-02
		136.48	10.60	-7.14E-03		1.36E-01
+	NI-59	6.92	29.80	-5.63E-01	7.59E-01	7.59E-01

Analysis Report for 1405116-05

BMAC0008

	Nuclide Name	Energy (keV)		Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	MO-93	16.59		52.90	5.47E-03	6.91E-02	6.91E-02
		18.60		10.00	7.54E-02		3.06E-01
+	NB-93M	16.57		9.43	3.08E-02	3.88E-01	3.88E-01
+	CD-109	88.03	*	3.72	9.75E-01	6.14E-01	6.14E-01
+	SN-113	255.12		1.93	-5.78E-01	5.22E-02	9.48E-01
		391.69		61.90	-2.68E-03		5.22E-02
+	SN-119M	23.87		16.10	-9.11E-01	1.16E-01	1.70E-01
		25.10		22.70	8.47E-02		1.16E-01
+	I-125	35.49		6.49	-3.58E-03	2.45E-01	2.45E-01
+	I-129	29.78		57.00	2.79E-02	3.55E-02	3.55E-02
		33.60		13.20	-7.09E-03		1.24E-01
		39.58		7.52	5.15E-02		1.92E-01
+	BA-133	30.80		97.60	-9.25E-03	1.90E-02	1.90E-02
		81.00		33.00	-1.18E-02		4.48E-02
		302.84		17.80	-5.88E-02		1.23E-01
		356.01		60.00	-3.19E-02		4.22E-02
		383.85		8.70	-1.56E-02		3.71E-01
+	CE-139	165.85		80.35	3.58E-04	2.16E-02	2.16E-02
+	CE-144	133.54		10.80	-3.03E-02	1.23E-01	1.23E-01
+	HG-203	279.19		77.30	-2.49E-03	2.80E-02	2.80E-02
+	PB-210	10.80		9.57	-2.25E-02	4.30E-01	9.01E-01
		46.50		4.25	5.44E-01		4.30E-01
+	PA-231	9.28		42.00	7.10E-02	2.81E-01	2.81E-01
		10.11		20.20	5.40E-03		4.82E-01
		283.67		1.60	8.15E-01		1.56E+00
		302.67		2.30	-6.59E-01		9.22E-01
+	TH-231	25.64		14.70	2.08E-01	1.76E-01	1.76E-01
		84.21		6.40	1.84E-01		2.45E-01
+	PA-234	9.89		89.00	-5.05E-02	5.51E-02	1.12E-01
		21.72		64.90	2.31E-01		7.48E-02
		37.93		23.75	-5.66E-02		5.51E-02
		131.42		20.40	-2.51E-02		6.69E-02
+	TH-234	63.29	*	3.80	6.53E-01	4.10E-01	4.10E-01
+	NP-237	29.37		14.00	4.79E-02	1.41E-01	1.41E-01
		86.50		12.60	1.25E-01		1.48E-01
+	U-237	97.08		16.30	-2.98E-02	5.71E-02	9.50E-02
		101.07		26.30	-2.24E-02		5.71E-02
		114.00		12.30	2.99E-02		1.30E-01
		208.01		22.00	-3.58E-03		1.19E-01
+	AM-241	59.54		35.90	6.33E-03	4.12E-02	4.12E-02
+	AM-243	74.67	*	66.00	7.23E-02	3.31E-02	3.31E-02

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

Analysis Report for 1405116-05

BMAC0008

NUCLIDE MDA REPORT

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

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
	FE-55	5.89		24.50	1.40E+00	1.40E+00	-3.86E-01	6.75E-01
	CO-57	122.06		85.51	1.67E-02	1.67E-02	3.50E-04	7.85E-03
		136.48		10.60	1.36E-01		-7.14E-03	6.37E-02
	NI-59	6.92		29.80	7.59E-01	7.59E-01	-5.63E-01	3.65E-01
	MO-93	16.59		52.90	6.91E-02	6.91E-02	5.47E-03	3.28E-02
		18.60		10.00	3.06E-01		7.54E-02	1.45E-01
	NB-93M	16.57		9.43	3.88E-01	3.88E-01	3.08E-02	1.84E-01
+	CD-109	88.03	*	3.72	6.14E-01	6.14E-01	9.75E-01	2.97E-01
	SN-113	255.12		1.93	9.48E-01	5.22E-02	-5.78E-01	4.31E-01
		391.69		61.90	5.22E-02		-2.68E-03	2.36E-02
	SN-119M	23.87		16.10	1.70E-01	1.16E-01	-9.11E-01	8.11E-02
		25.10		22.70	1.16E-01		8.47E-02	5.53E-02
	I-125	35.49		6.49	2.45E-01	2.45E-01	-3.58E-03	1.16E-01
	I-129	29.78		57.00	3.55E-02	3.55E-02	2.79E-02	1.69E-02
		33.60		13.20	1.24E-01		-7.09E-03	5.87E-02
		39.58		7.52	1.92E-01		5.15E-02	9.08E-02
	BA-133	30.80		97.60	1.90E-02	1.90E-02	-9.25E-03	9.02E-03
		81.00		33.00	4.48E-02		-1.18E-02	2.13E-02
		302.84		17.80	1.23E-01		-5.88E-02	5.57E-02
		356.01		60.00	4.22E-02		-3.19E-02	1.89E-02
		383.85		8.70	3.71E-01		-1.56E-02	1.69E-01
	CE-139	165.85		80.35	2.16E-02	2.16E-02	3.58E-04	1.01E-02
	CE-144	133.54		10.80	1.23E-01	1.23E-01	-3.03E-02	5.75E-02
	HG-203	279.19		77.30	2.80E-02	2.80E-02	-2.49E-03	1.28E-02
	PB-210	10.80		9.57	9.01E-01	4.30E-01	-2.25E-02	4.32E-01
		46.50		4.25	4.30E-01		5.44E-01	2.06E-01
	PA-231	9.28		42.00	2.81E-01	2.81E-01	7.10E-02	1.35E-01
		10.11		20.20	4.82E-01		5.40E-03	2.31E-01
		283.67		1.60	1.56E+00		8.15E-01	7.21E-01
		302.67		2.30	9.22E-01		-6.59E-01	4.17E-01
	TH-231	25.64		14.70	1.76E-01	1.76E-01	2.08E-01	8.44E-02
		84.21		6.40	2.45E-01		1.84E-01	1.17E-01
	PA-234	9.89		89.00	1.12E-01	5.51E-02	-5.05E-02	5.39E-02
		21.72		64.90	7.48E-02		2.31E-01	3.64E-02
		37.93		23.75	5.51E-02		-5.66E-02	2.58E-02
		131.42		20.40	6.69E-02		-2.51E-02	3.13E-02

Analysis Report for 1405116-05

BMAC0008

	Nuclide Name	Energy (keV)		Yield(%)	Line MDA (pCi/grams)	Nuclide MDA (pCi/grams)	Activity (pCi/grams)	Dec. Level (pCi/grams)
+	TH-234	63.29	*	3.80	4.10E-01	4.10E-01	6.53E-01	1.96E-01
	NP-237	29.37		14.00	1.41E-01	1.41E-01	4.79E-02	6.69E-02
		86.50		12.60	1.48E-01		1.25E-01	7.14E-02
	U-237	97.08		16.30	9.50E-02	5.71E-02	-2.98E-02	4.47E-02
		101.07		26.30	5.71E-02		-2.24E-02	2.68E-02
		114.00		12.30	1.30E-01		2.99E-02	6.12E-02
		208.01		22.00	1.19E-01		-3.58E-03	5.61E-02
	AM-241	59.54		35.90	4.12E-02	4.12E-02	6.33E-03	1.96E-02
+	AM-243	74.67	*	66.00	3.31E-02	3.31E-02	7.23E-02	1.60E-02

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

No Action Level results available for reporting purposes.

DATA REVIEW COMMENTS REPORT

Creation Date	Comment	User

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: BMAC0008

Elapsed Live time: 7200
Elapsed Real Time: 7210

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	5
33:	42	241	214	163	125	88	89	60
41:	58	52	24	32	29	23	19	27
49:	18	22	23	21	15	15	11	15
57:	21	11	10	20	14	16	23	13
65:	10	11	17	10	14	13	8	6
73:	11	9	16	10	11	12	8	12
81:	8	8	7	13	8	15	10	10
89:	18	8	8	9	8	6	9	14
97:	6	11	5	5	3	7	13	15
105:	14	8	7	12	4	9	5	13
113:	15	7	10	7	10	10	6	6
121:	5	7	8	12	11	14	8	8
129:	8	5	4	14	13	8	7	10
137:	5	3	8	7	7	10	5	9
145:	3	8	4	10	7	6	11	3
153:	9	4	2	6	9	3	9	12
161:	10	8	4	8	10	5	6	4
169:	4	3	3	3	6	4	4	2
177:	6	6	3	7	1	8	7	7
185:	4	7	6	4	2	7	11	4
193:	8	5	6	4	5	8	2	3
201:	8	6	9	7	9	3	9	9
209:	7	4	5	10	12	10	24	39
217:	61	39	59	52	34	23	15	7
225:	6	4	4	5	8	7	9	5
233:	5	6	5	5	7	3	4	2
241:	5	7	7	15	17	14	11	8
249:	11	9	3	6	8	4	4	7
257:	2	2	8	5	6	2	8	4
265:	3	3	7	2	3	3	6	7
273:	3	8	4	6	2	4	3	0
281:	3	3	2	7	4	5	3	8
289:	7	10	7	12	5	11	14	0
297:	3	4	3	3	6	6	5	0
305:	3	3	3	7	4	6	3	4
313:	3	10	7	4	6	3	7	5
321:	5	1	3	2	3	9	5	5
329:	5	7	7	6	4	3	4	7
337:	4	2	3	1	4	3	2	3
345:	8	5	2	5	8	4	5	5
353:	4	8	4	3	5	3	6	2
361:	4	5	0	2	5	3	5	7

369:	2	4	6	4	1	1	3	3

Sample Title: BMAC0008

Channel								
377:	2	3	2	3	0	4	9	5
385:	5	3	7	5	8	3	1	6
393:	3	5	6	4	5	5	3	2
401:	5	1	5	4	3	5	5	2
409:	4	5	2	4	3	4	6	5
417:	2	7	3	3	3	4	8	4
425:	2	4	5	6	5	3	1	6
433:	1	4	9	2	5	7	0	4
441:	2	3	2	5	3	5	2	5
449:	16	16	21	13	16	11	12	12
457:	4	8	5	5	6	4	4	4
465:	2	6	6	5	3	6	4	2
473:	6	6	2	5	4	7	0	6
481:	5	4	7	3	5	1	4	2
489:	3	4	3	4	7	2	5	2
497:	6	3	5	5	2	3	2	6
505:	1	5	4	3	3	6	5	6
513:	2	8	3	3	8	8	3	6
521:	5	6	4	2	5	9	2	2
529:	7	10	7	4	6	2	5	5
537:	4	3	1	7	0	3	0	4
545:	3	6	3	2	10	3	8	3
553:	1	8	2	2	4	2	9	6
561:	7	6	5	5	1	2	5	6
569:	6	8	2	2	4	7	7	9
577:	5	10	3	7	3	3	4	7
585:	3	9	4	5	9	4	2	5
593:	10	2	5	2	4	3	3	3
601:	3	3	2	4	9	4	8	10
609:	5	10	8	12	12	17	6	8
617:	8	8	1	6	7	2	4	1
625:	6	9	2	4	5	6	5	4
633:	6	2	8	5	10	3	3	2
641:	7	8	4	4	3	7	8	8
649:	3	5	6	4	6	11	10	6
657:	5	6	2	2	6	8	4	5
665:	5	7	7	7	5	10	5	5
673:	6	8	2	4	1	4	3	8
681:	7	1	2	7	4	3	6	4
689:	0	5	6	1	2	4	3	7
697:	5	3	5	3	9	4	9	9
705:	5	5	6	8	5	3	7	4
713:	8	5	7	2	10	11	18	25
721:	20	38	46	28	19	22	8	10
729:	8	5	4	6	5	6	5	7
737:	6	3	17	19	27	44	51	60
745:	58	47	38	28	21	14	6	4
753:	5	5	5	1	5	3	5	2
761:	6	5	9	17	9	7	2	4
769:	7	4	6	3	4	8	5	6
777:	4	6	3	8	5	6	3	6
785:	5	7	9	5	4	1	4	8
793:	5	4	5	4	5	4	3	5

801:	5	2	6	6	6	7	8	7

Sample Title: BMAC0008

Channel								
809:	7	10	12	4	6	8	12	8
817:	2	6	3	2	4	5	4	0
825:	4	9	3	8	3	1	4	7
833:	3	5	8	10	13	10	10	17
841:	20	16	14	9	9	10	9	7
849:	10	9	13	4	3	6	3	2
857:	7	6	8	5	5	7	6	15
865:	5	6	13	4	6	9	7	4
873:	1	4	3	5	7	1	5	1
881:	3	2	5	5	4	5	7	11
889:	9	13	9	12	12	17	11	19
897:	6	14	11	9	17	8	6	5
905:	7	5	5	8	7	3	3	4
913:	2	6	11	4	4	5	3	0
921:	2	3	1	3	4	3	1	1
929:	3	3	3	7	7	6	2	3
937:	0	3	3	2	2	4	4	4
945:	5	6	6	2	2	5	5	1
953:	2	3	4	3	7	1	4	7
961:	5	3	5	8	4	3	1	3
969:	6	2	1	0	4	5	2	3
977:	7	3	3	3	2	1	2	1
985:	1	3	1	9	2	2	3	5
993:	5	3	3	2	2	4	5	1
1001:	2	7	2	1	1	3	4	4
1009:	2	6	5	8	4	5	5	3
1017:	7	7	3	7	3	3	4	4
1025:	0	3	3	6	0	3	2	2
1033:	4	2	2	3	2	4	1	7
1041:	1	3	6	5	1	1	5	3
1049:	6	2	2	3	8	4	2	8
1057:	1	4	3	3	3	5	3	5
1065:	4	2	1	4	5	4	6	4
1073:	4	1	6	4	7	2	5	1
1081:	4	0	2	1	5	2	1	5
1089:	1	2	4	4	2	1	3	6
1097:	2	2	2	1	3	6	1	6
1105:	2	2	7	4	3	4	3	4
1113:	0	4	2	3	3	2	4	1
1121:	6	6	4	3	4	5	1	2
1129:	3	1	2	5	2	2	1	2
1137:	3	6	3	2	3	4	2	3
1145:	1	1	1	5	2	2	1	1
1153:	1	0	2	3	2	6	2	4
1161:	5	2	3	2	4	4	1	6
1169:	1	2	2	6	4	7	0	10
1177:	2	5	1	5	2	2	2	6
1185:	0	1	5	2	4	2	1	5
1193:	4	2	4	2	8	3	8	3
1201:	3	3	2	5	0	0	0	6
1209:	2	1	4	2	2	6	4	1
1217:	2	2	6	1	3	1	2	2
1225:	3	1	2	4	4	3	2	3

1233:	2	1	1	1	5	4	5	3

Sample Title: BMAC0008

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

1665:	1	2	2	4	1	1	3	4

Sample Title: BMAC0008

Channel								
1673:	1	6	1	4	3	2	2	2
1681:	1	4	4	4	4	2	0	2
1689:	5	3	2	2	0	2	0	2
1697:	1	1	2	1	4	1	2	3
1705:	2	2	2	2	2	0	2	1
1713:	1	2	3	3	3	3	1	4
1721:	2	5	3	4	0	3	3	1
1729:	3	1	5	2	3	1	3	2
1737:	3	1	3	1	2	2	1	3
1745:	2	1	2	5	4	3	3	0
1753:	6	3	2	4	0	4	2	1
1761:	2	3	0	1	1	3	0	3
1769:	2	6	2	3	2	4	4	5
1777:	2	4	4	4	1	12	5	9
1785:	11	13	9	10	7	5	5	2
1793:	7	2	1	2	2	1	2	0
1801:	1	3	1	4	2	2	1	1
1809:	2	5	2	0	5	0	3	4
1817:	2	5	2	4	1	3	5	6
1825:	3	1	2	2	1	1	3	1
1833:	2	1	4	2	6	2	1	7
1841:	2	1	0	3	2	1	4	3
1849:	3	1	1	3	3	3	3	3
1857:	8	1	3	2	0	2	2	3
1865:	1	1	1	2	0	2	2	1
1873:	0	4	2	4	4	0	3	1
1881:	4	1	1	1	5	1	4	6
1889:	5	4	2	4	4	3	3	2
1897:	2	4	2	2	2	1	2	0
1905:	4	3	2	2	3	1	1	5
1913:	1	1	0	1	3	3	1	2
1921:	2	1	5	3	5	1	3	2
1929:	3	1	5	1	3	2	2	1
1937:	2	4	2	2	3	2	3	4
1945:	3	3	5	1	2	3	3	3
1953:	1	3	2	4	2	1	2	4
1961:	2	0	2	0	9	1	2	0
1969:	4	2	5	1	4	1	2	0
1977:	5	3	4	3	3	2	3	2
1985:	1	2	0	2	4	3	4	3
1993:	3	2	4	5	1	1	1	2
2001:	0	3	6	2	5	7	6	8
2009:	1	4	1	1	3	3	3	1
2017:	1	0	0	2	1	0	1	5
2025:	0	4	3	1	1	2	2	2
2033:	4	1	2	1	2	5	1	1
2041:	2	2	1	4	1	3	2	3
2049:	2	0	1	2	2	0	0	3
2057:	0	2	1	2	3	0	1	1
2065:	1	1	5	2	1	2	2	1
2073:	1	0	1	1	0	1	1	2
2081:	2	1	2	7	4	0	0	0
2089:	1	4	1	2	1	1	3	1

2097:	1	1	1	0	1	1	3	3

Sample Title: BMAC0008

Channel								
2105:	3	1	5	1	0	1	0	2
2113:	2	2	1	3	1	2	3	0
2121:	2	0	0	2	1	3	1	3
2129:	1	5	2	1	4	1	0	2
2137:	1	2	1	1	0	2	0	2
2145:	0	1	1	1	1	1	2	2
2153:	3	1	1	1	2	2	1	4
2161:	3	0	2	0	4	1	4	0
2169:	2	3	3	1	3	3	1	3
2177:	4	2	2	0	5	2	3	2
2185:	3	3	1	0	3	3	4	2
2193:	1	1	3	2	0	1	3	1
2201:	9	6	1	4	2	5	4	2
2209:	4	4	1	1	1	3	0	3
2217:	1	2	1	3	3	2	1	2
2225:	0	4	2	3	3	1	2	2
2233:	2	0	1	2	4	1	1	0
2241:	2	2	2	2	0	2	2	2
2249:	2	3	3	3	3	0	4	0
2257:	2	4	2	0	1	0	2	1
2265:	3	3	1	4	3	1	3	2
2273:	0	3	3	1	3	3	2	5
2281:	6	12	9	22	31	21	28	31
2289:	30	21	23	13	8	4	5	7
2297:	1	0	4	1	2	1	3	1
2305:	4	0	2	5	2	4	5	9
2313:	3	2	4	5	8	5	7	11
2321:	11	5	9	8	4	0	3	2
2329:	0	2	0	2	1	2	1	2
2337:	0	5	0	2	3	2	4	1
2345:	0	3	3	1	0	4	2	1
2353:	3	0	0	1	1	2	1	3
2361:	3	2	1	0	1	1	3	1
2369:	0	0	0	1	2	2	3	4
2377:	1	3	2	0	3	0	1	3
2385:	0	1	0	1	1	4	0	0
2393:	2	0	1	1	2	1	1	2
2401:	2	2	0	1	1	1	0	0
2409:	1	0	2	2	1	1	1	2
2417:	2	0	1	2	1	2	2	0
2425:	3	3	0	0	1	1	1	1
2433:	1	0	1	0	3	1	1	2
2441:	1	1	0	2	1	2	1	1
2449:	1	1	1	1	2	3	1	1
2457:	0	3	2	1	0	0	0	2
2465:	3	1	1	2	2	4	2	1
2473:	4	0	1	2	1	1	2	3
2481:	2	6	4	1	0	2	0	0
2489:	1	2	1	4	0	1	2	1
2497:	1	3	0	2	1	1	1	4
2505:	1	2	2	1	1	3	0	2
2513:	1	1	0	2	1	3	1	1
2521:	1	0	0	0	1	2	2	1

2529:	1	2	0	2	1	2	2	1

Sample Title: BMAC0008

Channel								
2537:	1	3	2	1	0	0	1	2
2545:	2	1	0	3	1	2	2	1
2553:	0	0	1	0	1	1	5	1
2561:	1	1	0	1	2	1	4	0
2569:	0	2	1	1	0	2	1	5
2577:	0	2	1	1	1	5	0	2
2585:	3	1	5	5	4	5	3	4
2593:	1	0	0	0	0	1	1	2
2601:	2	1	4	0	0	0	4	3
2609:	2	1	1	1	3	2	1	4
2617:	0	1	1	1	1	0	1	3
2625:	3	3	3	1	0	1	2	3
2633:	2	6	1	0	1	0	1	1
2641:	1	0	3	1	0	1	2	2
2649:	4	2	2	1	4	1	7	2
2657:	2	1	1	0	2	1	1	2
2665:	3	0	1	1	2	1	1	1
2673:	2	3	2	0	0	1	0	3
2681:	0	0	1	0	1	0	0	3
2689:	2	2	0	1	1	2	0	0
2697:	0	0	1	1	1	1	1	0
2705:	0	1	1	3	1	2	2	1
2713:	7	3	2	0	2	0	2	4
2721:	2	1	1	0	2	1	3	1
2729:	0	1	1	3	2	0	0	1
2737:	2	0	2	2	4	1	3	0
2745:	0	1	1	2	1	1	1	2
2753:	1	5	1	2	1	2	0	1
2761:	2	2	1	1	0	1	0	0
2769:	1	2	1	0	0	2	5	1
2777:	0	1	1	0	1	0	2	0
2785:	1	1	2	2	2	0	1	2
2793:	1	3	4	3	0	1	1	0
2801:	0	2	2	1	0	3	0	4
2809:	1	1	2	4	1	1	1	1
2817:	0	0	1	3	1	3	5	4
2825:	10	11	12	14	11	17	12	5
2833:	13	5	6	4	0	4	0	0
2841:	1	1	4	1	1	2	4	0
2849:	4	0	1	2	2	1	0	1
2857:	0	2	0	2	2	0	1	1
2865:	3	2	2	1	1	2	3	0
2873:	2	2	2	2	0	5	5	0
2881:	1	2	1	2	1	0	0	2
2889:	1	1	3	2	2	1	0	1
2897:	1	0	4	0	1	0	1	0
2905:	0	0	0	0	1	2	0	0
2913:	0	1	0	1	1	3	1	2
2921:	1	3	0	0	0	2	2	3
2929:	1	1	1	2	1	1	1	7
2937:	1	2	1	1	0	0	3	2
2945:	1	1	1	2	0	2	2	2
2953:	0	0	2	3	1	1	1	1

2961:	0	0	2	1	2	2	0	2

Sample Title: BMAC0008

Channel								
2969:	2	0	1	0	1	2	0	1
2977:	2	0	3	1	1	2	1	0
2985:	4	0	2	1	1	3	1	1
2993:	1	0	1	0	3	0	2	2
3001:	3	2	1	1	1	1	2	1
3009:	1	1	1	1	0	2	2	3
3017:	1	0	3	2	2	2	1	1
3025:	1	2	2	2	3	0	1	1
3033:	0	0	0	2	0	0	1	1
3041:	0	2	0	1	1	0	0	1
3049:	0	2	2	1	1	1	1	2
3057:	3	1	0	1	2	2	1	0
3065:	1	3	1	0	2	0	1	0
3073:	1	2	1	1	1	0	1	1
3081:	1	3	1	1	0	3	3	3
3089:	3	0	1	3	0	2	1	0
3097:	1	3	0	4	1	0	0	0
3105:	2	1	0	3	1	0	1	2
3113:	1	1	1	1	0	1	2	3
3121:	0	1	0	1	1	0	3	2
3129:	1	1	1	2	2	1	1	0
3137:	0	0	1	3	0	0	6	3
3145:	2	2	2	1	0	0	3	1
3153:	1	3	0	0	2	1	1	0
3161:	3	2	1	0	3	3	2	1
3169:	0	1	1	0	1	1	3	0
3177:	2	4	3	1	0	0	3	2
3185:	2	2	2	0	0	1	3	1
3193:	1	1	0	1	1	2	1	1
3201:	0	1	1	0	1	2	0	2
3209:	1	2	0	2	1	1	0	2
3217:	0	1	0	1	2	0	1	0
3225:	1	3	0	1	4	1	1	0
3233:	3	1	2	8	2	9	6	4
3241:	5	7	3	6	5	4	2	1
3249:	1	1	3	2	2	1	0	0
3257:	1	0	1	0	2	0	0	2
3265:	0	2	0	1	1	0	1	4
3273:	1	0	1	1	1	1	1	0
3281:	2	0	0	0	1	1	1	0
3289:	4	0	0	1	0	0	0	0
3297:	0	1	3	1	0	1	1	1
3305:	0	3	0	4	0	1	2	0
3313:	0	1	2	1	1	1	1	1
3321:	2	0	0	2	0	1	0	1
3329:	1	0	1	1	1	0	0	0
3337:	1	1	1	1	1	0	2	2
3345:	2	0	2	2	1	0	1	4
3353:	1	1	2	1	0	0	1	4
3361:	1	1	3	4	7	9	13	18
3369:	15	15	15	10	16	10	9	13
3377:	5	4	2	2	2	0	3	0
3385:	0	1	1	0	3	2	3	0

3393:	2	2	2	2	0	0	1	0

Sample Title: BMAC0008

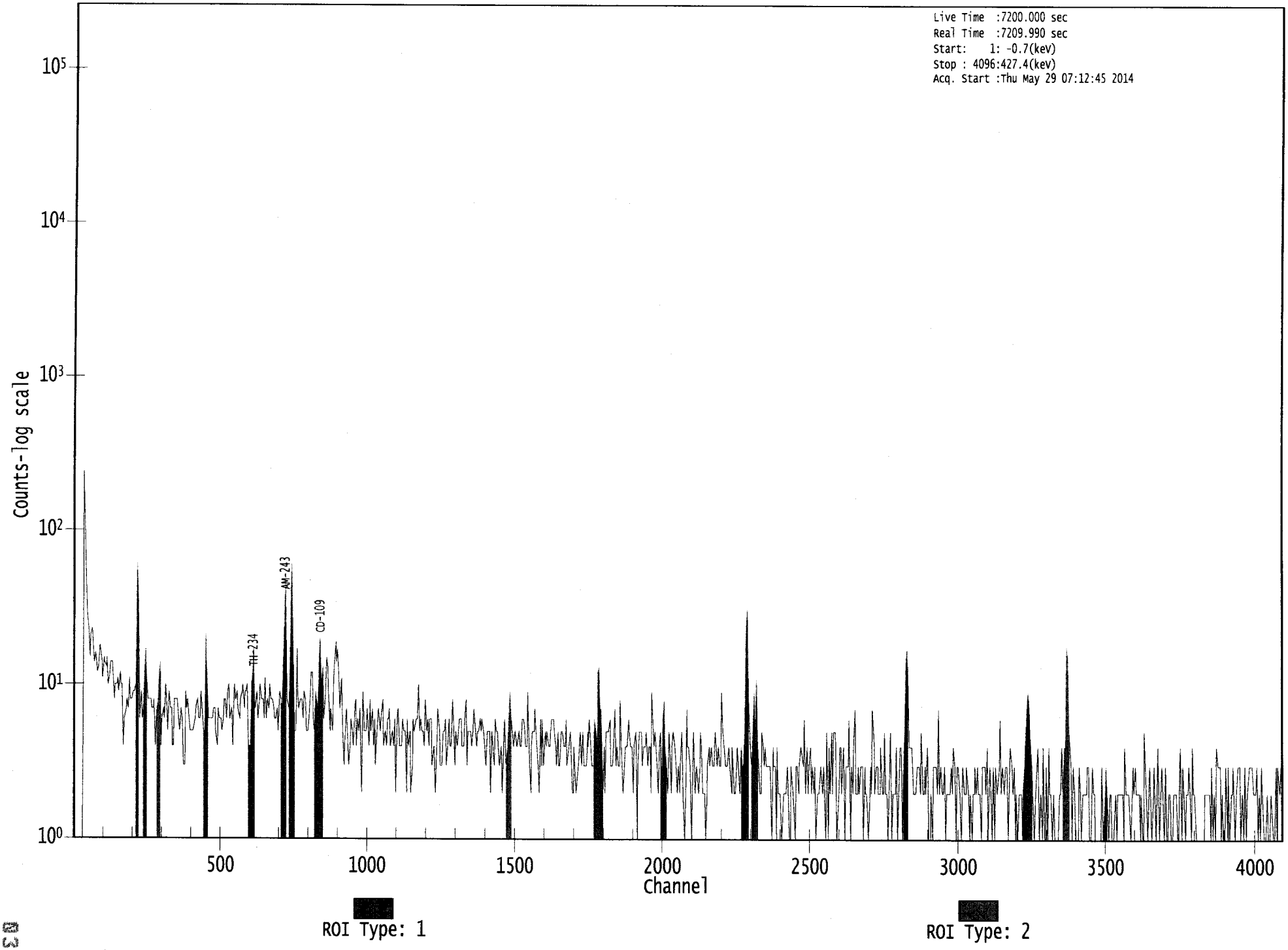
Channel								
3401:	1	0	0	1	0	1	0	1
3409:	0	2	3	2	0	1	1	2
3417:	1	1	0	0	0	0	1	2
3425:	2	0	0	0	1	0	2	1
3433:	0	1	0	2	0	3	1	2
3441:	1	0	3	2	0	0	0	0
3449:	1	0	1	0	0	0	0	3
3457:	2	0	1	2	2	0	0	2
3465:	1	0	0	0	1	0	0	0
3473:	0	1	1	1	0	0	1	0
3481:	0	1	0	1	1	0	0	3
3489:	0	1	0	1	1	0	0	0
3497:	0	2	2	2	3	3	2	1
3505:	1	2	0	0	1	0	1	0
3513:	0	1	1	2	0	1	2	0
3521:	0	1	0	0	1	1	1	1
3529:	1	1	1	0	2	1	2	1
3537:	1	0	1	1	1	2	0	1
3545:	2	1	1	2	1	0	1	2
3553:	0	0	2	2	1	2	2	2
3561:	0	1	0	1	1	4	1	1
3569:	0	0	2	1	2	0	0	1
3577:	1	0	2	2	0	2	2	0
3585:	1	0	1	0	0	1	0	0
3593:	0	1	3	1	2	1	1	0
3601:	0	0	3	1	2	0	0	1
3609:	0	1	2	1	1	2	1	2
3617:	0	0	1	1	2	0	1	0
3625:	0	0	1	0	0	0	1	0
3633:	5	0	0	2	1	2	2	0
3641:	0	0	1	1	0	0	0	2
3649:	0	2	3	1	3	0	0	1
3657:	1	1	0	0	2	0	0	2
3665:	0	3	0	2	1	0	1	1
3673:	0	0	1	0	0	4	2	1
3681:	0	0	0	1	0	1	1	2
3689:	0	2	1	3	1	2	1	1
3697:	0	1	0	1	0	1	1	3
3705:	1	1	1	1	0	1	1	0
3713:	0	0	2	1	0	0	2	0
3721:	1	1	0	0	0	0	1	0
3729:	2	0	2	0	1	0	0	2
3737:	1	1	1	2	1	0	1	1
3745:	0	1	1	1	0	2	0	0
3753:	4	2	0	2	1	0	1	0
3761:	3	0	0	0	2	0	0	0
3769:	1	1	1	0	0	2	1	1
3777:	1	1	2	0	1	3	0	1
3785:	1	2	1	0	1	1	1	0
3793:	1	4	2	1	2	0	1	0
3801:	2	0	1	1	0	1	1	0
3809:	0	1	0	0	0	0	0	1
3817:	0	1	0	1	1	1	1	0

3825:	1	1	0	1	0	0	0	0

Sample Title: BMAC0008

Channel								
3833:	1	0	2	1	2	0	0	1
3841:	1	2	0	1	0	2	0	2
3849:	1	0	2	2	0	0	0	1
3857:	0	3	2	1	1	1	1	0
3865:	0	2	2	0	0	0	1	0
3873:	2	0	4	3	0	1	0	3
3881:	0	2	1	3	1	0	0	3
3889:	0	1	0	0	1	2	0	0
3897:	0	0	0	0	1	1	0	2
3905:	3	1	1	1	0	1	1	1
3913:	3	1	2	0	1	1	0	0
3921:	2	0	0	2	2	0	1	2
3929:	3	0	2	0	1	0	0	1
3937:	1	1	0	2	2	2	1	1
3945:	2	3	2	1	1	1	0	3
3953:	0	1	0	0	0	0	1	2
3961:	1	1	1	1	0	0	1	3
3969:	1	1	0	1	1	1	1	2
3977:	1	2	0	0	1	1	3	0
3985:	2	1	3	1	1	0	0	3
3993:	2	2	3	0	2	1	1	0
4001:	0	1	0	2	2	0	0	3
4009:	1	0	1	1	2	1	0	2
4017:	1	0	1	1	0	1	3	1
4025:	0	2	1	0	0	0	1	1
4033:	0	1	0	0	1	0	0	0
4041:	0	0	2	0	0	0	0	0
4049:	0	1	1	0	0	0	2	0
4057:	1	2	0	0	0	0	1	0
4065:	0	1	1	0	2	1	0	3
4073:	0	0	0	0	3	0	1	2
4081:	0	1	0	2	0	0	0	3
4089:	0	1	2	0	2	3	2	1

0000008056.CNF



WLLFOIA4312 - 001 - 0035162

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

Last Results Report
5/28/14 7:08:30 AM

AG
5/28/14

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

Detector: GE4
Geometry: <None>
Certificate: <None>
Sample ID: QA Background Ch
Sample Desc: QA Count
Sample Quantity: 1.0000E+000
Sample Date: 5/28/14 6:53:10 AM
Measurement Date: 5/28/14 6:53:12 AM
Elapsed Live Time: 900.0 seconds
Elapsed Real Time: 909.3 seconds

Parameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
DAILY BKG CT RATE GE4 [SD: 1.6445E+000+/- 0.077]	1.6633E+000	2.4565E-001 < : : : >

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

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

Last Results Report
5/28/14 7:31:35 AM

AG
5/28/14

A File: \\OR-GAMMA1\ApexRoot\Countroom\QA\D0000000005LPGAS-13C.QC

etector: GE5
eometry: <None>
ertificate: LPGAS-13
ample ID: QA Calibration C
ample Desc: QA Count
ample Quantity: 1.0000E+000
ample Date: 7/1/13 12:00:00 AM
easurement Date: 5/28/14 7:13:50 AM
lapsed Live Time: 900.0 seconds
lapsed Real Time: 1052.7 seconds

arameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
eak centroid 59.54 keV	5.7627E+002	
Boundary Limits: [5.550E+002, 6.000E+002]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
eak centroid 122.06 keV	1.1737E+003	
Boundary Limits: [1.152E+003, 1.196E+003]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
eak centroid 391.69 keV	3.7502E+003	
Boundary Limits: [3.730E+003, 3.795E+003]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
eak FWHM AM-241	7.4935E-001	
Boundary Limits: [2.500E-001, 3.000E+000]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
eak FWHM CO-57	8.1652E-001	
Boundary Limits: [2.500E-001, 3.000E+000]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
eak FWHM SN-113	1.0374E+000	
Boundary Limits: [2.500E-001, 3.000E+000]		< : : : >
C ACTIVITY AM-241	1.5868E+005	
Boundary Limits: [1.292E-001, 1.938E-001]		< : : : >
C ACTIVITY CO-57	5.4860E+004	
Boundary Limits: [4.132E-002, 6.197E-002]		< : : : >
C ACTIVITY SN-113	1.4398E+005	
Boundary Limits: [1.066E-001, 1.600E-001]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		

lags 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        *****
*********************************************************************
```

AG
5/29/14

Last Results Report
5/29/14 7:05:03 AM

A File: \\OR-GAMMA1\ApexRoot\Countroom\QA\D0000000005LPGAS-13C.QC

etector: GE5
eometry: <None>
ertificate: LPGAS-13
ample ID: QA Calibration C
ample Desc: QA Count
ample Quantity: 1.0000E+000
ample Date: 7/1/13 12:00:00 AM
easurement Date: 5/29/14 6:47:23 AM
lapsed Live Time: 900.0 seconds
lapsed Real Time: 1048.6 seconds

arameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
eak centroid 59.54 keV	5.7632E+002	
Boundary Limits: [5.550E+002, 6.000E+002]		< : : : >
eak centroid 122.06 keV	1.1737E+003	
Boundary Limits: [1.152E+003, 1.196E+003]		< : : : >
eak centroid 391.69 keV	3.7501E+003	
Boundary Limits: [3.730E+003, 3.795E+003]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
eak FWHM AM-241	7.5193E-001	
Boundary Limits: [2.500E-001, 3.000E+000]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
eak FWHM CO-57	8.2279E-001	
Boundary Limits: [2.500E-001, 3.000E+000]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		
eak FWHM SN-113	1.0923E+000	
Boundary Limits: [2.500E-001, 3.000E+000]		< : : : >
C ACTIVITY AM-241	1.5543E+005	
Boundary Limits: [1.292E-001, 1.938E-001]		< : : : >
C ACTIVITY CO-57	5.3531E+004	
Boundary Limits: [4.132E-002, 6.197E-002]		< : : : >
C ACTIVITY SN-113	1.4188E+005	
Boundary Limits: [1.066E-001, 1.600E-001]		< : : : >
Trend Test: The last 9 samples exhibit a bias trend.		

lags 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
5/29/14 6:40:58 AM

AG
5/29/14

A File: \\OR-GAMMA1\ApexRoot\Countroom\QA\D0000000005B.QCK

etector: GE5
eometry: <None>
ertificate: <None>
ample ID: QA Background Ch
ample Desc: QA Count
ample Quantity: 1.0000E+000
ample Date: 5/29/14 6:25:41 AM
easurement Date: 5/29/14 6:25:42 AM
lapsed Live Time: 900.0 seconds
lapsed Real Time: 900.9 seconds

arameter Description [Mean +/- Std. Dev.]	Value	Deviation/Flags < LU : SD : UD : BS >
AILY BKG CT RATE GE5 [SD: 5.6108E+005+/-******]	6.2400E+002	-9.4770E-002 < : : : >

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

'lags 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)