ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #13-04049-OR

May 6, 2013

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN

TABLE OF CONTENTS

Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 13-04049

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

Date for Partial	Initials	Date	Initials	Checklist Items
		4/9/13	KC	Sample Log-In
		4/25/13	KBS	Data Compilation
		4-26-13	mLT	First Technical Data Review
		4/26/13	MSt	Second Technical Data Review
		5/2/13		Data Entry/Electronic Deliverable
		5/2/13		Case Narrative
		5/6/13	KBS	Electronic Deliverable Proof
		5/6/13	MSt	Samples Analyzed within Holding Time Yes? [X] No? [ ]
		5/6/13	MSt	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by: _____ 5/6/13

Laboratory Manager — Date

Copy No. _____

SECTION I

CHAIN OF CUSTODY
&
pH CHECK SHEET

13-04049

Chain of Custody Record

№ 1604

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830
(865) 481-0683 Phone • (865) 483-4621 Fax

EBERLINE SERVICES

Project Name: West Lake OU-1	Project Number:
Send Report To: Paul Rosasco	Sampler (Print Name): John D Reagan
Address:	Sampler (Print Name):
	Shipment Method: Courier
	Airbill Number: ____
Phone:	Laboratory Receiving:
Fax:	

Page 1 of 3

Purchase Order #: ____

(1) Lab to filter for dissolved parameters.

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Diss U-238, U-235, U-234	Diss Ra-226, Ra-228	Diss Thor 232, 230, 228	Tot U-238, 235, 234	Tot Ra 226, 228	Tot Thor 232, 230, 228	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
4,5 PZ-302-AI	4/3/13	1145	Aqueous	1	X	X	X	X	X	X	(1)	
6,7 LR-100		1327			X	X	X	X	X	X		
8,9 D-81		1340			X	X	X	X	X	X		
10,11 LR-105		1424			X	X	X	X	X	X		
12,13 PZ-207-AS		1505			X	X	X	X	X	X		
14,15 LR-103	4/3/13	1530			X	X	X	X	X	X		
16,17 PZ-1105S	4/4/13	1027			X	X	X	X	X	X		
18,19 I-62		1042			X	X	X	X	X	X		
S-8		1132			X	X	X	X	X	X		
D-13		1155			X	X	X	X	X	X		
PZ-304-AS		1256			X	X	X	X	X	X		
PZ-303-AS		1300			X	X	X	X	X	X		
D-12		1350			X	X	X	X	X	X		
PZ-111-SD		1352			X	X	X	X	X	X		
PZ-301-AI		1408			X	X	X	X	X	X		
I-11		1440			X	X	X	X	X	X		
PZ-105-SS	4/4/13	1506	Aqueous	1	X	X	X	X	X	X	(1)	

REC'D APR 09 2013

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	First Cmptd Courier	4/8/13	0800
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
	Kristen Combs	4/9/13	800
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:

Sample Custodian Remarks (Completed By Laboratory):

QA/QC Level	Turnaround
Level I ☐	Routine ☐
Level II ☐	24 Hour ☐
Level III ☐	1 Week ☐
Other ☐	Other ____

Sample Receipt	
Total # Containers Received?	
COC Seals Present?	
COC Seals Intact?	
Received Containers Intact?	
Temperature?	

EBERLINE SERVICES

Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	**13-04049**
Lab Deadline	**4/30/2013**
Analysis	**UUISO - Level 4**
Sample Matrix	**Water**

Comments

Fxns 04, 06, 08, 10, 12, 14, 16 & 18 are TOTAL

Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	39	W1.0
05	39	W1.0
06	42	W1.0
07	42	W1.0
08	41	W1.0
09	41	W1.0
10	40	W1.0
11	40	W1.0
12	45	W1.0
13	45	W1.0
14	45	W1.0
15	45	W1.0
16	38	W1.0
17	38	W1.0
18	46	W1.0
19	46	W1.0

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JB	4/11/13 0720
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JB	4/12/13 0800
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0800 TCM	4/12/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0845 TCM	4/16/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0845	4/16/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB 4/16/13	1514
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES Oak Ridge Laboratory	Internal Chain of Custody	Work Order #	13-04049
		Lab Deadline	4/30/2013
		Analysis	ThISO - Level 4
		Sample Matrix	Water

Comments

Fxns 04, 06, 08, 10, 12, 14, 16 & 18 are TOTAL

Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	39	W1.0
05	39	W1.0
06	42	W1.0
07	42	W1.0
08	41	W1.0
09	41	W1.0
10	40	W1.0
11	40	W1.0
12	45	W1.0
13	45	W1.0
14	45	W1.0
15	45	W1.0
16	38	W1.0
17	38	W1.0
18	46	W1.0
19	46	W1.0

	Location (circle one)					Initials	Date
Received by	Sample Storage (circled)	Rough Prep	Prep	Separations	Count Room	JB	4/11/13 0700
Relinquished by	Sample Storage	Rough Prep	Prep (circled)	Separations	Count Room	JB	4/11/13 0950
Received by	Sample Storage	Rough Prep	Prep	Separations (circled)	Count Room	0950 RM	4/11/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations (circled)	Count Room	0905 RM	4/16/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room (circled)	0905 C	4/16/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room (circled)	ICB	4/16/13 1519
Received by	Sample Storage (circled)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04049
Lab Deadline	4/30/2013
Analysis	Ra226 - Level 4
Sample Matrix	Water

Comments

Fxns 04, 06, 08, 10, 12, 14, 16 & 18 are TOTAL

Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	39	W1.0
05	39	W1.0
06	42	W1.0
07	42	W1.0
08	41	W1.0
09	41	W1.0
10	40	W1.0
11	40	W1.0
12	45	W1.0
13	45	W1.0
14	45	W1.0
15	45	W1.0
16	38	W1.0
17	38	W1.0
18	46	W1.0
19	46	W1.0

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	BJ	4/11/13 0700
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	BJ	4/12/13 0700
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/12/13 1510
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/15/13 1750
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	4/15/13 1754
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		4/17 0800
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/17/13 1126
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4-25-13 0913
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		4/25/13 0851
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	4/25/13 1429
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 #	13-04049
		Lab Deadline	4/30/2013
		Analysis	Ra228 - Level 4
		Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Fxns 04, 06, 08, 10, 12, 14, 16 & 18 are TOTAL Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED	04	39	W1.0
	05	39	W1.0
	06	42	W1.0
	07	42	W1.0
	08	41	W1.0
	09	41	W1.0
	10	40	W1.0
	11	40	W1.0
	12	45	W1.0
	13	45	W1.0
	14	45	W1.0
	15	45	W1.0
	16	38	W1.0
	17	38	W1.0
	18	46	W1.0
	19	46	W1.0

	Location (circle one)					Initials	Date
Received by	**(Sample Storage)**	Rough Prep	Prep	Separations	Count Room	JB	4/11/13 0700
Relinquished by	Sample Storage	Rough Prep	**(Prep)**	Separations	Count Room	JB	4/12/13 0700
Received by	Sample Storage	Rough Prep	Prep	**(Separations)**	Count Room	JW	4/12/13 1510
Relinquished by	Sample Storage	Rough Prep	Prep	**(Separations)**	Count Room	JW	4/15/13 1750
Received by	Sample Storage	Rough Prep	Prep	Separations	**(Count Room)**	KB	4/15/13 1754
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	**(Count Room)**	c 4/17/13 [illegible]	
Received by	Sample Storage	Rough Prep	Prep	**(Separations)**	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order
13-04049
Received By
KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	W1.0		
02	BLANK	0		WA	W1.0		
03	DUP	0		WA	W1.0		
04	PZ-302-AI TOT ✓	1		WA	W1.0	9.50	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	39
05	PZ-302-AI DIS ✓	1		WA	W1.0	0.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				39
06	LR-100 TOT ✓	1		WA	W1.0	9.50	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	42
07	LR-100 DIS ✓	1		WA	W1.0	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				42
08	D-81 TOT ✓	1		WA	W1.0	9.50	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	41
09	D-81 DIS ✓	1		WA	W1.0	0.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				41
10	LR-105 TOT ✓	1		WA	W1.0	9.50	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	40
11	LR-105 DIS ✓	1		WA	W1.0	0.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				40
12	PZ-207-AS TOT ✓	1		WA	W1.0	9.50	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	45
13	PZ-207-AS DIS ✓	1		WA	W1.0	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				45
14	LR-103 TOT ✓	1		WA	W1.0	9.50	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	45
15	LR-103 DIS ✓	1		WA	W1.0	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				45
16	PZ-110-SS TOT ✓	1		WA	W1.0	9.50	38
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	38
17	PZ-110-SS DIS ✓	1		WA	W1.0	0.00	38
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				38
18	I-62 TOT ✓	1		WA	W1.0	9.50	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	46
19	I-62 DIS ✓	1		WA	W1.0	0.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				46

JEJ 04/09/13

Received by: Kristen Coulston Date: 4/9/13

SECTION II

SAMPLE ACKNOWLEDGEMENT

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
Engineering Management Support, Inc.	West Lake OU-1	Environmental	04/09/2013	28	13-04049
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
West Lake OU-1	West Lake OU-1	W	04/30/2013	05/06/2013	05/07/2013

Internal ID	Client ID	Sample Date	Matrix	Storage	Ra226	Ra228	ThISO	UUISO																					Ttl
01	LCS	04/09/13	WA	W1.0	X	X	X	X																					4
02	BLANK	04/09/13	WA	W1.0	X	X	X	X																					4
03	DUP	04/09/13	WA	W1.0	X	X	X	X																					4
04	PZ-302-AI TOT	04/03/13 11:45	WA	W1.0	X	X	X	X																					4
05	PZ-302-AI DIS	04/03/13 11:45	WA	W1.0	X	X	X	X																					4
06	LR-100 TOT	04/03/13 13:27	WA	W1.0	X	X	X	X																					4
07	LR-100 DIS	04/03/13 13:27	WA	W1.0	X	X	X	X																					4
08	D-81 TOT	04/03/13 13:40	WA	W1.0	X	X	X	X																					4
09	D-81 DIS	04/03/13 13:40	WA	W1.0	X	X	X	X																					4
10	LR-105 TOT	04/03/13 14:24	WA	W1.0	X	X	X	X																					4
11	LR-105 DIS	04/03/13 14:24	WA	W1.0	X	X	X	X																					4
12	PZ-207-AS TOT	04/03/13 15:05	WA	W1.0	X	X	X	X																					4
13	PZ-207-AS DIS	04/03/13 15:05	WA	W1.0	X	X	X	X																					4
14	LR-103 TOT	04/03/13 15:30	WA	W1.0	X	X	X	X																					4
15	LR-103 DIS	04/03/13 15:30	WA	W1.0	X	X	X	X																					4
16	PZ-110-SS TOT	04/04/13 10:27	WA	W1.0	X	X	X	X																					4
17	PZ-110-SS DIS	04/04/13 10:27	WA	W1.0	X	X	X	X																					4
18	I-62 TOT	04/04/13 10:42	WA	W1.0	X	X	X	X																					4
19	I-62 DIS	04/04/13 10:42	WA	W1.0	X	X	X	X																					4
																													0
		Totals Per Analysis (non QA samples)			16	16	16	16	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	Paul V. Rosasco, P.E. Engineering Management Support, Inc. 7220 West Jefferson Avenue, Suite 406 Lakewood, CO 80235	**Report Data**	Paul V. Rosasco, P.E. Engineering Management Support, Inc 7220 West Jefferson Ave, Suite 406 Lakewood, CO 80235
Voice Fax	303-640-3426	*Voice* *Fax*	303-940-3426
Contact Voice Fax	Lyn Fitzgerald 303-601-4255		

Printed: 4/9/2013 12:30 PM

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST MP-001-2

WORK ORDER # 13-04049

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 Carlstrom DATE: 4/9/13

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-35524

May 7, 2013

Paul V. Rosasco, P.E.
Engineering Management Support, Inc.
7220 West Jefferson Ave, Suite 406
Lakewood, CO 80235

CASE NARRATIVE
Work Order # 13-04049-OR

SAMPLE RECEIPT

This work order contains eight water samples received 04/09/2013. All samples were analyzed as total and dissolved for Isotopic Uranium, Isotopic Thorium and Radium-226/228.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
PZ-302-AI TOT	13-04049-04	PZ-207-AS TOT	13-04049-12
PZ-302-AI DIS	13-04049-05	PZ-207-AS DIS	13-04049-13
LR-100 TOT	13-04049-06	LR-103 TOT	13-04049-14
LR-100 DIS	13-04049-07	LR-103 DIS	13-04049-15
D-81 TOT	13-04049-08	PZ-110-SS TOT	13-04049-16
D-81 DIS	13-04049-09	PZ-110-SS DIS	13-04049-17
LR-105 TOT	13-04049-10	I-62 TOT	13-04049-18
LR-105 DIS	13-04049-11	I-62 DIS	13-04049-19

ANALYTICAL METHODS

Isotopic Uranium and Isotopic Thorium were analyzed using Method HASL 300, 4.5.2. Radium-226 was analyzed using EPA Method 903.0. Radium-228 was analyzed using EPA Method 904.0.

Laboratory qualifiers are as follows:

J - Indicates a situation where the result minus the error is less than the detection limit but greater than zero.

U - Indicates a situation where the result minus the error is less than or equal to zero.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM

Samples were filtered to disassociate dissolved and total fractions. Volumetric aliquots from dissolved fractions were acidified with HNO_3. All samples were prepared by mixed acid digestions as appropriate. 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 slightly low for sample fraction -10 (Client ID: LR-105 TOT). Chemical recovery was acceptable for all other 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 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 filtered to disassociate dissolved and total fractions. Volumetric aliquots from dissolved fractions were acidified with HNO_3. All samples were prepared by mixed acid digestions as appropriate. 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 slightly low for sample fractions -07 and -15 (Client IDs: LR-100 DIS and LR-103 DIS). Chemical recovery was acceptable for all other 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 a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Thorium-228, Thorium-230 and Thorium-232 laboratory control sample demonstrated an acceptable percent recovery.

RADIUM-226

Samples were filtered to disassociate dissolved and total fractions. Volumetric aliquots from dissolved fractions were acidified with HNO_3. All samples were prepared by mixed acid digestions as appropriate. This was followed by selective sulfate precipitations of the Radium. Samples were then mounted by semi-micro-precipitations onto micro-porous filters. Samples were counted by alpha spectroscopy using an energy specific region of interest for Radium-226. Chemical recovery was calculated by the use of a Barium-133 tracer, which was determined by HPGe gamma spectroscopy.

Samples demonstrated acceptable results for all Radium-226 analyses. Chemical recovery was acceptable for all samples. The Radium-226 method blank demonstrated acceptable results. Results for the Radium-226 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Radium-226 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

RADIUM-228

Following alpha spectroscopy analysis of Radium-226, Barium/Radium Sulfate precipitates were redissolved and allowed for sufficient ingrowth of the Actinium-228 daughter. After ingrowth, Actinium-228 was selectively precipitated. Precipitates were filtered and beta emissions for Actinium-228 were then counted on a gas proportional counter. Chemical recovery was determined by the use of a Barium-133 tracer, the activity of which was determined by HPGe gamma spectroscopy and an elemental Yttrium carrier by gravimetric measurements. The product of these two recoveries was used to calculate chemical yield.

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

CERTIFICATION OF ACCURACY

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

M.R. McDougall
Laboratory Manager

Date: 5/7/2013

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SECTION IV

ANALYTICAL RESULTS SUMMARY

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Lakewood, CO 80235

Project: West Lake OU-1
SDG: 1304049
Received: 04/09/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
LCS13-04049-01	13-04049-01	04/16/2013 16:12:04	Radium-226	E903.0	10.60	1.30	0.20		pCi/l
LCS13-04049-01	13-04049-01	04/25/2013 10:06:51	Radium-228	E904.0	8.43	1.03	1.46		pCi/l
LCS13-04049-01	13-04049-01	04/16/2013 11:59:01	Thorium-228	HASL 300, 4.5.2	4.98	0.79	0.13		pCi/l
LCS13-04049-01	13-04049-01	04/16/2013 11:59:01	Thorium-230	HASL 300, 4.5.2	4.68	0.75	0.08		pCi/l
LCS13-04049-01	13-04049-01	04/16/2013 11:59:01	Thorium-232	HASL 300, 4.5.2	4.53	0.73	0.07		pCi/l
LCS13-04049-01	13-04049-01	04/17/2013 06:11:19	Uranium-234	HASL 300, 4.5.2	8.24	1.09	0.07		pCi/l
LCS13-04049-01	13-04049-01	04/17/2013 06:11:19	Uranium-235	HASL 300, 4.5.2	0.66	0.21	0.08		pCi/l
LCS13-04049-01	13-04049-01	04/17/2013 06:11:19	Uranium-238	HASL 300, 4.5.2	8.07	1.07	0.08		pCi/l
BLANK13-04049-02	13-04049-02	04/16/2013 16:12:05	Radium-226	E903.0	0.00	0.08	0.20	U	pCi/l
BLANK13-04049-02	13-04049-02	04/25/2013 10:06:51	Radium-228	E904.0	0.50	0.49	0.98	J	pCi/l
BLANK13-04049-02	13-04049-02	04/16/2013 11:59:03	Thorium-228	HASL 300, 4.5.2	0.09	0.09	0.13	U	pCi/l
BLANK13-04049-02	13-04049-02	04/16/2013 11:59:03	Thorium-230	HASL 300, 4.5.2	0.14	0.09	0.10	J	pCi/l
BLANK13-04049-02	13-04049-02	04/16/2013 11:59:03	Thorium-232	HASL 300, 4.5.2	0.02	0.04	0.07	U	pCi/l
BLANK13-04049-02	13-04049-02	04/17/2013 06:11:20	Uranium-234	HASL 300, 4.5.2	0.06	0.06	0.09	U	pCi/l
BLANK13-04049-02	13-04049-02	04/17/2013 06:11:20	Uranium-235	HASL 300, 4.5.2	0.00	0.03	0.09	U	pCi/l
BLANK13-04049-02	13-04049-02	04/17/2013 06:11:20	Uranium-238	HASL 300, 4.5.2	0.08	0.06	0.07	J	pCi/l
PZ-302-AI TOT DUP	13-04049-03	04/16/2013 16:11:59	Radium-226	E903.0	0.77	0.29	0.23		pCi/l
PZ-302-AI TOT DUP	13-04049-03	04/25/2013 10:06:51	Radium-228	E904.0	1.21	0.48	0.88	J	pCi/l
PZ-302-AI TOT DUP	13-04049-03	04/16/2013 11:59:35	Thorium-228	HASL 300, 4.5.2	0.09	0.10	0.15	U	pCi/l
PZ-302-AI TOT DUP	13-04049-03	04/16/2013 11:59:35	Thorium-230	HASL 300, 4.5.2	0.18	0.11	0.11	J	pCi/l
PZ-302-AI TOT DUP	13-04049-03	04/16/2013 11:59:35	Thorium-232	HASL 300, 4.5.2	0.04	0.07	0.14	U	pCi/l
PZ-302-AI TOT DUP	13-04049-03	04/17/2013 06:11:17	Uranium-234	HASL 300, 4.5.2	4.14	0.60	0.09		pCi/l
PZ-302-AI TOT DUP	13-04049-03	04/17/2013 06:11:17	Uranium-235	HASL 300, 4.5.2	0.14	0.09	0.08	J	pCi/l
PZ-302-AI TOT DUP	13-04049-03	04/17/2013 06:11:17	Uranium-238	HASL 300, 4.5.2	3.02	0.47	0.07		pCi/l
PZ-302-AI TOT	13-04049-04	04/16/2013 16:12:01	Radium-226	E903.0	0.60	0.24	0.13		pCi/l
PZ-302-AI TOT	13-04049-04	04/25/2013 10:06:52	Radium-228	E904.0	1.20	0.46	0.84	J	pCi/l
PZ-302-AI TOT	13-04049-04	04/16/2013 11:59:36	Thorium-228	HASL 300, 4.5.2	-0.04	0.06	0.20	U	pCi/l
PZ-302-AI TOT	13-04049-04	04/16/2013 11:59:36	Thorium-230	HASL 300, 4.5.2	0.25	0.16	0.13	J	pCi/l
PZ-302-AI TOT	13-04049-04	04/16/2013 11:59:36	Thorium-232	HASL 300, 4.5.2	0.06	0.08	0.11	U	pCi/l
PZ-302-AI TOT	13-04049-04	04/17/2013 06:11:18	Uranium-234	HASL 300, 4.5.2	4.18	0.64	0.05		pCi/l
PZ-302-AI TOT	13-04049-04	04/17/2013 06:11:18	Uranium-235	HASL 300, 4.5.2	0.35	0.15	0.09		pCi/l
PZ-302-AI TOT	13-04049-04	04/17/2013 06:11:18	Uranium-238	HASL 300, 4.5.2	3.21	0.53	0.08		pCi/l

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Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
PZ-302-AI DIS	13-04049-05	04/16/2013 16:12:01	Radium-226	E903.0	0.39	0.20	0.16		pCi/l
PZ-302-AI DIS	13-04049-05	04/25/2013 10:06:46	Radium-228	E904.0	0.86	0.52	1.02	J	pCi/l
PZ-302-AI DIS	13-04049-05	04/16/2013 11:59:37	Thorium-228	HASL 300, 4.5.2	0.08	0.11	0.17	U	pCi/l
PZ-302-AI DIS	13-04049-05	04/16/2013 11:59:37	Thorium-230	HASL 300, 4.5.2	0.26	0.18	0.18	J	pCi/l
PZ-302-AI DIS	13-04049-05	04/16/2013 11:59:37	Thorium-232	HASL 300, 4.5.2	0.00	0.05	0.10	U	pCi/l
PZ-302-AI DIS	13-04049-05	04/16/2013 09:01:59	Uranium-234	HASL 300, 4.5.2	4.02	0.64	0.08		pCi/l
PZ-302-AI DIS	13-04049-05	04/16/2013 09:01:59	Uranium-235	HASL 300, 4.5.2	0.11	0.09	0.07	J	pCi/l
PZ-302-AI DIS	13-04049-05	04/16/2013 09:01:59	Uranium-238	HASL 300, 4.5.2	2.69	0.48	0.08		pCi/l
LR-100 TOT	13-04049-06	04/16/2013 16:12:03	Radium-226	E903.0	0.44	0.24	0.24	J	pCi/l
LR-100 TOT	13-04049-06	04/25/2013 10:06:46	Radium-228	E904.0	0.37	0.54	1.12	U	pCi/l
LR-100 TOT	13-04049-06	04/16/2013 11:59:38	Thorium-228	HASL 300, 4.5.2	-0.03	0.04	0.12	U	pCi/l
LR-100 TOT	13-04049-06	04/16/2013 11:59:38	Thorium-230	HASL 300, 4.5.2	0.14	0.10	0.09	J	pCi/l
LR-100 TOT	13-04049-06	04/16/2013 11:59:38	Thorium-232	HASL 300, 4.5.2	0.03	0.04	0.06	U	pCi/l
LR-100 TOT	13-04049-06	04/16/2013 09:02:01	Uranium-234	HASL 300, 4.5.2	0.14	0.14	0.15	U	pCi/l
LR-100 TOT	13-04049-06	04/16/2013 09:02:01	Uranium-235	HASL 300, 4.5.2	0.09	0.15	0.27	U	pCi/l
LR-100 TOT	13-04049-06	04/16/2013 09:02:01	Uranium-238	HASL 300, 4.5.2	0.06	0.10	0.17	U	pCi/l
LR-100 DIS	13-04049-07	04/16/2013 16:12:33	Radium-226	E903.0	0.14	0.15	0.22	U	pCi/l
LR-100 DIS	13-04049-07	04/25/2013 10:08:29	Radium-228	E904.0	0.68	0.48	0.96	J	pCi/l
LR-100 DIS	13-04049-07	04/16/2013 11:59:39	Thorium-228	HASL 300, 4.5.2	0.13	0.22	0.39	U	pCi/l
LR-100 DIS	13-04049-07	04/16/2013 11:59:39	Thorium-230	HASL 300, 4.5.2	0.28	0.27	0.32	J	pCi/l
LR-100 DIS	13-04049-07	04/16/2013 11:59:39	Thorium-232	HASL 300, 4.5.2	-0.02	0.12	0.37	U	pCi/l
LR-100 DIS	13-04049-07	04/16/2013 09:02:02	Uranium-234	HASL 300, 4.5.2	0.08	0.07	0.07	J	pCi/l
LR-100 DIS	13-04049-07	04/16/2013 09:02:02	Uranium-235	HASL 300, 4.5.2	0.12	0.10	0.11	J	pCi/l
LR-100 DIS	13-04049-07	04/16/2013 09:02:02	Uranium-238	HASL 300, 4.5.2	0.17	0.10	0.06		pCi/l
D-81 TOT	13-04049-08	04/16/2013 16:12:34	Radium-226	E903.0	0.87	0.35	0.22		pCi/l
D-81 TOT	13-04049-08	04/25/2013 10:08:29	Radium-228	E904.0	1.59	0.54	0.98		pCi/l
D-81 TOT	13-04049-08	04/16/2013 11:59:40	Thorium-228	HASL 300, 4.5.2	0.04	0.09	0.16	U	pCi/l
D-81 TOT	13-04049-08	04/16/2013 11:59:40	Thorium-230	HASL 300, 4.5.2	0.13	0.11	0.11	J	pCi/l
D-81 TOT	13-04049-08	04/16/2013 11:59:40	Thorium-232	HASL 300, 4.5.2	0.03	0.06	0.12	U	pCi/l
D-81 TOT	13-04049-08	04/16/2013 09:02:04	Uranium-234	HASL 300, 4.5.2	1.57	0.31	0.05		pCi/l
D-81 TOT	13-04049-08	04/16/2013 09:02:04	Uranium-235	HASL 300, 4.5.2	0.14	0.09	0.06	J	pCi/l
D-81 TOT	13-04049-08	04/16/2013 09:02:04	Uranium-238	HASL 300, 4.5.2	1.21	0.26	0.05		pCi/l

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D-81 DIS	13-04049-09	04/16/2013 16:12:35	Radium-226	E903.0	0.18	0.16	0.21	J	pCi/l
D-81 DIS	13-04049-09	04/25/2013 10:08:29	Radium-228	E904.0	0.86	0.48	0.93	J	pCi/l
D-81 DIS	13-04049-09	04/16/2013 12:00:09	Thorium-228	HASL 300, 4.5.2	0.29	0.23	0.22	J	pCi/l
D-81 DIS	13-04049-09	04/16/2013 12:00:09	Thorium-230	HASL 300, 4.5.2	0.10	0.13	0.15	U	pCi/l
D-81 DIS	13-04049-09	04/16/2013 12:00:09	Thorium-232	HASL 300, 4.5.2	-0.01	0.07	0.17	U	pCi/l
D-81 DIS	13-04049-09	04/16/2013 09:02:06	Uranium-234	HASL 300, 4.5.2	1.49	0.31	0.06		pCi/l
D-81 DIS	13-04049-09	04/16/2013 09:02:06	Uranium-235	HASL 300, 4.5.2	0.20	0.12	0.09	J	pCi/l
D-81 DIS	13-04049-09	04/16/2013 09:02:06	Uranium-238	HASL 300, 4.5.2	1.27	0.29	0.07		pCi/l
LR-105 TOT	13-04049-10	04/16/2013 16:12:36	Radium-226	E903.0	0.69	0.29	0.21		pCi/l
LR-105 TOT	13-04049-10	04/25/2013 12:09:59	Radium-228	E904.0	0.55	0.52	1.04	J	pCi/l
LR-105 TOT	13-04049-10	04/16/2013 12:00:11	Thorium-228	HASL 300, 4.5.2	0.05	0.05	0.05	U	pCi/l
LR-105 TOT	13-04049-10	04/16/2013 12:00:11	Thorium-230	HASL 300, 4.5.2	0.30	0.13	0.07		pCi/l
LR-105 TOT	13-04049-10	04/16/2013 12:00:11	Thorium-232	HASL 300, 4.5.2	0.03	0.04	0.07	U	pCi/l
LR-105 TOT	13-04049-10	04/16/2013 09:02:07	Uranium-234	HASL 300, 4.5.2	0.04	0.24	0.66	U	pCi/l
LR-105 TOT	13-04049-10	04/16/2013 09:02:07	Uranium-235	HASL 300, 4.5.2	-0.10	0.30	0.82	U	pCi/l
LR-105 TOT	13-04049-10	04/16/2013 09:02:07	Uranium-238	HASL 300, 4.5.2	-0.30	0.29	0.98	U	pCi/l
LR-105 DIS	13-04049-11	04/16/2013 16:12:37	Radium-226	E903.0	1.04	0.36	0.20		pCi/l
LR-105 DIS	13-04049-11	04/25/2013 12:09:59	Radium-228	E904.0	0.95	0.60	1.18	J	pCi/l
LR-105 DIS	13-04049-11	04/16/2013 12:00:12	Thorium-228	HASL 300, 4.5.2	-0.01	0.08	0.18	U	pCi/l
LR-105 DIS	13-04049-11	04/16/2013 12:00:12	Thorium-230	HASL 300, 4.5.2	0.10	0.13	0.15	U	pCi/l
LR-105 DIS	13-04049-11	04/16/2013 12:00:12	Thorium-232	HASL 300, 4.5.2	-0.01	0.07	0.15	U	pCi/l
LR-105 DIS	13-04049-11	04/16/2013 09:02:09	Uranium-234	HASL 300, 4.5.2	0.31	0.23	0.19	J	pCi/l
LR-105 DIS	13-04049-11	04/16/2013 09:02:09	Uranium-235	HASL 300, 4.5.2	0.04	0.10	0.21	U	pCi/l
LR-105 DIS	13-04049-11	04/16/2013 09:02:09	Uranium-238	HASL 300, 4.5.2	0.02	0.08	0.21	U	pCi/l
PZ-207-AS TOT	13-04049-12	04/16/2013 16:12:38	Radium-226	E903.0	1.12	0.40	0.19		pCi/l
PZ-207-AS TOT	13-04049-12	04/25/2013 12:09:59	Radium-228	E904.0	0.68	0.73	1.49	U	pCi/l
PZ-207-AS TOT	13-04049-12	04/16/2013 12:00:14	Thorium-228	HASL 300, 4.5.2	0.12	0.09	0.09	J	pCi/l
PZ-207-AS TOT	13-04049-12	04/16/2013 12:00:14	Thorium-230	HASL 300, 4.5.2	0.13	0.09	0.08	J	pCi/l
PZ-207-AS TOT	13-04049-12	04/16/2013 12:00:14	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.07	U	pCi/l
PZ-207-AS TOT	13-04049-12	04/16/2013 09:02:11	Uranium-234	HASL 300, 4.5.2	0.18	0.15	0.18	J	pCi/l
PZ-207-AS TOT	13-04049-12	04/16/2013 09:02:11	Uranium-235	HASL 300, 4.5.2	0.07	0.12	0.22	U	pCi/l
PZ-207-AS TOT	13-04049-12	04/16/2013 09:02:11	Uranium-238	HASL 300, 4.5.2	0.07	0.10	0.16	U	pCi/l

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Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
PZ-207-AS DIS	13-04049-13	04/16/2013 16:13:16	Radium-226	E903.0	0.49	0.23	0.11		pCi/l
PZ-207-AS DIS	13-04049-13	04/25/2013 12:09:59	Radium-228	E904.0	1.16	0.58	1.11	J	pCi/l
PZ-207-AS DIS	13-04049-13	04/16/2013 12:00:16	Thorium-228	HASL 300, 4.5.2	-0.01	0.06	0.13	U	pCi/l
PZ-207-AS DIS	13-04049-13	04/16/2013 12:00:16	Thorium-230	HASL 300, 4.5.2	0.15	0.14	0.13	J	pCi/l
PZ-207-AS DIS	13-04049-13	04/16/2013 12:00:16	Thorium-232	HASL 300, 4.5.2	0.02	0.06	0.13	U	pCi/l
PZ-207-AS DIS	13-04049-13	04/16/2013 09:02:13	Uranium-234	HASL 300, 4.5.2	0.32	0.24	0.24	J	pCi/l
PZ-207-AS DIS	13-04049-13	04/16/2013 09:02:13	Uranium-235	HASL 300, 4.5.2	0.20	0.22	0.30	U	pCi/l
PZ-207-AS DIS	13-04049-13	04/16/2013 09:02:13	Uranium-238	HASL 300, 4.5.2	0.15	0.16	0.17	U	pCi/l
LR-103 TOT	13-04049-14	04/16/2013 16:13:17	Radium-226	E903.0	0.97	0.35	0.14		pCi/l
LR-103 TOT	13-04049-14	04/25/2013 12:10:03	Radium-228	E904.0	0.59	0.63	1.29	U	pCi/l
LR-103 TOT	13-04049-14	04/16/2013 12:00:18	Thorium-228	HASL 300, 4.5.2	0.03	0.05	0.07	U	pCi/l
LR-103 TOT	13-04049-14	04/16/2013 12:00:18	Thorium-230	HASL 300, 4.5.2	0.11	0.08	0.09	J	pCi/l
LR-103 TOT	13-04049-14	04/16/2013 12:00:18	Thorium-232	HASL 300, 4.5.2	-0.04	0.03	0.13	U	pCi/l
LR-103 TOT	13-04049-14	04/16/2013 09:02:14	Uranium-234	HASL 300, 4.5.2	0.07	0.09	0.12	U	pCi/l
LR-103 TOT	13-04049-14	04/16/2013 09:02:14	Uranium-235	HASL 300, 4.5.2	0.02	0.06	0.15	U	pCi/l
LR-103 TOT	13-04049-14	04/16/2013 09:02:14	Uranium-238	HASL 300, 4.5.2	0.19	0.14	0.10	J	pCi/l
LR-103 DIS	13-04049-15	04/16/2013 16:13:13	Radium-226	E903.0	0.52	0.26	0.16		pCi/l
LR-103 DIS	13-04049-15	04/25/2013 12:10:04	Radium-228	E904.0	1.62	0.69	1.29	J	pCi/l
LR-103 DIS	13-04049-15	04/16/2013 12:00:19	Thorium-228	HASL 300, 4.5.2	0.35	0.31	0.34	J	pCi/l
LR-103 DIS	13-04049-15	04/16/2013 12:00:19	Thorium-230	HASL 300, 4.5.2	0.54	0.37	0.24	J	pCi/l
LR-103 DIS	13-04049-15	04/16/2013 12:00:19	Thorium-232	HASL 300, 4.5.2	0.02	0.10	0.28	U	pCi/l
LR-103 DIS	13-04049-15	04/16/2013 09:02:16	Uranium-234	HASL 300, 4.5.2	0.22	0.14	0.12	J	pCi/l
LR-103 DIS	13-04049-15	04/16/2013 09:02:16	Uranium-235	HASL 300, 4.5.2	0.05	0.07	0.10	U	pCi/l
LR-103 DIS	13-04049-15	04/16/2013 09:02:16	Uranium-238	HASL 300, 4.5.2	0.36	0.18	0.12		pCi/l
PZ-110-SS TOT	13-04049-16	04/16/2013 16:13:14	Radium-226	E903.0	4.00	0.66	0.15		pCi/l
PZ-110-SS TOT	13-04049-16	04/25/2013 12:10:04	Radium-228	E904.0	1.15	0.57	1.09	J	pCi/l
PZ-110-SS TOT	13-04049-16	04/16/2013 12:00:21	Thorium-228	HASL 300, 4.5.2	0.03	0.04	0.07	U	pCi/l
PZ-110-SS TOT	13-04049-16	04/16/2013 12:00:21	Thorium-230	HASL 300, 4.5.2	0.16	0.10	0.09	J	pCi/l
PZ-110-SS TOT	13-04049-16	04/16/2013 12:00:21	Thorium-232	HASL 300, 4.5.2	0.02	0.04	0.08	U	pCi/l
PZ-110-SS TOT	13-04049-16	04/16/2013 11:58:31	Uranium-234	HASL 300, 4.5.2	0.13	0.10	0.09	J	pCi/l
PZ-110-SS TOT	13-04049-16	04/16/2013 11:58:31	Uranium-235	HASL 300, 4.5.2	0.10	0.09	0.10	J	pCi/l
PZ-110-SS TOT	13-04049-16	04/16/2013 11:58:31	Uranium-238	HASL 300, 4.5.2	0.14	0.10	0.10	J	pCi/l

Paul V. Rosasco, P.E.
Engineering Management Support, Inc.
7220 West Jefferson Ave, Suite 406
Lakewood, CO 80235

Project: West Lake OU-1
SDG: 1304049
Received: 04/09/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
PZ-110-SS DIS	13-04049-17	04/16/2013 16:13:22	Radium-226	E903.0	3.76	0.69	0.15		pCi/l
PZ-110-SS DIS	13-04049-17	04/25/2013 12:10:04	Radium-228	E904.0	1.70	0.67	1.24	J	pCi/l
PZ-110-SS DIS	13-04049-17	04/16/2013 12:00:23	Thorium-228	HASL 300, 4.5.2	0.00	0.05	0.10	U	pCi/l
PZ-110-SS DIS	13-04049-17	04/16/2013 12:00:23	Thorium-230	HASL 300, 4.5.2	0.21	0.15	0.14	J	pCi/l
PZ-110-SS DIS	13-04049-17	04/16/2013 12:00:23	Thorium-232	HASL 300, 4.5.2	0.08	0.09	0.11	U	pCi/l
PZ-110-SS DIS	13-04049-17	04/16/2013 11:58:32	Uranium-234	HASL 300, 4.5.2	0.08	0.08	0.12	U	pCi/l
PZ-110-SS DIS	13-04049-17	04/16/2013 11:58:32	Uranium-235	HASL 300, 4.5.2	0.04	0.07	0.13	U	pCi/l
PZ-110-SS DIS	13-04049-17	04/16/2013 11:58:32	Uranium-238	HASL 300, 4.5.2	0.08	0.08	0.09	U	pCi/l
I-62 TOT	13-04049-18	04/16/2013 16:13:19	Radium-226	E903.0	0.46	0.22	0.18		pCi/l
I-62 TOT	13-04049-18	04/25/2013 12:09:54	Radium-228	E904.0	1.27	0.62	1.18	J	pCi/l
I-62 TOT	13-04049-18	04/16/2013 12:00:25	Thorium-228	HASL 300, 4.5.2	0.25	0.12	0.05		pCi/l
I-62 TOT	13-04049-18	04/16/2013 12:00:25	Thorium-230	HASL 300, 4.5.2	0.21	0.11	0.06		pCi/l
I-62 TOT	13-04049-18	04/16/2013 12:00:25	Thorium-232	HASL 300, 4.5.2	0.05	0.05	0.07	U	pCi/l
I-62 TOT	13-04049-18	04/16/2013 11:58:29	Uranium-234	HASL 300, 4.5.2	0.22	0.11	0.10	J	pCi/l
I-62 TOT	13-04049-18	04/16/2013 11:58:29	Uranium-235	HASL 300, 4.5.2	0.05	0.06	0.09	U	pCi/l
I-62 TOT	13-04049-18	04/16/2013 11:58:29	Uranium-238	HASL 300, 4.5.2	0.22	0.11	0.08		pCi/l
I-62 DIS	13-04049-19	04/16/2013 16:13:20	Radium-226	E903.0	0.40	0.20	0.14		pCi/l
I-62 DIS	13-04049-19	04/25/2013 12:09:54	Radium-228	E904.0	1.01	0.65	1.28	J	pCi/l
I-62 DIS	13-04049-19	04/16/2013 12:00:26	Thorium-228	HASL 300, 4.5.2	0.01	0.05	0.13	U	pCi/l
I-62 DIS	13-04049-19	04/16/2013 12:00:26	Thorium-230	HASL 300, 4.5.2	0.21	0.15	0.13	J	pCi/l
I-62 DIS	13-04049-19	04/16/2013 12:00:26	Thorium-232	HASL 300, 4.5.2	0.02	0.05	0.10	U	pCi/l
I-62 DIS	13-04049-19	04/16/2013 11:58:30	Uranium-234	HASL 300, 4.5.2	0.18	0.10	0.05		pCi/l
I-62 DIS	13-04049-19	04/16/2013 11:58:30	Uranium-235	HASL 300, 4.5.2	0.09	0.08	0.09	J	pCi/l
I-62 DIS	13-04049-19	04/16/2013 11:58:30	Uranium-238	HASL 300, 4.5.2	0.22	0.11	0.08		pCi/l

SECTION V

ANALYTICAL STANDARDS

U-8

QA/QC REVIEWED
Date 1/16/95 Initials MK

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, ERIC ALLAS
QUALITY CONTROL

29 DECEMBER 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
3017 N. San Fernando Blvd.
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818·843·7000 Fax 818·843·6168

0025

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

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

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

		CURRENT DATE	9/6/2012 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: September 6, 2013

Verified & Approved By _____ Date: 9/26/2012 0:00

QC Approval _____ Date: 9/26/12

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MP-009

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RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

MP-009

Solution Reference #	IPL 479-50	Date	9/6/2012 0:00
		Solution #	U-8a

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

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

Reference Date: 1/1/1995 0:00

Chemical Composition of Standard Solution
Uranly Nitrate in 1M HNO_3

Dilution Instructions:

Dilution Solvent Used: 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 7.1182E+01 dpm/ml

NOTES:

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

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

Isotopic ratios from manufacturer's data sheet

Expiration Date: September 6, 2013

Verified & Approved By _____ Date: 9/26/2012 0:00

QC Approval _____ Date: 9/26/12

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		5.35€ 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

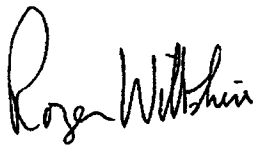
Chemical Composition Calculated weight of U-232, 4.42E-08 grams, as 2M HNO3 solution in a flame sealed glass vial.
This Tracer solution has been produced 'carrier free'.

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



Project Ref. AE2315

Roger Wiltshire

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

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

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

CURRENT DATE: 12/13/2012 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: December 7, 2013

Verified & Approved By _____ Date: 12/13/2012 0:00

QC Approval _____ Date: 12/13/12

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RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP-009	Date	12/7/2012 0:00
Solution Reference #	AEA/Amersham 92/232/67	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: December 7, 2013

Verified & Approved By _____ Date: 12/13/2012 0:00

QC Approval _____ Date: 12/13/12

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

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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RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP-009	Date	3/4/2013 0:00
Solution Reference #	IPL 388-116	Solution #	Th-1b

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

Radionuclide of Interest: ^{230}Thorium
Parent Solution Conc.: 2.30E+03 dpm/ml

Reference Date: 11/1/1991 0:00

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: March 4, 2014

Recertified By _____ Date: 3/21/2013 0:00

Verified & Approved By _____ Date: 3/21/13

QC Approval _____ Date: 3/21/13

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

CURRENT DATE: 3/4/2013 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: March 4, 2014

Recertified By _____ Date: 3/21/2013 0:00

QC Approval _____ Date: 3/21/13

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

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

CURRENT DATE: 10/9/2012 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: October 9, 2013

Verified & Approved By _____ Date: 10/9/2012 0:00

QC Approval _____ Date: 11/12/12

US EPA ARCHIVE DOCUMENT

EBERLINE SERVICES | QUALITY CONTROL PROGRAM
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EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP-009	Date	11/9/2012 0:00
Solution Reference #	IPL 435-104-2	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	Reference Date	11/1/1993 0:00
Parent Solution Conc.	2.07E+02 dpm/ml		

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:	600.0000 ml	Final Activity Concentration:	1.0355E+02 dpm/ml
Total Activity:	1.0355E+05 dpm		
Final Volume:	1000.00 ml		

NOTES:

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

Expiration Date: October 9, 2013

Verified & Approved By _____ Date: 11/9/2012 0:00

QC Approval _____ Date: 11/12/12

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

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

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

CURRENT DATE: 11/9/2012 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: October 9, 2013

Verified & Approved By _____ Date: 11/9/2012 0:00

QC Approval _____ Date: 11/12/12

EBERLINE SERVICES | **QUALITY CONTROL PROGRAM**
MP-009

Rev.7; 9/29/99
Title: **Radioactive Reference Standards Solutions & Records**

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

	MP-009	Date	11/9/2012 0:00
Solution Reference #	IPL 867-54	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: October 9, 2013

Verified & Approved By _____ Date: 11/9/2012 0:00

QC Approval _____ Date: 11/12/12

Ba-6
(& 6a)

National Institute of Standards & Technology

Certificate

ORIGINAL

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

ORIGINAL

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least June 2004.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

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

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

QCP-009

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

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

CURRENT DATE: 9/20/2012 0:00

SOLUTION REFERENCE #: NIST SRM4251C

SOLUTION #: Ba-6

Principal Radionuclide	Half Life, Years	Half Life, Days
^{133}Barium	1.048E+01	3.828E+03

Radionuclide: ^{133}Barium
Reference Date: 9/1/1993 0:00
Certified Activity: µCi
Certified Concentration: 1.318E+01 µCi per gram

Ampoule /Solution Gross	9.3081	Weight, Grams
Empty Ampoule	4.2582	Weight, Grams
Solution Net	5.0499	Weight, Grams
Total Activity in Ampoule	66.5577	µCi

Chemical Composition of Standard Solution

$^{133}BaCl_2$ in 1M HCl

Dilution Instructions:

Dilution Solvent Used: 1M HCl

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 66.5577 µCi Which Equals 1.478E+08 dpm at the date listed above

And after dilution the activity of this solution is 1.478E+05 dpm/ml

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

Expiration Date: September 20, 2013

Verified & Approved By _____ Date: 9/27/12

QC Approval _____ Date: 9/27/12

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

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

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

	QCP-009-1-A	Date	9/20/12
Solution Reference #	NIST SRM4251C	Solution #	Ba-6a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{133}Ba	1.048E+01	3.828E+03

Radionuclide of Interest: ^{133}Ba
Parent Solution Conc.: 1.48E+05 dpm/ml

Reference Date: 9/1/1993 0:00

Chemical Composition of Standard Solution
$^{133}BaCl_2$ in 1M HCl

Dilution Instructions:

Dilution Solvent Used: 1M HCl

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 25.0000 ml
Total Activity: 3.6950E+06 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 3.6950E+03 dpm/ml

NOTES:

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

Expiration Date: September 20, 2013

Verified & Approved By _____ Date: 9/27/12

QC Approval _____ Date: 9/27/12

Ra-5

QA/QC REVIEWED
Date 2/8/94 Initials WT

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Radionuclide:	Ra-226	Customer:	TMA EBERLINE
Half Life:	1600 ± 7 years	P.O.No.:	VH1888
Catalog No.:	7226	Reference Date:	February 1 1994 12:00 PST.
Source No.:	453-26	Contained Radioactivity: (Ra-226)	1.001 μCi.
		Contained Radioactivity: (Ra-226)	37.0 kBq.

Description of Solution

a. Mass of solution: 5.1864 g (in a 5 ml Flame Sealed Ampoule)

b. Chemical form: Ra(NO3)2 in 1 N HNO3

c. Carrier content: None added

d. Density: 1.0318 g/ml @ 20°C.

Radioimpurities: None detected(other than daughters)

Radioactive Daughters

Rn-222, Po-218, At-218, Pb-214, Bi-214, Po-214, Tl-210, Pb-210, Bi-210, Po-210 and Tl-206.

Radionuclide Concentration

(Ra-226) 0.1929 μCi/g.

Method of Calibration

Weighed aliquots of the solution were assayed using gamma spectrometry:
Energy peak(s) integrated under: 186 keV.
Branching ratio(s) used: 0.0351 gamma rays per decay.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration: ±3.4%

b. Random uncertainty in assay: ±3.1%

c. Random uncertainty in weighing(s): ±0.2%

d. Total uncertainty at the 99% confidence level: ±4.6%

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).

Ana U. Kuan
QUALITY CONTROL

Feb. 3, 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
Burbank, California 91504
(818) 843 - 7000

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP 009

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

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

		CURRENT DATE	11/9/2012 0:00
SOLUTION REFERENCE #	IPL 453-26	SOLUTION #	Ra-5

Principal Radionuclide	Half Life, Years	Half Life, Days
^{226}Radium	1.600E+03	5.844E+05

Radionuclide	^{226}Radium	Reference Date	2/1/1994 0:00
Certified Activity	1.001E+00 µCi		
Certified Concentration		µCi per gram	

Ampoule /Solution Gross		Weight, Grams
Empty Ampoule		Weight, Grams
Solution Net		Weight, Grams
Total Activity in Ampoule	1.0010	µCi

Chemical Composition of Standard Solution

$^{226}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions: Dilution Solvent Used: 1M HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0010 µCi Which Equals 2.222E+06 dpm at the date listed above

And after dilution the activity of this solution is 2.222E+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 9, 2013

Verified & Approved By _____ Date: 11/9/2012

QC Approval _____ Date: 11/12/12

EBERLINE SERVICES | **QUALITY CONTROL PROGRAM**
MP 009

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

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

MP 009
Solution Reference # IPL-453-26 **Date** 11/9/2012 0:00 **Solution #** Ra-5b

Principal Radionuclide	Half Life, Years	Half Life, Days
^{226}Radium	1.600E+03	5.844E+05

Radionuclide of Interest ^{226}Radium
Parent Solution Conc. 2.22E+03 dpm/ml
Reference Date 2/1/1994 0:00

Chemical Composition of Standard Solution
$^{226}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions:
Dilution Solvent Used 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 20.0000 ml
Total Activity: 4.4440E+04 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 4.4440E+01 dpm/ml
This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

NOTES:

Expiration Date: November 9, 2013

Verified & Approved By _____ Date: 11/9/2012 0:00

QC Approval _____ Date: 11/12/12

RA-11

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

62680-416

Ra-228 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated using a germanium gamma spectrometer system.

Radionuclide purity and calibration were checked using a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

ISOTOPE:	Ra-228
ACTIVITY (dps):	2.585 E3
HALF-LIFE:	5.75 years
CALIBRATION DATE:	November 7, 2001 12:00 EST
TOTAL UNCERTAINTY*:	4.0%
SYSTEMATIC:	3.0%
RANDOM:	1.0%

*99% Confidence Level

Impurities: γ-impurities (other than decay products) <0.1%

5.07198 grams 0.1M HCl solution with 50 µg/g Ba carrier.

P O NUMBER 9508, Item 1 (Part #4339A)

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 11/7/01

New vial from the 6/11/01 shipment.
P.S. Different activity Level
8/19/11

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

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

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

CURRENT DATE: 4/16/2012 0:00
SOLUTION REFERENCE #: Analytics 62680-416
SOLUTION #: Ra-11

Principal Radionuclide	Half Life, Years	Half Life, Days
^{228}Ra	5.750E+00	2.100E+03

Radionuclide: ^{226}Ra
Certified Activity: 6.986E-02 µCi
Certified Concentration: µCi per gram
Reference Date: 11/7/2001 0:00

Ampoule /Solution Gross	9.4982	Weight, Grams
Empty Ampoule	4.4895	Weight, Grams
Solution Net	5.0087	Weight, Grams
Total Activity in Ampoule	0.0699	µCi

Chemical Composition of Standard Solution
$^{228}Ra(NO_3)_2$ in 0.5 M HCl

Dilution Instructions:

Dilution Solvent Used: 0.5 M HCl

Dilute to a volume of 1000.00 millilliters

Certified Total Activity of 0.0699 µCi Which Equals 1.551E+05 dpm at the date listed above

And after dilution the activity of this solution is 1.551E+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: April 12, 2013

Recertified By _____ Date: 4/16/12

Verified & Approved By _____ Date: _____

QC Approval _____ Date: 4/16/12

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04049	UUISO	1	pCi	l	Engineering Management Support, Inc.

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	0.13	101.03%	15.02%	100.00%	3.60%	8.15E+00	2.94E-01	8.24E+00	1.24E+00	U-8a	3.52E+01	3.60E+00	5.14E-01
U-238	0.20	101.54%	15.06%	100.00%	3.60%	7.95E+00	2.86E-01	8.07E+00	1.21E+00	U-8a	3.44E+01	3.60E+00	5.14E-01

Matrix Spike

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

Replicate Sample

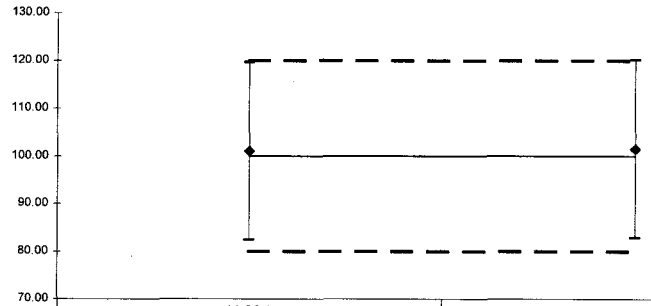
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
U-234	0.07	0.87	4.18E+00	7.05E-01	4.14E+00	6.68E-01
U-238	0.48	6.08	3.21E+00	5.74E-01	3.02E+00	5.22E-01
U-235	2.21	83.01	3.46E-01	1.54E-01	1.43E-01	9.23E-02

QC Summary

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

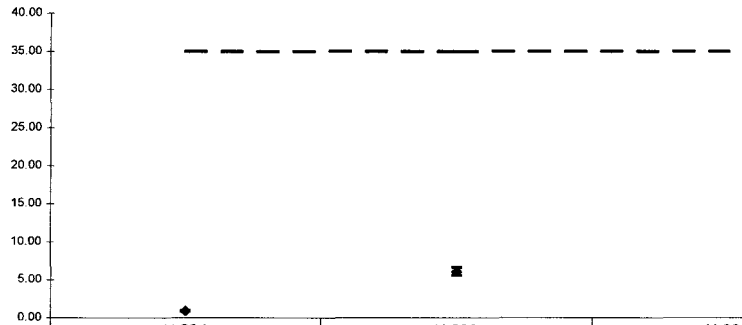
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04049	UUISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



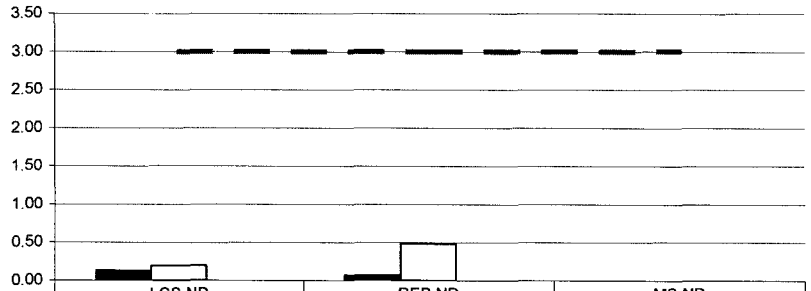
	U-234	U-238
Lower Error	82.41	82.89
Upper Error	119.65	120.20
%R	101.03	101.54
LCL	80	80
Mean	100	100
UCL	120	120

Replicate Sample RPD



	U-234	U-238	U-235
Lower Error	0.95	6.61	103.96
Upper Error	0.80	5.54	62.07
RPD	0.87	6.08	83.01
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
U-234	0.13	0.07	0.00
U-238	0.20	0.48	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04049	ThISO	1	pCi	l	Engineering Management Support, Inc.

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	0.33	103.24%	18.50%	100.00%	3.60%	4.82E+00	1.74E-01	4.98E+00	9.21E-01	Th-8b	1.04E+02	3.60E+00	1.03E-01
TH-230	1.62	85.53%	20.31%	100.00%	2.70%	5.47E+00	1.48E-01	4.68E+00	9.51E-01	Th-1b	2.35E+01	2.70E+00	5.17E-01
TH-232	0.69	93.88%	18.45%	100.00%	3.60%	4.82E+00	1.74E-01	4.53E+00	8.36E-01	Th-8b	1.04E+02	3.60E+00	1.03E-01

Matrix Spike

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

Replicate Sample

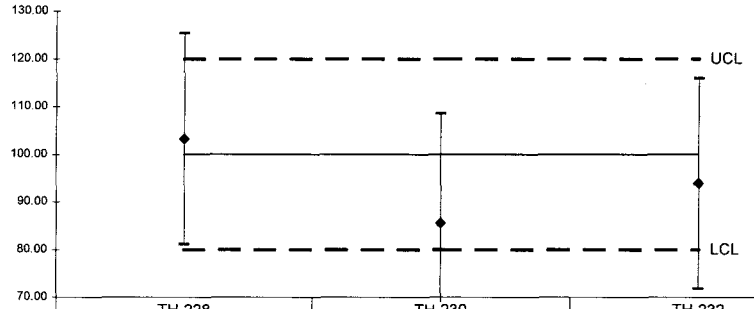
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
TH-228	2.13	490.65	-3.74E-02	5.73E-02	8.90E-02	1.01E-01
TH-230	0.69	33.83	2.46E-01	1.67E-01	1.75E-01	1.17E-01
TH-232	0.42	46.18	6.34E-02	8.29E-02	3.96E-02	7.43E-02

QC Summary

LCS Relative Bias	*LCS % R*	*LCS ND*	*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.03	OK	OK			NA	OK
0.86	OK	OK			NA	OK
0.94	OK	OK			NA	OK

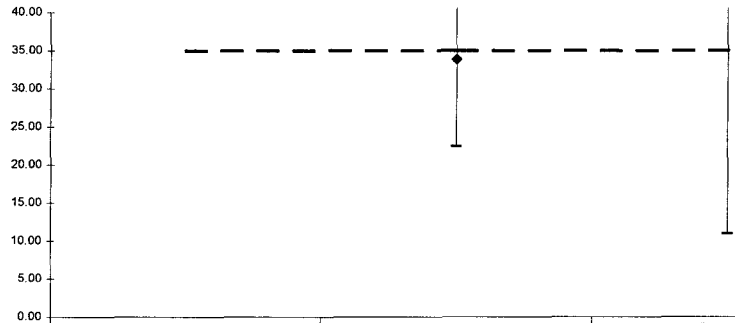
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04049	ThISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



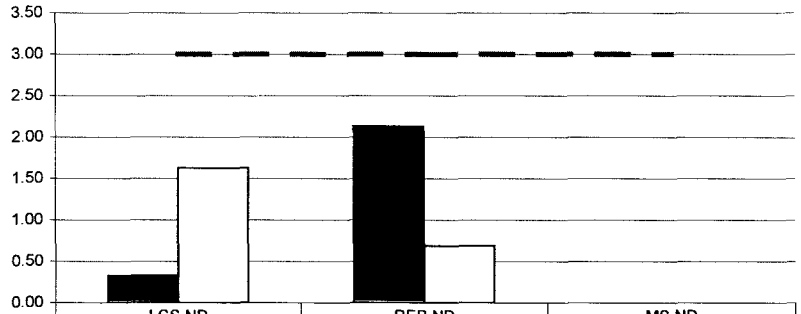
	TH-228	TH-230	TH-232
Lower Error	81.14	62.52	71.82
Upper Error	125.34	108.53	115.93
%R	103.24	85.53	93.88
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	1244.75	45.23	81.41
Upper Error	-263.45	22.44	10.94
RPD	490.65	33.83	46.18
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	0.33	2.13	0.00
TH-230	1.62	0.69	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04049	Ra226	1	pCi	l	Engineering Management Support, Inc.

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)
RA-226	0.18	102.31%	24.45%	100.00%	4.60%	1.04E+01	4.77E-01	1.06E+01	2.59E+00	Ra-5b	4.41E+01	4.60E+00	5.22E-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

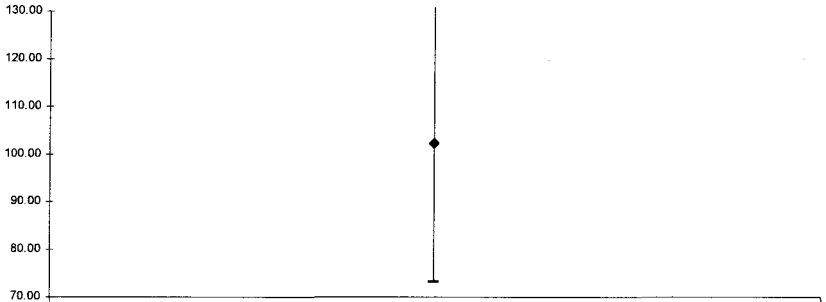
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-226	0.75	24.14	6.01E-01	2.74E-01	7.66E-01	3.32E-01

QC Summary

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

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04049	Ra226	1	pCi	l	Engineering Management Support, Inc.

LCS % Recovery

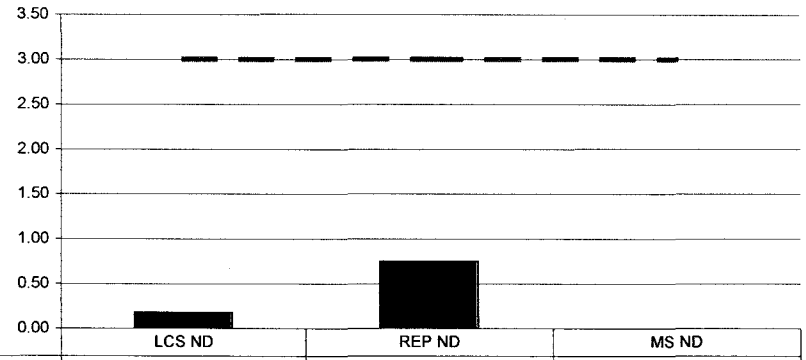


	RA-226
Lower Error	73.25
Upper Error	131.36
%R	102.31
LCL	80
Mean	100
UCL	120

Replicate Sample RPD

	RA-226
Lower Error	29.49
Upper Error	18.80
RPD	24.14
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-226	0.18	0.75	0.00
UCL	3	3	3

No Matrix Spike

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04049	Ra228	1	pCi	l	Engineering Management Support, Inc.

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)
RA-228	0.59	92.79%	25.74%	100.00%	5.10%	9.09E+00	4.64E-01	8.43E+00	2.17E+00	Ra-11	3.91E+01	5.10E+00	5.16E-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

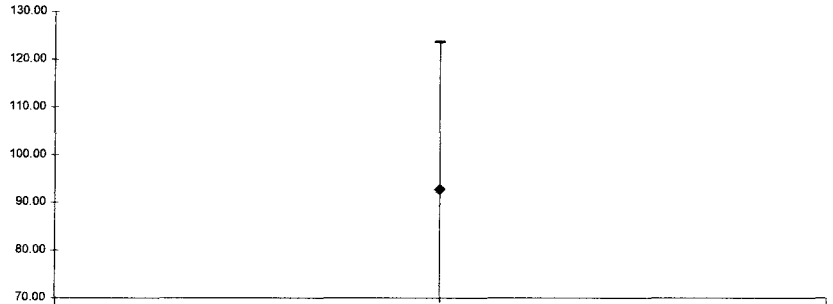
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-228	0.03	0.83	1.20E+00	5.34E-01	1.21E+00	5.52E-01

QC Summary

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

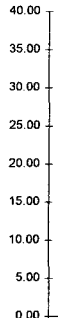
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04049	Ra228	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



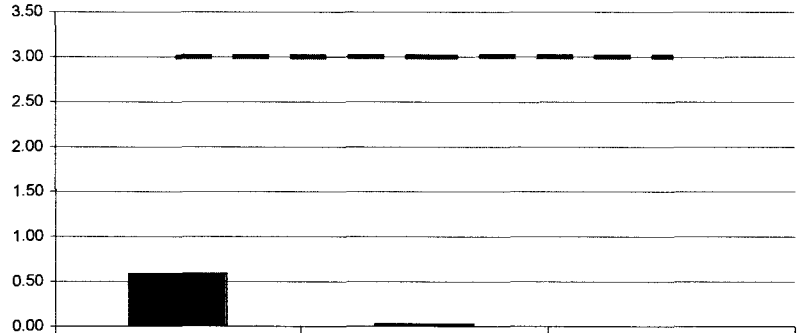
	RA-228
Lower Error	61.95
Upper Error	123.63
%R	92.79
LCL	80
Mean	100
UCL	120

Replicate Sample RPD



	RA-228
Lower Error	1.01
Upper Error	0.64
RPD	0.83
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-228	0.59	0.03	0.00
UCL	3	3	3

No Matrix Spike

Version

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	13-04049
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:30	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PRESERVED SAMPLES WITH HNO3 AND PUT ON HOT PLATES AND DRIED SAMPLES DOWN- SUBMITTED SAMPLES TO SEPARATIONS

4/11/13

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	13-04049
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:30	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PRESERVED SAMPLES WITH HNO3 AND PUT ON HOT PLATES AND DRIED SAMPLES DOWN- SUBMITTED SAMPLES TO SEPARATIONS
2	04/15/13 18:16	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 D Melas
4/15/13

EBERLINE SERVICES

Work Order Analysis Notes

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Oak Ridge, TN 37830
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Internal Work Order	13-04049
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:30	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PRESERVED SAMPLES WITH HNO3 AND PUT ON HOT PLATES AND DRIED SAMPLES DOWN- SUBMITTED SAMPLES TO SEPARATIONS
2	04/15/13 18:16	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	04/16/13 05:35	CHEM	RMARTZ	ADDED 0.1 ML NEODYMIUM CARRIER, 0.3 ML TITANOUS CHLORIDE, & 1 ML HF TO C-TUBES; LET SET SIT IN ICE BATH FOR ONE HOUR. SET UP FILTERS BY ADDING ALCOHOL & CARBON SUBSTRATE THEN ADDED SAMPLES; WHEN SAMPLES WERE THROUGH FILTERS, ADDED 10 ML DI H2O RINSES FROM C-TUBES, REMOVED FILTERS, LET DRY IN DESSICATOR, THEN SENT SET TO COUNT ROOM.

RA 4/16/13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04049	
Analysis Code	Run
UUISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/11/2013
013666P	Anion Exchange Resin	Reagent Grade	JDEMELAS	4/15/2013
013735S	HCl - NH4I	8N - 0.1M	JDEMELAS	4/15/2013
013573D01	Hydrochloric Acid	0.5N	JDEMELAS	4/15/2013
013712S	Hydrochloric Acid	6.5N	JDEMELAS	4/15/2013
013732S	Hydrochloric Acid	8N	JDEMELAS	4/15/2013
013675P	Hydrochloric Acid	Reagent Grade	JDEMELAS	4/15/2013
013729S	HCl - HF	6.5N - 0.04N	JDEMELAS	4/15/2013
013246S	Carbon substrate	Solution	RMARTZ	4/16/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	4/16/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	4/16/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	4/16/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	4/16/2013

Date	Sample #	Client	Time	Time	Analysis	Tech
4/11/13	Daily Pulser	LAB	0931	10 min	Nat	—
4/11/13	1704070A(4)	UCOR	1005	2hr	Am241	c
4/11/13	1704070A(1-4)	UCOR	1006	2hr	Am241	c
4/11/13	1304017A (1-4)	UCOR	1701	2hr 50 min	Th	KB
4/11/13	1304017A (4)	UCOR	1701	2hr 50 min	THNT	KB
4/11/13	1304017A (1)	UCOR	1702	2hr 50 min	U	KB
4/11/13	Daily Pulser	LAB	0931	10 min	Nat	—
4/11/13	SECCAL	LAB	0814	2hr	Nat	—
4/12/13	1704095A(1-7)	Westinghouse	1050	2hr	U238	c
4/12/13	1704072A(1,2)	Westinghouse	1050	2hr	Th230	c
4/12/13	1304031A (1-4,7)	UCOR	1355	2 HR 50 MIN	ISO-U	AG
4/12/13	1304031ANT (4)	UCOR	1355	2 HR 50 min	ISO-U (NT)	AG
4/12/13	WEEKLY BKGD	LAB	1657	16 HR 40 MIN	α	AG
4/13/13	DAILY PULSER	LAB	1004	10 MIN	NA	AG
4/13/13	1303120A (1-6)	TN DEPT HEALTH	1055	16 HR 40 min	ISO-U	AG
4/14/13	Daily Pulser	Lab	0709	10 min	NA	AG
4/14/13	1304033A (1-4)	UCOR	0734	2 HR 50 min	Am-243	AG
4/14/13	1304030A (1-2)	UCOR	0734	2 hr 50 min	ISO-U	AG
4/15/13	Daily Pulser	LAB	0932	10	Nat	c
4/15/13	1704072A(1-4)	United	0935	2hr	Am241	c
4/15/13	1704043A(1,2)	United	0935	2hr	Am241	c
4/15/13	1304030A(4)	UCOR	1249	2hr 50 min	PUNT	KB
4/15/13	1304032A (1-4,6)	United	1249	2hr 50 min	PU	KB
4/15/13	1304033A (1-4)	UCOR	1604	2hr 50 mins	Th	KB
4/15/13	1304043A (1-2)	United	1614	2hr 50 mins.	Th	KB
4/16/13	Daily Pulser	LAB	0931	10	Nat	—
4/16/13	1704043A(1-4)	United	0859	2hr	U238	c
4/16/13	1704043A(1,2)	United	0859	2hr	Pu239	c
4/16/13	1304049A(16-9)	Eng. Mang	1158	2hr	U238	c
4/16/13	1704049A(1,2)	Eng. Mang	1159	2hr	Th230	c
4/16/13	1304049A(1-6)	Eng. Manag. SU	1612	2hr 50 mins	Rad	KB
4/17/13	Daily Pulser	LAB	0859	10	Nat	—
4/17/13	1704049A(1-4)	Eng. Mang	0644	2hr	U238	c

Date	Samplett	Client	Start Time	Count Time	Analysis	Tech
4/10/17	Daily Pulser	Lab	0872	10 min	N/A	C
4/10/17	1704016A(7)	UCOR	0955	2 hr	U-Z50	C
4/10/17	1707100A(1-5)	Weston Sol	0956	2 hr	U-Z50	C
4/10/17	1707102A(7-8)	Weston Sol.	1254	2 hr	U-Z50	C
4/11/17	Daily Pulser	Lab	0826	10 min	N/A	—
4/11/17	1704017A(1-4)(?)	UCOR	1028	2 hr	Pu-Z50	C
4/11/17	1704017A(1-4)	UCOR	1028	2 hr	Pu-AT	C
4/11/13	1304017A(2-4)	UCOR	1727	2hr50min	UU	KB
4/11/13	1304030A(1-3)	UCOR	1727	2hr50min	Np	KB
4/12/17	Daily Pulser	Lab	0826	10 min	N/A	—
4/12/17	SECCAL	Lab	1048	2hr 7 min	N/A	—
4/12/17	1704079A(1-5)	Wastren	1224	2 hr	U-Z50	—
4/12/17	1704077A(2-4)	UCOR	1224	2 hr	Am-Z41	C
4/12/13	WEEKLY BKGD	LAB	1657	16Hr40min	α	AG
4/13/13	DAILY PULSER	LAB	1004	10 min	NA	AG
4/13/13	1303120A(7-12)	TN DEPT HEALTH	1055	16Hr40min	iso-U	AG
4/14/13	Daily Pulser	Lab	0709	10 min	NA	AG
4/14/13	1304030A(3,4)	UCOR	0734	2hr50min	iso-U	AG
4/14/13	1304031A(1-4)	UCOR	0734	2hr 50min	iso-U	AG
4/15/17	Daily Pulser	Lab	0822	10 min	N/A	—
4/15/17	1704047A(3,4)	Unitech	0925	2 hr	Am-Z41	C
4/15/17	1304005A(1-4)	Mirion	0926	2 hr	U-Z50	—
4/15/13	1304033A(1-4)	UCOR	1252	2hr50min	UU	KB
4/15/13	1304033A (4)	UCOR	1252	2hr50min	UUNT	KB
4/15/13	1304033A (4)	UCOR	1253	2hr50min	ThNT	KB
4/15/13	1304043A(3-4)	Unitech	1615	2hr50mins	Th	KB
4/15/13	1304032A(1-4)	Unitech	1615	2hr50min	Th	KB
4/16/13	Daily Pulser	Lab	0525	10 min	N/A	—
4/16/17	1704047A(7-14)	Unitech	0900	2 hr	Pu-Z50	C
4/16/17	1304049A(1-4)	Engineer	0901	2 hr	U-Z50	C

Alpha #3

Date	Sample#	Client	Sample Time	CT Time	Analysis	Tech
4/16/10	170404SAC(5-15)	[illegible]	0801	[illegible]	[illegible]	[illegible]

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	13-04049
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:30	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PRESERVED SAMPLES WITH HNO3 AND PUT ON HOT PLATES AND DRIED SAMPLES DOWN- SUBMITTED SAMPLES TO SEPARATIONS

4/11/13

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
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Internal Work Order	13-04049
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:30	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PRESERVED SAMPLES WITH HNO3 AND PUT ON HOT PLATES AND DRIED SAMPLES DOWN- SUBMITTED SAMPLES TO SEPARATIONS
2	04/15/13 18:16	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.

4/15/13

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	13-04049
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:30	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PRESERVED SAMPLES WITH HNO3 AND PUT ON HOT PLATES AND DRIED SAMPLES DOWN- SUBMITTED SAMPLES TO SEPARATIONS
2	04/15/13 18:16	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	04/16/13 05:36	CHEM	RMARTZ	ADDED 0.75 ML 0.1MG/ML CERIUM CARRIER & 1 ML HF TO C-TUBES & LET SET SIT IN ICE BATH FOR ONE HOUR; SET UP FILTERS BY ADDING ALCOHOL & CARBON SUBSTRATE THEN ADDED SAMPLES; WHEN SAMPLES WERE THROUGH FILTERS, ADDED 10 ML DI H2O RINSES FROM C-TUBES, REMOVED FILTERS, LET DRY IN DESSICATOR, THEN SENT SET TO COUNT ROOM.

4/16/13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04049	
Analysis Code	Run
ThISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/11/2013
013666P	Anion Exchange Resin	Reagent Grade	JDEMELAS	4/15/2013
013675P	Hydrochloric Acid	Reagent Grade	JDEMELAS	4/15/2013
013724S	Nitric Acid	8N	JDEMELAS	4/15/2013
013733S	Nitric Acid	8N	JDEMELAS	4/15/2013
013732S	Hydrochloric Acid	8N	JDEMELAS	4/15/2013
013246S	Carbon substrate	Solution	RMARTZ	4/16/2013
013017S	Cerrium Carrier	0.1mg/ml	RMARTZ	4/16/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	4/16/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	4/16/2013

Date	Sample #	Client	Time	QTOF	Analysis	Tech
4/11/13	Daily Pulser	LAB	0921	10 min	NA	—
4/11/13	1704070A(4)	UCOR	1007	2 hr	Am241	c
4/11/13	1704070A(1-4)	UCOR	1006	2 hr	Am241	c
4/11/13	1304017A (1-4)	UCOR	1701	2hr 50 min	Th	KB
4/11/13	1304017A (4)	UCOR	1701	2hr 50 min	THNT	KB
4/11/13	1304017A (1)	UCOR	1702	2hr 50 min	U	KB
4/12/13	Daily Pulser	LAB	0921	10 min	NA	—
4/12/13	SECCAL	LAB	0814	2 hr	NA	—
4/12/13	1707095A(1-7,11)	Westinghouse	1020	2 hr	U238	c
4/12/13	1704072A(1,2)	Westinghouse	1020	2 hr	Th230	c
4/12/13	1304031A (1-4,7)	UCOR	1355	2 HR 50 MIN	ISO-U	AG
4/12/13	1304031ANT (4)	UCOR	1355	2 HR 50 min	ISO-U (NT)	AG
4/12/13	WEEKLY BKGD	LAB	1657	16 HR 40 MIN	α	AG
4/13/13	DAILY PULSER	LAB	1004	10 MIN	NA	AG
4/13/13	1303120A (1-6)	TN DEPT HEALTH	1055	16 HR 40 min	ISO-U	AG
4/14/13	Daily Pulser	Lab	0709	10 MIN	NA	AG
4/14/13	1304033A (1-4)	UCOR	0734	2 HR 50 min	Am-243	AG
4/14/13	1304030A (1-2)	UCOR	0734	2 HR 50 min	ISO-U	AG
4/15/13	Daily Pulser	LAB	0722	10 min	NA	c
4/15/13	1704072A(1-4)	Uniteck	0937	2 hr	Am241	c
4/15/13	1704047A(1,2)	Uniteck	0937	2 hr	Am241	c
4/15/13	1304030A (4)	UCOR	1249	2hr 50 min	PUNT	KB
4/15/13	1304032A (1-4,6)	Uniteck	1249	2hr 50 min	PU	KB
4/15/13	1304033A (1-4)	UCOR	1604	2hr 50 mins	Th	KB
4/15/13	1304043A (1-2)	Uniteck	1614	2hr 50 mins.	Th	KB
4/16/13	Daily Pulser	LAB	0721	10 min	NA	—
4/16/13	1704043A(1-4)	Uniteck	0859	2 hr	U238	c
4/16/13	1704047A(1,2)	Uniteck	0859	2 hr	Pu239	c
4/16/13	1304049A(16-9)	Eng. Man	1158	2 hr	U238	c
4/16/13	1704049A(1,2)	Eng. Man	1159	2 hr	Th230	c

Alpha #2

Date	Sample #	Client	Load Time	Count Time	Analysis	Tech
4/10/17	Daily Pulser	LAB	0872	10 min	NA	C
4/10/17	1704016A(7)	U COR	0955	2 hr 50	U Iso	C
4/10/17	1707100A(1-5)	Weston Sol.	0956	2 hr	U Iso	C
4/10/17	1707102A(3-8)	Weston Sol.	1254	2 hr	U Iso	C
4/11/17	Daily Pulser	LAB	0876	10 min	NA	—
4/11/17	1704017A(1-4,8)	U COR	1028	2 hr	Pu Iso	C
4/11/17	1704017A(4)	U COR	1028	2 hr	Pu AT	C
4/11/13	1304017A(2-4)	UCOR	1727	2hr50 min	UU	KB
4/11/13	1304030A(1-3)	UCOR	1727	2hr50 min	Np	KB
4/12/17	Daily Pulser	LAB	0876	10 min	NA	—
4/12/17	SECCAL	LAB	1048	2 hr	NA	—
4/12/17	1704078A(3-5)	Westinghouse	1224	2 hr	U Iso	—
4/12/17	1704077A(2-4)	U COR	1224	2 hr	Am241	C
4/12/13	WEEKLY BKGD	LAB	1657	16Hr 40min	α	AG
4/13/13	DAILY PULSER	LAB	1004	10 min	NA	AG
4/13/13	1303120A(7-12)	TN DEPT HEALTH	1055	16 hr 40 min	iso-U	AG
4/14/13	Daily Pulser	Lab	0709	10 min	NA	AG
4/14/13	1304030A(3,4)	UCOR	0734	2 hr 50 m	iso-U	AG
4/14/13	1304031A(1-4)	UCOR	0734	2 hr 50 m	iso-U	AG
4/15/17	Daily Pulser	LAB	0872	10 min	NA	—
4/15/17	1704047A(3,4)	United	0975	2 hr	Am241	C
4/15/17	1304005A(1-4)	Mirion	0976	2 hr	U Iso	C
4/15/13	1304033A(1-4)	UCOR	1252	2hr50 min	UU	KB
4/15/13	1304033A (4)	UCOR	1252	2hr50 min	UUNT	KB
4/15/13	1304033A (4)	UCOR	1253	2hr50 min	ThNT	KB
4/15/13	1304043A(3-4)	Unitech	1615	2hr50mins	Th	KB
4/15/13	1304032A(1-4)	Unitech	1615	2hr50 min	Th	KB
4/16/13	Daily Pulser	LAB	0875	10 min	NA	—
4/16/17	1704047A(7,14)	Unitech	0900	2 hr	Pu Iso	C
4/16/17	1304049A(1-4)	Engman	0901	2 hr	U Iso	C
4/16/17	1704049A(28)	Eng. man	1159	2 hr	Th Iso	C

Alpha #3

Date	Sample #	Client	Load Time	CT Time	Analysis	Tech
4/16/10	170404SA(5-15)	Eng. man.	0801	[illegible]	[illegible]	[illegible]
4/16/10	170404SA(9-19)	Eng. man	1100	[illegible]	[illegible]	[illegible]

RA-226 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	13-04049
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:25	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

JB 4/11/13

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	13-04049
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:25	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	04/12/13 15:36	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	04/13/13 17:41 15 hour 4.15.13	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.8 IN AP-006 REV 12 FOR RA 226 ANALYSIS (SYRINGE FILTERED SAMPLES-PRECIP-FILTERED-DRIED-OBTAIN FINAL WEIGHT) SUBMIT TO COUNT ROOM.

L. Walker
4/15/13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04049	
Analysis Code	Run
Ra226	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/11/2013
013377D03	Ammonium Sulfate	200 mg/ml	JBARNARD	4/11/2013
012766D13	Barium Carrier	1 mg/ml	JBARNARD	4/11/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/11/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/11/2013
013689S	EDTA	0.25M	LWALKER	4/12/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	4/13/2013
013377D01	Ammonium Sulfate	200 mg/ml	LWALKER	4/13/2013

Alpha # 1

Date	Sample #	Client	Load Time	CT Time	Analysis	Tech
4/11/17	Daily Pulser	LAB	0721	10 min	NA	—
4/11/17	1704070A(4)	UCOR	1005	2 hr	Am-241	c
4/11/17	1704070A(1-4)	UCOR	1006	2 hr	Am-241	c
4/11/13	1304017A (1-4)	UCOR	1701	2hr 50 mins	Th	KB
4/11/13	1304017A (4)	UCOR	1701	2hr 50 mins	TUNT	KB
4/11/13	1304017A (1)	UCOR	1702	2hr 50 min	UU	KB
4/12/17	Daily Pulser	LAB	0726	10 min	NA	—
4/12/17	SECCAL	LAB	0814	2 hr	NA	—
4/12/17	1704095A(1-7,15)	[illegible]	1050	2 hr	U/U-230	c
4/12/17	1704078A(1,2)	[illegible]	1050	2 hr	Th-230	c
4/12/13	1304031A (1-4,7)	UCOR	1355	2 HR 50 MIN	iso-U	AG
4/12/13	1304031ANT (4)	UCOR	1355	2 HR 50 m	iso-U (NT)	AG
4/12/13	WEEKLY BKGD	LAB	1657	16 HR 40 MIN	α	AG
4/13/13	DAILY PULSER	LAB	1004	10 min	NA	AG
4/13/13	1303120A (1-6)	TN DEPT HEALTH	1055	16 HR 40 min	iso-U	AG
4/14/13	DAily Pulsar	Lab	0709	10 min	NA	AG
4/14/13	1304033A (1-4)	UCOR	0734	2 HR 50 min	Am-243	AG
4/14/13	1304030A (1-2)	UCOR	0734	2 hr 50 m	iso-U	AG
4/15/17	Daily Pulser	LAB	0522	10 min	NA	c
4/15/17	1704072A(1-4)	Unitech	0525	2 hr	Am-241	c
4/15/17	1704047A(1,2)	Unitech	0525	2 hr	Am-241	c
4/15/13	1304030A (4)	UCOR	1249	2hr 50 min	PUNT	KB
4/15/13	1304032A (1-4,6)	Unitech	1249	2hr 50 min	PY	KB
4/15/13	1304033A (1-4)	UCOR	1604	2hr 50 mins	Th	KB
4/15/13	1304043A (1-2)	Unitech	1614	2hr 50 mins.	Th	KB
4/16/17	Daily Pulser	LAB	0575	10 min	NA	—
4/16/17	1704043A(1-4)	Unitech	0859	2 hr	U/U-230	c
4/16/17	1704047A(1,2)	Unitech	0859	2 hr	Pu-239	c
4/16/17	1304049A(1-6)	Eng. Man	1158	2 hr	U/U-230	c
4/16/17	1704049A(4,7)	Eng. Man	1159	2 hr	Th-230	c
4/16/13	1304049A (1-6)	Eng. Manag. Su	1612	2hr 50 mins	Rad	KB

Date	Sample #	Client	Time In	TAT	Analysis	Tech
4/10/17	Daily Pulser	LAB	0822	10m	Alpha	C
4/10/17	1704016A(1-7)	UCOR	0955	24hr	Gr/Sr	C
4/10/17	1707100A(1-5)	Westinghouse	0956	24hr	Gr/Sr	C
4/10/17	1707102A(1-8)	Westinghouse	1254	24hr	Gr/Sr	C
4/11/17	Daily Pulser	LAB	0822	10m	Alpha	C
4/11/17	1704017A(1-4)(8)	UCOR	1028	24hr	Pu/Sr	C
4/11/17	1704017A(1-4)	UCOR	1028	24hr	Pu/Am	C
4/11/13	1304017A(2-4)	UCOR	1724	2hr50m	U	KB
4/11/13	1304030A(1-3)	UCOR	1727	2hr50m	Np	KB
4/12/17	Daily Pulser	LAB	0822	10m	Alpha	C
4/12/17	SEC CAL	LAB	1048	2hr30m	Alpha	C
4/12/17	1704071A(1-5)	Westinghouse	1724	24hr	Gr/Sr	C
4/12/17	1704073A(2-4)	UCOR	1224	24hr	Am/Cm	C
4/12/13	WEEKLY BKG	LAB	1657	16Hr40m	α	AG
4/13/13	DAILY PULSER	LAB	1004	10MIN	NA	AG
4/13/13	1303120A(7-12)	TN DEPT HEALTH	1055	16Hr40m	iso-U	AG
4/14/17	Daily Pulser	LAB	0758	10min	Alpha	C
4/14/13	1304030A(3,4)	UCOR	0734	2m50m	iso-U	AG
4/14/13	1304031A(1-4)	UCOR	0734	2Hr50m	iso-U	AG
4/15/17	Daily Pulser	LAB	0822	10m	Alpha	C
4/15/17	1704047A(3,4)	United	0935	24hr	Am/Cm	C
4/15/17	1304008A(1-4)	Nuvion	0936	24hr	Gr/Sr	C
4/15/13	1304033A(1-4)	UCOR	1252	2hr50m	U	KB
4/15/13	1304033A(4)	UCOR	1252	2hr50m	UNT	KB
4/15/13	1304033A(4)	UCOR	1253	2hr50m	ThNT	KB
4/15/13	1304043A(3-4)	United	1615	2hr50mins	Th	KB
4/15/13	1304032A(1-4)	United	1615	2hr50m	Th	KB
4/16/17	Daily Pulser	LAB	0822	10m	Alpha	C
4/16/17	1704047A(7-14)	United	0900	24hr	Pu/Sr	C
4/16/17	1304049A(1-4)	Eng.man	0901	24hr	Gr/Sr	C
4/16/17	1704049A(2-8)	Eng.man	1159	24hr	Th Iso	C
4/16/13	1304049A(7-12)	Eng.Manag. Su	1612	2hr50mins	Ra	KB

Alpha #3

Date	Sample #	Client	Start Time	CT Time	Analysis	Tech.
4/16/13	1304049A(5-15)	Eng. man	0901	2hr	[illegible]	[illegible]
4/16/13	1304049A(9-19)	Eng. man	1200	2hr	7hr	[illegible]
4/16/13	1304049A(13-19)	Eng. Manag. Su	1613	2hr30	Rad	KCB

RA-228 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	13-04049
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:25	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

4/11/13

EBERLINE SERVICES

Work Order Analysis Notes

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Internal Work Order	13-04049
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:25	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	~~04/17/13 11:39~~	~~PREP~~	~~LWALKER~~	~~FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)~~ OMIT LOW 4.22.13
3	04/22/13 18:18	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)

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	13-04049
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	04/11/13 11:25	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS TO ALL- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	~~04/17/13 11:39~~	~~PREP~~	~~LWALKER~~	~~FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)~~
3	04/22/13 18:18	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)
4	04/25/13 08:00	CHEM	TSMITH	Followed steps 12.7 to 12.15 in AP-007 rev. 17 . (Precipitated samples, hot bathed, centrifuged, and discarded supernate. Dissolved precip, precipitated samples, hot bathed, centrifuged, and discarded supernate. Dissolved precip, precipitated and filtered samples, obtained final weights, covered with aluminum foil, and took to count room)

4-25-13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04049	
Analysis Code	Run
Ra228	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/11/2013
013377D03	Ammonium Sulfate	200 mg/ml	JBARNARD	4/11/2013
012766D13	Barium Carrier	1 mg/ml	JBARNARD	4/11/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/11/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/11/2013
011504D20	Ammonium Sulfide	2%	LWALKER	4/22/2013
013624P	Nitric Acid	Reagent Grade	LWALKER	4/22/2013
013322D01	Sodium Hydroxide	10M	LWALKER	4/22/2013
013587S	Yttrium Carrier	9 mg/ml	LWALKER	4/22/2013
012729D08	Lead Carrier	1.5 mg/ml	LWALKER	4/22/2013
012717D03	Ammonium Oxalate	5%	TSMITH	4/25/2013
013624D03	Nitric Acid	1N	TSMITH	4/25/2013
013290D18	Nitric Acid	6N	TSMITH	4/25/2013
013322D01	Sodium Hydroxide	10M	TSMITH	4/25/2013
013322D03	Sodium Hydroxide	18M	TSMITH	4/25/2013

Date	Sample#	Client	Location	CT Time	Analysis	Tech
4/22/13	1303107ABC(2-5)	SCDHEC	1058	2h	A/B	C
4/22/13	1303106ABC(2-9)	SCDHEC	1255	2h	A/B	C
4/22/13	1303106ABC(10-17)	SCDHEC	1709	2h	A/B	C
4/22/13	1303106ABA(18-20)	SC DHEC	1504	2 hrs	αβ	KB
4/23/13	EFFOC	LAB	0518	70min	A/B	C
4/23/13	BKGDCC	LAB	0551	60m	A/B	C
4/23/13	1304114ABC(1-4)	ULOR	0754	2h	A/B	C
4/23/13	1304117RA(1-4)	ULOR	0922	2h	RA8	C
4/23/13	1304084RA(1-3)	MPA	0922	2h	RA8	C
4/23/13	1304117Pb(1-4)	ULOR	0947	2h	Pb-210	C
4/23/13	1304084RA(4-6)	MPA	1135	2 hrs	Ra8	KB
4/23/13	1304134Pb(1-4)	ULOR	1137	2hrs	Pb210	KB
4/24/13	EFFOC	LAB	0516	70m	A/B	C
4/24/13	BKGDCC	LAB	0857	60m	A/B	C
4/24/13	1304036ABC(1-3, 5,6)	TEC	0744	70min	A/B	C
4/24/13	1304076ABC(4)	TEC	0871	70min	A/B	C
4/24/13	1304087ABC(1-3)	Microtec	0744	70min	A/B	C
4/24/13	1304087ABC(4)	Microtec	0871	70m	A/B	C
4/24/13	1304071SR(2-4, 6)	ULOR	0828	2h	SR90/89	C
4/24/13	1304071SR(1)	ULOR	090[illegible]	70m	SR90/89	C
4/24/13	1304018ABC(1-4)	Unitech	0840	2h	A/B	C
4/24/13	1304174RA(1-4)	ULOR	0940	2h	RA8	C
4/24/13	1304112RA(1-4)	ULOR	1077	2h	RA8	C
~~4/24/13~~	~~1304113RA(2-4)~~	~~ULOR~~	KB 4/24/13	~~2hrs~~	~~Ra8~~	~~KB~~
4/24/13	1304113RA(2-4)	ULOR	1143	4hrs	Ra8	KB
4/24/13	1304113Pb(2-4)	ULOR	1145	4hrs	Pb210	KB
4/25/13	EFFOC	LAB	0512	70m	A/B	C
4/25/13	BKGDCC	LAB	0548	60m	A/B	C
4/25/13	1304079ABC(1-4)	TEC	0741	2h	A/B	C
4/25/13	1304072SR(1-4)	Unitech	0807	2h	SR202	C
4/25/13	1304042SR(1-2)	Unitech	0811	2h	SR202	C
4/25/13	1304154ABC(1-4)	Materion	0945	2h	A/B	C
4/25/13	1304049RA(1-9)	Eng. Man	1024	2h	RA8	C
	1304049RA1(10-19)	Eng. Manag. Su	1227	2hrs	Ra8	KB

LB4110 Aqua

Date	Sample#	Client	Load Time	CT Time	Analyst	Tech
4/22/13	1303107AB(1,6-8)	SC DHEC	1206	2hrs	αβ	KB
4/22/13	1303106ABL(8,9)	SC DHEC	1300	2h	LB	C
4/22/13	1303106AB(14-17)	SC DHEC	1409	2hrs	αβ	KB
4/23/13	Bkg Dec	LAB	0518	60min	LB	C
4/23/13	Eff Dec	LAB	0621	70min	LB	C
4/23/13	1304124SR(1-4,6)	U Con	0827	2h	SR707	C
4/23/13	1304124NP(1-4)	U Con	1028	10min	NP274	C
4/23/13	1304108NP(1-4)	Unitech	1045	10min	NP274	C
4/23/13	1304145AB(1-4)	Hudson Reach	1104	30mins	αβ	KB
4/23/13	1304079RA(1-4)	TEC	1141	2hrs	Ra8	KB
4/24/13	Bkg Dec	LAB	0516	60min	LB	C
4/24/13	Eff Dec	LAB	0621	70min	LB	C
4/24/13	1304072SR(1-4,6)	U Con	0755	2h	SR Scan	C
4/24/13	1304124RA(1)	U Con	1002	70min	RA8	C
4/24/13	1304080RA(1-4)	ST&ND	[illegible]	2h	RA8	C
4/24/13	1304112RA(1)	U Con	1076	70min	RA8	C
4/24/13	1304113Pb(1)	UCOR	1136	30mins	Pb^{210}	KB
4/24/13	1304121Pb(1-4)	UCOR	1211	2hrs	Pb^{210}	KB
4/24/13	1304135CL(1-3,5)	UCOR	1503	30mins	CL36	KB
4/25/13	Bkg Dec	LAB	0512	60min	LB	C
4/25/13	Eff Dec	LAB	0618	70min	LB	C
4/25/13	1304047SR(7-11)	Unitech	0812	2h	SR707	C
4/25/13	1304047SR(1-3)	Unitech	0816	2h	SR707	C
4/25/13	1304047SR(4)	Unitech	1026	2h	SR707	C
4/25/13	1304049RA(7,8,9)	Engineer	1026	2h	RA8	C

SECTION VIII

ANALYTICAL DATA (ISOTOPIC URANIUM)

Work Order	13-04049
Analysis Code	UUISO
Run	1
Date Received	4/9/2013
Lab Deadline	4/30/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	NAS NS-3050 Mod
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	U-232
Radiometric Sol#	U-10a
Tracer Act (dpm/g)	19.1
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/09/13 00:00	1.0000E+00
02	MBL	BLANK		04/09/13 00:00	1.0000E+00
03	DUP	PZ-302-AI TOT	39	04/03/13 11:45	1.0000E+00
04	DO	PZ-302-AI TOT	39	04/03/13 11:45	1.0000E+00
05	TRG	PZ-302-AI DIS	39	04/03/13 11:45	1.0000E+00
06	TRG	LR-100 TOT	42	04/03/13 13:27	1.0000E+00
07	TRG	LR-100 DIS	42	04/03/13 13:27	1.0000E+00
08	TRG	D-81 TOT	41	04/03/13 13:40	1.0000E+00
09	TRG	D-81 DIS	41	04/03/13 13:40	1.0000E+00
10	TRG	LR-105 TOT	40	04/03/13 14:24	1.0000E+00
11	TRG	LR-105 DIS	40	04/03/13 14:24	1.0000E+00
12	TRG	PZ-207-AS TOT	45	04/03/13 15:05	1.0000E+00
13	TRG	PZ-207-AS DIS	45	04/03/13 15:05	1.0000E+00
14	TRG	LR-103 TOT	45	04/03/13 15:30	1.0000E+00
15	TRG	LR-103 DIS	45	04/03/13 15:30	1.0000E+00
16	TRG	PZ-110-SS TOT	38	04/04/13 10:27	1.0000E+00
17	TRG	PZ-110-SS DIS	38	04/04/13 10:27	1.0000E+00
18	TRG	I-62 TOT	46	04/04/13 10:42	1.0000E+00
19	TRG	I-62 DIS	46	04/04/13 10:42	1.0000E+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.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.6102	11.7		0.00								
02	MBL	0.6056	11.6		0.00								
03	DUP	0.6032	11.5		0.00								
04	DO	0.5995	11.5		0.00								
05	TRG	0.5969	11.4		0.00								
06	TRG	0.5979	11.4		0.00								
07	TRG	0.5990	11.4		0.00								
08	TRG	0.5979	11.4		0.00								
09	TRG	0.5978	11.4		0.00								
10	TRG	0.5986	11.4		0.00								
11	TRG	0.5994	11.4		0.00								
12	TRG	0.5948	11.4		0.00								
13	TRG	0.5957	11.4		0.00								
14	TRG	0.5971	11.4		0.00								
15	TRG	0.5968	11.4		0.00								
16	TRG	0.6021	11.5		0.00								
17	TRG	0.5995	11.5		0.00								
18	TRG	0.5964	11.4		0.00								
19	TRG	0.5974	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.

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			04/11/13 11:21	JBARNARD				
02	MBL			04/11/13 11:21	JBARNARD				
03	DUP			04/11/13 11:21	JBARNARD				
04	DO			04/11/13 11:21	JBARNARD				
05	TRG			04/11/13 11:21	JBARNARD				
06	TRG			04/11/13 11:21	JBARNARD				
07	TRG			04/11/13 11:21	JBARNARD				
08	TRG			04/11/13 11:21	JBARNARD				
09	TRG			04/11/13 11:21	JBARNARD				
10	TRG			04/11/13 11:21	JBARNARD				
11	TRG			04/11/13 11:21	JBARNARD				
12	TRG			04/11/13 11:21	JBARNARD				
13	TRG			04/11/13 11:21	JBARNARD				
14	TRG			04/11/13 11:21	JBARNARD				
15	TRG			04/11/13 11:21	JBARNARD				
16	TRG			04/11/13 11:21	JBARNARD				
17	TRG			04/11/13 11:21	JBARNARD				
18	TRG			04/11/13 11:21	JBARNARD				
19	TRG			04/11/13 11:21	JBARNARD				

* 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.

Work Order: 13-04049-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-04049
Client: Engineering Management Support, Inc.

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/l	8.24E+00	1.09E+00	6.73E-02	8.15E+00	101.03	OK		OK	
02	U-234	MBL	BLANK	pCi/l	5.54E-02	5.96E-02	8.70E-02					OK	OK
03	U-234	DUP	PZ-302-AI TOT	pCi/l	4.14E+00	5.99E-01	8.99E-02				NA	OK	
04	U-234	DO	PZ-302-AI TOT	pCi/l	4.18E+00	6.38E-01	5.32E-02					OK	
05	U-234	TRG	PZ-302-AI DIS	pCi/l	4.02E+00	6.41E-01	8.18E-02					OK	
06	U-234	TRG	LR-100 TOT	pCi/l	1.37E-01	1.43E-01	1.50E-01					OK	
07	U-234	TRG	LR-100 DIS	pCi/l	8.14E-02	7.00E-02	6.88E-02					OK	
08	U-234	TRG	D-81 TOT	pCi/l	1.57E+00	3.08E-01	5.42E-02					OK	
09	U-234	TRG	D-81 DIS	pCi/l	1.49E+00	3.14E-01	6.10E-02					OK	
10	U-234	TRG	LR-105 TOT	pCi/l	3.76E-02	2.44E-01	6.63E-01					OK	
11	U-234	TRG	LR-105 DIS	pCi/l	3.06E-01	2.29E-01	1.91E-01					OK	
12	U-234	TRG	PZ-207-AS TOT	pCi/l	1.76E-01	1.54E-01	1.76E-01					OK	
13	U-234	TRG	PZ-207-AS DIS	pCi/l	3.20E-01	2.42E-01	2.40E-01					OK	
14	U-234	TRG	LR-103 TOT	pCi/l	6.58E-02	8.53E-02	1.18E-01					OK	
15	U-234	TRG	LR-103 DIS	pCi/l	2.23E-01	1.41E-01	1.21E-01					OK	
16	U-234	TRG	PZ-110-SS TOT	pCi/l	1.27E-01	9.56E-02	8.88E-02					OK	
17	U-234	TRG	PZ-110-SS DIS	pCi/l	7.85E-02	8.46E-02	1.23E-01					OK	
18	U-234	TRG	I-62 TOT	pCi/l	2.17E-01	1.14E-01	1.03E-01					OK	
19	U-234	TRG	I-62 DIS	pCi/l	1.83E-01	9.55E-02	5.14E-02					OK	

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04049	Engineering Management Support, Inc.

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	04/09/13 00:00	1.00E+00	118.59	0.00	0.00			
02	U-234	MBL	04/09/13 00:00	1.00E+00	122.53	0.00	0.00			
03	U-234	DUP	04/03/13 11:45	1.00E+00	120.11	0.00	0.00			
04	U-234	DO	04/03/13 11:45	1.00E+00	105.53	0.00	0.00			
05	U-234	TRG	04/03/13 11:45	1.00E+00	106.64	0.00	0.00			
06	U-234	TRG	04/03/13 13:27	1.00E+00	39.87	0.00	0.00			
07	U-234	TRG	04/03/13 13:27	1.00E+00	101.11	0.00	0.00			
08	U-234	TRG	04/03/13 13:40	1.00E+00	131.34	0.00	0.00			
09	U-234	TRG	04/03/13 13:40	1.00E+00	109.58	0.00	0.00			
10	U-234	TRG	04/03/13 14:24	1.00E+00	11.42	0.00	0.00			
11	U-234	TRG	04/03/13 14:24	1.00E+00	35.97	0.00	0.00			
12	U-234	TRG	04/03/13 15:05	1.00E+00	47.65	0.00	0.00			
13	U-234	TRG	04/03/13 15:05	1.00E+00	37.15	0.00	0.00			
14	U-234	TRG	04/03/13 15:30	1.00E+00	58.90	0.00	0.00			
15	U-234	TRG	04/03/13 15:30	1.00E+00	78.02	0.00	0.00			
16	U-234	TRG	04/04/13 10:27	1.00E+00	89.84	0.00	0.00			
17	U-234	TRG	04/04/13 10:27	1.00E+00	86.49	0.00	0.00			
18	U-234	TRG	04/04/13 10:42	1.00E+00	104.58	0.00	0.00			
19	U-234	TRG	04/04/13 10:42	1.00E+00	109.30	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-04049-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04049	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	04/17/13 06:11		A_Spec	Alpha_003	170	6.42 E+02	3.00 E-03	17.5
02	U-234	MBL	04/17/13 06:11		A_Spec	Alpha_004	170	4.96 E+00	1.20 E-02	19.4
03	U-234	DUP	04/17/13 06:11		A_Spec	Alpha_010	170	3.69 E+02	1.30 E-02	19.7
04	U-234	DO	04/17/13 06:11		A_Spec	Alpha_011	170	3.28 E+02	1.00 E-03	19.7
05	U-234	TRG	04/16/13 09:01		A_Spec	Alpha_033	170	2.95 E+02	0.00 E+00	18.2
06	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_034	170	3.83 E+00	1.00 E-03	18.6
07	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_035	170	5.66 E+00	2.00 E-03	18.3
08	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_037	170	1.39 E+02	2.00 E-03	17.8
09	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_040	170	1.17 E+02	2.00 E-03	19
10	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_041	170	3.20 E-01	4.00 E-03	19.8
11	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_042	170	7.66 E+00	2.00 E-03	18.5
12	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_044	170	6.00 E+00	0.00 E+00	19
13	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_046	170	8.00 E+00	0.00 E+00	17.9
14	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_047	170	2.66 E+00	2.00 E-03	18.2
15	U-234	TRG	04/16/13 09:02		A_Spec	Alpha_048	170	1.10 E+01	0.00 E+00	16.8
16	U-234	TRG	04/16/13 11:58		A_Spec	Alpha_003	170	7.49 E+00	3.00 E-03	17.5
17	U-234	TRG	04/16/13 11:58		A_Spec	Alpha_004	170	4.96 E+00	1.20 E-02	19.4
18	U-234	TRG	04/16/13 11:58		A_Spec	Alpha_010	170	1.68 E+01	1.30 E-02	19.7
19	U-234	TRG	04/16/13 11:58		A_Spec	Alpha_011	170.02	1.48 E+01	1.00 E-03	19.7

Work Order: 13-04049-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-04049
Client: Engineering Management Support, Inc.

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/l	8.07E+00	1.07E+00	7.64E-02	7.95E+00	101.54	OK		OK	
02	U-238	MBL	BLANK	pCi/l	7.95E-02	6.27E-02	6.66E-02					OK	OK
03	U-238	DUP	PZ-302-AI TOT	pCi/l	3.02E+00	4.75E-01	6.70E-02				NA	OK	
04	U-238	DO	PZ-302-AI TOT	pCi/l	3.21E+00	5.26E-01	8.00E-02					OK	
05	U-238	TRG	PZ-302-AI DIS	pCi/l	2.69E+00	4.80E-01	8.15E-02					OK	
06	U-238	TRG	LR-100 TOT	pCi/l	5.93E-02	1.01E-01	1.71E-01					OK	
07	U-238	TRG	LR-100 DIS	pCi/l	1.69E-01	9.92E-02	5.98E-02					OK	
08	U-238	TRG	D-81 TOT	pCi/l	1.21E+00	2.60E-01	4.71E-02					OK	
09	U-238	TRG	D-81 DIS	pCi/l	1.27E+00	2.85E-01	7.16E-02					OK	
10	U-238	TRG	LR-105 TOT	pCi/l	-2.98E-01	2.89E-01	9.82E-01					OK	
11	U-238	TRG	LR-105 DIS	pCi/l	1.95E-02	8.14E-02	2.09E-01					OK	
12	U-238	TRG	PZ-207-AS TOT	pCi/l	6.77E-02	1.01E-01	1.65E-01					OK	
13	U-238	TRG	PZ-207-AS DIS	pCi/l	1.52E-01	1.59E-01	1.66E-01					OK	
14	U-238	TRG	LR-103 TOT	pCi/l	1.93E-01	1.40E-01	1.03E-01					OK	
15	U-238	TRG	LR-103 DIS	pCi/l	3.63E-01	1.79E-01	1.21E-01					OK	
16	U-238	TRG	PZ-110-SS TOT	pCi/l	1.37E-01	1.01E-01	1.01E-01					OK	
17	U-238	TRG	PZ-110-SS DIS	pCi/l	8.11E-02	7.71E-02	9.43E-02					OK	
18	U-238	TRG	I-62 TOT	pCi/l	2.20E-01	1.10E-01	7.69E-02					OK	
19	U-238	TRG	I-62 DIS	pCi/l	2.20E-01	1.08E-01	7.72E-02					OK	

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Preliminary Data Report & Analytical Calculations

Work Order: 13-04049-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-04049
Client: Engineering Management Support, Inc.

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	04/09/13 00:00	1.00E+00	118.59	0.00	0.00			
02	U-238	MBL	04/09/13 00:00	1.00E+00	122.53	0.00	0.00			
03	U-238	DUP	04/03/13 11:45	1.00E+00	120.11	0.00	0.00			
04	U-238	DO	04/03/13 11:45	1.00E+00	105.53	0.00	0.00			
05	U-238	TRG	04/03/13 11:45	1.00E+00	106.64	0.00	0.00			
06	U-238	TRG	04/03/13 13:27	1.00E+00	39.87	0.00	0.00			
07	U-238	TRG	04/03/13 13:27	1.00E+00	101.11	0.00	0.00			
08	U-238	TRG	04/03/13 13:40	1.00E+00	131.34	0.00	0.00			
09	U-238	TRG	04/03/13 13:40	1.00E+00	109.58	0.00	0.00			
10	U-238	TRG	04/03/13 14:24	1.00E+00	11.42	0.00	0.00			
11	U-238	TRG	04/03/13 14:24	1.00E+00	35.97	0.00	0.00			
12	U-238	TRG	04/03/13 15:05	1.00E+00	47.65	0.00	0.00			
13	U-238	TRG	04/03/13 15:05	1.00E+00	37.15	0.00	0.00			
14	U-238	TRG	04/03/13 15:30	1.00E+00	58.90	0.00	0.00			
15	U-238	TRG	04/03/13 15:30	1.00E+00	78.02	0.00	0.00			
16	U-238	TRG	04/04/13 10:27	1.00E+00	89.84	0.00	0.00			
17	U-238	TRG	04/04/13 10:27	1.00E+00	86.49	0.00	0.00			
18	U-238	TRG	04/04/13 10:42	1.00E+00	104.58	0.00	0.00			
19	U-238	TRG	04/04/13 10:42	1.00E+00	109.30	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-04049-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04049	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	04/17/13 06:11		A_Spec	Alpha_003	170	6.32 E+02	5.00 E-03	17.5
02	U-238	MBL	04/17/13 06:11		A_Spec	Alpha_004	170	7.15 E+00	5.00 E-03	19.4
03	U-238	DUP	04/17/13 06:11		A_Spec	Alpha_010	170	2.70 E+02	5.00 E-03	19.7
04	U-238	DO	04/17/13 06:11		A_Spec	Alpha_011	170	2.53 E+02	6.00 E-03	19.7
05	U-238	TRG	04/16/13 09:01		A_Spec	Alpha_033	170	1.98 E+02	0.00 E+00	18.2
06	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_034	170	1.66 E+00	2.00 E-03	18.6
07	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_035	170	1.18 E+01	1.00 E-03	18.3
08	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_037	170	1.07 E+02	1.00 E-03	17.8
09	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_040	170	1.00 E+02	4.00 E-03	19
10	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_041	170	-2.55 E+00	1.50 E-02	19.8
11	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_042	170	4.90 E-01	3.00 E-03	18.5
12	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_044	170	2.32 E+00	4.00 E-03	19
13	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_046	170	3.83 E+00	1.00 E-03	17.9
14	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_047	170	7.83 E+00	1.00 E-03	18.2
15	U-238	TRG	04/16/13 09:02		A_Spec	Alpha_048	170	1.80 E+01	0.00 E+00	16.8
16	U-238	TRG	04/16/13 11:58		A_Spec	Alpha_003	170	8.15 E+00	5.00 E-03	17.5
17	U-238	TRG	04/16/13 11:58		A_Spec	Alpha_004	170	5.15 E+00	5.00 E-03	19.4
18	U-238	TRG	04/16/13 11:58		A_Spec	Alpha_010	170	1.71 E+01	5.00 E-03	19.7
19	U-238	TRG	04/16/13 11:58		A_Spec	Alpha_011	170.02	1.80 E+01	6.00 E-03	19.7

Preliminary Data Report & Analytical Calculations

Work Order: 13-04049-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04049
Client	Engineering Management Support, Inc.

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/l	6.59E-01	2.13E-01	7.56E-02					OK	
02	U-235	MBL	BLANK	pCi/l	-2.62E-03	2.96E-02	9.08E-02					OK	OK
03	U-235	DUP	PZ-302-AI TOT	pCi/l	1.43E-01	9.18E-02	7.82E-02				NA	OK	
04	U-235	DO	PZ-302-AI TOT	pCi/l	3.46E-01	1.62E-01	9.43E-02					OK	
05	U-235	TRG	PZ-302-AI DIS	pCi/l	1.15E-01	8.84E-02	7.02E-02					OK	
06	U-235	TRG	LR-100 TOT	pCi/l	8.85E-02	1.51E-01	2.65E-01					OK	
07	U-235	TRG	LR-100 DIS	pCi/l	1.24E-01	9.94E-02	1.06E-01					OK	
08	U-235	TRG	D-81 TOT	pCi/l	1.37E-01	8.80E-02	5.84E-02					OK	
09	U-235	TRG	D-81 DIS	pCi/l	2.05E-01	1.17E-01	9.43E-02					OK	
10	U-235	TRG	LR-105 TOT	pCi/l	-9.86E-02	3.02E-01	8.18E-01					OK	
11	U-235	TRG	LR-105 DIS	pCi/l	4.09E-02	9.83E-02	2.06E-01					OK	
12	U-235	TRG	PZ-207-AS TOT	pCi/l	7.23E-02	1.23E-01	2.17E-01					OK	
13	U-235	TRG	PZ-207-AS DIS	pCi/l	1.97E-01	2.19E-01	2.95E-01					OK	
14	U-235	TRG	LR-103 TOT	pCi/l	2.01E-02	6.16E-02	1.46E-01					OK	
15	U-235	TRG	LR-103 DIS	pCi/l	4.57E-02	7.00E-02	1.04E-01					OK	
16	U-235	TRG	PZ-110-SS TOT	pCi/l	9.73E-02	9.28E-02	9.98E-02					OK	
17	U-235	TRG	PZ-110-SS DIS	pCi/l	3.53E-02	6.86E-02	1.29E-01					OK	
18	U-235	TRG	I-62 TOT	pCi/l	5.29E-02	6.36E-02	8.98E-02					OK	
19	U-235	TRG	I-62 DIS	pCi/l	9.11E-02	7.93E-02	9.11E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-04049-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04049	Engineering Management Support, Inc.

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	04/09/13 00:00	1.00E+00	118.59	0.00	0.00			
02	U-235	MBL	04/09/13 00:00	1.00E+00	122.53	0.00	0.00			
03	U-235	DUP	04/03/13 11:45	1.00E+00	120.11	0.00	0.00			
04	U-235	DO	04/03/13 11:45	1.00E+00	105.53	0.00	0.00			
05	U-235	TRG	04/03/13 11:45	1.00E+00	106.64	0.00	0.00			
06	U-235	TRG	04/03/13 13:27	1.00E+00	39.87	0.00	0.00			
07	U-235	TRG	04/03/13 13:27	1.00E+00	101.11	0.00	0.00			
08	U-235	TRG	04/03/13 13:40	1.00E+00	131.34	0.00	0.00			
09	U-235	TRG	04/03/13 13:40	1.00E+00	109.58	0.00	0.00			
10	U-235	TRG	04/03/13 14:24	1.00E+00	11.42	0.00	0.00			
11	U-235	TRG	04/03/13 14:24	1.00E+00	35.97	0.00	0.00			
12	U-235	TRG	04/03/13 15:05	1.00E+00	47.65	0.00	0.00			
13	U-235	TRG	04/03/13 15:05	1.00E+00	37.15	0.00	0.00			
14	U-235	TRG	04/03/13 15:30	1.00E+00	58.90	0.00	0.00			
15	U-235	TRG	04/03/13 15:30	1.00E+00	78.02	0.00	0.00			
16	U-235	TRG	04/04/13 10:27	1.00E+00	89.84	0.00	0.00			
17	U-235	TRG	04/04/13 10:27	1.00E+00	86.49	0.00	0.00			
18	U-235	TRG	04/04/13 10:42	1.00E+00	104.58	0.00	0.00			
19	U-235	TRG	04/04/13 10:42	1.00E+00	109.30	0.00	0.00			

Preliminary Data Report & Analytical Calculations
Work Order: 13-04049-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04049
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	04/17/13 06:11		A_Spec	Alpha_003	170	4.17 E+01	2.00 E-03	17.5
02	U-235	MBL	04/17/13 06:11		A_Spec	Alpha_004	170	-1.90 E-01	7.00 E-03	19.4
03	U-235	DUP	04/17/13 06:11		A_Spec	Alpha_010	170	1.03 E+01	4.00 E-03	19.7
04	U-235	DO	04/17/13 06:11		A_Spec	Alpha_011	170	2.20 E+01	0.00 E+00	19.7
05	U-235	TRG	04/16/13 09:01		A_Spec	Alpha_033	170	6.83 E+00	1.00 E-03	18.2
06	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_034	170	2.00 E+00	0.00 E+00	18.6
07	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_035	170	7.00 E+00	0.00 E+00	18.3
08	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_037	170	9.83 E+00	1.00 E-03	17.8
09	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_040	170	1.30 E+01	0.00 E+00	19
10	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_041	170	-6.80 E-01	4.00 E-03	19.8
11	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_042	170	8.30 E-01	1.00 E-03	18.5
12	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_044	170	2.00 E+00	0.00 E+00	19
13	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_046	170	4.00 E+00	0.00 E+00	17.9
14	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_047	170	6.60 E-01	2.00 E-03	18.2
15	U-235	TRG	04/16/13 09:02		A_Spec	Alpha_048	170	1.83 E+00	1.00 E-03	16.8
16	U-235	TRG	04/16/13 11:58		A_Spec	Alpha_003	170	4.66 E+00	2.00 E-03	17.5
17	U-235	TRG	04/16/13 11:58		A_Spec	Alpha_004	170	1.81 E+00	7.00 E-03	19.4
18	U-235	TRG	04/16/13 11:58		A_Spec	Alpha_010	170	3.32 E+00	4.00 E-03	19.7
19	U-235	TRG	04/16/13 11:58		A_Spec	Alpha_011	170.02	6.00 E+00	0.00 E+00	19.7

Count Room Report
Client: Engineering Management Su

13-04049-UUISO-1 (pCi/l) in WA
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	04/09/13 00:00	1.0000	0.6102	11.6548		0.00		
02	MBL	BLANK	04/09/13 00:00	1.0000	0.6056	11.5670		0.00		
03	DUP	PZ-302-AI TOT	04/03/13 11:45	1.0000	0.6032	11.5211		0.00		
04	DO	PZ-302-AI TOT	04/03/13 11:45	1.0000	0.5995	11.4505		0.00		
05	TRG	PZ-302-AI DIS	04/03/13 11:45	1.0000	0.5969	11.4008		0.00		
06	TRG	LR-100 TOT	04/03/13 13:27	1.0000	0.5979	11.4199		0.00		
07	TRG	LR-100 DIS	04/03/13 13:27	1.0000	0.5990	11.4409		0.00		
08	TRG	D-81 TOT	04/03/13 13:40	1.0000	0.5979	11.4199		0.00		
09	TRG	D-81 DIS	04/03/13 13:40	1.0000	0.5978	11.4180		0.00		
10	TRG	LR-105 TOT	04/03/13 14:24	1.0000	0.5986	11.4333		0.00		
11	TRG	LR-105 DIS	04/03/13 14:24	1.0000	0.5994	11.4485		0.00		
12	TRG	PZ-207-AS TOT	04/03/13 15:05	1.0000	0.5948	11.3607		0.00		
13	TRG	PZ-207-AS DIS	04/03/13 15:05	1.0000	0.5957	11.3779		0.00		
14	TRG	LR-103 TOT	04/03/13 15:30	1.0000	0.5971	11.4046		0.00		
15	TRG	LR-103 DIS	04/03/13 15:30	1.0000	0.5968	11.3989		0.00		
16	TRG	PZ-110-SS TOT	04/04/13 10:27	1.0000	0.6021	11.5001		0.00		
17	TRG	PZ-110-SS DIS	04/04/13 10:27	1.0000	0.5995	11.4505		0.00		
18	TRG	I-62 TOT	04/04/13 10:42	1.0000	0.5964	11.3912		0.00		
19	TRG	I-62 DIS	04/04/13 10:42	1.0000	0.5974	11.4103		0.00		

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-04049	1	UUISO	4/11/2013 11:20	JBARNARD		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
U-234	U-8a	35.240	4/11/2013	0.500	0.5136				8.15	0.294	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	4/11/2013	0.500	0.5136				7.95	0.286	0.00	0.000	0.00	0.000	0.00	0.000

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	U-232	U-10a	19.100	4/11/2013	0.6102	0.6300
02	U-232	U-10a	19.100	4/11/2013	0.6056	0.6300
03	U-232	U-10a	19.100	4/11/2013	0.6032	0.6300
04	U-232	U-10a	19.100	4/11/2013	0.5995	0.6300
05	U-232	U-10a	19.100	4/11/2013	0.5969	0.6300
06	U-232	U-10a	19.100	4/11/2013	0.5979	0.6300
07	U-232	U-10a	19.100	4/11/2013	0.5990	0.6300
08	U-232	U-10a	19.100	4/11/2013	0.5979	0.6300
09	U-232	U-10a	19.100	4/11/2013	0.5978	0.6300
10	U-232	U-10a	19.100	4/11/2013	0.5986	0.6300
11	U-232	U-10a	19.100	4/11/2013	0.5994	0.6300
12	U-232	U-10a	19.100	4/11/2013	0.5948	0.6300
13	U-232	U-10a	19.100	4/11/2013	0.5957	0.6300
14	U-232	U-10a	19.100	4/11/2013	0.5971	0.6300
15	U-232	U-10a	19.100	4/11/2013	0.5968	0.6300
16	U-232	U-10a	19.100	4/11/2013	0.6021	0.6300
17	U-232	U-10a	19.100	4/11/2013	0.5995	0.6300
18	U-232	U-10a	19.100	4/11/2013	0.5964	0.6300
19	U-232	U-10a	19.100	4/11/2013	0.5974	0.6300

Balance Printer Tapes

Tracer

0.6102 g
0.6056 g
-0.6032 g
-0.5995 g
-0.5969 g
-0.5979 g
-0.5990 g
-0.5979 g
-0.5978 g
-0.5986 g
-0.5994 g
-0.5948 g

-0.5957 g
-0.5971 g
-0.5968 g

-0.6021 g
-0.5995 g
-0.5964 g
-0.5974 g

LCS

0.5136 g

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 4/11/2013 11:21 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04049	1	UUISO	liters	4/30/2013	JBARNARD

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	PZ-302-AI TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-302-AI TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-302-AI DIS	TRG					1.0000E+00	1.0000E+00				
06	LR-100 TOT	TRG					1.0000E+00	1.0000E+00				
07	LR-100 DIS	TRG					1.0000E+00	1.0000E+00				
08	D-81 TOT	TRG					1.0000E+00	1.0000E+00				
09	D-81 DIS	TRG					1.0000E+00	1.0000E+00				
10	LR-105 TOT	TRG					1.0000E+00	1.0000E+00				
11	LR-105 DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-207-AS TOT	TRG					1.0000E+00	1.0000E+00				
13	PZ-207-AS DIS	TRG					1.0000E+00	1.0000E+00				
14	LR-103 TOT	TRG					1.0000E+00	1.0000E+00				
15	LR-103 DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-110-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	I-62 TOT	TRG					1.0000E+00	1.0000E+00				
19	I-62 DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: _____ Date: 4/11/13

Apex-Alpha™

4/17/13

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556
Batch Identification: 1304049A-UU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_003
Chamber Serial Number:
Detector Serial Number: 3
Env. Background: System Bkgd 54570
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/17/2013 6:08:25 AM
Acquisition Date/Time: 4/17/2013 6:11:19 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.610 mL
Effective Efficiency: 0.2071 +/- 0.0113
Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
Chem. Recovery Factor: 1.1859 +/- 0.0685

Control Certificate Name: NatU_U-8A
Chem. Recov. of Control: U-238 0.989821 +/- 0.073222
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	5.273	407.98	9.72	1.02	0.00E+000	22.7
U-234		4.727	642.49	7.74	0.51	0.00E+000	35.3
U-235		4.387	41.66	30.51	0.34	0.00E+000	5.2
U-238		4.146	632.15	7.80	0.85	0.00E+000	11.1

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.23E+000 +/- 5.60E-001	8.08E-002 +/- 8.65E-003
U-234	0.992	4761.50*	8.24E+000 +/- 1.09E+000	6.73E-002 +/- 7.21E-003
U-235	1.000	4385.50*	6.59E-001 +/- 2.13E-001	7.56E-002 +/- 8.10E-003
U-238	0.990	4184.40*	8.07E+000 +/- 1.07E+000	7.64E-002 +/- 8.19E-003

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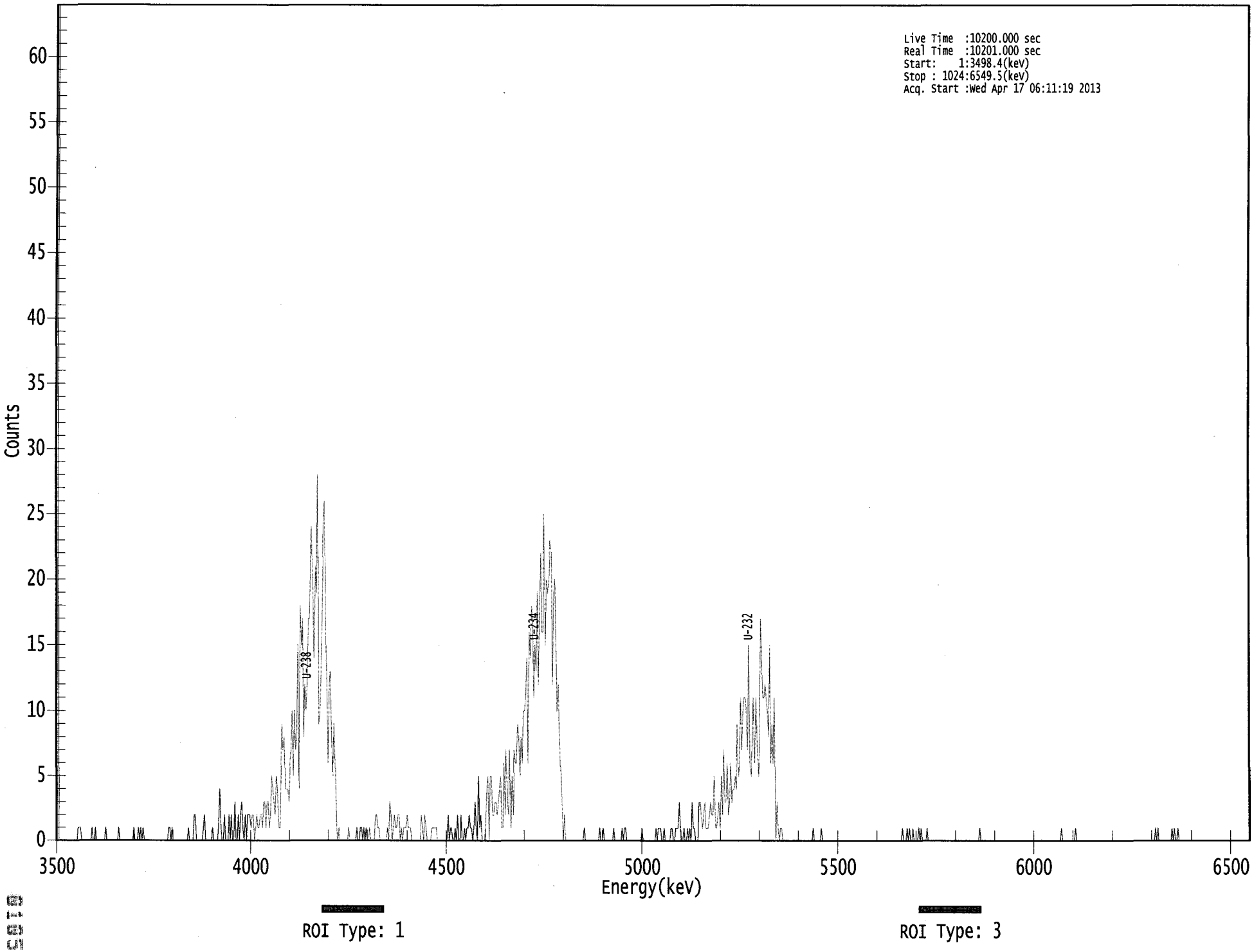
4/17/13

0000055650.CNF



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

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	10201	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	1	1	1	0	0
25:	0	0	0	0	0	0	0	1
33:	0	0	1	0	0	0	0	0
41:	0	0	0	1	0	0	0	0
49:	0	0	0	0	0	0	1	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	1	0	0	0	1
73:	0	1	0	1	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	1	1	0	1	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	1	0	0	0	0	2
121:	2	0	0	0	0	0	0	1
129:	2	0	0	0	0	0	0	1
137:	0	0	0	0	1	4	1	0
145:	0	2	0	0	0	2	0	2
153:	0	0	3	0	0	2	0	2
161:	3	1	0	2	0	2	2	2
169:	1	2	2	0	1	2	1	1
177:	2	2	1	3	3	1	3	3
185:	1	2	5	4	3	2	5	4
193:	1	1	4	9	7	8	4	4
201:	4	3	6	7	10	5	10	7
209:	8	15	4	18	15	17	8	12
217:	10	12	17	17	22	24	18	14
225:	21	19	28	9	10	13	18	24
233:	26	16	12	6	12	13	8	5
241:	9	6	1	0	1	0	0	0
249:	0	0	0	0	1	0	0	0
257:	0	0	0	1	0	0	1	1
265:	0	1	0	1	0	0	1	0
273:	0	0	0	2	2	1	1	0
281:	0	0	0	0	0	1	0	3
289:	2	0	1	2	1	1	2	2
297:	0	1	0	1	1	1	2	1
305:	1	1	0	0	0	0	0	0
313:	0	0	2	1	0	2	1	0
321:	0	0	0	1	1	1	1	1
329:	0	0	0	0	0	0	0	0
337:	0	2	0	1	1	0	0	1
345:	0	2	0	0	2	0	0	1
353:	0	1	1	2	1	1	0	1
361:	3	1	0	5	1	2	0	0

369:	0	1	4	5	0	5	5	2

Sample Title: 01

Channel								
377:	2	3	3	2	3	4	5	1
385:	1	6	2	7	3	2	7	1
393:	5	2	7	6	6	9	8	5
401:	8	6	10	10	11	14	6	16
409:	14	18	17	11	15	13	19	12
417:	17	22	16	16	25	15	20	19
425:	20	23	22	12	19	20	15	10
433:	12	8	5	3	0	2	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	1	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	1	0	0	1	0
473:	0	0	0	0	0	0	0	1
481:	0	0	0	0	0	0	1	0
489:	1	1	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	1
505:	0	0	0	0	0	0	0	0
513:	0	0	0	1	0	1	1	1
521:	0	0	1	0	0	0	0	0
529:	1	1	0	0	1	1	1	3
537:	1	0	0	1	0	0	1	0
545:	1	0	3	1	1	0	0	0
553:	3	3	2	1	2	3	1	1
561:	1	2	3	2	2	5	1	1
569:	2	3	1	5	2	7	3	3
577:	6	2	3	6	3	4	4	5
585:	4	9	5	6	11	7	10	11
593:	11	10	7	15	6	5	8	11
601:	6	11	8	5	7	17	14	11
609:	11	12	11	10	8	15	6	9
617:	6	11	0	3	1	0	1	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	1	0	0	0	0	0
657:	0	1	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	1	0
729:	0	0	1	0	1	0	0	1
737:	0	0	0	0	1	0	1	0
745:	0	0	0	1	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	1	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	1	0
865:	0	0	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	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:	1	0	0	0	0	0	0	0
953:	0	0	0	0	1	0	1	0
961:	0	1	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™

4/17/13

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556
Batch Identification: 1304049A-UU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_004
Chamber Serial Number:
Detector Serial Number: 4
Env. Background: System Bkgd 54571
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/17/2013 6:08:25 AM
Acquisition Date/Time: 4/17/2013 6:11:20 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: 0.2377 +/- 0.0123
Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
Chem. Recovery Factor: 1.2253 +/- 0.0674

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	5.269	464.81	9.10	1.19	0.00E+000	22.4
U-234		4.790	4.96	107.11	2.04	0.00E+000	2.9
U-235		4.371	-0.19	1131.2	1.19	0.00E+000	2.9
U-238		4.142	7.15	78.23	0.85	0.00E+000	5.9

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.992	5302.50*	5.19E+000 +/- 5.27E-001	7.36E-002 +/- 7.48E-003
U-234	0.994	4761.50*	5.54E-002 +/- 5.96E-002	8.70E-002 +/- 8.84E-003
U-235	0.999	4385.50*	-2.62E-003 +/- 2.96E-002	9.08E-002 +/- 9.22E-003
U-238	0.987	4184.40*	7.95E-002 +/- 6.27E-002	6.66E-002 +/- 6.76E-003

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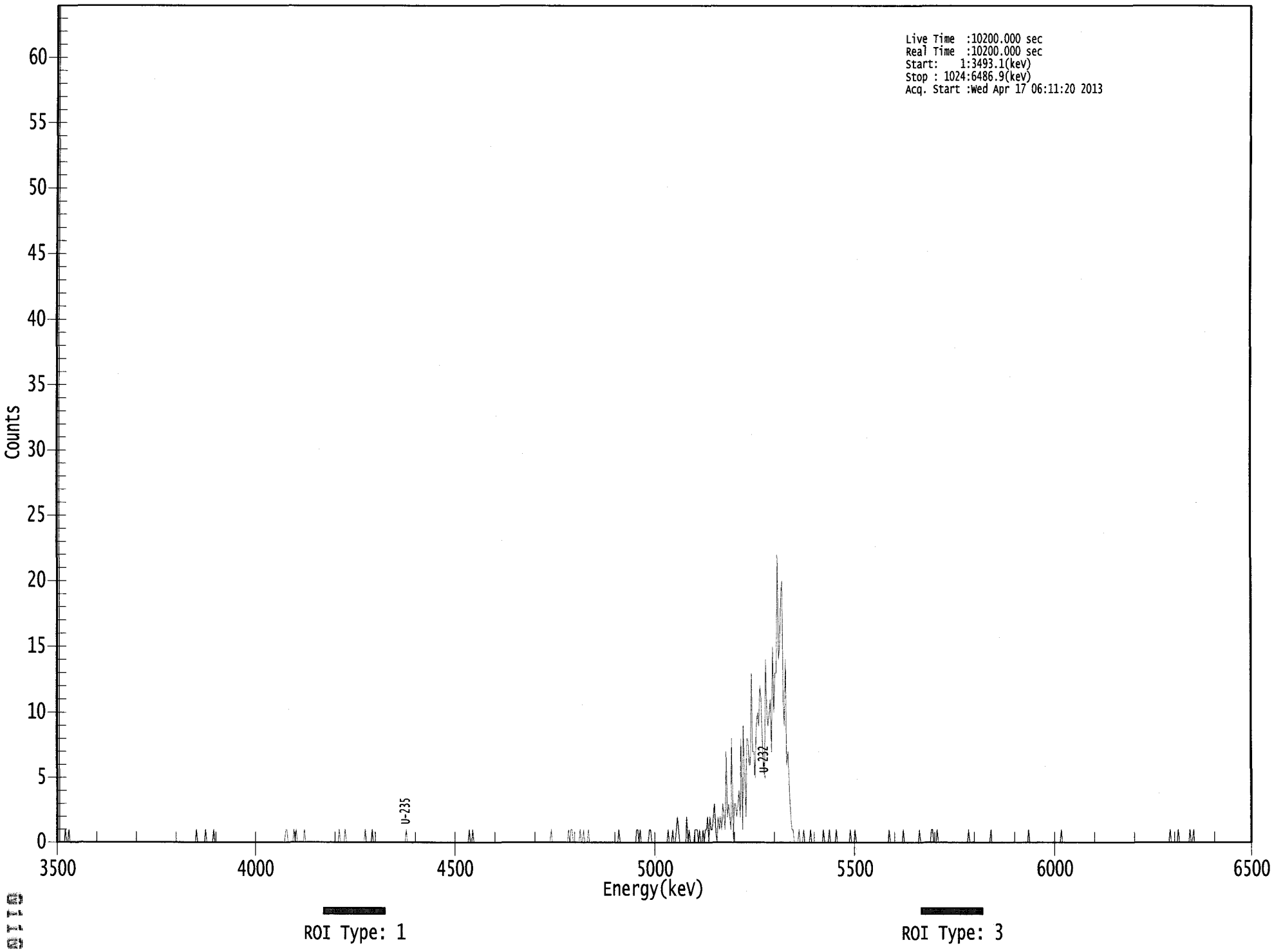
4/17/13

0000055651.CNF



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

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	10200	10200	0	0	0	0	0	1
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	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	1	0	0	0	0	0	0	0
129:	1	0	0	0	0	0	0	1
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	1	1	0
201:	0	0	0	0	1	0	1	0
209:	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	1	0	0	0	0	0	1
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	1	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	1	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	1	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	1
441:	0	1	1	0	0	0	0	0
449:	0	1	0	0	1	0	0	0
457:	1	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	1	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	1	1	0	1	0	0	0
505:	0	0	0	0	1	1	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	1	0	0	0
529:	1	0	0	1	2	1	0	0
537:	0	0	0	0	2	0	1	0
545:	0	0	0	1	1	1	0	1
553:	0	0	1	0	1	1	2	0
561:	2	1	1	2	3	1	0	2
569:	1	2	1	3	2	1	7	2
577:	3	2	1	8	0	3	3	2
585:	3	4	2	8	1	9	5	2
593:	8	8	6	6	13	7	7	5
601:	9	10	9	12	11	8	6	5
609:	14	10	9	10	11	7	15	10
617:	13	13	22	14	15	19	20	11
625:	9	14	6	7	4	2	1	1
633:	0	0	0	0	1	0	0	0
641:	1	0	0	0	0	0	1	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	1	0
665:	0	0	0	0	1	0	0	0
673:	0	0	0	0	0	0	0	0
681:	1	0	0	0	1	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	1	0	0	0	0	0	0
721:	0	0	0	0	0	1	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	1	0	0	0	0
745:	0	0	0	0	0	1	1	0
753:	0	0	1	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	1	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	1	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:	1	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	1	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	1	0	0	0	0	0	0
961:	1	0	0	0	0	0	0	0
969:	0	0	1	0	0	1	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™

4/17/13

Sample Description: PZ-302-AI TOT-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556
Batch Identification: 1304049A-UU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_010
Chamber Serial Number:
Detector Serial Number: 10
Env. Background: System Bkgd 54572
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:08:25 AM
Acquisition Date/Time: 4/17/2013 6:11:17 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: 0.2363 +/- 0.0123
Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
Chem. Recovery Factor: 1.2011 +/- 0.0663

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	5.279	460.13	9.16	1.87	0.00E+000	22.3
U-234		4.728	368.79	10.24	2.21	0.00E+000	5.1
U-235		4.420	10.32	63.32	0.68	0.00E+000	2.9
U-238		4.143	270.15	11.95	0.85	0.00E+000	8.6

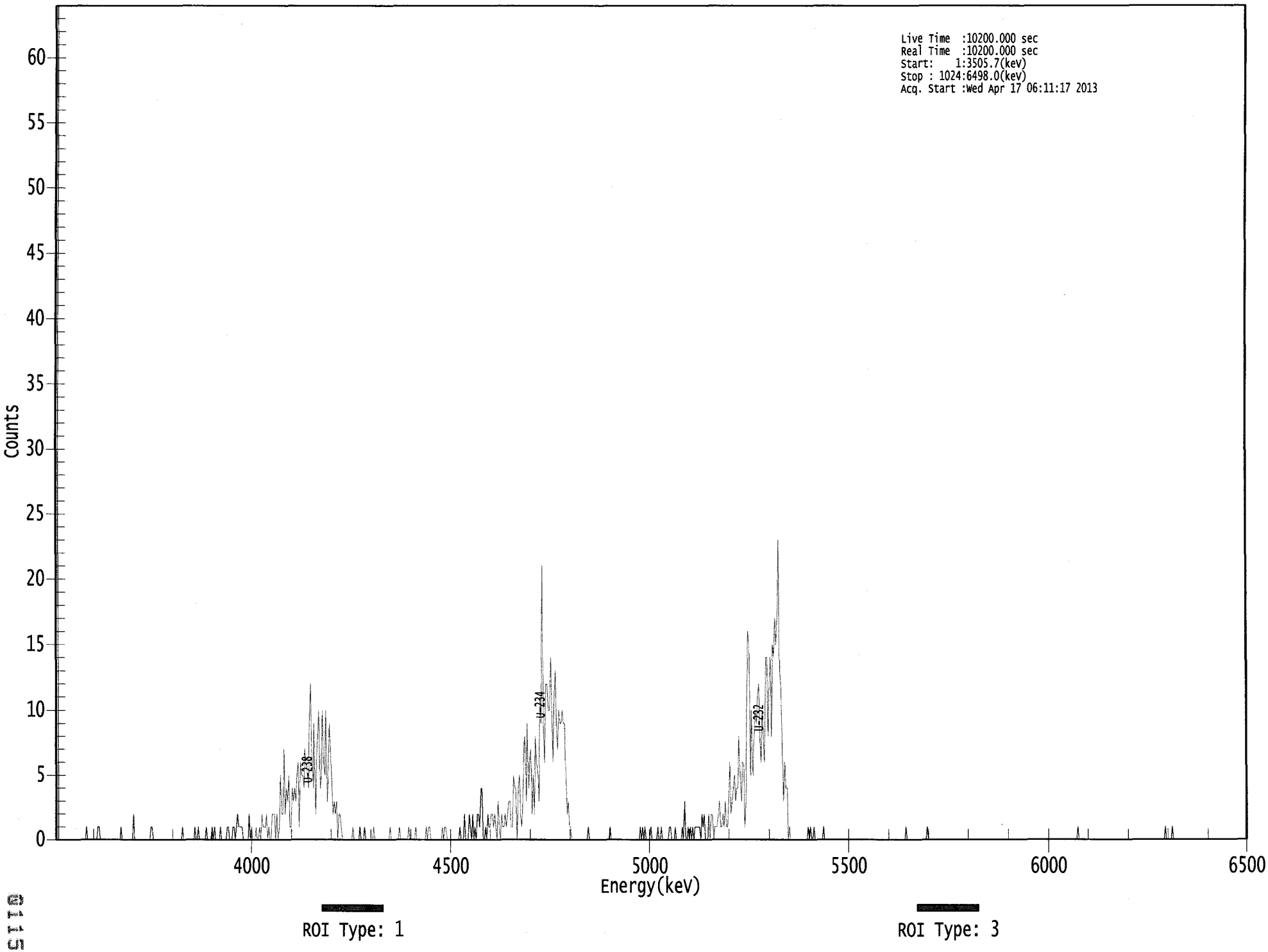
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.17E+000 +/- 5.28E-001	8.51E-002 +/- 8.69E-003
U-234	0.992	4761.50*	4.14E+000 +/- 5.99E-001	8.99E-002 +/- 9.17E-003
U-235	0.992	4385.50*	1.43E-001 +/- 9.18E-002	7.82E-002 +/- 7.98E-003
U-238	0.988	4184.40*	3.02E+000 +/- 4.75E-001	6.70E-002 +/- 6.84E-003

AG
4/17/13

0000055648.CNF



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

Sample Title: 03

Elapsed Live time: 10200
Elapsed Real Time: 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	1	0	0	0	0	0
33:	0	0	0	0	1	1	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	1	0	0	0	0	0	0	0
65:	0	0	0	2	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	1	1	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	1	0	0
113:	0	0	0	0	0	0	0	0
121:	1	0	0	1	0	0	0	0
129:	0	0	1	0	0	0	0	1
137:	0	1	0	0	0	0	1	0
145:	0	0	0	0	1	1	0	0
153:	0	1	1	0	1	2	1	1
161:	1	1	0	0	0	0	0	2
169:	0	1	0	0	0	1	0	0
177:	1	0	2	1	1	1	2	0
185:	1	0	0	2	2	2	0	2
193:	0	1	5	2	2	7	2	4
201:	3	5	1	1	4	3	4	3
209:	5	6	1	6	5	5	4	7
217:	6	5	4	9	12	7	4	9
225:	2	6	8	10	4	5	10	6
233:	5	10	3	5	9	7	4	2
241:	3	2	3	0	2	2	1	0
249:	0	0	0	0	0	0	0	0
257:	1	0	0	0	0	0	1	0
265:	0	0	1	0	0	0	0	0
273:	0	0	1	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	1	0	0	0	0	0	0	0
297:	1	0	0	0	0	0	0	0
305:	1	0	0	0	0	0	1	0
313:	0	0	0	0	0	0	0	1
321:	0	1	1	0	0	0	0	0
329:	0	0	0	0	0	1	0	1
337:	1	0	0	0	0	0	0	0
345:	0	0	0	0	1	0	0	0
353:	2	0	0	0	2	1	0	2
361:	0	1	0	2	2	1	4	4

369:	0	0	1	0	2	1	1	2

Sample Title: 03

Channel								
377:	2	1	2	1	0	3	1	0
385:	2	1	1	2	1	2	3	3
393:	1	1	5	4	4	0	4	5
401:	2	1	3	7	8	3	9	4
409:	6	7	2	5	2	8	6	5
417:	3	11	9	21	9	6	12	12
425:	10	10	14	10	6	11	13	9
433:	7	10	9	9	10	9	9	5
441:	2	3	1	1	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	1	0	0	0	0	0
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	1
505:	0	1	0	1	0	0	0	0
513:	1	0	0	0	0	0	1	0
521:	0	1	0	0	0	0	0	0
529:	1	1	0	0	0	1	0	0
537:	0	0	0	1	0	3	0	0
545:	1	0	1	0	1	0	1	1
553:	1	1	1	0	2	1	2	0
561:	0	0	2	0	2	2	0	1
569:	1	1	2	3	1	1	2	1
577:	3	1	1	3	6	2	3	4
585:	5	3	4	4	8	5	3	6
593:	6	1	3	11	16	15	5	10
601:	5	8	10	9	11	12	8	6
609:	10	8	6	14	14	8	12	14
617:	8	15	14	17	15	17	23	13
625:	12	8	3	6	4	4	0	1
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	1
649:	0	1	0	0	1	0	0	0
657:	0	0	0	0	1	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	1	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	1	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	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	1	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	1	0	0	0	0	0	1
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™

4/17/13

Sample Description: PZ-302-AI TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556
Batch Identification: 1304049A-UU
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_011
Chamber Serial Number:
Detector Serial Number: 11
Env. Background: System Bkgd 54573
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:08:25 AM
Acquisition Date/Time: 4/17/2013 6:11:18 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.600 mL
Effective Efficiency: 0.2082 +/- 0.0114
Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
Chem. Recovery Factor: 1.0553 +/- 0.0621

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	5.266	402.98	9.78	1.02	0.00E+000	24.4
U-234		4.723	327.83	10.83	0.17	0.00E+000	15.1
U-235		4.418	22.00	42.73	0.00	0.00E+000	2.7
U-238		4.148	252.98	12.35	1.02	0.00E+000	3.6

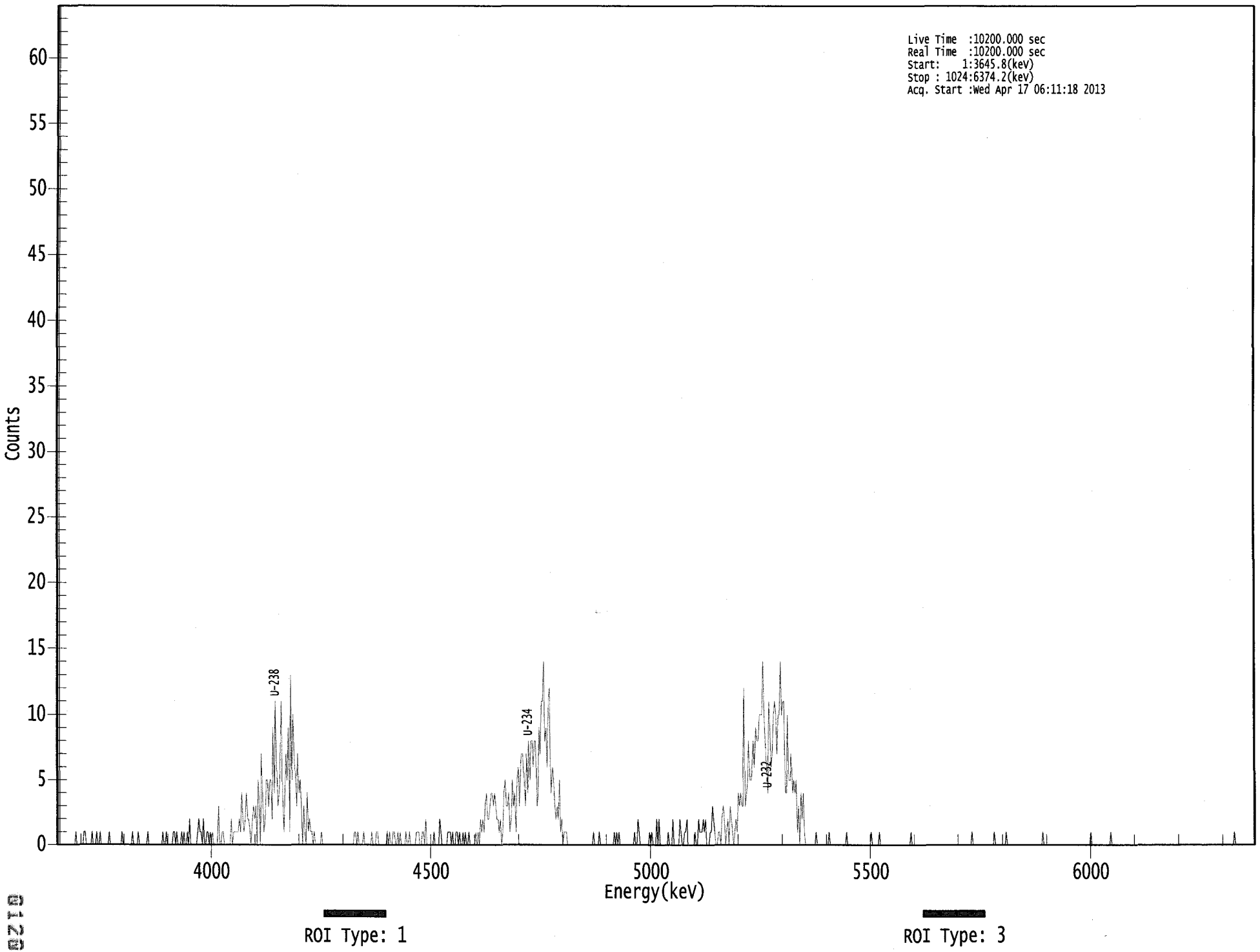
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.991	5302.50*	5.14E+000 +/- 5.54E-001	8.04E-002 +/- 8.65E-003
U-234	0.989	4761.50*	4.18E+000 +/- 6.38E-001	5.32E-002 +/- 5.73E-003
U-235	0.993	4385.50*	3.46E-001 +/- 1.52E-001	9.43E-002 +/- 1.02E-002
U-238	0.991	4184.40*	3.21E+000 +/- 5.26E-001	8.00E-002 +/- 8.61E-003

AG
4/17/13

0000055649.CNF



0218

****
***** 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:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	1	0	0	0	0	0	0	1
25:	1	0	0	0	0	0	1	0
33:	0	0	1	0	0	1	0	0
41:	0	0	0	0	0	1	0	0
49:	0	0	0	0	0	0	0	0
57:	1	0	0	0	0	0	0	0
65:	0	1	0	0	0	0	1	0
73:	0	0	0	0	0	0	1	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	1	0	0	1	0
97:	0	0	0	0	1	1	0	1
105:	0	0	0	1	0	1	0	0
113:	1	0	2	0	0	0	0	0
121:	0	1	2	1	1	0	2	0
129:	0	1	1	0	1	0	1	0
137:	0	0	0	3	0	0	1	1
145:	0	0	0	0	0	0	2	0
153:	1	1	1	1	1	2	1	4
161:	2	1	2	4	2	2	1	0
169:	2	3	2	3	0	5	3	0
177:	7	3	1	2	5	5	3	5
185:	5	2	9	4	11	6	3	4
193:	6	11	4	1	5	7	5	9
201:	1	13	5	10	7	5	3	7
209:	4	5	3	0	3	1	0	4
217:	1	2	1	1	0	1	0	0
225:	0	0	0	1	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	1
257:	1	0	1	0	0	0	0	1
265:	0	0	0	0	0	0	1	0
273:	0	0	1	1	0	0	0	0
281:	0	0	0	1	0	1	0	0
289:	1	1	0	0	1	0	1	0
297:	0	0	0	1	0	0	1	0
305:	0	0	0	0	1	1	1	0
313:	0	1	1	0	2	0	0	0
321:	0	0	0	1	0	0	0	0
329:	2	1	0	0	0	0	0	1
337:	1	1	0	1	0	0	1	1
345:	0	1	0	0	1	0	1	0
353:	0	1	0	0	0	0	0	1
361:	0	1	0	2	1	2	1	3

369:	4	2	2	3	4	4	3	4

Sample Title: 04

Channel								
377:	3	2	2	1	2	0	1	4
385:	5	3	3	4	1	2	5	3
393:	4	1	5	6	3	6	7	7
401:	5	3	7	4	8	5	8	8
409:	6	8	8	3	4	9	7	11
417:	11	14	8	9	6	11	12	4
425:	6	5	3	2	3	2	5	1
433:	2	0	1	1	1	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	1	0	0	0	0
465:	1	0	0	0	0	0	0	0
473:	0	0	0	0	0	1	0	1
481:	0	1	0	0	0	0	0	0
489:	0	0	0	0	0	0	1	0
497:	0	2	1	0	0	0	0	0
505:	0	0	0	1	0	1	0	0
513:	0	2	0	2	0	0	0	0
521:	0	0	0	1	0	0	0	2
529:	0	0	0	0	0	2	1	0
537:	0	1	1	2	0	0	0	0
545:	0	0	1	0	0	2	1	1
553:	1	2	1	2	0	0	0	1
561:	1	3	2	1	0	0	1	1
569:	0	2	3	2	0	1	2	0
577:	3	2	1	0	1	2	1	4
585:	3	4	3	3	12	3	4	5
593:	8	5	5	6	8	6	9	8
601:	8	10	10	10	14	10	8	6
609:	4	11	9	6	7	10	11	10
617:	7	10	10	14	10	11	11	4
625:	4	10	5	5	7	4	5	4
633:	5	1	3	0	4	2	4	1
641:	0	0	0	0	0	0	0	0
649:	0	1	0	0	0	0	0	0
657:	0	0	0	0	1	0	0	0
665:	0	0	0	0	0	0	0	0
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:	1	0	0	0	0	0	0	1
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	1	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	1	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	1	0	0	0	0	0	0

Sample Title: 04

Channel								
809:	0	0	0	1	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	1	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	1	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	1	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	1	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB 4/16/13

Apex-Alpha™

Sample Description: PZ-302-AI DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_033
Chamber Serial Number: 04026479A
Detector Serial Number: 91132
Env. Background: System Bkgd 54582
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:01:59 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.597 mL
Effective Efficiency: 0.1946 +/- 0.0110
Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
Chem. Recovery Factor: 1.0664 +/- 0.0632

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.277	375.00	10.13	0.00	0.00E+000	5.6
U-234		4.737	295.00	11.43	0.00	0.00E+000	9.9
U-235		4.387	6.83	76.08	0.17	0.00E+000	3.0
U-238		4.158	198.00	13.96	0.00	0.00E+000	4.8

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.12E+000 +/- 5.68E-001	8.18E-002 +/- 9.08E-003
U-234	0.996	4761.50*	4.02E+000 +/- 6.41E-001	8.18E-002 +/- 9.08E-003
U-235	1.000	4385.50*	1.15E-001 +/- 8.84E-002	7.02E-002 +/- 7.79E-003
U-238	0.995	4184.40*	2.69E+000 +/- 4.80E-001	8.15E-002 +/- 9.04E-003

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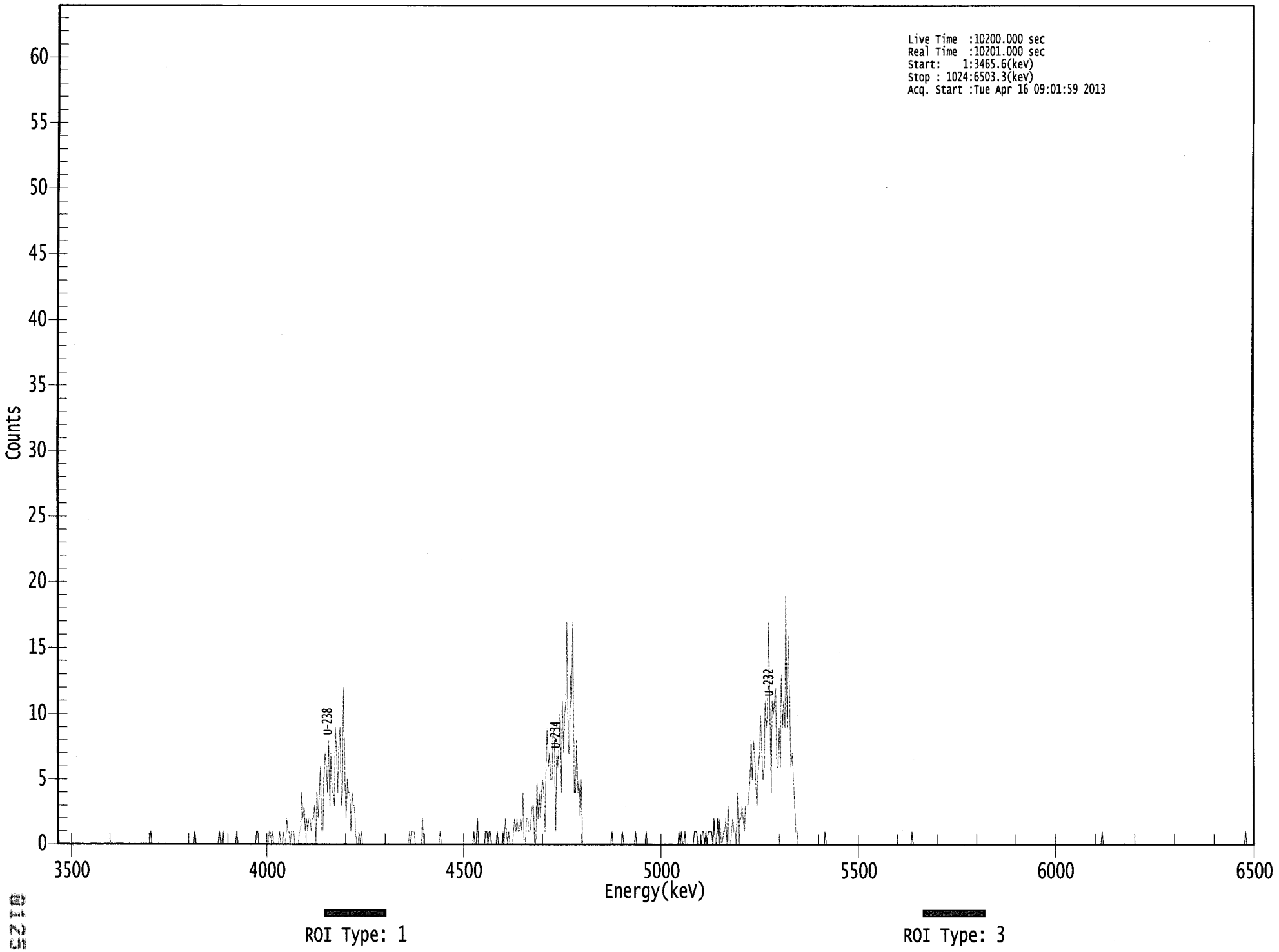
0000055563.CNF



****
***** 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: 10201

Channel							
1:	1	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:	1	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	1	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	1	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	1	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	1	1	0	0	0
177:	0	0	0	0	0	0	1	1
185:	0	1	0	0	0	0	0	1
193:	0	0	1	0	0	2	1	1
201:	0	1	1	1	0	0	0	0
209:	1	1	4	2	3	1	2	1
217:	2	2	1	2	2	3	0	4
225:	2	4	6	1	1	5	7	6
233:	4	8	3	7	4	4	3	9
241:	7	4	8	9	3	4	12	5
249:	2	5	4	4	1	4	3	3
257:	1	0	0	1	0	1	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	1	0
305:	1	1	1	0	0	0	0	0
313:	0	2	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	1	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	1	0	0
361:	2	0	0	0	0	0	0	1

369:	1	0	1	1	0	0	0	0

Sample Title: 05

Channel								
377:	0	1	0	0	0	0	1	0
385:	2	1	0	1	0	0	0	1
393:	2	1	2	1	1	2	1	4
401:	0	0	2	2	1	1	2	3
409:	3	0	0	5	2	4	2	4
417:	5	4	1	6	9	6	7	5
425:	5	9	8	1	7	6	8	10
433:	4	11	7	10	11	17	7	7
441:	13	11	17	4	4	8	4	5
449:	2	5	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	1	0	0	0	0
481:	0	0	0	0	1	0	0	0
489:	0	0	0	0	0	0	0	1
497:	0	0	0	0	0	0	0	0
505:	1	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	1	0	1	0
537:	0	1	0	0	0	0	0	0
545:	0	1	1	1	0	0	0	0
553:	1	1	0	1	0	1	1	1
561:	1	0	2	0	0	2	0	2
569:	0	0	1	1	2	0	3	0
577:	0	1	2	1	1	0	4	0
585:	2	2	3	2	1	3	3	3
593:	4	5	8	5	8	7	4	3
601:	6	7	10	7	5	6	11	9
609:	10	17	11	4	11	10	11	12
617:	6	6	9	6	13	9	11	9
625:	19	9	16	11	6	7	5	3
633:	1	1	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	1	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	1	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: 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	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	1	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	1
1017:	0	0	0	0	0	0	0	0

KB 4/16/13

Apex-Alpha™

Sample Description: LR-100 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_034
Chamber Serial Number: 04026479B
Detector Serial Number: 91136
Env. Background: System Bkgd 54583
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:02:01 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.598 mL
Effective Efficiency: 0.0740 +/- 0.0064
Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
Chem. Recovery Factor: 0.3987 +/- 0.0353

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	5.282	142.83	16.41	0.17	0.00E+000	13.6
U-234		4.652	3.83	102.72	0.17	0.00E+000	3.0
U-235		4.374	2.00	169.74	0.00	0.00E+000	3.0
U-238		4.078	1.66	169.38	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.13E+000 +/- 8.73E-001	1.50E-001 +/- 2.55E-002
U-234	0.918	4761.50*	1.37E-001 +/- 1.43E-001	1.50E-001 +/- 2.55E-002
U-235	0.999	4385.50*	8.85E-002 +/- 1.51E-001	2.65E-001 +/- 4.52E-002
U-238	0.923	4184.40*	5.93E-002 +/- 1.01E-001	1.71E-001 +/- 2.91E-002

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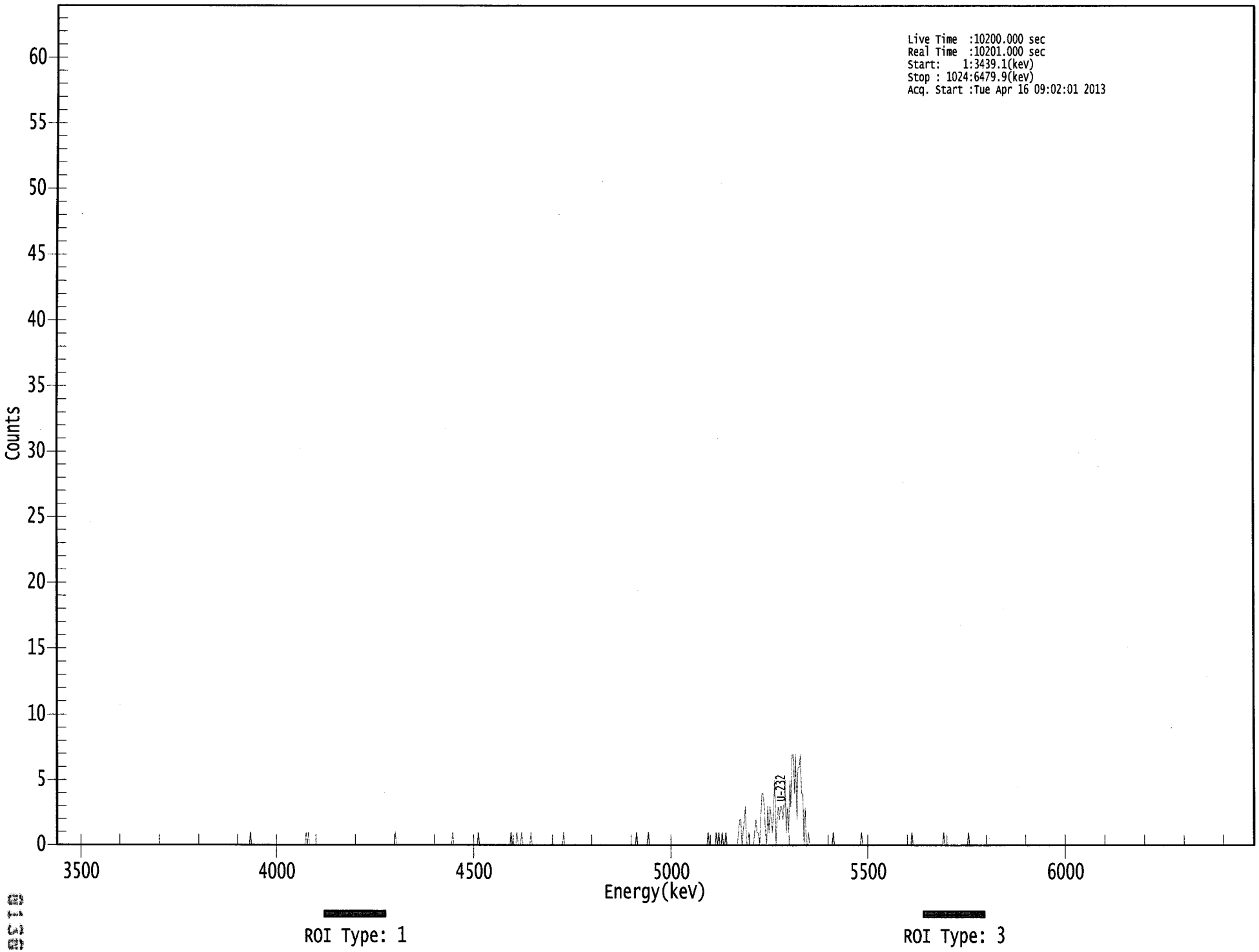
0000055564.CNF



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

Sample Title: 06

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	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	1	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	1	0
217:	1	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	1	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	1	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	1	0	0
393:	0	0	1	0	0	0	1	0
401:	0	0	0	0	0	0	1	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	0	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	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	1	0	0	0	0	0	0	0
505:	0	0	1	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	1	0	0
561:	0	0	0	0	1	0	1	0
569:	0	1	0	0	1	0	0	0
577:	0	0	0	0	0	0	0	1
585:	2	2	0	1	2	3	0	0
593:	1	0	0	0	0	1	2	1
601:	1	0	2	4	4	3	1	0
609:	3	1	3	2	1	3	5	0
617:	2	3	2	3	3	2	3	5
625:	1	3	1	5	3	7	7	4
633:	7	2	6	6	7	4	4	0
641:	3	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:	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:	1	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	1	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	1	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	1	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	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

KAB 4/16/13

Apex-Alpha™

Sample Description:	LR-100 DIS
Spectrum File:	\\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification:	1304049A-UU
Sample Identification:	07
Sample Geometry:	Shelf 2
Procedure Description:	U iso
Detector Name:	Alpha_035
Chamber Serial Number:	04026477A
Detector Serial Number:	58771
Env. Background:	System Bkgd 54584
Reagent Blank:	<not performed>
Sample Size:	1.000E+000 +/- 0.000E+000 liter
Sample Date/Time:	4/3/2013 6:12:59 AM
Acquisition Date/Time:	4/16/2013 9:02:02 AM
Acquisition Live Time:	170.0 minutes
Acquisition Real Time:	170.0 minutes
Tracer Certificate:	U232_UU-10A
Tracer Quantity:	0.599 mL
Effective Efficiency:	0.1846 +/- 0.0107
Counting Efficiency:	0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
Chem. Recovery Factor:	1.0111 +/- 0.0610
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	5.293	357.00	10.39	0.00	0.00E+000	9.2
U-234		4.734	5.66	85.23	0.34	0.00E+000	2.9
U-235		4.424	7.00	79.20	0.00	0.00E+000	2.9
U-238		4.084	11.83	57.46	0.17	0.00E+000	4.4

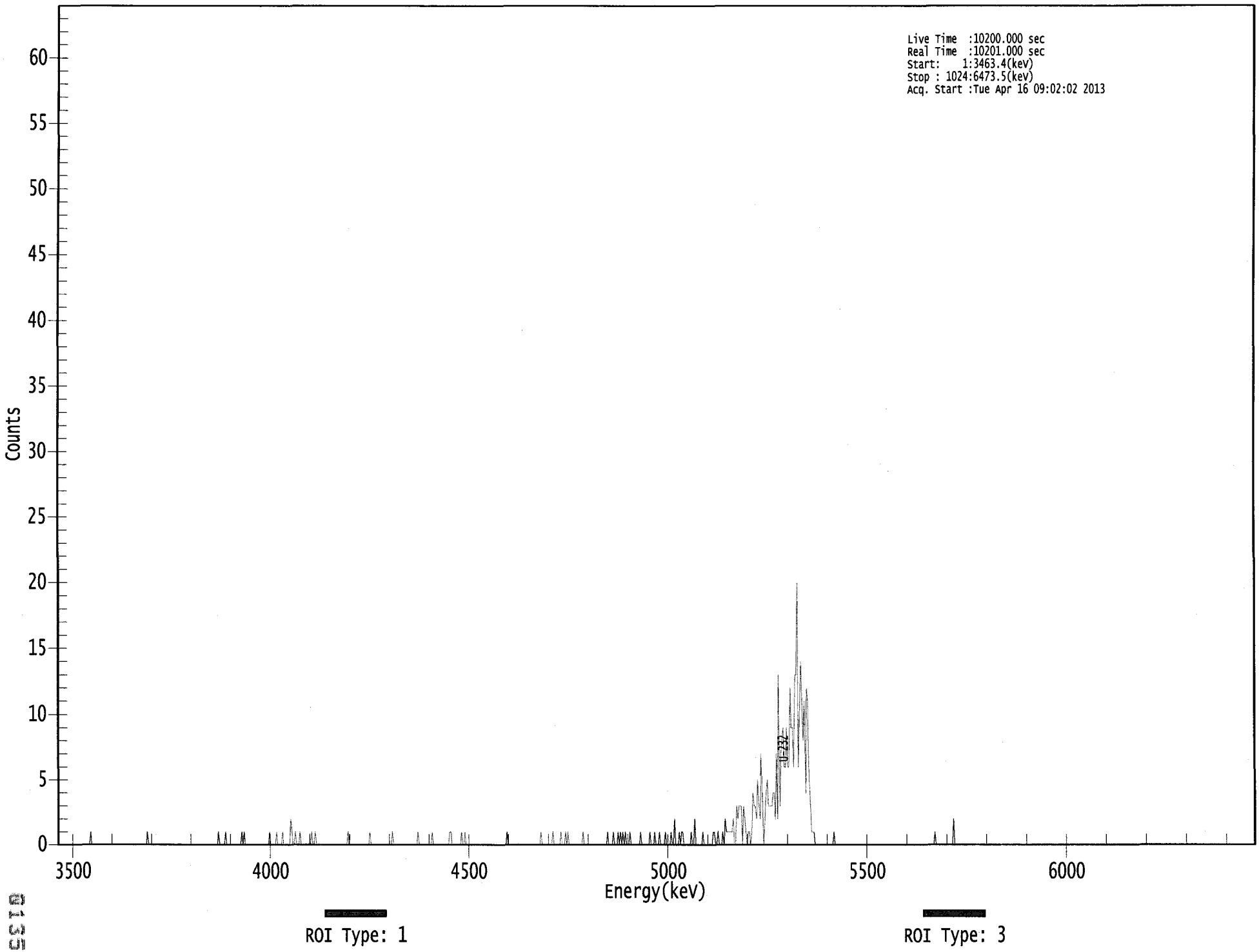
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.14E+000 +/- 5.82E-001	8.63E-002 +/- 9.77E-003
U-234	0.995	4761.50*	8.14E-002 +/- 7.00E-002	6.88E-002 +/- 7.79E-003
U-235	0.990	4385.50*	1.24E-001 +/- 9.94E-002	1.06E-001 +/- 1.20E-002
U-238	0.931	4184.40*	1.69E-001 +/- 9.92E-002	5.98E-002 +/- 6.77E-003

AG 4/17/13

0000055559.CNF



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

Sample Title: 07

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	1	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	1	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	1	0	0	0	0	0
145:	1	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	1	0
161:	1	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	1	0
185:	0	0	0	0	1	0	0	0
193:	0	1	0	0	0	0	0	0
201:	2	1	0	0	1	0	0	0
209:	1	0	0	0	0	0	0	0
217:	0	0	1	0	0	1	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	1	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	1	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	1
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	1	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	1	1	0	0	0	0	0	0
345:	0	0	1	0	0	1	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	1	0
417:	0	0	0	0	0	0	0	0
425:	1	0	0	0	0	0	0	1
433:	0	0	0	1	0	1	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	1	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	1
473:	0	0	0	0	1	0	0	0
481:	1	0	1	0	1	0	1	0
489:	0	0	1	0	0	0	0	0
497:	0	0	0	1	0	0	0	0
505:	0	0	0	1	0	0	0	1
513:	0	0	0	1	0	0	0	0
521:	1	0	0	0	0	1	0	0
529:	2	0	0	0	1	0	1	1
537:	0	0	0	0	0	0	1	0
545:	0	2	0	0	0	0	0	0
553:	1	0	0	0	0	0	0	0
561:	0	1	1	0	0	1	0	0
569:	0	1	0	2	1	1	1	1
577:	1	1	2	0	0	3	2	3
585:	3	3	0	3	2	1	0	1
593:	1	0	1	4	3	3	2	5
601:	3	2	7	3	0	2	4	5
609:	3	3	3	3	4	4	2	7
617:	2	13	3	7	8	9	6	6
625:	9	6	6	12	9	9	6	13
633:	13	20	6	10	14	11	8	11
641:	4	12	11	5	3	1	1	1
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	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	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	1	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	2	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: 07

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

CB 4/16/13

Apex-Alpha™

Sample Description: D-81 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 08
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_037
Chamber Serial Number: 04026478A
Detector Serial Number: 91133
Env. Background: System Bkgd 54585
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:02:04 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.598 mL
Effective Efficiency: 0.2342 +/- 0.0123
Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
Chem. Recovery Factor: 1.3134 +/- 0.0730

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	5.275	452.00	9.23	0.00	0.00E+000	5.0
U-234		4.733	138.66	16.67	0.34	0.00E+000	10.9
U-235		4.416	9.83	63.14	0.17	0.00E+000	2.9
U-238		4.152	106.83	18.98	0.17	0.00E+000	4.7

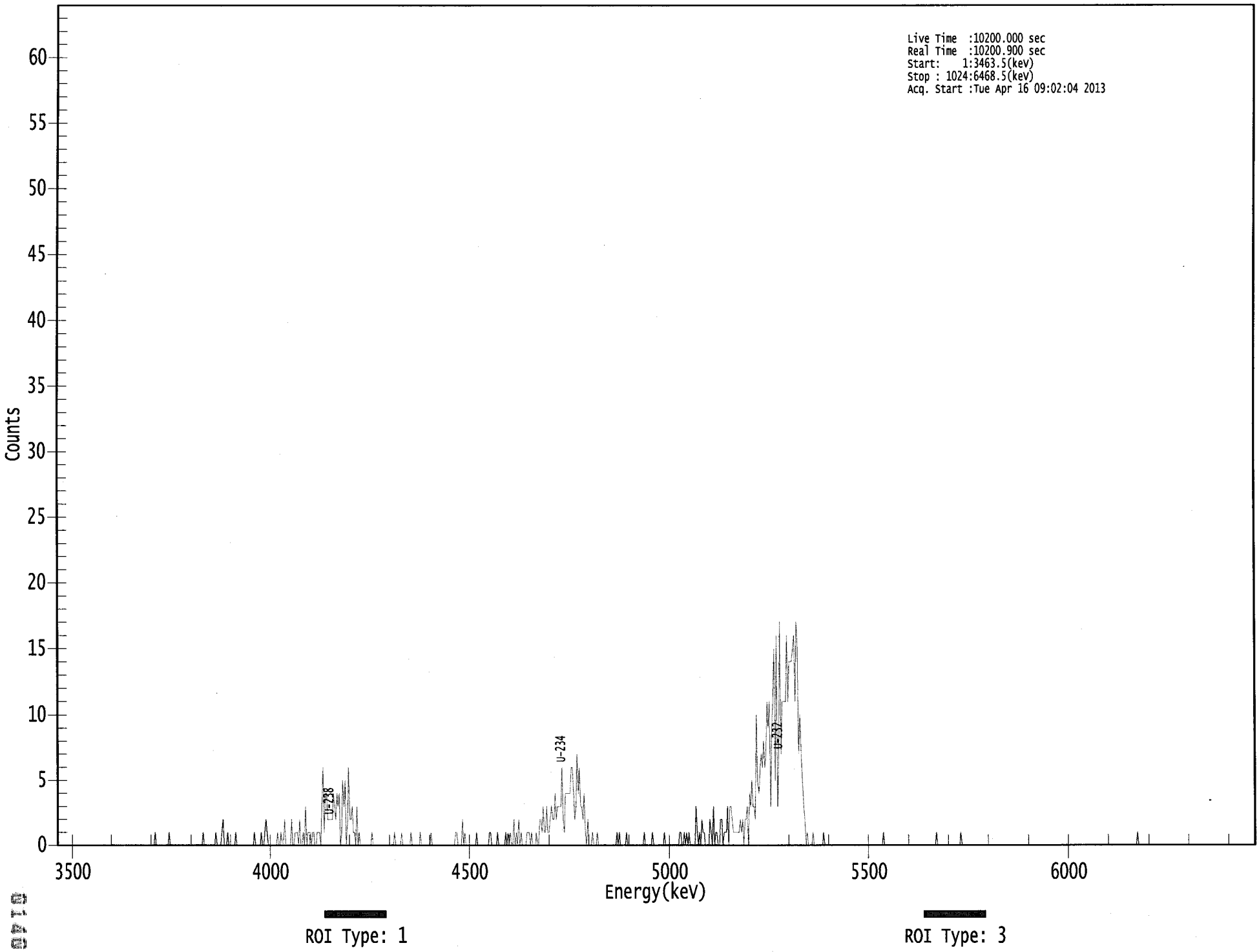
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.13E+000 +/- 5.27E-001	6.80E-002 +/- 6.99E-003
U-234	0.994	4761.50*	1.57E+000 +/- 3.08E-001	5.42E-002 +/- 5.57E-003
U-235	0.993	4385.50*	1.37E-001 +/- 8.80E-002	5.84E-002 +/- 6.00E-003
U-238	0.993	4184.40*	1.21E+000 +/- 2.60E-001	4.71E-002 +/- 4.84E-003

AG 4/17/13

0000055560.CNF



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

Sample Title: 08

Elapsed Live time: 10200
Elapsed Real Time: 10201

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

369:	0	0	1	1	0	0	0	0

Sample Title: 08

Channel								
377:	0	1	0	0	0	0	0	0
385:	1	0	1	0	1	0	0	2
393:	0	1	0	2	0	1	0	0
401:	0	0	1	1	1	0	1	0
409:	0	0	1	0	0	2	2	1
417:	3	1	1	3	1	1	2	3
425:	2	2	4	2	3	3	3	3
433:	6	2	1	4	4	4	4	4
441:	6	6	4	2	3	7	4	6
449:	3	3	2	4	1	0	2	0
457:	0	0	1	0	0	0	1	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	1
481:	0	1	0	0	0	0	0	1
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	1	0
505:	0	0	0	0	0	1	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	1	1	0	0
537:	1	0	1	0	1	0	0	0
545:	0	0	3	1	0	1	0	2
553:	1	1	0	0	0	0	2	1
561:	0	3	0	1	1	0	0	2
569:	2	0	1	1	1	3	0	3
577:	3	2	1	1	1	1	1	1
585:	2	1	2	0	2	2	3	0
593:	4	3	5	3	3	2	10	5
601:	4	6	7	6	8	6	7	11
609:	9	11	3	9	11	15	5	16
617:	3	7	17	7	11	11	11	11
625:	16	11	14	14	14	15	16	11
633:	17	15	7	10	7	5	3	2
641:	0	1	0	0	0	0	1	0
649:	0	0	0	0	0	0	0	1
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	1	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	1
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	1	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: 08

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	1	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

KAB 4/16/13

Apex-Alpha™

Sample Description: D-81 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 09
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 54586
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:02:06 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.598 mL
Effective Efficiency: 0.2082 +/- 0.0114
Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
Chem. Recovery Factor: 1.0958 +/- 0.0631

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	5.258	401.83	9.78	0.17	0.00E+000	21.8
U-234		4.715	116.66	18.18	0.34	0.00E+000	7.2
U-235		4.362	13.00	56.41	0.00	0.00E+000	3.0
U-238		4.130	100.32	19.65	0.68	0.00E+000	3.8

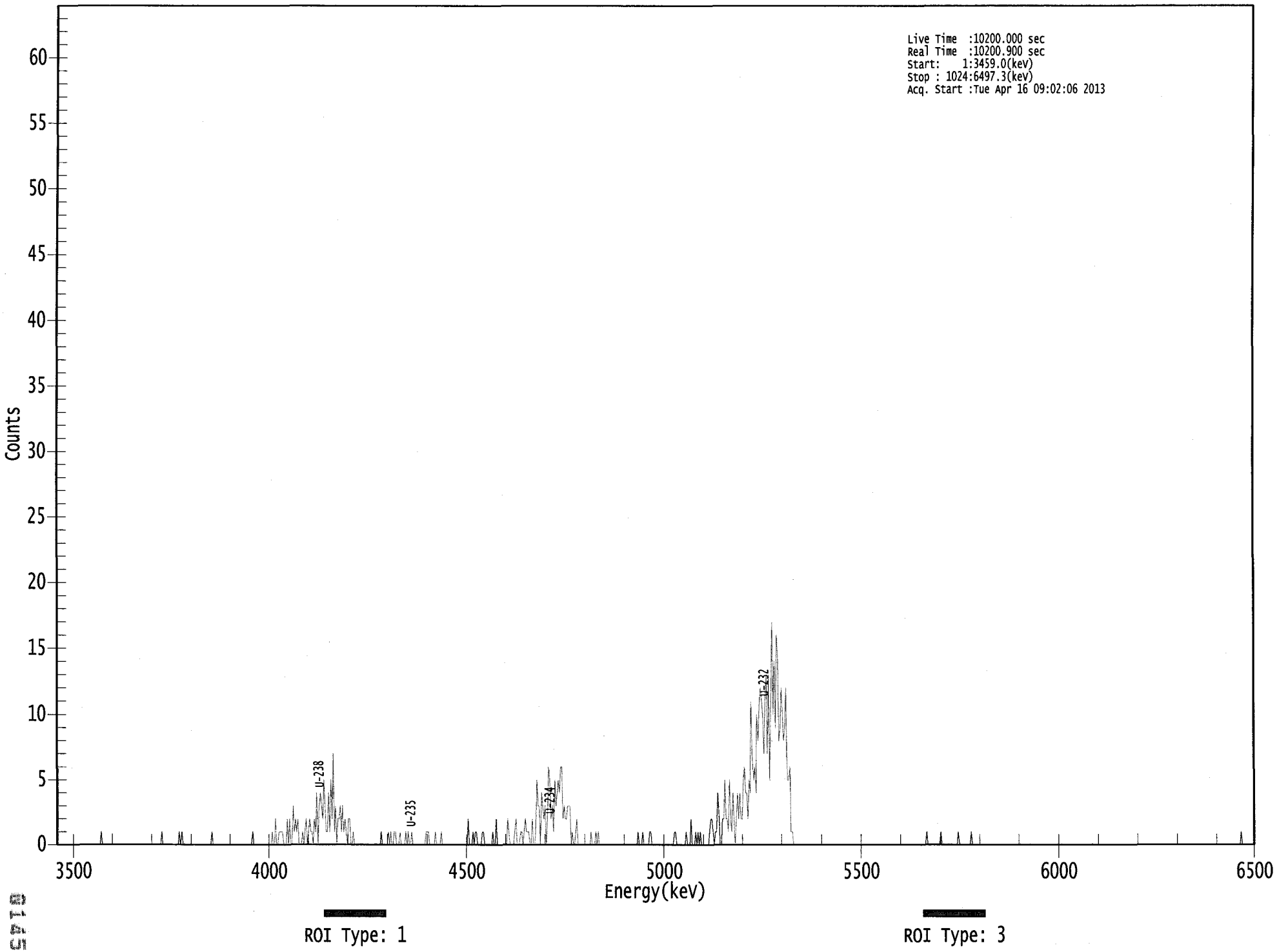
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.986	5302.50*	5.13E+000 +/- 5.52E-001	5.32E-002 +/- 5.73E-003
U-234	0.985	4761.50*	1.49E+000 +/- 3.14E-001	6.10E-002 +/- 6.57E-003
U-235	0.996	4385.50*	2.05E-001 +/- 1.17E-001	9.43E-002 +/- 1.02E-002
U-238	0.979	4184.40*	1.27E+000 +/- 2.85E-001	7.16E-002 +/- 7.71E-003

AG
4/17/13

0000055561.CNF



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

Sample Title: 09

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	1	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	1	0	0	0	0	0
97:	0	0	0	0	0	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	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:	1	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	1	0	0	2	0	0	1
193:	1	1	1	0	0	0	2	0
201:	2	0	0	3	1	2	1	2
209:	0	0	0	1	0	1	2	0
217:	1	2	1	1	0	2	1	4
225:	0	3	4	3	2	5	3	1
233:	1	4	1	5	2	7	1	3
241:	0	2	2	3	1	3	1	2
249:	1	0	2	2	0	0	1	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	1	0
281:	0	0	0	0	1	0	1	0
289:	0	1	1	0	0	0	1	0
297:	0	0	0	1	0	1	0	0
305:	1	0	0	0	0	0	0	0
313:	0	0	0	0	1	1	1	0
321:	0	0	0	0	1	0	0	0
329:	0	1	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:	2	0	0	0	1	0	1	1
361:	0	0	0	0	1	1	0	0

369:	0	0	0	0	0	1	0	0

Sample Title: 09

Channel								
377:	2	0	0	0	0	0	0	0
385:	0	0	2	1	0	0	0	0
393:	1	2	0	0	0	1	1	0
401:	1	2	1	1	1	0	0	2
409:	0	0	1	5	3	3	0	4
417:	3	2	3	0	2	6	5	2
425:	3	1	5	3	4	5	4	6
433:	6	2	3	2	2	3	3	3
441:	0	1	0	0	1	2	0	0
449:	0	0	0	0	0	0	0	0
457:	0	1	0	0	0	1	0	1
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	1	0	0	0	1	0	0
505:	0	0	0	1	1	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	1	1	0	0	0	0	0	0
537:	0	0	1	0	0	0	2	0
545:	0	0	1	0	1	0	1	0
553:	0	0	0	0	0	0	1	2
561:	2	1	0	1	1	4	2	0
569:	0	2	2	5	2	2	1	5
577:	2	1	4	2	0	2	4	2
585:	4	2	2	5	6	4	4	2
593:	5	4	11	7	5	6	4	10
601:	8	11	12	11	10	7	11	13
609:	7	13	5	11	17	10	14	9
617:	16	14	8	9	12	10	8	9
625:	12	5	5	6	1	1	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	1
745:	0	0	0	0	0	0	0	0
753:	0	0	0	1	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	1	0	0	0	0	0
777:	0	0	0	0	0	1	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: 09

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

Apex-Alpha™

KCB 4/16/13

Sample Description: LR-105 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 10
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 54587
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:02:07 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.599 mL
Effective Efficiency: 0.0226 +/- 0.0035
Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
Chem. Recovery Factor: 0.1142 +/- 0.0177

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	5.287	43.66	29.80	0.34	0.00E+000	5.2
U-234		4.686	0.32	646.93	0.68	0.00E+000	3.0
U-235		4.396	-0.68	304.44	0.68	0.00E+000	0.0
U-238		4.133	-2.55	92.03	2.55	0.00E+000	0.0

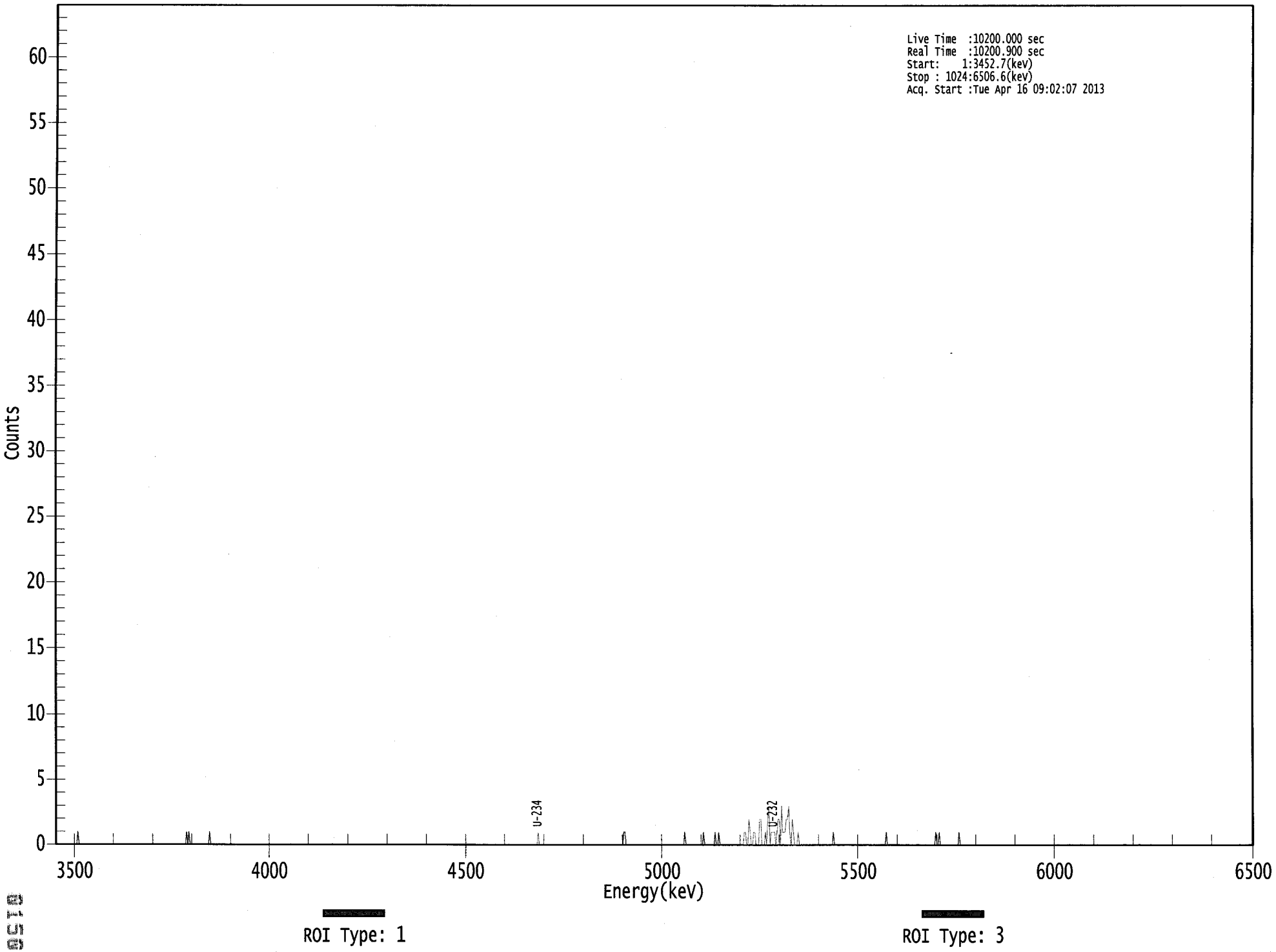
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.13E+000 +/- 1.55E+000	5.62E-001 +/- 1.69E-001
U-234	0.960	4761.50*	3.76E-002 +/- 2.44E-001	6.63E-001 +/- 2.00E-001
U-235	0.999	4385.50*	-9.86E-002 +/- 3.02E-001	8.18E-001 +/- 2.46E-001
U-238	0.982	4184.40*	-2.98E-001 +/- 2.89E-001	9.82E-001 +/- 2.96E-001

AG 4/17/13

0000055565.CNF



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

Sample Title: 10

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	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	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	1	0	1	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	1	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	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	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: 10

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	1	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	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	0	0	0	0	0	1	1
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	1	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	1	0	0	0	0	0
561:	0	0	0	0	1	0	0	1
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	1	1	0
593:	0	2	1	0	0	1	1	0
601:	0	0	2	2	0	0	0	1
609:	0	2	3	0	1	1	1	1
617:	0	1	2	2	0	3	1	1
625:	1	2	2	3	1	0	2	1
633:	0	0	0	1	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	1	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	1	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:	1	0	0	1	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	1	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: 10

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

KAB 4/16/13

Apex-Alpha™

Sample Description: LR-105 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 11
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_042
Chamber Serial Number: 05026930B
Detector Serial Number: 84185
Env. Background: System Bkgd 54588
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:02:09 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.599 mL
Effective Efficiency: 0.0664 +/- 0.0061
Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
Chem. Recovery Factor: 0.3597 +/- 0.0335

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	5.279	128.49	17.33	0.51	0.00E+000	5.7
U-234		4.743	7.66	72.63	0.34	0.00E+000	3.0
U-235		4.463	0.83	239.53	0.17	0.00E+000	3.0
U-238		4.245	0.49	416.98	0.51	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

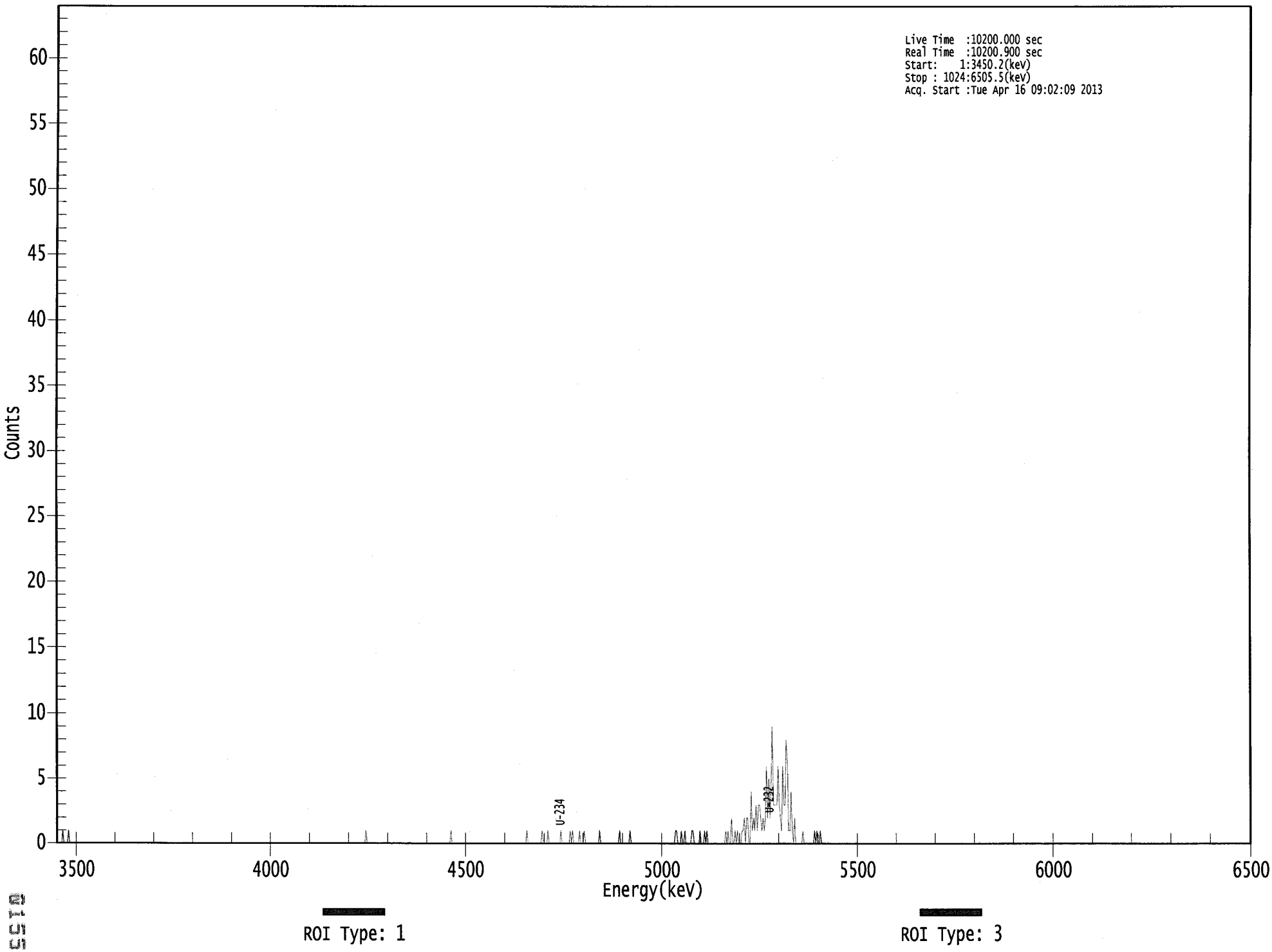
NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.14E+000 +/- 9.20E-001	2.10E-001 +/- 3.76E-002
U-234	0.997	4761.50*	3.06E-001 +/- 2.29E-001	1.91E-001 +/- 3.42E-002
U-235	0.959	4385.50*	4.09E-002 +/- 9.83E-002	2.06E-001 +/- 3.69E-002
U-238	0.975	4184.40*	1.95E-002 +/- 8.14E-002	2.09E-001 +/- 3.74E-002

AG
4/17/13

US EPA ARCHIVE DOCUMENT

0000055566.CNF



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

Sample Title: 11

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	1	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	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	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	1	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	1	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: 11

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	1	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	1	0	0	0	0	1	0
425:	0	0	0	0	0	0	0	0
433:	0	1	0	0	0	0	0	0
441:	0	1	0	1	0	0	0	0
449:	0	1	0	0	0	1	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	1	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	0	0	0	1	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	1	1	0	0	0
537:	1	0	0	1	0	0	0	0
545:	0	1	1	0	0	0	0	0
553:	1	0	0	0	1	0	1	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	1	0
577:	1	0	0	2	0	0	1	0
585:	1	0	0	0	1	1	2	0
593:	2	2	0	0	4	1	2	1
601:	3	1	3	3	2	1	2	1
609:	2	6	2	5	2	5	9	3
617:	3	3	3	6	3	2	1	6
625:	3	3	8	6	1	1	4	1
633:	0	2	0	0	0	0	0	0
641:	1	0	0	0	0	0	0	0
649:	0	0	1	0	1	0	0	1
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: 11

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 4/16/13

Sample Description: PZ-207-AS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 12
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_044
Chamber Serial Number: 04026481B
Detector Serial Number: 84168
Env. Background: System Bkgd 54589
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:02:11 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.595 mL
Effective Efficiency: 0.0906 +/- 0.0072
Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
Chem. Recovery Factor: 0.4765 +/- 0.0387

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	5.275	174.00	14.90	0.00	0.00E+000	11.5
U-234		4.720	6.00	86.43	0.00	0.00E+000	3.0
U-235		4.440	2.00	169.74	0.00	0.00E+000	3.0
U-238		4.189	2.32	149.12	0.68	0.00E+000	3.0

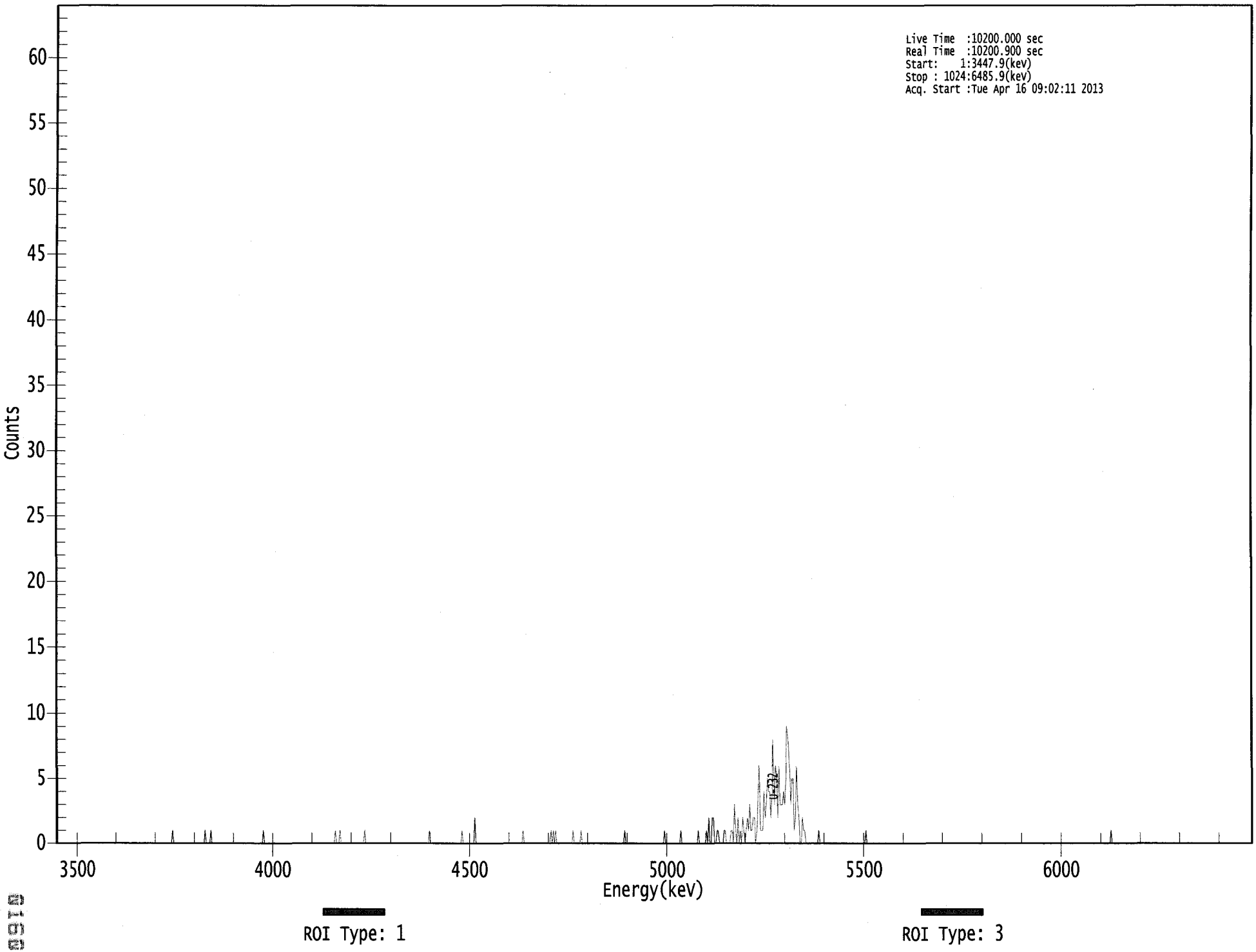
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.10E+000 +/- 7.94E-001	1.76E-001 +/- 2.74E-002
U-234	0.988	4761.50*	1.76E-001 +/- 1.54E-001	1.76E-001 +/- 2.74E-002
U-235	0.979	4385.50*	7.23E-002 +/- 1.23E-001	2.17E-001 +/- 3.37E-002
U-238	1.000	4184.40*	6.77E-002 +/- 1.01E-001	1.65E-001 +/- 2.56E-002

AG 4/17/13

0000055562.CNF



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

Sample Title: 12

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	1	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:	1	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	1	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:	1	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	1	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:	1	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	1	0	0	0
353:	0	0	0	0	0	0	0	2
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 12

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	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:	1	0	1	0	1	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	1	0	0	0	0
449:	0	0	1	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	0	0	0	0	0	0	1
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	1	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	1	0
553:	0	0	0	0	0	1	0	2
561:	0	0	2	2	0	0	1	1
569:	0	0	0	0	1	1	0	0
577:	0	0	1	1	0	3	1	0
585:	2	0	1	0	2	1	0	1
593:	2	1	3	1	1	2	2	0
601:	1	4	6	1	1	1	4	2
609:	3	5	4	4	2	4	8	3
617:	6	5	2	6	3	3	3	4
625:	3	5	9	8	7	3	5	5
633:	1	2	6	3	2	0	0	2
641:	1	1	0	0	0	0	0	0
649:	0	0	0	0	0	1	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	1	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	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: 12

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	1	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB 4/16/13

Apex-Alpha™

Sample Description: PZ-207-AS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 13
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_046
Chamber Serial Number: 04026482B
Detector Serial Number: 58762
Env. Background: System Bkgd 54590
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:02:13 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.596 mL
Effective Efficiency: 0.0665 +/- 0.0061
Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
Chem. Recovery Factor: 0.3715 +/- 0.0346

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	5.282	127.83	17.35	0.17	0.00E+000	5.7
U-234		4.747	8.00	73.50	0.00	0.00E+000	3.0
U-235		4.349	4.00	109.57	0.00	0.00E+000	3.0
U-238		4.139	3.83	102.72	0.17	0.00E+000	3.0

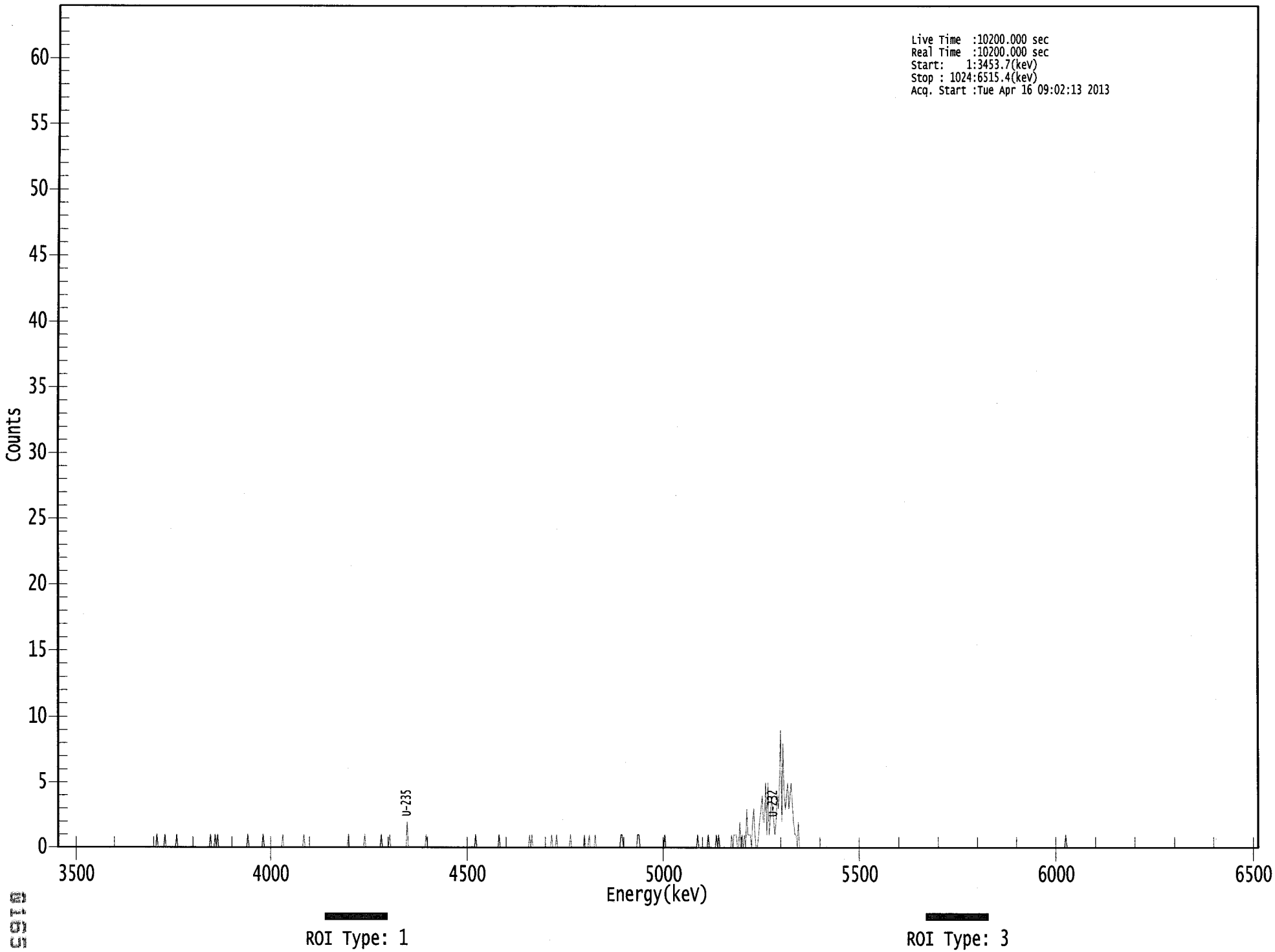
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.11E+000 +/- 9.16E-001	1.67E-001 +/- 2.99E-002
U-234	0.999	4761.50*	3.20E-001 +/- 2.42E-001	2.40E-001 +/- 4.29E-002
U-235	0.991	4385.50*	1.97E-001 +/- 2.19E-001	2.95E-001 +/- 5.30E-002
U-238	0.985	4184.40*	1.52E-001 +/- 1.59E-001	1.66E-001 +/- 2.98E-002

AG 4/17/13

0000055558.CNF



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

Sample Title: 13

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	1	0	0
89:	0	0	0	0	1	0	0	0
97:	0	0	0	0	0	0	1	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	1	0	0	0	1
137:	0	1	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	1	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	0	0	0	0	0
193:	0	1	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	1	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	1	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	1
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	1	0	0
281:	0	0	0	0	1	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	2	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	1	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	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	1	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 13

Channel								
377:	0	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	1	0	1	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	1	0
425:	0	0	1	0	0	0	0	0
433:	0	0	0	0	0	0	1	0
441:	0	0	0	0	0	0	0	0
449:	0	0	1	0	0	0	1	0
457:	0	0	0	1	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	0	1
497:	1	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	1	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	1	0	0	0	0	0
553:	0	0	0	1	0	0	0	0
561:	0	0	1	0	1	0	0	0
569:	0	0	0	0	0	0	0	1
577:	0	1	1	1	0	0	2	0
585:	1	0	1	0	3	1	1	1
593:	0	2	3	1	0	0	1	2
601:	3	4	2	2	5	1	5	1
609:	2	4	3	2	1	2	4	3
617:	5	9	2	8	4	3	4	5
625:	3	4	5	3	2	1	1	0
633:	2	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	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: 13

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:	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 4/16/13

Sample Description: LR-103 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 14
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_047
Chamber Serial Number: 02030596A
Detector Serial Number: 91086
Env. Background: System Bkgd 54591
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:02:14 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.597 mL
Effective Efficiency: 0.1073 +/- 0.0079
Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
Chem. Recovery Factor: 0.5890 +/- 0.0444

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	5.249	206.83	13.64	0.17	0.00E+000	21.3
U-234		4.655	2.66	128.85	0.34	0.00E+000	2.9
U-235		4.423	0.66	305.43	0.34	0.00E+000	2.9
U-238		4.135	7.83	70.93	0.17	0.00E+000	2.9

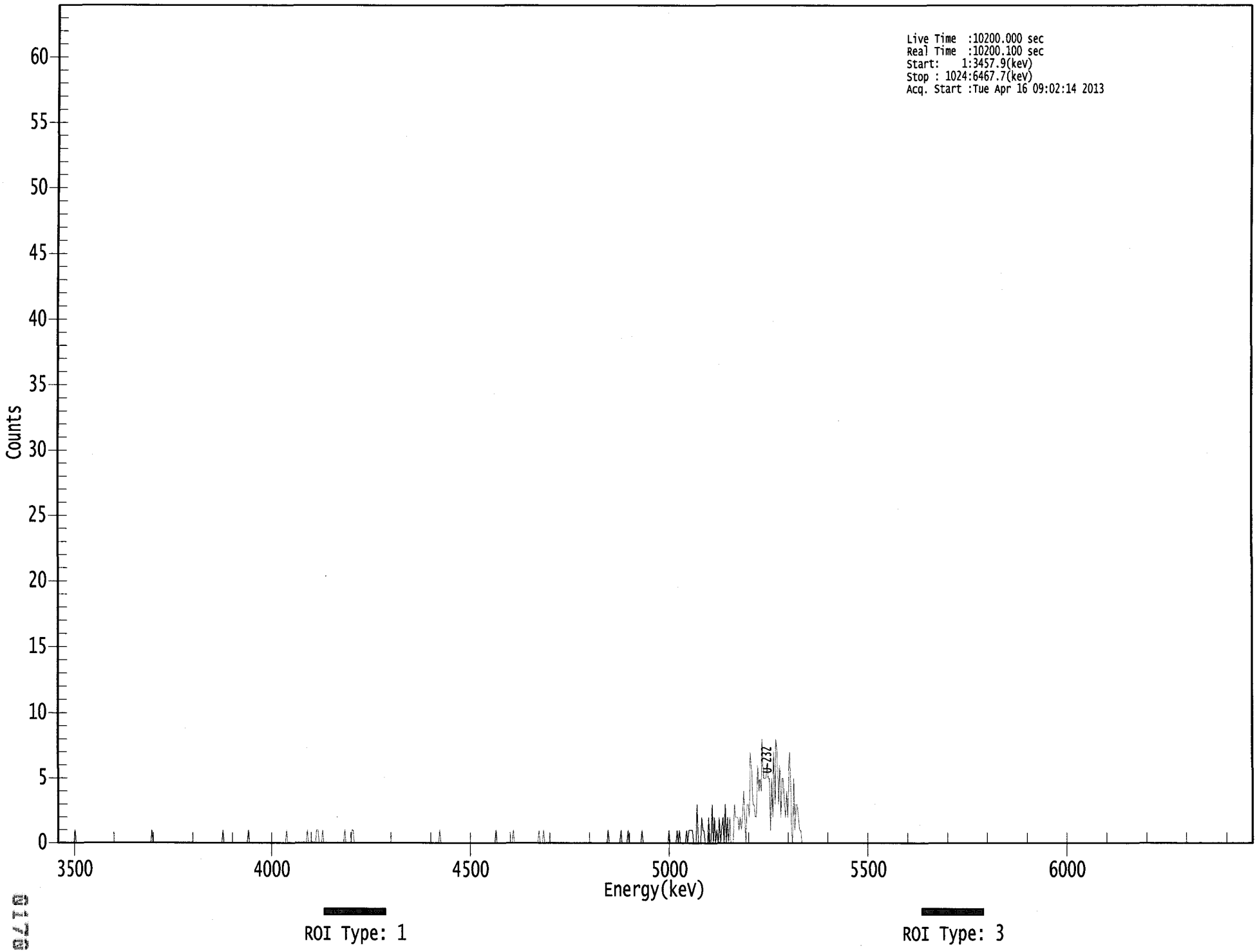
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.980	5302.50*	5.12E+000 +/- 7.35E-001	1.03E-001 +/- 1.48E-002
U-234	0.923	4761.50*	6.58E-002 +/- 8.53E-002	1.18E-001 +/- 1.70E-002
U-235	0.990	4385.50*	2.01E-002 +/- 6.16E-002	1.46E-001 +/- 2.10E-002
U-238	0.983	4184.40*	1.93E-001 +/- 1.40E-001	1.03E-001 +/- 1.48E-002

AG
4/17/13

0000055567.CNF



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

Sample Title: 14

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	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	1	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	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	1	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	1	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	1
217:	0	0	0	0	0	0	0	1
225:	1	0	0	0	1	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	1
249:	0	0	0	0	0	1	1	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	1	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: 14

Channel								
377:	1	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	1
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	1	0	0
417:	0	1	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	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:	1	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	1	0	0	0	0	0	0
497:	0	0	0	0	0	1	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	1	0	0	0
529:	0	0	0	1	0	1	0	0
537:	0	0	0	1	0	1	1	1
545:	1	0	0	0	3	0	0	0
553:	2	1	1	0	0	0	2	0
561:	0	3	0	2	0	1	0	2
569:	0	1	2	0	3	0	2	0
577:	2	0	0	0	3	2	2	2
585:	1	2	1	2	4	2	0	3
593:	3	2	7	6	3	3	2	2
601:	6	4	5	4	8	5	5	5
609:	6	5	5	1	5	2	7	3
617:	8	7	3	6	2	5	5	3
625:	2	4	2	6	7	1	0	5
633:	1	3	3	2	1	1	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	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: 14

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

KDB 4/16/13

Apex-Alpha™

Sample Description: LR-103 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 15
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_048
Chamber Serial Number: 02030596B
Detector Serial Number: 83111
Env. Background: System Bkgd 54592
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/3/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 9:02:16 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.597 mL
Effective Efficiency: 0.1310 +/- 0.0088
Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
Chem. Recovery Factor: 0.7802 +/- 0.0541

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	5.279	252.49	12.35	0.51	0.00E+000	8.4
U-234		4.701	11.00	61.72	0.00	0.00E+000	3.0
U-235		4.316	1.83	152.56	0.17	0.00E+000	3.0
U-238		4.155	18.00	47.46	0.00	0.00E+000	4.4

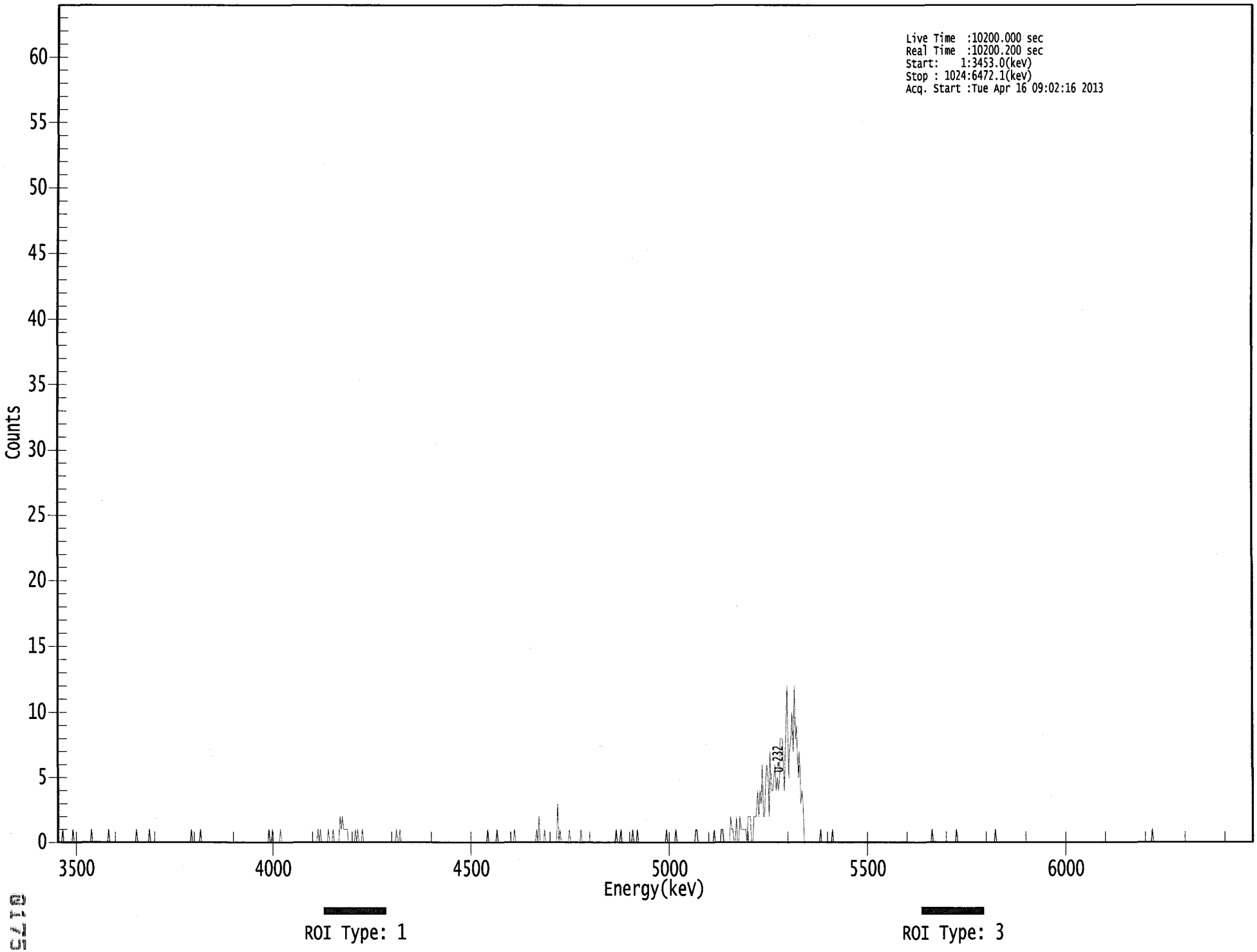
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.12E+000 +/- 6.73E-001	1.06E-001 +/- 1.40E-002
U-234	0.975	4761.50*	2.23E-001 +/- 1.41E-001	1.21E-001 +/- 1.60E-002
U-235	0.966	4385.50*	4.57E-002 +/- 7.00E-002	1.04E-001 +/- 1.37E-002
U-238	0.994	4184.40*	3.63E-001 +/- 1.79E-001	1.21E-001 +/- 1.59E-002

AG
4/17/13

0000055568.CNF



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

Sample Title: 15

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	1	0	0	0
9:	0	0	0	0	0	1	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	1	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	1	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	1	0	0	0
73:	0	0	0	0	0	0	0	1
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	1	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	1	0
185:	0	1	0	0	0	0	0	0
193:	1	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:	1	0	1	0	0	0	0	0
233:	0	1	0	0	0	1	0	0
241:	0	0	0	2	1	2	1	1
249:	1	1	0	0	0	0	0	0
257:	1	0	1	0	0	0	1	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	1	0	0	1	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	1	0	0	0	0	0	0

Sample Title: 15

Channel								
377:	0	1	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	1	0	2	0	0
417:	0	0	1	0	0	0	0	0
425:	0	0	0	0	0	3	0	1
433:	0	0	0	0	0	0	0	1
441:	0	0	0	0	0	0	0	0
449:	0	1	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	1
481:	0	0	0	1	0	0	0	0
489:	0	0	0	0	0	1	0	0
497:	0	1	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	1	0	0	0	0	0
529:	0	0	1	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	1	1	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	1	0	0	0	0
569:	0	1	1	0	0	0	0	0
577:	0	2	1	1	0	0	2	0
585:	0	2	1	1	1	1	1	0
593:	2	2	2	0	0	2	2	2
601:	4	2	4	3	6	2	2	5
609:	6	5	2	7	4	4	5	6
617:	4	5	4	5	8	8	8	4
625:	6	9	12	5	7	8	10	7
633:	12	8	9	5	7	3	4	3
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	1	0
657:	0	0	0	0	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	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	1	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	1	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	1	0	0	0	0

Sample Title: 15

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	1	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

JDB 4/16/13

Apex-Alpha™

Sample Description: PZ-110-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 16
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_003
Chamber Serial Number:
Detector Serial Number: 3
Env. Background: System Bkgd 54570
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/4/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 11:58:31 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: 0.1569 +/- 0.0097
Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
Chem. Recovery Factor: 0.8984 +/- 0.0580

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	5.279	304.98	11.25	1.02	0.00E+000	17.5
U-234		4.712	7.49	74.41	0.51	0.00E+000	6.0
U-235		4.401	4.66	94.59	0.34	0.00E+000	3.0
U-238		4.165	8.15	72.72	0.85	0.00E+000	3.0

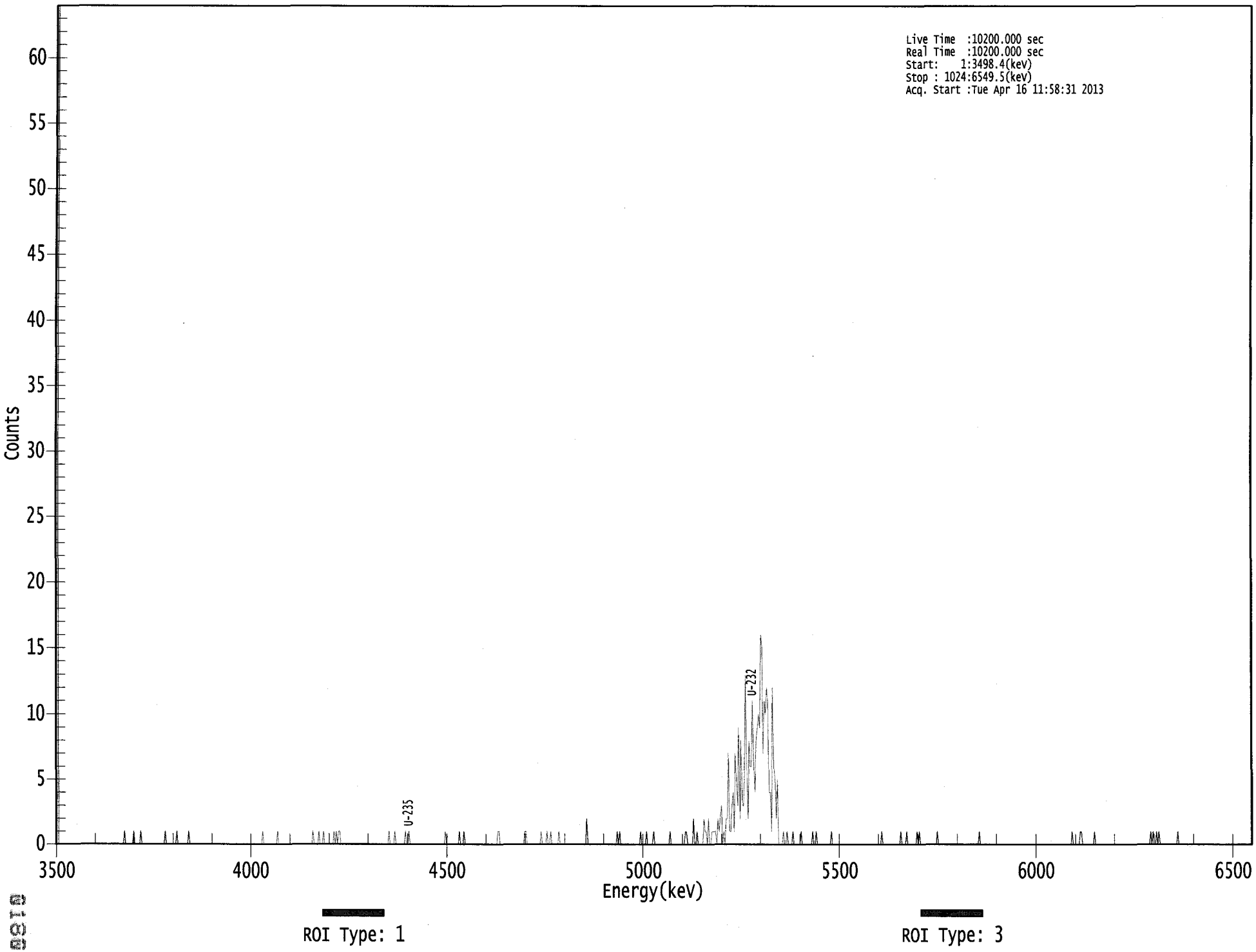
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.16E+000 +/- 6.26E-001	1.07E-001 +/- 1.29E-002
U-234	0.983	4761.50*	1.27E-001 +/- 9.56E-002	8.88E-002 +/- 1.08E-002
U-235	0.998	4385.50*	9.73E-002 +/- 9.28E-002	9.98E-002 +/- 1.21E-002
U-238	0.997	4184.40*	1.37E-001 +/- 1.01E-001	1.01E-001 +/- 1.22E-002

AG
4/17/13

0000055569.CNF



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

Sample Title: 16

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	1	0	0	0	0
65:	0	0	0	1	0	0	0	0
73:	0	1	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	1	0
97:	0	0	0	0	0	0	0	0
105:	1	0	0	0	0	0	0	0
113:	0	0	1	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	0	1	0	0	0	0	0
185:	0	0	0	0	0	0	0	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	0	0	0	1	0	0
225:	0	0	1	0	0	0	1	0
233:	0	0	0	0	0	0	0	1
241:	0	1	0	1	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	1	0
289:	0	0	0	1	0	0	0	0
297:	0	0	0	0	1	0	0	1
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	1	0
337:	0	0	0	0	0	0	0	0
345:	0	0	1	0	0	0	1	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 16

Channel								
377:	0	0	0	1	1	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	1	1	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	1	0	0	0	0	1	0	0
425:	1	0	0	0	0	0	0	1
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	2
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	0	1	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	1	0	0
505:	0	0	1	0	0	0	0	0
513:	1	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	1	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	1	1	0	0	0
545:	0	0	2	0	0	1	0	0
553:	0	0	0	2	1	1	0	2
561:	0	0	1	1	1	1	0	2
569:	1	2	3	0	1	0	2	2
577:	7	1	1	3	4	1	7	5
585:	3	9	2	8	3	3	6	13
593:	5	2	8	6	6	11	6	4
601:	8	9	10	9	16	15	7	11
609:	10	12	11	4	4	1	12	6
617:	5	2	5	0	0	0	0	1
625:	0	0	1	0	0	0	0	1
633:	0	0	0	0	0	0	1	0
641:	0	0	0	0	0	0	0	0
649:	1	0	0	1	0	0	0	0
657:	0	0	0	0	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	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	1	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	1	0	0	0	0
729:	1	0	0	0	0	0	0	0
737:	0	1	0	1	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	1	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	1	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 16

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	1	0	0
873:	0	0	0	0	1	1	0	0
881:	0	0	0	0	0	0	0	0
889:	1	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:	1	0	1	0	0	1	0	1
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	1
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

LCB 4/16/13

Apex-Alpha™

Sample Description: PZ-110-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 17
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_004
Chamber Serial Number:
Detector Serial Number: 4
Env. Background: System Bkgd 54571
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/4/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 11:58:32 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.600 mL
Effective Efficiency: 0.1678 +/- 0.0101
Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
Chem. Recovery Factor: 0.8649 +/- 0.0544

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	5.265	324.81	10.90	1.19	0.00E+000	4.1
U-234		4.697	4.96	107.11	2.04	0.00E+000	2.9
U-235		4.410	1.81	193.78	1.19	0.00E+000	2.9
U-238		4.145	5.15	94.34	0.85	0.00E+000	2.9

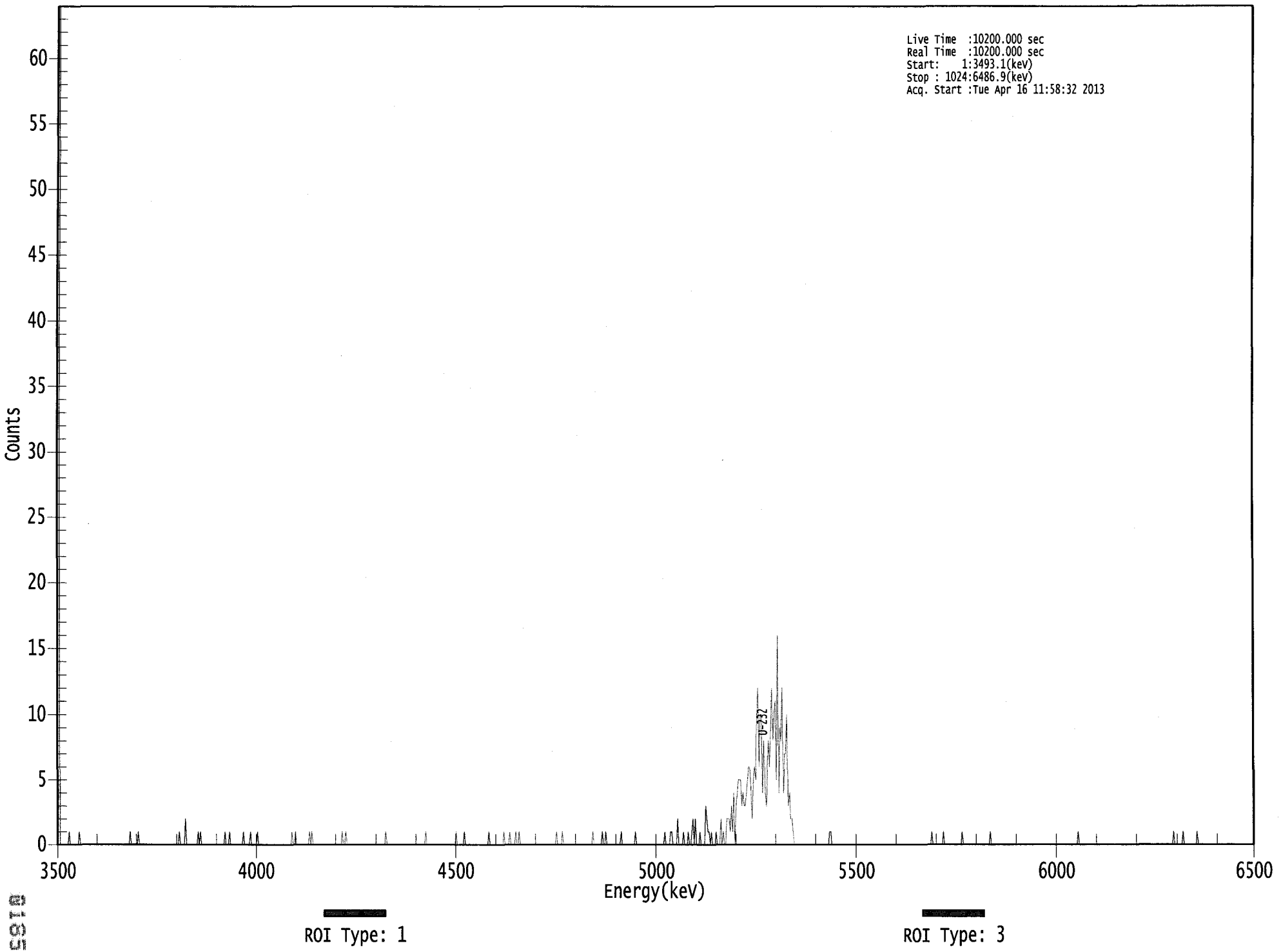
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.990	5302.50*	5.14E+000 +/- 6.06E-001	1.04E-001 +/- 1.23E-002
U-234	0.971	4761.50*	7.85E-002 +/- 8.46E-002	1.23E-001 +/- 1.45E-002
U-235	0.996	4385.50*	3.53E-002 +/- 6.86E-002	1.29E-001 +/- 1.52E-002
U-238	0.989	4184.40*	8.11E-002 +/- 7.71E-002	9.43E-002 +/- 1.11E-002

AG 4/17/13

0000055570.CNF



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

Sample Title: 17

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	10200	10200	0	0	0	0	0	0
9:	0	0	1	0	0	0	0	0
17:	0	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	1
65:	0	0	0	0	0	0	1	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	2	0
113:	0	0	0	0	0	0	0	0
121:	0	1	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:	1	0	0	0	1	0	0	0
153:	0	0	0	0	0	0	0	0
161:	1	0	0	0	0	0	1	0
169:	0	0	0	0	1	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	1	0	0	1	0	0
209:	0	0	0	0	0	0	0	0
217:	0	1	0	1	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	1	0	0
249:	1	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	1	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	1	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	1	0
345:	0	0	0	0	0	1	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	1	0	0	0	0	0

Sample Title: 17

Channel								
377:	0	0	0	0	0	0	0	1
385:	0	0	0	0	1	0	0	0
393:	0	1	0	0	1	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	1	0	0	0
433:	0	1	0	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	1	0	0	0	0
465:	0	0	0	1	0	0	1	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	0	0	0	0	0	0	1
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:	1	0	0	0	0	1	1	0
529:	0	0	0	2	0	0	0	0
537:	1	0	0	0	1	0	0	1
545:	2	0	2	0	0	0	1	0
553:	0	0	0	3	2	1	1	0
561:	1	0	0	0	1	0	0	0
569:	2	0	1	0	0	2	2	2
577:	1	3	1	4	0	3	4	5
585:	5	5	3	4	3	3	4	5
593:	6	6	4	2	5	6	5	9
601:	12	6	10	10	4	8	4	3
609:	6	8	6	9	12	8	10	11
617:	5	16	4	9	8	12	4	7
625:	7	10	3	4	2	2	1	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	1	1	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	1	0	0	0
753:	0	0	0	0	0	0	1	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	1	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	1	0

801:	0	0	0	0	0	0	0	0

Sample Title: 17

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	1	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	1	0	0	0	0	0
961:	0	0	1	0	0	0	0	0
969:	0	0	0	0	0	0	1	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

1083 4/16/13

Apex-Alpha™

Sample Description: I-62 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 18
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_010
Chamber Serial Number:
Detector Serial Number: 10
Env. Background: System Bkgd 54572
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/4/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 11:58:29 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.596 mL
Effective Efficiency: 0.2057 +/- 0.0114
Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
Chem. Recovery Factor: 1.0458 +/- 0.0610

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	396.13	9.87	1.87	0.00E+000	14.9
U-234		4.723	16.79	51.38	2.21	0.00E+000	3.7
U-235		4.415	3.32	119.77	0.68	0.00E+000	2.9
U-238		4.159	17.15	48.68	0.85	0.00E+000	4.4

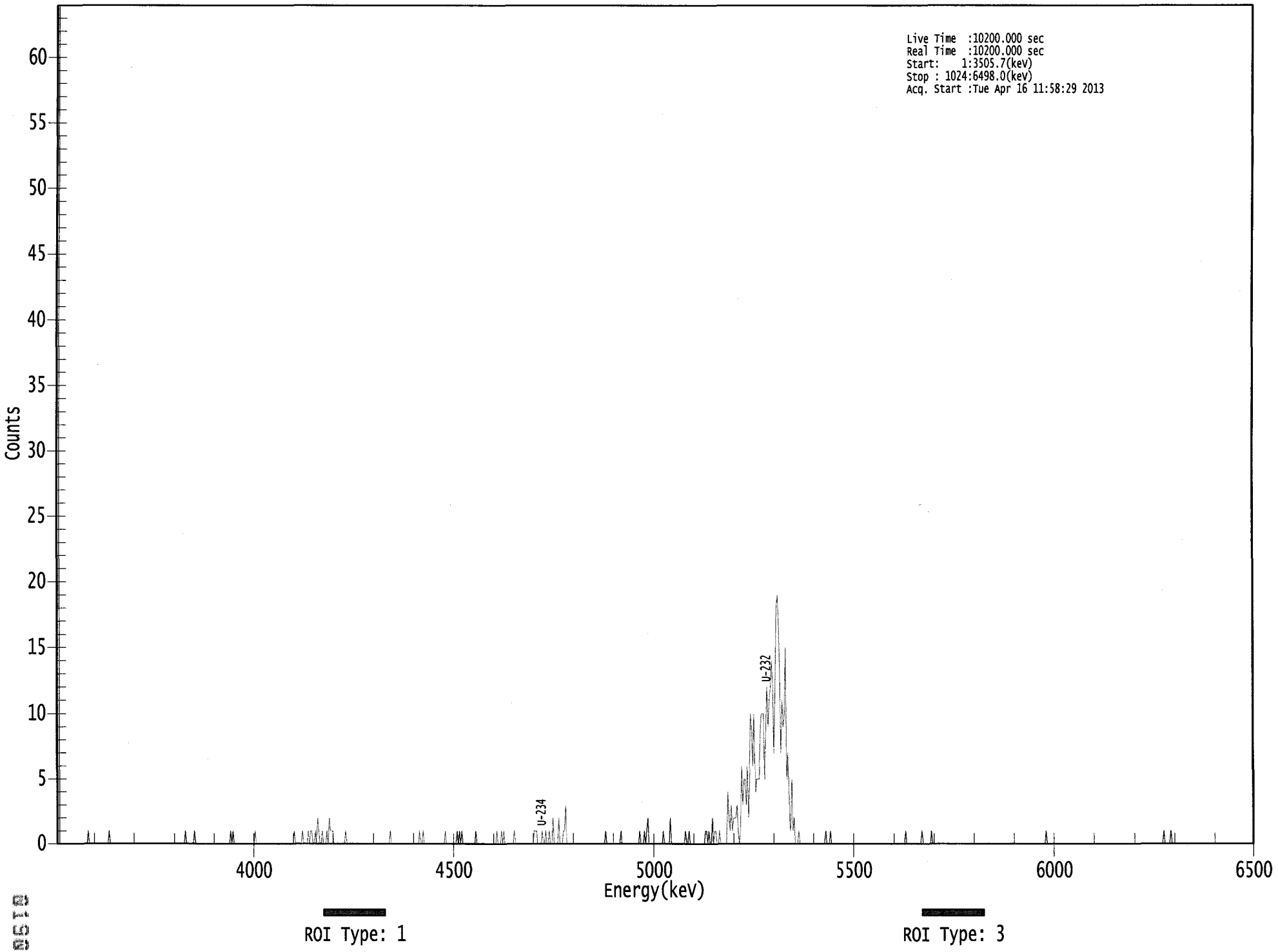
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.11E+000 +/- 5.55E-001	9.78E-002 +/- 1.06E-002
U-234	0.990	4761.50*	2.17E-001 +/- 1.14E-001	1.03E-001 +/- 1.12E-002
U-235	0.994	4385.50*	5.29E-002 +/- 6.36E-002	8.98E-002 +/- 9.75E-003
U-238	0.995	4184.40*	2.20E-001 +/- 1.10E-001	7.69E-002 +/- 8.35E-003

AG 4/17/13

0000055571.CNF



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

Sample Title: 18

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	1	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	1	0
113:	0	0	0	0	0	0	1	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	1	0	1
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	1	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	1	0	0	0
209:	0	0	0	1	0	0	0	0
217:	1	0	1	1	0	0	1	0
225:	2	1	0	0	1	0	0	0
233:	1	0	2	1	1	1	0	0
241:	0	0	0	0	0	0	0	0
249:	1	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	1	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	1
313:	0	0	1	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	1	0	0
337:	0	0	0	0	0	0	0	1
345:	0	1	0	1	0	0	0	0
353:	0	0	0	0	0	0	0	1
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 18

Channel								
377:	0	1	0	0	0	1	0	1
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	1	1	1	0	0	0	0
417:	1	0	0	1	0	0	1	0
425:	0	2	0	0	0	0	2	0
433:	0	0	1	1	3	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	1	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	1	0	0	0	1
505:	0	1	2	0	0	0	0	0
513:	0	0	0	0	0	0	0	1
521:	0	0	0	0	0	2	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	1	0	0	1	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	1	1	0	1	0
561:	0	2	0	1	1	0	0	1
569:	0	0	0	0	0	0	4	2
577:	1	3	1	2	2	2	3	1
585:	0	1	6	3	5	5	3	6
593:	2	5	10	9	6	10	4	5
601:	5	5	8	10	10	10	5	9
609:	12	9	11	12	14	12	7	12
617:	18	19	17	13	7	11	9	10
625:	15	5	7	2	1	5	1	2
633:	0	0	0	1	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	1	0	0	0	1	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	1	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	1	0	0	0
745:	0	0	0	0	1	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: 18

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	1	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	1	0	0	0	0	0
953:	1	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

1043 4/16/13

Apex-Alpha™

Sample Description: I-62 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555
Batch Identification: 1304049A-UU
Sample Identification: 19
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_011
Chamber Serial Number:
Detector Serial Number: 11
Env. Background: System Bkgd 54573
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/4/2013 6:12:59 AM
Acquisition Date/Time: 4/16/2013 11:58:30 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.597 mL
Effective Efficiency: 0.2157 +/- 0.0117
Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
Chem. Recovery Factor: 1.0930 +/- 0.0636

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	5.265	415.98	9.62	1.02	0.00E+000	16.2
U-234		4.720	14.83	51.24	0.17	0.00E+000	4.0
U-235		4.427	6.00	86.43	0.00	0.00E+000	5.3
U-238		4.139	17.98	47.73	1.02	0.00E+000	2.7

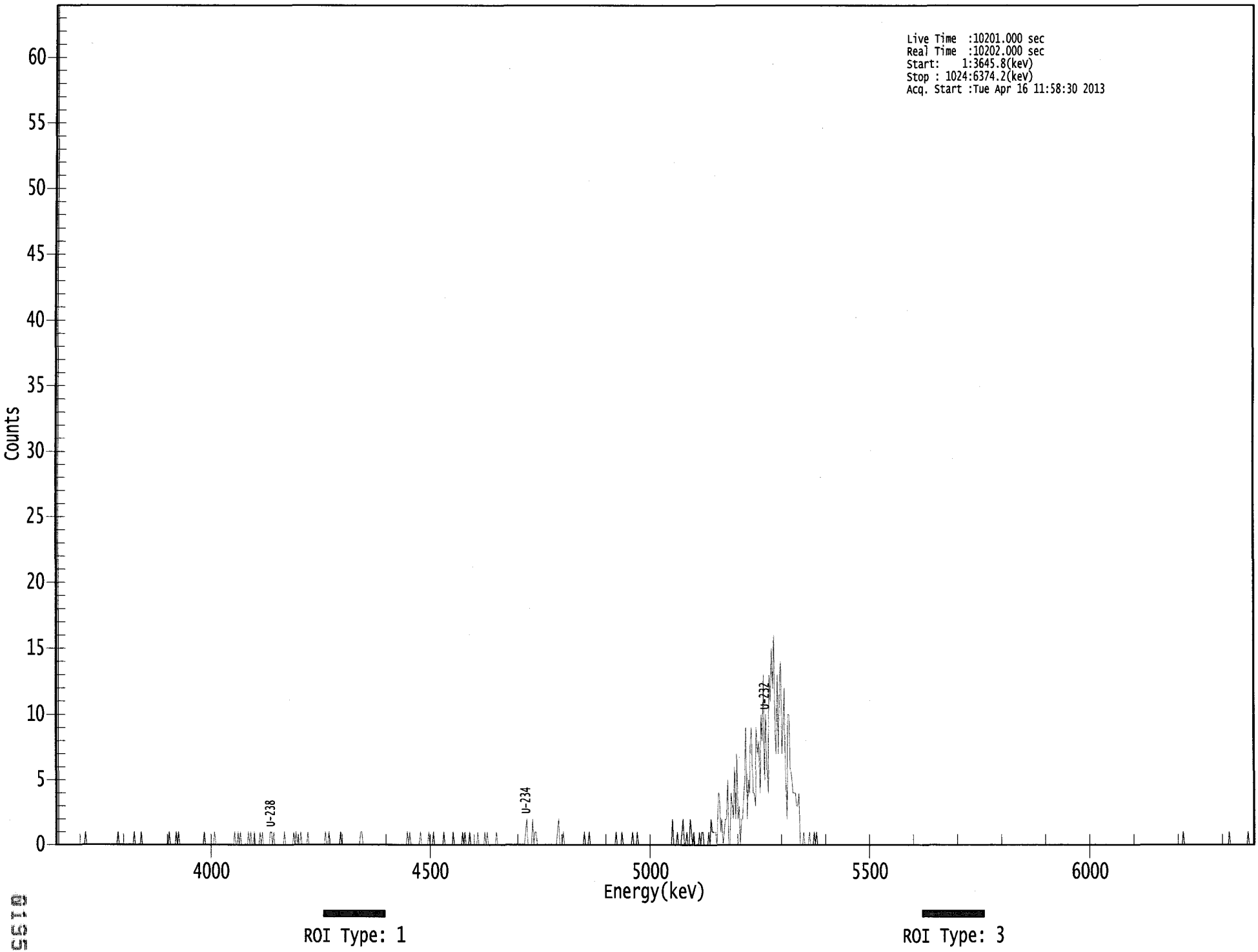
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.990	5302.50*	5.12E+000 +/- 5.44E-001	7.76E-002 +/- 8.25E-003
U-234	0.988	4761.50*	1.83E-001 +/- 9.55E-002	5.14E-002 +/- 5.46E-003
U-235	0.988	4385.50*	9.11E-002 +/- 7.93E-002	9.11E-002 +/- 9.68E-003
U-238	0.985	4184.40*	2.20E-001 +/- 1.08E-001	7.72E-002 +/- 8.21E-003

AG
4/17/13

0000055572.CNF



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

Sample Title: 19

Elapsed Live time: 10201
Elapsed Real Time: 10202

Channel								
1:	10202	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	1	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	1	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	1	0	0	0	0
73:	0	1	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	1	0	0	0	0	0	1
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	1
129:	0	0	0	0	0	0	0	0
137:	1	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	1	0	0	1	0	1	0
161:	0	0	0	0	0	1	0	1
169:	0	0	1	0	0	0	0	1
177:	0	1	0	0	0	0	0	0
185:	1	1	0	1	0	0	0	0
193:	0	0	0	0	1	0	0	0
201:	0	0	0	0	1	0	1	0
209:	0	0	1	0	0	0	0	0
217:	1	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	1
233:	0	0	1	0	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	1	1	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	1	0	1
305:	0	0	0	0	0	0	0	0
313:	1	0	0	0	0	0	0	1
321:	0	0	0	1	0	0	0	0
329:	0	0	0	0	1	0	0	0
337:	0	0	0	0	1	0	0	0
345:	0	0	0	0	1	0	1	0
353:	0	0	1	0	0	0	0	0
361:	0	1	0	0	0	0	0	1

369:	0	1	0	0	0	0	0	0

Sample Title: 19

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

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	1	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	1	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	1	0	0	0	0	0	0

4/16/2013 5:57:39 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 4/16/2013
Time : 5:57:39 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	4/16/2013 5:35:47 AM
Alpha_004	21f	ALL	Passed	4/16/2013 5:35:48 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	4/16/2013 5:35:49 AM
Alpha_011	21f	ALL	Passed	4/16/2013 5:35:49 AM
Alpha_012	21f	ALL	Not Done	
Alpha_013	21f	ALL	Passed	4/16/2013 5:35:50 AM
Alpha_014	21f	ALL	Passed	4/16/2013 5:35:51 AM
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	4/16/2013 5:35:52 AM
Alpha_019	AIM730	ALL	Not Done	
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	4/16/2013 5:35:53 AM
Alpha_023	AIM730	ALL	Not Done	
Alpha_024	AIM730	ALL	Passed	4/16/2013 5:35:53 AM
Alpha_025	AIM730	ALL	Passed	4/16/2013 5:35:54 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	4/16/2013 5:35:55 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	4/16/2013 5:35:56 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Not Done	
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:35:57 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:35:59 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:00 AM
Alpha_036	Alpha Analyst100DC	ALL	Not Done	
Alpha_037	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:01 AM
Alpha_038	Alpha Analyst100DC	ALL	Not Done	
Alpha_039	Alpha Analyst100DC	ALL	Not Done	
Alpha_040	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:03 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:04 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:06 AM

Review of QA Results - Pulser Check

4/16/2013 5:57:39 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:07 AM
Alpha_045	Alpha Analyst100DC	ALL	Not Done	
Alpha_046	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:09 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:10 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:12 AM

APPROVED BY: C

APPROVAL DATE: 4/16/13

4/17/2013 5:59:29 AM

Apex-Alpha™

QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 4/17/2013
Time : 5:59:29 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	4/17/2013 5:39:42 AM
Alpha_004	21f	ALL	Passed	4/17/2013 5:39:43 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	4/17/2013 5:39:43 AM
Alpha_011	21f	ALL	Passed	4/17/2013 5:39:44 AM
Alpha_012	21f	ALL	Not Done	
Alpha_013	21f	ALL	Passed	4/17/2013 5:39:45 AM
Alpha_014	21f	ALL	Passed	4/17/2013 5:39:46 AM
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	4/17/2013 5:39:47 AM
Alpha_019	AIM730	ALL	Not Done	
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	4/17/2013 5:39:48 AM
Alpha_023	AIM730	ALL	Not Done	
Alpha_024	AIM730	ALL	Passed	4/17/2013 5:39:48 AM
Alpha_025	AIM730	ALL	Passed	4/17/2013 5:39:49 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	4/17/2013 5:39:50 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	4/17/2013 5:39:52 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Not Done	
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:39:53 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:39:54 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:39:56 AM
Alpha_036	Alpha Analyst100DC	ALL	Not Done	
Alpha_037	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:39:57 AM
Alpha_038	Alpha Analyst100DC	ALL	Not Done	
Alpha_039	Alpha Analyst100DC	ALL	Not Done	
Alpha_040	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:39:59 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:40:00 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:40:02 AM

Review of QA Results - Ruleer Check

4/17/2013 5:59:29 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:40:03 AM
Alpha_045	Alpha Analyst100DC	ALL	Not Done	
Alpha_046	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:40:05 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:40:07 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	4/17/2013 5:40:09 AM

APPROVED BY: C

APPROVAL DATE: 4/17/13

****
***** 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