ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #13-04051-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 # 13-04051

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
		04/30/13	[illegible]	Data Compilation
		5-1-13	[illegible]	First Technical Data Review
		5/1/13	[illegible]	Second Technical Data Review
		5/2/13	[illegible]	Data Entry/Electronic Deliverable
		5/2/13	[illegible]	Case Narrative
		5/3/13	[illegible]	Electronic Deliverable Proof
		5/3/13	[illegible]	Samples Analyzed within Holding Time Yes? [X] No? [ ]
		5/3/13	[illegible]	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: [signature] 5/6/13

Laboratory Manager Date

Copy No. _____

Radiochemistry Services

SECTION I

CHAIN OF CUSTODY
&
pH CHECK SHEET

Chain of Custody Record

№ 1604

13-04051

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

EBERLINE SERVICES

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

Page 1 of 3

Purchase Order #: _____

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 Tho 232, 230, 228	Tot U238, 235, 234	Tot Ra 226, 228	Tot Tho 232, 230, 228	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
PZ-302-AI	4/3/13	1145	Aqueous	1	X	X	X	X	X	X	1	
LR-100		1327			X	X	X	X	X	X		
D-81		1340			X	X	X	X	X	X		
LR-105		1424			X	X	X	X	X	X		
PZ-207-AS		1505			X	X	X	X	X	X		
LR-103	4/3/13	1530			X	X	X	X	X	X		
PZ-1105S	4/4/13	1027			X	X	X	X	X	X		
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		1356			X	X	X	X	X	X		
PZ-111-SD		1352			X	X	X	X	X	X		
PZ-304-AI		1408			X	X	X	X	X	X		
I-11		1440	↓	↓	X	X	X	X	X	X		
4,5- PZ-105-SS	4/4/13	1506	Aqueous	1	X	X	X	X	X	X	1	

1 Lab to filter for dissolved parameters.

REC'D APR 09 2013

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	First Capital Courier	4/8/13	0800
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
	Kristen Cordell	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?	

SSG

13-04051

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:		Page 2 of 3
Send Report To: Paul Rosasco	Sampler (Print Name): John D Regan		① Lab to filter for dissolved parameters.
Address:	Sampler (Print Name):		
	Shipment Method: Courier		
	Airbill Number: —		Purchase Order #:
Phone:	Laboratory Receiving:		
Fax:			

Analysis Requested

	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 U238, 235, 234	Tot Ra 226, 228	Tot Thor 232, 230, 228						Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
6,7	S-10	4/4/13	1525	Aqueous	1	X	X	X	X	X	X						①	
8,9	LR-104		1552			X	X	X	X	X	X							
10,11	Dup Ø1		—			X	X	X	X	X	X							
12,13	Dup Ø2		—			X	X	X	X	X	X							REC'D APR 09 2013
14,15	FBCPZ10-SS	4/4/13	0930			X	X	X	X	X	X							
16,17	MW-103	4/5/13	0950			X	X	X	X	X	X							
18,19	PZ-200-SS		1110			X	X	X	X	X	X							
	S-61		1118			X	X	X	X	X	X							
	MW-102	Dry Point				~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~						no sample, dry point	
	PZ-115-SS		1223			X	X	X	X	X	X							
	MW-104		1256			X	X	X	X	X	X							
	PZ-100-SD		1403			X	X	X	X	X	X							
	Z-67		1409			X	X	X	X	X	X							
	PZ-203-SS		1458			X	X	X	X	X	X							
	PZ-100-SS		1458			X	X	X	X	X	X							
	Z-66		1459	~~1538~~		X	X	X	X	X	X							
	PZ-305-AI	4/5/13	~~[illegible]~~	Aqueous	1	X	X	X	X	X	X						~~[illegible]~~ ①	

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

Sample Custodian Remarks (Completed By Laboratory):

QA/QC Level	Turnaround	Sample Receipt	
Level I ☐	Routine ☐	Total # Containers Received?	
Level II ☐	24 Hour ☐	COC Seals Present?	
Level III ☐	1 Week ☐	COC Seals Intact?	
Other ☐	Other ____	Received Containers Intact?	
		Temperature?	

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04051
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	46	U1.0
05	46	U1.0
06	42	U1.0
07	42	U1.0
08	45	U1.0
09	45	U1.0
10	48	U1.0
11	48	U1.0
12	43	U1.0
13	43	U1.0
14	42	U1.0
15	42	U1.0
16	48	U1.0
17	48	U1.0
18	37	U1.0
19	37	U1.0

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	BT	4/16/13 0900
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	JW	4/17/13 1535
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JPD	4/17/13 1535
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	0955 RM	4/19/13
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	0855 C	4/19/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	ICB	4/19/13 1740
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES Oak Ridge Laboratory	Internal Chain of Custody	Work Order #	13-04051
		Lab Deadline	4/30/2013
		Analysis	ThISO - 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	04	46	U1.0
Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED	05	46	U1.0
	06	42	U1.0
	07	42	U1.0
	08	45	U1.0
	09	45	U1.0
	10	48	U1.0
	11	48	U1.0
	12	43	U1.0
	13	43	U1.0
	14	42	U1.0
	15	42	U1.0
	16	48	U1.0
	17	48	U1.0
	18	37	U1.0
	19	37	U1.0

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	BT	4/16/13 [illegible]
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	BT	4/17/13 1200
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JPD	4/17/13 1200
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0955 PM	4/19/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0955	4/19/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	C	4/22/13 0600
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 #	13-04051
Lab Deadline	4/30/2013
Analysis	Ra226 - 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	46	U1.0
	05	46	U1.0
	06	42	U1.0
	07	42	U1.0
	08	45	U1.0
	09	45	U1.0
	10	48	U1.0
	11	48	U1.0
	12	43	U1.0
	13	43	U1.0
	14	42	U1.0
	15	42	U1.0
	16	48	U1.0
	17	48	U1.0
	18	37	U1.0
	19	37	U1.0

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	[illegible]	4/16/13 0900
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	[illegible]	4/17/13 1045
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JW	4/17/13 1715
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JW	4/18/13 1500
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KB	4/18/13 1505
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	AG	4/21/13 1400
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04051
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	46	U1.0
	05	46	U1.0
	06	42	U1.0
	07	42	U1.0
	08	45	U1.0
	09	45	U1.0
	10	48	U1.0
	11	48	U1.0
	12	43	U1.0
	13	43	U1.0
	14	42	U1.0
	15	42	U1.0
	16	48	U1.0
	17	48	U1.0
	18	37	U1.0
	19	37	U1.0

4/16/13 JB

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	JB	4/16/13 0900
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	JB	4/17/13 1045
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JW	4/17/13 1715
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JW	4/18/13 1500
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	ICB	4/18/13 1605
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	ICB	4/22/13 1054
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	[illegible]	4-22-13 1055
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	[illegible]	42913 0856
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	[illegible]	4/29/13 [illegible]
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	ICB	4/29/13 1520
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
13-04051
Received By
KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	U1.0		
02	BLANK	0		WA	U1.0		
03	DUP	0		WA	U1.0		
04	PZ-105-SS TOT	1		WA	U1.0	9.50	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	46
05	PZ-105-SS DIS	1		WA	U1.0	0.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				46
06	S-10 TOT	1		WA	U1.0	9.50	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	42
07	S-10 DIS	1		WA	U1.0	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				42
08	LR-104 TOT	1		WA	U1.0	9.50	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	45
09	LR-104 DIS	1		WA	U1.0	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				45
10	DUP 01 TOT	1		WA	U1.0	9.50	48
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	48
11	DUP 01 DIS	1		WA	U1.0	0.00	48
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				48
12	DUP 02 TOT	1		WA	U1.0	9.50	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	43
13	DUP 02 DIS	1		WA	U1.0	0.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				43
14	FB PZ-110-SS TOT	1		WA	U1.0	9.50	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	42
15	FB PZ-110-SS DIS	1		WA	U1.0	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				42
16	MW-103 TOT	1		WA	U1.0	9.50	48
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	48
17	MW-103 DIS	1		WA	U1.0	0.00	48
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				48
18	PZ-200-SS TOT	1		WA	U1.0	9.50	37
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	37
19	PZ-200-SS DIS	1		WA	U1.0	0.00	37
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				37

vey 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	13-04051
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	UISO																					Ttl
01	LCS	04/09/13	WA	U1.0	X	X	X	X																					4
02	BLANK	04/09/13	WA	U1.0	X	X	X	X																					4
03	DUP	04/09/13	WA	U1.0	X	X	X	X																					4
04	PZ-105-SS TOT	04/04/13 15:06	WA	U1.0	X	X	X	X																					4
05	PZ-105-SS DIS	04/04/13 15:06	WA	U1.0	X	X	X	X																					4
06	S-10 TOT	04/04/13 15:25	WA	U1.0	X	X	X	X																					4
07	S-10 DIS	04/04/13 15:25	WA	U1.0	X	X	X	X																					4
08	LR-104 TOT	04/04/13 15:52	WA	U1.0	X	X	X	X																					4
09	LR-104 DIS	04/04/13 15:52	WA	U1.0	X	X	X	X																					4
10	DUP 01 TOT	04/04/13 00:00	WA	U1.0	X	X	X	X																					4
11	DUP 01 DIS	04/04/13 00:00	WA	U1.0	X	X	X	X																					4
12	DUP 02 TOT	04/04/13 00:00	WA	U1.0	X	X	X	X																					4
13	DUP 02 DIS	04/04/13 00:00	WA	U1.0	X	X	X	X																					4
14	FB at PZ-110-SS TOT	04/04/13 09:30	WA	U1.0	X	X	X	X																					4
15	FB at PZ-110-SS DIS	04/04/13 09:30	WA	U1.0	X	X	X	X																					4
16	MW-103 TOT	04/05/13 09:50	WA	U1.0	X	X	X	X																					4
17	MW-103 DIS	04/05/13 09:50	WA	U1.0	X	X	X	X																					4
18	PZ-200-SS TOT	04/05/13 11:10	WA	U1.0	X	X	X	X																					4
19	PZ-200-SS DIS	04/05/13 11:10	WA	U1.0	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	
Voice	303-640-3426	
Fax		
Contact	Lyn Fitzgerald	
Voice	303-601-4255	
Fax		
Report Data	Paul V. Rosasco, P.E. Engineering Management Support, Inc 7220 West Jefferson Ave, Suite 406 Lakewood, CO 80235	
Voice	303-940-3426	
Fax		

Printed: 4/9/2013 2:05 PM

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST MP-001-2

WORK ORDER # 13-04051

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 Carlsten 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-35526

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 # 13-04051-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-105-SS TOT	13-04051-04	DUP 02 TOT	13-04051-12
PZ-105-SS DIS	13-04051-05	DUP 02 DIS	13-04051-13
S-10 TOT	13-04051-06	FB at PZ-110-SS TOT	13-04051-14
S-10 DIS	13-04051-07	FB at PZ-110-SS DIS	13-04051-15
LR-104 TOT	13-04051-08	MW-103 TOT	13-04051-16
LR-104 DIS	13-04051-09	MW-103 DIS	13-04051-17
DUP 01 TOT	13-04051-10	PZ-200-SS TOT	13-04051-18
DUP 01 DIS	13-04051-11	PZ-200-SS DIS	13-04051-19

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 acceptable for all samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234, Uranium-235 and Uranium-238 duplicate demonstrated an acceptable relative percent difference and normalized difference. 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 acceptable for all samples. The Thorium-228, Thorium-230 and Thorium-232 method blank demonstrated acceptable results. Results for the Thorium-228, Thorium-230 and Thorium-232 duplicate demonstrated 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 a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. 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 a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. 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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Project: West Lake OU-1
SDG: 1304051
Received: 04/09/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
LCS13-04051-01	13-04051-01	04/19/2013 14:39:26	Radium-226	E903.0	10.63	1.15	0.17		pCi/l
LCS13-04051-01	13-04051-01	04/29/2013 08:17:44	Radium-228	E904.0	9.72	0.89	1.04		pCi/l
LCS13-04051-01	13-04051-01	04/20/2013 13:48:50	Thorium-228	HASL 300, 4.5.2	5.19	0.81	0.14		pCi/l
LCS13-04051-01	13-04051-01	04/20/2013 13:48:50	Thorium-230	HASL 300, 4.5.2	5.36	0.83	0.08		pCi/l
LCS13-04051-01	13-04051-01	04/20/2013 13:48:50	Thorium-232	HASL 300, 4.5.2	5.22	0.81	0.08		pCi/l
LCS13-04051-01	13-04051-01	04/19/2013 11:36:31	Uranium-234	HASL 300, 4.5.2	7.85	1.07	0.09		pCi/l
LCS13-04051-01	13-04051-01	04/19/2013 11:36:31	Uranium-235	HASL 300, 4.5.2	0.43	0.17	0.08		pCi/l
LCS13-04051-01	13-04051-01	04/19/2013 11:36:31	Uranium-238	HASL 300, 4.5.2	8.02	1.09	0.09		pCi/l
BLANK13-04051-02	13-04051-02	04/19/2013 14:39:27	Radium-226	E903.0	0.12	0.12	0.17	U	pCi/l
BLANK13-04051-02	13-04051-02	04/29/2013 08:17:45	Radium-228	E904.0	0.59	0.39	0.76	J	pCi/l
BLANK13-04051-02	13-04051-02	04/20/2013 13:48:51	Thorium-228	HASL 300, 4.5.2	0.00	0.03	0.09	U	pCi/l
BLANK13-04051-02	13-04051-02	04/20/2013 13:48:51	Thorium-230	HASL 300, 4.5.2	0.10	0.07	0.05	J	pCi/l
BLANK13-04051-02	13-04051-02	04/20/2013 13:48:51	Thorium-232	HASL 300, 4.5.2	0.00	0.02	0.05	U	pCi/l
BLANK13-04051-02	13-04051-02	04/19/2013 11:36:32	Uranium-234	HASL 300, 4.5.2	0.05	0.05	0.07	U	pCi/l
BLANK13-04051-02	13-04051-02	04/19/2013 11:36:32	Uranium-235	HASL 300, 4.5.2	0.04	0.06	0.09	U	pCi/l
BLANK13-04051-02	13-04051-02	04/19/2013 11:36:32	Uranium-238	HASL 300, 4.5.2	0.02	0.05	0.09	U	pCi/l
FB at PZ-110-SS TOT DUP	13-04051-03	04/19/2013 14:39:28	Radium-226	E903.0	-0.03	0.04	0.15	U	pCi/l
FB at PZ-110-SS TOT DUP	13-04051-03	04/29/2013 08:17:45	Radium-228	E904.0	0.13	0.43	0.91	U	pCi/l
PZ-105-SS TOT DUP	13-04051-03	04/20/2013 13:48:52	Thorium-228	HASL 300, 4.5.2	-0.02	0.06	0.15	U	pCi/l
PZ-105-SS TOT DUP	13-04051-03	04/20/2013 13:48:52	Thorium-230	HASL 300, 4.5.2	0.13	0.09	0.08	J	pCi/l
PZ-105-SS TOT DUP	13-04051-03	04/20/2013 13:48:52	Thorium-232	HASL 300, 4.5.2	0.01	0.04	0.09	U	pCi/l
PZ-105-SS TOT DUP	13-04051-03	04/19/2013 11:36:33	Uranium-234	HASL 300, 4.5.2	2.60	0.46	0.09		pCi/l
PZ-105-SS TOT DUP	13-04051-03	04/19/2013 11:36:33	Uranium-235	HASL 300, 4.5.2	0.11	0.09	0.07	J	pCi/l
PZ-105-SS TOT DUP	13-04051-03	04/19/2013 11:36:33	Uranium-238	HASL 300, 4.5.2	1.82	0.36	0.06		pCi/l
PZ-105-SS TOT	13-04051-04	04/19/2013 14:39:28	Radium-226	E903.0	1.79	0.40	0.14		pCi/l
PZ-105-SS TOT	13-04051-04	04/29/2013 08:17:45	Radium-228	E904.0	0.87	0.46	0.88	J	pCi/l
PZ-105-SS TOT	13-04051-04	04/20/2013 13:48:53	Thorium-228	HASL 300, 4.5.2	0.04	0.06	0.10	U	pCi/l
PZ-105-SS TOT	13-04051-04	04/20/2013 13:48:53	Thorium-230	HASL 300, 4.5.2	0.08	0.07	0.08	J	pCi/l
PZ-105-SS TOT	13-04051-04	04/20/2013 13:48:53	Thorium-232	HASL 300, 4.5.2	0.01	0.02	0.06	U	pCi/l
PZ-105-SS TOT	13-04051-04	04/19/2013 11:36:34	Uranium-234	HASL 300, 4.5.2	2.62	0.45	0.08		pCi/l
PZ-105-SS TOT	13-04051-04	04/19/2013 11:36:34	Uranium-235	HASL 300, 4.5.2	0.11	0.09	0.09	J	pCi/l
PZ-105-SS TOT	13-04051-04	04/19/2013 11:36:34	Uranium-238	HASL 300, 4.5.2	1.64	0.33	0.06		pCi/l

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Project: West Lake OU-1
SDG: 1304051
Received: 04/09/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
PZ-105-SS DIS	13-04051-05	04/19/2013 14:39:29	Radium-226	E903.0	1.22	0.33	0.17		pCi/l
PZ-105-SS DIS	13-04051-05	04/29/2013 09:09:03	Radium-228	E904.0	1.03	0.42	0.77	J	pCi/l
PZ-105-SS DIS	13-04051-05	04/20/2013 13:50:08	Thorium-228	HASL 300, 4.5.2	0.01	0.05	0.12	U	pCi/l
PZ-105-SS DIS	13-04051-05	04/20/2013 13:50:08	Thorium-230	HASL 300, 4.5.2	0.24	0.12	0.08		pCi/l
PZ-105-SS DIS	13-04051-05	04/20/2013 13:50:08	Thorium-232	HASL 300, 4.5.2	0.03	0.05	0.08	U	pCi/l
PZ-105-SS DIS	13-04051-05	04/19/2013 11:36:35	Uranium-234	HASL 300, 4.5.2	2.58	0.44	0.07		pCi/l
PZ-105-SS DIS	13-04051-05	04/19/2013 11:36:35	Uranium-235	HASL 300, 4.5.2	0.08	0.07	0.09	J	pCi/l
PZ-105-SS DIS	13-04051-05	04/19/2013 11:36:35	Uranium-238	HASL 300, 4.5.2	1.42	0.30	0.09		pCi/l
S-10 TOT	13-04051-06	04/19/2013 14:39:30	Radium-226	E903.0	0.03	0.05	0.10	U	pCi/l
S-10 TOT	13-04051-06	04/29/2013 09:09:03	Radium-228	E904.0	0.06	0.51	1.09	U	pCi/l
S-10 TOT	13-04051-06	04/20/2013 13:50:09	Thorium-228	HASL 300, 4.5.2	0.03	0.09	0.18	U	pCi/l
S-10 TOT	13-04051-06	04/20/2013 13:50:09	Thorium-230	HASL 300, 4.5.2	0.26	0.15	0.11		pCi/l
S-10 TOT	13-04051-06	04/20/2013 13:50:09	Thorium-232	HASL 300, 4.5.2	0.12	0.10	0.10	J	pCi/l
S-10 TOT	13-04051-06	04/19/2013 11:36:36	Uranium-234	HASL 300, 4.5.2	0.23	0.11	0.08		pCi/l
S-10 TOT	13-04051-06	04/19/2013 11:36:36	Uranium-235	HASL 300, 4.5.2	0.03	0.05	0.08	U	pCi/l
S-10 TOT	13-04051-06	04/19/2013 11:36:36	Uranium-238	HASL 300, 4.5.2	0.24	0.12	0.08		pCi/l
S-10 DIS	13-04051-07	04/19/2013 15:00:27	Radium-226	E903.0	0.01	0.04	0.09	U	pCi/l
S-10 DIS	13-04051-07	04/29/2013 09:09:03	Radium-228	E904.0	0.37	0.36	0.73	J	pCi/l
S-10 DIS	13-04051-07	04/20/2013 13:50:10	Thorium-228	HASL 300, 4.5.2	0.05	0.11	0.21	U	pCi/l
S-10 DIS	13-04051-07	04/20/2013 13:50:10	Thorium-230	HASL 300, 4.5.2	0.10	0.12	0.16	U	pCi/l
S-10 DIS	13-04051-07	04/20/2013 13:50:10	Thorium-232	HASL 300, 4.5.2	0.01	0.05	0.12	U	pCi/l
S-10 DIS	13-04051-07	04/19/2013 11:57:43	Uranium-234	HASL 300, 4.5.2	0.13	0.10	0.11	J	pCi/l
S-10 DIS	13-04051-07	04/19/2013 11:57:43	Uranium-235	HASL 300, 4.5.2	0.02	0.04	0.09	U	pCi/l
S-10 DIS	13-04051-07	04/19/2013 11:57:43	Uranium-238	HASL 300, 4.5.2	0.09	0.09	0.11	U	pCi/l
LR-104 TOT	13-04051-08	04/19/2013 15:00:29	Radium-226	E903.0	0.63	0.25	0.12		pCi/l
LR-104 TOT	13-04051-08	04/29/2013 09:09:03	Radium-228	E904.0	1.58	0.46	0.80		pCi/l
LR-104 TOT	13-04051-08	04/20/2013 13:50:11	Thorium-228	HASL 300, 4.5.2	0.08	0.08	0.09	U	pCi/l
LR-104 TOT	13-04051-08	04/20/2013 13:50:11	Thorium-230	HASL 300, 4.5.2	0.16	0.10	0.08	J	pCi/l
LR-104 TOT	13-04051-08	04/20/2013 13:50:11	Thorium-232	HASL 300, 4.5.2	0.05	0.06	0.07	U	pCi/l
LR-104 TOT	13-04051-08	04/19/2013 11:57:45	Uranium-234	HASL 300, 4.5.2	2.60	0.44	0.05		pCi/l
LR-104 TOT	13-04051-08	04/19/2013 11:57:45	Uranium-235	HASL 300, 4.5.2	0.16	0.10	0.09	J	pCi/l
LR-104 TOT	13-04051-08	04/19/2013 11:57:45	Uranium-238	HASL 300, 4.5.2	2.11	0.38	0.06		pCi/l

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Project: West Lake OU-1
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Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
LR-104 DIS	13-04051-09	04/19/2013 15:00:31	Radium-226	E903.0	0.39	0.18	0.10		pCi/l
LR-104 DIS	13-04051-09	04/29/2013 09:09:07	Radium-228	E904.0	1.00	0.47	0.88	J	pCi/l
LR-104 DIS	13-04051-09	04/20/2013 13:50:12	Thorium-228	HASL 300, 4.5.2	0.03	0.07	0.12	U	pCi/l
LR-104 DIS	13-04051-09	04/20/2013 13:50:12	Thorium-230	HASL 300, 4.5.2	0.06	0.07	0.10	U	pCi/l
LR-104 DIS	13-04051-09	04/20/2013 13:50:12	Thorium-232	HASL 300, 4.5.2	-0.01	0.03	0.11	U	pCi/l
LR-104 DIS	13-04051-09	04/19/2013 11:57:40	Uranium-234	HASL 300, 4.5.2	2.72	0.45	0.06		pCi/l
LR-104 DIS	13-04051-09	04/19/2013 11:57:40	Uranium-235	HASL 300, 4.5.2	0.16	0.10	0.09	J	pCi/l
LR-104 DIS	13-04051-09	04/19/2013 11:57:40	Uranium-238	HASL 300, 4.5.2	1.94	0.36	0.05		pCi/l
DUP 01 TOT	13-04051-10	04/19/2013 15:00:32	Radium-226	E903.0	0.32	0.17	0.12		pCi/l
DUP 01 TOT	13-04051-10	04/29/2013 09:09:07	Radium-228	E904.0	0.89	0.43	0.81	J	pCi/l
DUP 01 TOT	13-04051-10	04/20/2013 13:50:13	Thorium-228	HASL 300, 4.5.2	0.08	0.09	0.13	U	pCi/l
DUP 01 TOT	13-04051-10	04/20/2013 13:50:13	Thorium-230	HASL 300, 4.5.2	0.19	0.12	0.10	J	pCi/l
DUP 01 TOT	13-04051-10	04/20/2013 13:50:13	Thorium-232	HASL 300, 4.5.2	0.05	0.06	0.10	U	pCi/l
DUP 01 TOT	13-04051-10	04/19/2013 11:57:41	Uranium-234	HASL 300, 4.5.2	0.26	0.11	0.05		pCi/l
DUP 01 TOT	13-04051-10	04/19/2013 11:57:41	Uranium-235	HASL 300, 4.5.2	0.01	0.03	0.06	U	pCi/l
DUP 01 TOT	13-04051-10	04/19/2013 11:57:41	Uranium-238	HASL 300, 4.5.2	0.12	0.07	0.05		pCi/l
DUP 01 DIS	13-04051-11	04/19/2013 15:00:35	Radium-226	E903.0	0.19	0.13	0.11	J	pCi/l
DUP 01 DIS	13-04051-11	04/29/2013 09:09:07	Radium-228	E904.0	0.65	0.45	0.89	J	pCi/l
DUP 01 DIS	13-04051-11	04/20/2013 14:11:33	Thorium-228	HASL 300, 4.5.2	0.01	0.03	0.07	U	pCi/l
DUP 01 DIS	13-04051-11	04/20/2013 14:11:33	Thorium-230	HASL 300, 4.5.2	0.10	0.08	0.09	J	pCi/l
DUP 01 DIS	13-04051-11	04/20/2013 14:11:33	Thorium-232	HASL 300, 4.5.2	-0.04	0.03	0.12	U	pCi/l
DUP 01 DIS	13-04051-11	04/19/2013 11:57:49	Uranium-234	HASL 300, 4.5.2	0.20	0.11	0.07		pCi/l
DUP 01 DIS	13-04051-11	04/19/2013 11:57:49	Uranium-235	HASL 300, 4.5.2	0.03	0.06	0.10	U	pCi/l
DUP 01 DIS	13-04051-11	04/19/2013 11:57:49	Uranium-238	HASL 300, 4.5.2	0.14	0.09	0.08	J	pCi/l
DUP 02 TOT	13-04051-12	04/19/2013 15:00:37	Radium-226	E903.0	0.45	0.21	0.17		pCi/l
DUP 02 TOT	13-04051-12	04/29/2013 09:09:08	Radium-228	E904.0	1.61	0.48	0.85		pCi/l
DUP 02 TOT	13-04051-12	04/20/2013 14:11:34	Thorium-228	HASL 300, 4.5.2	0.10	0.12	0.16	U	pCi/l
DUP 02 TOT	13-04051-12	04/20/2013 14:11:34	Thorium-230	HASL 300, 4.5.2	0.17	0.14	0.11	J	pCi/l
DUP 02 TOT	13-04051-12	04/20/2013 14:11:34	Thorium-232	HASL 300, 4.5.2	0.07	0.09	0.12	U	pCi/l
DUP 02 TOT	13-04051-12	04/19/2013 11:57:46	Uranium-234	HASL 300, 4.5.2	0.16	0.10	0.08	J	pCi/l
DUP 02 TOT	13-04051-12	04/19/2013 11:57:46	Uranium-235	HASL 300, 4.5.2	0.01	0.04	0.10	U	pCi/l
DUP 02 TOT	13-04051-12	04/19/2013 11:57:46	Uranium-238	HASL 300, 4.5.2	0.10	0.09	0.12	J	pCi/l

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Project: West Lake OU-1
SDG: 1304051
Received: 04/09/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
DUP 02 DIS	13-04051-13	04/19/2013 15:00:40	Radium-226	E903.0	0.12	0.11	0.13	J	pCi/l
DUP 02 DIS	13-04051-13	04/29/2013 10:21:09	Radium-228	E904.0	0.85	0.50	0.97	J	pCi/l
DUP 02 DIS	13-04051-13	04/20/2013 14:11:30	Thorium-228	HASL 300, 4.5.2	0.01	0.03	0.06	U	pCi/l
DUP 02 DIS	13-04051-13	04/20/2013 14:11:30	Thorium-230	HASL 300, 4.5.2	0.15	0.10	0.09	J	pCi/l
DUP 02 DIS	13-04051-13	04/20/2013 14:11:30	Thorium-232	HASL 300, 4.5.2	0.00	0.04	0.09	U	pCi/l
DUP 02 DIS	13-04051-13	04/19/2013 11:57:47	Uranium-234	HASL 300, 4.5.2	0.18	0.10	0.07		pCi/l
DUP 02 DIS	13-04051-13	04/19/2013 11:57:47	Uranium-235	HASL 300, 4.5.2	0.12	0.09	0.07	J	pCi/l
DUP 02 DIS	13-04051-13	04/19/2013 11:57:47	Uranium-238	HASL 300, 4.5.2	0.13	0.09	0.07	J	pCi/l
FB at PZ-110-SS TOT	13-04051-14	04/19/2013 15:00:42	Radium-226	E903.0	0.12	0.09	0.06	J	pCi/l
FB at PZ-110-SS TOT	13-04051-14	04/29/2013 10:21:09	Radium-228	E904.0	1.16	0.57	1.08	J	pCi/l
FB at PZ-110-SS TOT	13-04051-14	04/20/2013 14:11:31	Thorium-228	HASL 300, 4.5.2	0.15	0.13	0.11	J	pCi/l
FB at PZ-110-SS TOT	13-04051-14	04/20/2013 14:11:31	Thorium-230	HASL 300, 4.5.2	0.15	0.13	0.11	J	pCi/l
FB at PZ-110-SS TOT	13-04051-14	04/20/2013 14:11:31	Thorium-232	HASL 300, 4.5.2	0.04	0.07	0.13	U	pCi/l
FB at PZ-110-SS TOT	13-04051-14	04/19/2013 14:33:37	Uranium-234	HASL 300, 4.5.2	0.02	0.03	0.06	U	pCi/l
FB at PZ-110-SS TOT	13-04051-14	04/19/2013 14:33:37	Uranium-235	HASL 300, 4.5.2	0.03	0.04	0.06	U	pCi/l
FB at PZ-110-SS TOT	13-04051-14	04/19/2013 14:33:37	Uranium-238	HASL 300, 4.5.2	-0.01	0.02	0.06	U	pCi/l
FB at PZ-110-SS DIS	13-04051-15	04/19/2013 15:00:44	Radium-226	E903.0	0.03	0.05	0.07	U	pCi/l
FB at PZ-110-SS DIS	13-04051-15	04/29/2013 10:21:09	Radium-228	E904.0	0.45	0.59	1.22	U	pCi/l
FB at PZ-110-SS DIS	13-04051-15	04/20/2013 14:11:27	Thorium-228	HASL 300, 4.5.2	0.02	0.04	0.08	U	pCi/l
FB at PZ-110-SS DIS	13-04051-15	04/20/2013 14:11:27	Thorium-230	HASL 300, 4.5.2	0.25	0.14	0.09		pCi/l
FB at PZ-110-SS DIS	13-04051-15	04/20/2013 14:11:27	Thorium-232	HASL 300, 4.5.2	-0.01	0.04	0.09	U	pCi/l
FB at PZ-110-SS DIS	13-04051-15	04/19/2013 14:33:38	Uranium-234	HASL 300, 4.5.2	0.04	0.07	0.12	U	pCi/l
FB at PZ-110-SS DIS	13-04051-15	04/19/2013 14:33:38	Uranium-235	HASL 300, 4.5.2	0.00	0.04	0.12	U	pCi/l
FB at PZ-110-SS DIS	13-04051-15	04/19/2013 14:33:38	Uranium-238	HASL 300, 4.5.2	-0.01	0.03	0.09	U	pCi/l
MW-103 TOT	13-04051-16	04/19/2013 15:00:47	Radium-226	E903.0	0.78	0.25	0.12		pCi/l
MW-103 TOT	13-04051-16	04/29/2013 10:21:09	Radium-228	E904.0	0.88	0.49	0.96	J	pCi/l
MW-103 TOT	13-04051-16	04/20/2013 14:11:28	Thorium-228	HASL 300, 4.5.2	1.38	0.36	0.09		pCi/l
MW-103 TOT	13-04051-16	04/20/2013 14:11:28	Thorium-230	HASL 300, 4.5.2	1.22	0.32	0.06		pCi/l
MW-103 TOT	13-04051-16	04/20/2013 14:11:28	Thorium-232	HASL 300, 4.5.2	1.19	0.32	0.06		pCi/l
MW-103 TOT	13-04051-16	04/19/2013 14:33:33	Uranium-234	HASL 300, 4.5.2	4.07	0.67	0.12		pCi/l
MW-103 TOT	13-04051-16	04/19/2013 14:33:33	Uranium-235	HASL 300, 4.5.2	0.37	0.17	0.10		pCi/l
MW-103 TOT	13-04051-16	04/19/2013 14:33:33	Uranium-238	HASL 300, 4.5.2	3.72	0.63	0.09		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: 1304051
Received: 04/09/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
MW-103 DIS	13-04051-17	04/19/2013 15:00:50	Radium-226	E903.0	0.24	0.15	0.09		pCi/l
MW-103 DIS	13-04051-17	04/29/2013 13:17:02	Radium-228	E904.0	1.08	0.57	1.09	J	pCi/l
MW-103 DIS	13-04051-17	04/21/2013 14:27:41	Thorium-228	HASL 300, 4.5.2	-0.02	0.06	0.18	U	pCi/l
MW-103 DIS	13-04051-17	04/21/2013 14:27:41	Thorium-230	HASL 300, 4.5.2	0.12	0.10	0.12	J	pCi/l
MW-103 DIS	13-04051-17	04/21/2013 14:27:41	Thorium-232	HASL 300, 4.5.2	0.07	0.08	0.09	U	pCi/l
MW-103 DIS	13-04051-17	04/19/2013 14:33:34	Uranium-234	HASL 300, 4.5.2	3.17	0.55	0.06		pCi/l
MW-103 DIS	13-04051-17	04/19/2013 14:33:34	Uranium-235	HASL 300, 4.5.2	0.27	0.14	0.11		pCi/l
MW-103 DIS	13-04051-17	04/19/2013 14:33:34	Uranium-238	HASL 300, 4.5.2	3.00	0.53	0.09		pCi/l
PZ-200-SS TOT	13-04051-18	04/20/2013 13:48:54	Radium-226	E903.0	2.44	0.58	0.25		pCi/l
PZ-200-SS TOT	13-04051-18	04/29/2013 13:17:02	Radium-228	E904.0	1.38	0.88	1.73	J	pCi/l
PZ-200-SS TOT	13-04051-18	04/21/2013 14:27:42	Thorium-228	HASL 300, 4.5.2	0.00	0.06	0.15	U	pCi/l
PZ-200-SS TOT	13-04051-18	04/21/2013 14:27:42	Thorium-230	HASL 300, 4.5.2	0.14	0.10	0.11	J	pCi/l
PZ-200-SS TOT	13-04051-18	04/21/2013 14:27:42	Thorium-232	HASL 300, 4.5.2	0.01	0.04	0.10	U	pCi/l
PZ-200-SS TOT	13-04051-18	04/19/2013 14:33:35	Uranium-234	HASL 300, 4.5.2	0.54	0.18	0.08		pCi/l
PZ-200-SS TOT	13-04051-18	04/19/2013 14:33:35	Uranium-235	HASL 300, 4.5.2	0.06	0.07	0.07	U	pCi/l
PZ-200-SS TOT	13-04051-18	04/19/2013 14:33:35	Uranium-238	HASL 300, 4.5.2	0.52	0.17	0.06		pCi/l
PZ-200-SS DIS	13-04051-19	04/20/2013 13:48:55	Radium-226	E903.0	1.84	0.45	0.22		pCi/l
PZ-200-SS DIS	13-04051-19	04/29/2013 13:17:02	Radium-228	E904.0	1.37	0.60	1.12	J	pCi/l
PZ-200-SS DIS	13-04051-19	04/21/2013 14:27:40	Thorium-228	HASL 300, 4.5.2	0.03	0.07	0.13	U	pCi/l
PZ-200-SS DIS	13-04051-19	04/21/2013 14:27:40	Thorium-230	HASL 300, 4.5.2	0.10	0.08	0.07	J	pCi/l
PZ-200-SS DIS	13-04051-19	04/21/2013 14:27:40	Thorium-232	HASL 300, 4.5.2	-0.01	0.03	0.08	U	pCi/l
PZ-200-SS DIS	13-04051-19	04/19/2013 14:33:36	Uranium-234	HASL 300, 4.5.2	0.53	0.18	0.09		pCi/l
PZ-200-SS DIS	13-04051-19	04/19/2013 14:33:36	Uranium-235	HASL 300, 4.5.2	0.04	0.06	0.09	U	pCi/l
PZ-200-SS DIS	13-04051-19	04/19/2013 14:33:36	Uranium-238	HASL 300, 4.5.2	0.58	0.18	0.06		pCi/l

SECTION V

ANALYTICAL STANDARDS

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

U-8

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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

Description of Solution

a. Mass of solution:	65.2896 g in a 50 ml flame sealed ampoule
b. Chemical form:	Uranyl Nitrate in H2O
c. Carrier content:	None
d. Density:	Approximately 1.3202 g/ml @ 20°C.

Radioimpurities: Refer to attached technical data sheet

Radioactive Daughters: Refer to attached technical data sheet

Radionuclide Concentration

(Total U) 0.1228 μCi/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±3.0%
b. Random uncertainty in assay:	±0.0%
c. Random uncertainty in weighing(s):	±2.0%
d. Total uncertainty at the 99% confidence level:	±3.6%

NIST Traceability

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

Leak Test(s)

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

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

[signature], ERIC ALLAS
QUALITY CONTROL

29 DECEMBER 1994
Date Signed

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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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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		5.356 grams
	Volume of solution		5.035 millilitres
	Total activity of U-232		3.61E+04 becquerels
	which is equivalent to		9.76E-01 microcuries

Accuracy

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

Radionuclidic Purity

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

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

Isotopic Purity

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

Not measured

Chemical Composition

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

Physical Data

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

Remarks

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

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

Approved Signatory

Roger Wiltshire

Project Ref. AE2315

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

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

Solution Reference #	MP-009 AEA/Amersham 92/232/67	Date	12/7/2012 0:00
		Solution #	U-10a

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

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

Reference Date: 3/1/2000 0:00

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

Dilution Instructions:

Dilution Solvent Used: 2M HNO_3

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 2.1670E+01 dpm/ml

NOTES:

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

Expiration Date: 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 WT 10/14/91 WT

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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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

EBERLINE SERVICES | QUALITY CONTROL PROGRAM
MP-009

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

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

	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:	500.0000 ml	Final Activity Concentration:	1.0365E+02 dpm/ml
Total Activity:	1.0365E+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

ORIGINAL

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

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

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Ra-5
QA/QC REVIEWED
Date 2/8/94 Initials WT

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. Knez
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
^{226}Ra	5.750E+00	2.100E+03

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

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
13-04051	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	0.48	96.33%	15.42%	100.00%	3.60%	8.15E+00	2.93E-01	7.85E+00	1.21E+00	U-8a	3.52E+01	3.60E+00	5.13E-01
U-238	0.12	100.95%	15.36%	100.00%	3.60%	7.94E+00	2.86E-01	8.02E+00	1.23E+00	U-8a	3.44E+01	3.60E+00	5.13E-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

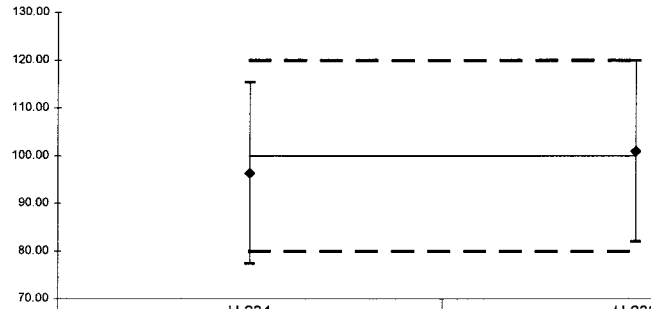
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
U-234	0.05	0.73	2.62E+00	4.92E-01	2.60E+00	4.97E-01
U-238	0.67	10.30	1.64E+00	3.52E-01	1.82E+00	3.84E-01
U-235	0.03	1.91	1.09E-01	8.73E-02	1.11E-01	8.56E-02

QC Summary

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

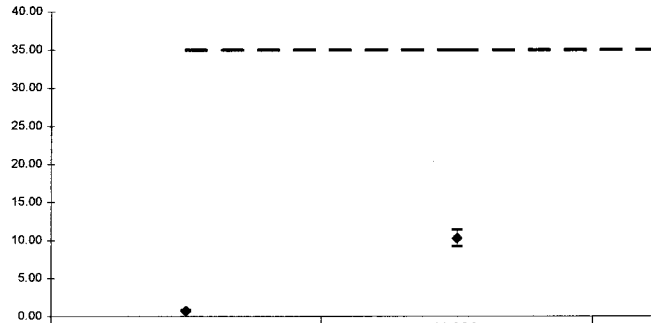
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04051	UUISO	1	pCi	l	Engineering Management Support, Inc.

LCS % Recovery



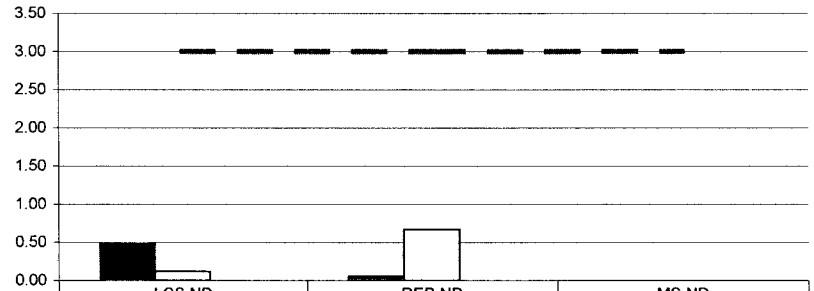
	U-234	U-238
Lower Error	77.31	81.99
Upper Error	115.34	119.91
%R	96.33	100.95
LCL	80	80
Mean	100	100
UCL	120	120

Replicate Sample RPD



	U-234	U-238	U-235
Lower Error	0.80	11.40	2.66
Upper Error	0.66	9.20	1.16
RPD	0.73	10.30	1.91
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
U-234	0.48	0.05	0.00
U-238	0.12	0.67	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04051	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	0.76	107.62%	18.25%	100.00%	3.60%	4.82E+00	1.73E-01	5.19E+00	9.46E-01	Th-8b	1.04E+02	3.60E+00	1.03E-01
TH-230	0.24	97.59%	19.82%	100.00%	2.70%	5.49E+00	1.48E-01	5.36E+00	1.06E+00	Th-1b	2.35E+01	2.70E+00	5.18E-01
TH-232	0.84	108.41%	17.89%	100.00%	3.60%	4.82E+00	1.73E-01	5.22E+00	9.35E-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

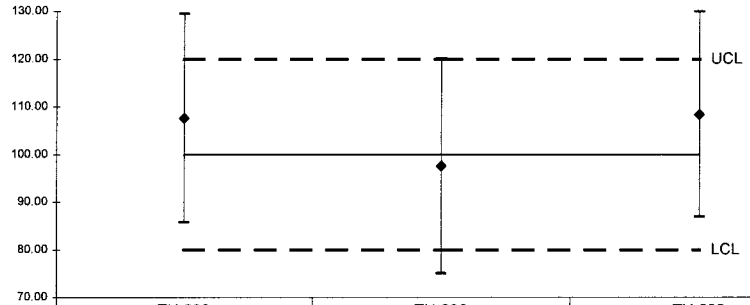
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
TH-228	1.53	584.85	4.21E-02	5.82E-02	-2.07E-02	5.54E-02
TH-230	0.95	52.45	7.81E-02	6.61E-02	1.34E-01	9.37E-02
TH-232	0.37	87.36	5.61E-03	2.34E-02	1.43E-02	3.98E-02

QC Summary

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

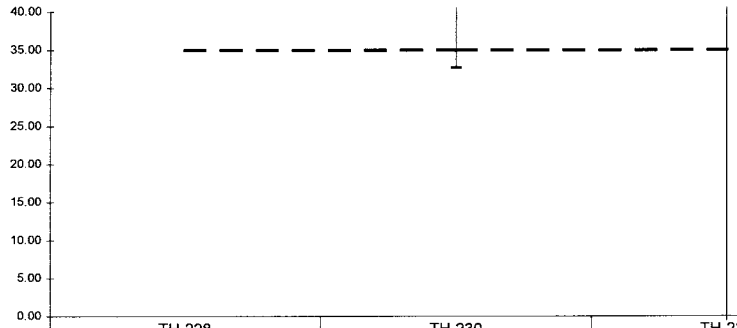
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04051	ThISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



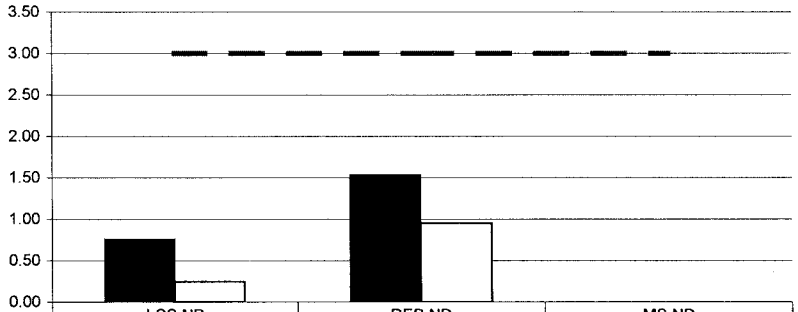
	TH-228	TH-230	TH-232
Lower Error	85.77	75.07	86.92
Upper Error	129.47	120.11	129.90
%R	107.62	97.59	108.41
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	2131.74	72.24	225.89
Upper Error	-962.05	32.65	-51.16
RPD	584.85	52.45	87.36
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	0.76	1.53	0.00
TH-230	0.24	0.95	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04051	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	0.23	102.89%	23.73%	100.00%	4.60%	1.03E+01	4.75E-01	1.06E+01	2.52E+00	Ra-5b	4.41E+01	4.60E+00	5.21E-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

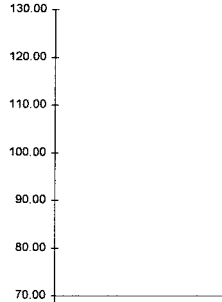
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-226	2.88	305.90	1.21E-01	8.98E-02	-2.54E-02	4.31E-02

QC Summary

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

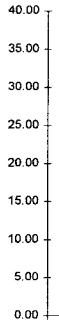
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04051	Ra226	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



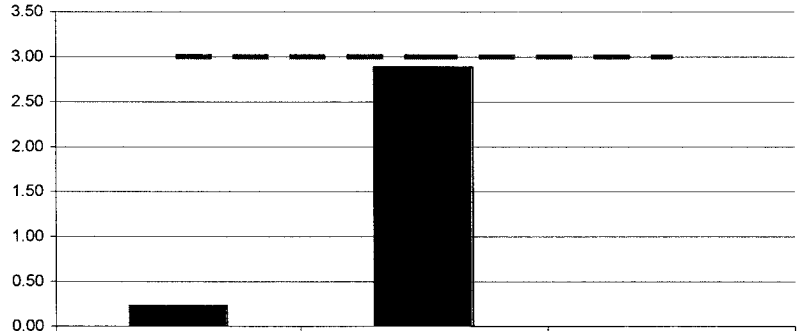
	RA-226
Lower Error	74.55
Upper Error	131.22
%R	102.89
LCL	80
Mean	100
UCL	120

Replicate Sample RPD



	RA-226
Lower Error	517.94
Upper Error	93.86
RPD	305.90
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-226	0.23	2.88	0.00
UCL	3	3	3

No Matrix Spike

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04051	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	0.53	107.19%	24.41%	100.00%	5.10%	9.06E+00	4.62E-01	9.72E+00	2.37E+00	Ra-11	3.91E+01	5.10E+00	5.15E-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

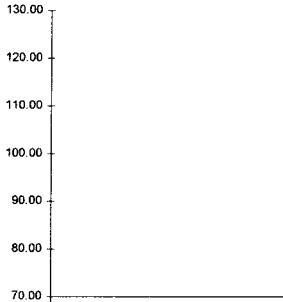
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-228	2.65	158.56	1.16E+00	6.25E-01	1.34E-01	4.33E-01

QC Summary

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

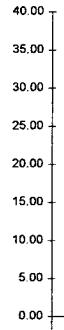
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04051	Ra228	1	pCi	l	Engineering Management Support, Inc.

LCS % Recovery



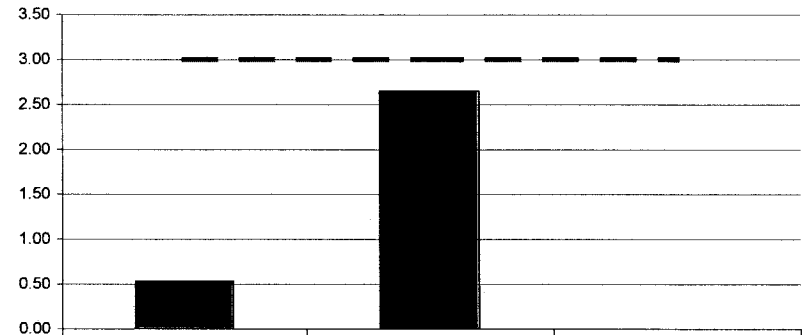
	RA-228
Lower Error	77.68
Upper Error	136.70
%R	107.19
LCL	80
Mean	100
UCL	120

Replicate Sample RPD



	RA-228
Lower Error	223.29
Upper Error	93.83
RPD	158.56
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-228	0.53	2.65	0.00
UCL	3	3	3

No Matrix Spike

SECTION VII

LABORATORY TECHNICIAN'S NOTES

ISO U NOTES

EBERLINE SERVICES

Work Order Analysis Notes

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

Internal Work Order	13-04051
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:36	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN

4/16/13

EBERLINE SERVICES

Work Order Analysis Notes

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Oak Ridge, TN 37830
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www.eberlineservices.com

Internal Work Order	13-04051
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:36	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/18/13 18:21	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.

4/18/13

EBERLINE SERVICES

Work Order Analysis Notes

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Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	13-04051
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:36	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/18/13 18:21	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	04/19/13 05:57	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.

R ☆ 4/19/13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04051	
Analysis Code	Run
UUISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/16/2013
013666P	Anion Exchange Resin	Reagent Grade	JDEMELAS	4/18/2013
013772S	HCl - HF	8N - 0.1M	JDEMELAS	4/18/2013
013778S	HCl - NH4I	8N - 0.1M	JDEMELAS	4/18/2013
013573D01	Hydrochloric Acid	0.5N	JDEMELAS	4/18/2013
013712S	Hydrochloric Acid	6.5N	JDEMELAS	4/18/2013
013770S	Hydrochloric Acid	8N	JDEMELAS	4/18/2013
013675P	Hydrochloric Acid	Reagent Grade	JDEMELAS	4/18/2013
013246S	Carbon substrate	Solution	RMARTZ	4/19/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	4/19/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	4/19/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	4/19/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	4/19/2013

Alpha #1

Date	Sample #	Client	Load Time	CT Time	Analyst	Tech
4/17/13	1304079A(1-5)	Westhampton	1021	2hrs	Au241	C
4/17/13	1304079B(1)	Westhampton	1021	2hrs	Au242	C
4/17/13	1304084A(1-6)	MPA	1724	2hrs	Rab	C
4/18/13	Daily Pulse	Lab	0816	10min	NH	C
4/18/13	1304098A(1-6)	Westhampton	0920	2hrs	Au230	C
4/18/13	1304089A(1-4,6)	UCOR	1228	2hr50mins	PU	KB
4/18/13	1304089A(4)	UCOR	1228	2hr50min	PUNT	KB
4/18/13	1304050A(15-19)	Eng. Manag. Sv	1525	2hr50mins	UU	KB
4/18/13	1304048A(1)	PCC	1524	2hr50min	Th	KB
4/18/13	1304050A(12-17)	Eng. Manag. Svc	1828	2hr50min	Rab	KB
4/19/13	Daily Pulse	Lab	0528	10min	NH	C
4/19/13	1304050A(16-19)	Eng. Man	0558	2hrs	Th230	C
4/19/13	1304112A(1,2)	UCOR	0558	2hrs	Rab	C
4/19/13	1304077B(1-4)	UCOR	0901	2hrs	Au241	C
4/19/13	1304112A(1,2)	UCOR	0901	2hrs	Au241	C
4/19/13	SEC CAL	Lab	1156	2hr70min	NH	C
4/19/13	1304051A(14-19)	Eng. Manag. Sv	1433	2hr50mins	UU	KB

Date	Sample #	Client	Time	CT Time	Analysis	Tech
4/17/13	1304075A(2-5)	Weston Sol.	1021	2hr	As243	C
4/17/13	1304085A(1,2)	Weston	1022	2hr	As243	C
4/17/13	1304085A (1-4) equipment	Weston	1225	2hr	NP277	C
4/18/13	Daily Pulse	LAS	0516	1am	—	—
4/18/13	1304098A(7)	Weston Sol.	0930	2hr	Hg7470	C
4/18/13	1304085A(1-5)	Weston Sol.	0931	2hr	Hg7470	C
4/18/13	1304085A(1-6)	Weston	1229	2hr 50m	Th	KCB
4/19/13	1304048A(2-7)	PCC	1524	2hr 50 mins	Th	KCB
4/19/13	1304050A(18-19)	Eng. Manag. Su	1929	2hr 50 mins	Rad	KCB
4/19/13	1304050A(1-4)	Eng. Manag. Su.	1829	2hr 50m	Th	KCB
4/19/13	Daily Pulse	LAS	0725	1am	—	—
4/19/13	1304112A(7,14)	Weston	0559	2hr	Pb6	C
4/19/13	SECCAL	LAS	0900	2hr 30m	Hg1	C
4/19/13	1304051A(1-6)	Engstrom	1176	2hr	Hg7470	—

Alpha #3

Date	Sample #	Client	Count Time	Count Time	Analysis	Tech
4/16/13	1304049A(5-15)	Eng. Man	0801	24hr	UU230	c
4/16/13	1304049A(9-19)	Eng. Man	1100	24hr	Th230	c
4/16/13	1304049A(13-19)	Eng. Manag. Su	1613	2hr 50 min	Ra	KB
4/17/13	Daily Pulser	LAS	0579	10 min	n/a	c
4/17/13	1304061A(1-7)	MPA	0604	24hr	Ra	c
4/17/13	1304043A(1-4)	Unitech	0607	24hr	UU230	c
4/17/13	1304080A(1-4)	STGNID	0578	24hr	Ra	c
4/17/13	1304075A(1-4)	TEC	0575	24hr	Ra	c
4/17/13	1304088A(3,4)	UCOR	1022	24hr	Am243	c
4/17/13	1304089A(1-4)	UCOR	1232	2hr 50 mins	Am^{241}	KB
4/17/13	1304089A(1-4)	UCOR	1233	2hr 50 mins	Ra	KB
4/17/13	1304039B(3-5)	WAshen	1503	1 hr	Am^{243}	KB
4/18/13	Daily Pulser	LAS	0546	10 min	n/a	c
4/18/13	1304085A(6,7)	Weston Sol.	0571	24hr	UU230	c
4/18/13	1304088A(1-4)	UCOR	0572	24hr	UU230	c
4/18/13	1304088A NT(4)	UCOR	0577	24hr	UUNT	c
4/18/13	1304050A(1-4)	Eng. Man	0577	24hr	UU230	c
4/18/13	1304085A(7)	Weston	1229	2hr 50 min	Th.	KB
4/18/13	1304050A(5-14)	Eng. Manag. Su.	1230	2hr 50 min	UU	KB
4/18/13	1304050A(1-11)	Eng. Manag. Su.	1527	2hr 50 min	Ra	KB
4/18/13	1304050A(5-15)	Eng. Manag. Su	1830	2hr 50 min	Th	KB
4/19/13	Daily Pulser	LAS	0525	1 min	n/a	c
4/19/13	SEC CAL	LAS	0559	24hr	n/a	c
4/19/13	1304112A(3,4)	UCOR	0902	24hr	Am241	c
4/19/13	1304112A(1-4)	UCOR	0902	24hr	Am243	c
4/19/13	1304112A(1-4)	UCOR	0907	24hr	Gh230	c
4/19/13	1304071A(1-7)	Eng. Man	1157	24hr	UU230	c
4/19/13	1304112A(1-4)	UCOR	1158	24hr	NP237	c

ISO TH NOTES

EBERLINE SERVICES

Work Order Analysis Notes

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Oak Ridge, TN 37830
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Internal Work Order	13-04051
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:36	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN

EBERLINE SERVICES

Work Order Analysis Notes

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Internal Work Order	13-04051
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:36	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/18/13 18:21	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.

4/18/13

EBERLINE SERVICES

Work Order Analysis Notes

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Oak Ridge, TN 37830
Voice: 865.481.0683
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Internal Work Order	13-04051
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:36	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/18/13 18:21	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	04/19/13 05:58	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.

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04051	
Analysis Code	Run
ThISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/16/2013
013666P	Anion Exchange Resin	Reagent Grade	JDEMELAS	4/18/2013
013675P	Hydrochloric Acid	Reagent Grade	JDEMELAS	4/18/2013
013733S	Nitric Acid	8N	JDEMELAS	4/18/2013
013624P	Nitric Acid	Reagent Grade	JDEMELAS	4/18/2013
013770S	Hydrochloric Acid	8N	JDEMELAS	4/18/2013
013246S	Carbon substrate	Solution	RMARTZ	4/19/2013
013017S	Cerrium Carrier	0.1mg/ml	RMARTZ	4/19/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	4/19/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	4/19/2013

Alpha #1

Date	Sample #	Client	Local Time	CT Time	Analyst	Tech
4/17/13	130407SA(1-5)	Weatherford	1021	2hr	[illegible]	C
4/17/13	130407SB(1)	Weatherford	1024	2hr	[illegible]	C
4/17/13	130408A(1-6)	MPA	1724	2hr	[illegible]	C
4/18/13	Daily Pulser	Lab	0516	10m	NA	C
4/18/13	130409SA(1-6)	Weatherford	0930	2hr	[illegible]	C
4/18/13	130408A(1-4,6)	UCOR	1228	2hr50mins	PU	ICB
4/18/13	130408A(4)	UCOR	1228	2hr50m	PUNT	ICB
4/18/13	130405DA(15-19)	Eng. Manag. Su	1525	2hr50mins	[illegible]	ICB
4/18/13	130404SA(1)	PCC	1524	2hr50m	TH	ICB
4/18/13	130405DA(12-17)	Eng. Manag. Su	1828	2hr50mins	Rad	ICB
4/19/13	Daily Pulser	Lab	0528	10m	NA	C
4/19/13	130405DA(16-19)	Eng. Man	0558	2hr	TH 150	C
4/19/13	130411SA(1,2)	UCOR	0558	2hr	Rad	C
4/19/13	130407SB(1-4)	UCOR	0901	2hr	[illegible]	C
4/19/13	130412A(1,2)	UCOR	0901	2hr	[illegible]	C
4/19/13	SEC CAL	Lab	1156	2hr30m	NA	C
4/19/13	130405IA(14-19)	Eng. Manag. Su	1433	2hr50mins	[illegible]	ICB
4/19/13	System Blksd	Lab	1755	16.40 hrs	—	ICB
4/20/13	Daily Pulser	Lab	1042	10mins	NA RA-226	ICB
4/20/13	130405IA(18,19)	ENG. MNgmt S	1349	2HR50m	AG	AG
4/20/13	130405IA(1-4)	ENG Mangmt S.	1349	2HR 50m	AG 150-TH	AG
4/21/13	Daily Pulser	Lab	1359	10min	NA	AG
4/21/13	130405IA(17-19)	Eng Mangmt S	1429	2HR50m	150-TH	AG

Alpha #2

Date	Sample #	Client	Start Time	CT Time	Analyst	Tech
4/17/13	1304078B(2-5)	[illegible]	1021	2hrs	Au241	c
4/17/13	1304088A(1,2)	U Loa	1022	2hrs	Au241	c
4/17/13	1304088A(1-4)	U Loa	1725	2hrs	NP277	c
4/18/13	Daily Pulse	Lab	0516	1 min	NA	—
4/18/13	1304098A(7)	Weston Sol.	0930	2hrs	U-Nat	c
4/18/13	1304085A(1-5)	Weston Sol.	0931	2hrs	U-Nat	c
4/18/13	1304085A (1-6)	Weston	1229	2hr 50 min	Th	KB
4/18/13	1304048A (2-7)	PCC	1524	2hr 50 mins	Th	KB
4/18/13	1304050A (18-19)	Eng. Manag. Su	1829	2hr 50 mins	Ra	KB
4/18/13	1304050A (1-4)	Eng. Manag. Su.	1829	2hr 50 min	Th	KB
4/19/13	Daily Pulse	Lab	0525	1 min	NA	—
4/19/13	1304112A(7,14)	U Loa	0559	2hrs	Ra	c
4/19/13	SEC CAL	Lab	0900	2hrs	NA	c
4/19/13	1304051A(1-6)	Eng Man	1176	2hrs	U-Nat	—
4/19/13	1304051A (1-6)	Eng. Manag. Su	1439	2hrs 50 mins	Ra	KB
4/19/13	System Bkgd	Lab	1755	16.40 hrs	α	KB
4/20/13	Daily Pulser	Lab	1042	10 mins	NA	KB
4/20/13	1304051A (5-10)	Eng Mngt S.	1350	2HR 50 m	iso-Th	AG

Alpha #3

Date	Sample #	Client	Count Time	CT Time	Analysis	Tech
4/16/13	1304049A(5-15)	Eng. Man.	0901	2 hr	U,U Iso	[illegible]
4/16/13	1304049A(9-19)	Eng. Man.	1100	2 hr	Th Iso	[illegible]
4/16/13	1304049A(13-19)	Eng. Manag. Su	1613	2hr 50 min	Ra	KB
4/17/13	Daily Pulser	Lab	0579	10 min	NA	[illegible]
4/17/13	1304061A(1-7)	MPA	0604	2 hr	Ra	[illegible]
4/17/13	1304043A(1-4)	Unitech	0607	2 hr	U Iso	[illegible]
4/17/13	1304080A(1-4)	SYGNID	0528	2 hr	Ra	[illegible]
4/17/13	1304078A(1-4)	TEC	0525	2 hr	Ra	[illegible]
4/17/13	1304088A(3,4)	UCOR	1022	2 hr	Am 243	[illegible]
4/17/13	1304089A(1-4)	UCOR	1232	2hr 50 mins	Am241	KB
4/17/13	1304089A(1-4)	UCOR	1233	2hr 50 mins	Ra	KB
4/17/13	1304039B(3-5)	WAsten	1503	1 hr	Am243	KB
4/18/13	Daily Pulser	Lab	0546	10 min	NA	[illegible]
4/18/13	1304085A(6,7)	Weston Sol.	0571	2 hr	U,U Iso	[illegible]
4/18/13	1304088A(1-4)	UCOR	0572	2 hr	U,U Iso	[illegible]
4/18/13	1304088ANT(4)	UCOR	0577	2 hr	U,U NT	[illegible]
4/18/13	1304050A(1-4)	Eng. Man	0977	2 hr	U,U Iso	[illegible]
4/18/13	1304085A(7)	Weston	1229	2h 50 min	Th	KB
4/18/13	1304050A(5-14)	Eng. Manag. Su.	1230	2h 50 min	U,U	KB
4/18/13	1304050A(1-11)	Eng. Manag. Su.	1527	2hr 50 min	Ra	KB
4/18/13	1304050A(5-15)	Eng. Manag. Su	1830	2hr 50 min	Th	KB
4/19/13	Daily Pulser	Lab	0525	10 min	NA	[illegible]
4/19/13	SEC CAL	Lab	0559	2 hr	NA	[illegible]
4/19/13	1304112A(7,4)	UCOR	0902	2 hr	Am241	[illegible]
4/19/13	1304112A(1-4)	UCOR	0902	2 hr	Am243	[illegible]
4/19/13	1304112A(1-4)	UCOR	0907	2 hr	Cm Iso	[illegible]
4/19/13	1304051A(7-7)	Eng. Man	1157	2 hr	U,U Iso	[illegible]
4/19/13	1304112A(1-4)	UCOR	1158	2 hr	NP237	[illegible]
4/19/13	1304051A(7-17)	Eng. Manag. Su.	1501	2hr 50 min	Ra	KB
4/19/13	System Bkgd	Lab	1755	16.40 hrs	–	KB
4/20/13	Daily Pulser	Lab	1042	10 mins	NA	KB
4/20/13	~~TN Dept Health~~ 1304060A(1-5)	TN Dept Health	1408	16 hr 40 m	iso-U	AG
4/20/13	1304051A(11-16)	Eng Mngt S	1412	2 hr 50 m	iso-Th	AG

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	13-04051
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:35	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

JBT
4/16/13
4/16/13

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	13-04051
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:35	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- 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 17:19	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	04/18/13 14:57	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
4/18/13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04051	
Analysis Code	Run
Ra226	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/16/2013
013575D01	Ammonium Sulfate	200 mg/ml	JBARNARD	4/16/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	4/16/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/16/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/16/2013
013754S	EDTA	0.25M	LWALKER	4/17/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	4/18/2013
013377D01	Ammonium Sulfate	200 mg/ml	LWALKER	4/18/2013

Alpha #1

Date	Sample #	Client	Load Time	CT Time	Analysis	Tech
4/17/13	1304078A(1-5)	Westmac	1021	2hr	Au241	C
4/17/13	1304078A(1)	Westmac	1021	2hr	Au242	C
4/17/13	1304084A(1-6)	MPA	1724	2hr	Ra6	C
4/18/13	Daily Pulse	Lab	0816	10m	NA	C
4/18/13	1304098A(1-6)	Westmac	0930	2hr	Uiso	C
4/18/13	1304089A (1-4,6)	UCOR	1228	2hr50mins	PU	KB
4/18/13	1304089A(4)	UCOR	1228	2hr50m	PUNT	KB
4/18/13	1304050A (15-19)	Eng. Manag. Su	1525	2hr50mins	UU	KB
4/18/13	1304048A (1)	PCC	1524	2hr50m	Th	KB
4/18/13	1304050A (12-17)	Eng. Manag. Su	1828	2hr50min	Ra	KB
4/19/13	Daily Pulse	Lab	0528	10m	NA	C
4/19/13	1304080A(16-19)	Eng. Ma	0858	2hr	Th230	C
4/19/13	1304112A(1,2)	UCOR	0858	2hr	Ra6	C
4/19/13	1304077A(1-4)	UCOR	0901	2hr	Au241	C
4/19/13	1304112A(1,2)	UCOR	0901	2hr	Au241	C
4/19/13	SEC CAL	Lab	1156	2hr 30m	NA	C
4/19/13	1304051A (14-19)	Eng. Manag. Su	1433	2hr50mins	UU	KB
4/19/13	System Bkgd	Lab	1755	16.40 hrs	–	KB
4/20/13	Daily Pulser	Lab	1042	10 mins	NA	KB
4/20/13	1304051A(18,19)	ENG. Mngmt S	1349	2hr50m	Ra-226 ~~Isoth~~	AG
4/20/13	1304051A(1-4)	ENG Mngmt S.	1349	2hr 50m	Iso-Th	AG

Alpha #2

Date	Sample #	Client	Log In Time	CT Time	Analyzed	Tech
4/17/13	1704075A(2-5)	Weston Adv.	1021	2hr	A-243	C
4/17/13	1704085A(1,2)	Weston	1022	2hr	A-243	C
4/17/13	1704089A(1-7)	Weston	1725	2hr	NP222	C
4/18/13	Daily Pulse	WS	0716	1hr	WS	—
4/18/13	1704098A(7)	Weston Sol.	0970	2hr	WS250	C
4/18/13	1304085A(1-5)	Weston Sol.	0931	2hr	WS250	C
4/18/13	1304085A(1-6)	Weston	1229	2hr 50	Th	LCB
4/18/13	1304048A(2-7)	PCC	1524	2hr 50 mins	Th	LCB
4/18/13	1304050A(18-19)	Eng. Manag. Su	1929	2hr 50 mins	Rak	LCB
4/18/13	1304050A(1-4)	Eng. Manag. Su.	1829	2hr 50	Th	LCB
4/19/13	Daily Pulse	WS	0725	1hr	WS	—
4/19/13	1704112A(7,14)	Weston	0554	2hr	N.L6	C
4/19/13	SEC CAL	WS	0900	2hr	WS	C
4/19/13	1304051A(1-6)	Eng. Manag.	1176	2hr	WS250	—
4/19/13	1304051A(1-6)	Eng. Manag. Su	1439	2hr 50 mins	Rak	LCB

Alpha #3

Date	Sample #	Client	Count Time	CT Time	Analyst	Tech
4/16/13	1304049A(5-15)	Eng. Man	0901	2 hr	U425o	c
4/16/13	1304049A(9-19)	Eng. Man	1200	2 hr	Th230	c
4/16/13	1304049A(13-19)	Eng. Manag. Su	1613	2hr50 min	Ra6	KB
4/17/13	Daily Pulser	LAS	0579	10 min	n/a	c
4/17/13	1304061A(1-7)	MPA	0604	2 hr	Ra6	c
4/17/13	1304042A(1-4)	Unitech	0607	2 hr	U4230	c
4/17/13	1304080A(1-4)	SYGNID	0528	2 hr	Ra6	c
4/17/13	1304078A(1-4)	TEL	0525	2 hr	Ra6	c
4/17/13	1304088A(3,4)	UCOR	1022	2 hr	Am241	c
4/17/13	1304084A(1-4)	UCOR	1232	2hr50mins	Am241	KB
4/17/13	1304084A(1-4)	UCOR	1233	2hr50mins	Ra6	KB
4/17/13	1304039B(3-5)	WAshen	1503	1 hr	Am243	KB
4/18/13	Daily Pulser	LAS	0546	10 min	n/a	c
4/18/13	1304085A(6,7)	Weston Sol.	0571	2 hr	U4230	c
4/18/13	1304088A(1-4)	UCOR	0572	2 hr	U4230	c
4/18/13	1304088AMT(4)	UCOR	0577	2 hr	U4NT	c
4/18/13	1304050A(1-4)	Eng. Man	0977	2 hr	U4230	c
4/17/13	1304085A(7)	Weston	1229	2h-50 min	Th	KB
4/18/13	1304050A(5-14)	Eng. Manag. Su.	1230	2h-50 min	UU	KB
4/18/13	1304050A (1-11)	Eng. Manag. Su.	1527	2hr 50 min	Ra6	KB
4/18/13	1304050A (5-15)	Eng. Manag. Su	1830	2hr 50 min	Th	KB
4/19/13	Daily Pulser	LAS	0525	10 min	n/a	c
4/19/13	SEC CAL	LAS	0559	2 hr	N4	c
4/19/13	1304112A(3,4)	UCOR	0502	2 hr	Am241	c
4/19/13	1304112A(1-4)	UCOR	0502	2 hr	Am243	c
4/19/13	1304112A(1-4)	UCOR	0507	2 hr	Gh4230	c
4/19/13	1304071A(7-17)	Eng. Man	1157	2 hr	U4230	c
4/19/13	1304112A(1-4)	UCOR	1158	2 hr	NP237	c
4/19/13	1304051A(7-17)	Eng. Manag. Su.	1501	2hr50 min	Ra6	KB

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	13-04051
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:35	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

4/16/13

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	13-04051
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:35	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	04/22/13 12:14	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	04/25/13 18:25	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)

L. Walker
4/25/13

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	13-04051
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	04/16/13 08:35	PREP	JBARNARD	ALIQUOTED ALL SAMPLES AND FILTERED SUSPENDED FRACTIONS- ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	04/22/13 12:14	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	04/25/13 18:25	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)
4	04/29/13 07:52	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)

4-29-13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04051	
Analysis Code	Run
Ra228	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/16/2013
013575D01	Ammonium Sulfate	200 mg/ml	JBARNARD	4/16/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	4/16/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/16/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/16/2013
011504D20	Ammonium Sulfide	2%	LWALKER	4/25/2013
012729D08	Lead Carrier	1.5 mg/ml	LWALKER	4/25/2013
013624P	Nitric Acid	Reagent Grade	LWALKER	4/25/2013
013322D01	Sodium Hydroxide	10M	LWALKER	4/25/2013
013587S	Yttrium Carrier	9 mg/ml	LWALKER	4/25/2013
012717D03	Ammonium Oxalate	5%	TSMITH	4/29/2013
013624D03	Nitric Acid	1N	TSMITH	4/29/2013
013290D18	Nitric Acid	6N	TSMITH	4/29/2013
013322D01	Sodium Hydroxide	10M	TSMITH	4/29/2013
013322D03	Sodium Hydroxide	18M	TSMITH	4/29/2013

LB4110 RED

Date	Sample #	Client	Load Time	Count Time	Analysis	Tech
4/25/13	1304139Pb(1-8)	USA	1432	2 hrs	Pb210	KB
4/26/13	EFFAC	Lab	0717	70	LB	C
4/26/13	NiLapac	Lab	0746	60	LB	C
4/26/13	1704062SY(1-4)	Dairyland	0751	72	SR90Y	C
4/26/13	1704062SY(1-4)	Dairyland	0751	72	SR90Y	C
4/26/13	1704089SR(1-3)	UCON	0802	72	SR707	C
4/26/13	1704089SR(4-)	UCON	0877	72	SR707	C
4/26/13	1704050RA(1-8)	Eng Man	1006	72	RA8	C
4/26/13	1704050RA(9-17)	Eng Man	1078	72	RA8	C
4/26/13	1304147Pb(2-5)	USA	1210	2hrs	Pb210	KB
4/26/13	1304050RAA(18-19)	Eng. Manag. Sv.	1212	2hrs	Ra8	KB
4/27/13	Weekly Blcd	Lab	1032	12 hrs	αβ	KB
4/29/13	EFFAC	Lab	0711	70	LB	C
4/29/13	NiLapac	Lab	0758	60	LB	C
4/29/13	1704078AD(1-6)	Accutest	0741	72	LB	C
4/29/13	1704051RA(1-4)	Eng Man	0889	72	RA8	C
4/29/13	1704051RA(5-11)	Eng Man	0910	72	RA8	C
4/29/13	1704051RA(12-16)	Eng Man	1102	72	RA8	C
4/29/13	1304051RAA(17-19)	Eng. Manag. Sv.	1153	2hrs	Ra8	KB

SECTION VIII

ANALYTICAL DATA (ISOTOPIC URANIUM)

Work Order	13-04051
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)	19.098
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-105-SS TOT	46	04/04/13 15:06	1.0000E+00
04	DO	PZ-105-SS TOT	46	04/04/13 15:06	1.0000E+00
05	TRG	PZ-105-SS DIS	46	04/04/13 15:06	1.0000E+00
06	TRG	S-10 TOT	42	04/04/13 15:25	1.0000E+00
07	TRG	S-10 DIS	42	04/04/13 15:25	1.0000E+00
08	TRG	LR-104 TOT	45	04/04/13 15:52	1.0000E+00
09	TRG	LR-104 DIS	45	04/04/13 15:52	1.0000E+00
10	TRG	DUP 01 TOT	48	04/04/13 00:00	1.0000E+00
11	TRG	DUP 01 DIS	48	04/04/13 00:00	1.0000E+00
12	TRG	DUP 02 TOT	43	04/04/13 00:00	1.0000E+00
13	TRG	DUP 02 DIS	43	04/04/13 00:00	1.0000E+00
14	TRG	FB at PZ-110-SS TOT	42	04/04/13 09:30	1.0000E+00
15	TRG	FB at PZ-110-SS DIS	42	04/04/13 09:30	1.0000E+00
16	TRG	MW-103 TOT	48	04/05/13 09:50	1.0000E+00
17	TRG	MW-103 DIS	48	04/05/13 09:50	1.0000E+00
18	TRG	PZ-200-SS TOT	37	04/05/13 11:10	1.0000E+00
19	TRG	PZ-200-SS DIS	37	04/05/13 11:10	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	0.6104	11.7		0.00								
02	MBL	0.6068	11.6		0.00								
03	DUP	0.6050	11.6		0.00								
04	DO	0.5980	11.4		0.00								
05	TRG	0.6003	11.5		0.00								
06	TRG	0.6041	11.5		0.00								
07	TRG	0.5991	11.4		0.00								
08	TRG	0.6016	11.5		0.00								
09	TRG	0.6002	11.5		0.00								
10	TRG	0.5979	11.4		0.00								
11	TRG	0.5993	11.4		0.00								
12	TRG	0.5998	11.5		0.00								
13	TRG	0.6012	11.5		0.00								
14	TRG	0.5945	11.4		0.00								
15	TRG	0.5956	11.4		0.00								
16	TRG	0.5933	11.3		0.00								
17	TRG	0.5965	11.4		0.00								
18	TRG	0.5933	11.3		0.00								
19	TRG	0.5962	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			04/16/13 08:25	JBARNARD				
02	MBL			04/16/13 08:25	JBARNARD				
03	DUP			04/16/13 08:25	JBARNARD				
04	DO			04/16/13 08:25	JBARNARD				
05	TRG			04/16/13 08:25	JBARNARD				
06	TRG			04/16/13 08:25	JBARNARD				
07	TRG			04/16/13 08:25	JBARNARD				
08	TRG			04/16/13 08:25	JBARNARD				
09	TRG			04/16/13 08:25	JBARNARD				
10	TRG			04/16/13 08:25	JBARNARD				
11	TRG			04/16/13 08:25	JBARNARD				
12	TRG			04/16/13 08:25	JBARNARD				
13	TRG			04/16/13 08:25	JBARNARD				
14	TRG			04/16/13 08:25	JBARNARD				
15	TRG			04/16/13 08:25	JBARNARD				
16	TRG			04/16/13 08:25	JBARNARD				
17	TRG			04/16/13 08:25	JBARNARD				
18	TRG			04/16/13 08:25	JBARNARD				
19	TRG			04/16/13 08:25	JBARNARD				

Preliminary Data Report & Analytical Calculations
Work Order: 13-04051-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04051	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	7.85E+00	1.07E+00	8.92E-02	8.15E+00	96.33	OK		OK	
02	U-234	MBL	BLANK	pCi/l	4.51E-02	5.14E-02	6.78E-02					OK	OK
03	U-234	DUP	PZ-105-SS TOT	pCi/l	2.60E+00	4.61E-01	9.02E-02				OK	OK	
04	U-234	DO	PZ-105-SS TOT	pCi/l	2.62E+00	4.55E-01	7.94E-02					OK	
05	U-234	TRG	PZ-105-SS DIS	pCi/l	2.58E+00	4.43E-01	6.90E-02					OK	
06	U-234	TRG	S-10 TOT	pCi/l	2.29E-01	1.15E-01	8.09E-02					OK	
07	U-234	TRG	S-10 DIS	pCi/l	1.25E-01	1.00E-01	1.07E-01					OK	
08	U-234	TRG	LR-104 TOT	pCi/l	2.60E+00	4.42E-01	5.07E-02					OK	
09	U-234	TRG	LR-104 DIS	pCi/l	2.72E+00	4.51E-01	5.62E-02					OK	
10	U-234	TRG	DUP 01 TOT	pCi/l	2.55E-01	1.09E-01	5.38E-02					OK	
11	U-234	TRG	DUP 01 DIS	pCi/l	2.04E-01	1.08E-01	6.66E-02					OK	
12	U-234	TRG	DUP 02 TOT	pCi/l	1.59E-01	9.76E-02	7.93E-02					OK	
13	U-234	TRG	DUP 02 DIS	pCi/l	1.77E-01	1.01E-01	6.69E-02					OK	
14	U-234	TRG	FB at PZ-110-SS TOT	pCi/l	1.57E-02	2.98E-02	5.52E-02					OK	
15	U-234	TRG	FB at PZ-110-SS DIS	pCi/l	4.42E-02	6.79E-02	1.16E-01					OK	
16	U-234	TRG	MW-103 TOT	pCi/l	4.07E+00	6.75E-01	1.19E-01					OK	
17	U-234	TRG	MW-103 DIS	pCi/l	3.17E+00	5.52E-01	5.99E-02					OK	
18	U-234	TRG	PZ-200-SS TOT	pCi/l	5.42E-01	1.80E-01	8.08E-02					OK	
19	U-234	TRG	PZ-200-SS DIS	pCi/l	5.32E-01	1.77E-01	9.34E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-04051-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04051	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	110.41	0.00	0.00			
02	U-234	MBL	04/09/13 00:00	1.00E+00	134.21	0.00	0.00			
03	U-234	DUP	04/04/13 15:06	1.00E+00	117.95	0.00	0.00			
04	U-234	DO	04/04/13 15:06	1.00E+00	121.42	0.00	0.00			
05	U-234	TRG	04/04/13 15:06	1.00E+00	125.70	0.00	0.00			
06	U-234	TRG	04/04/13 15:25	1.00E+00	101.21	0.00	0.00			
07	U-234	TRG	04/04/13 15:25	1.00E+00	81.32	0.00	0.00			
08	U-234	TRG	04/04/13 15:52	1.00E+00	117.88	0.00	0.00			
09	U-234	TRG	04/04/13 15:52	1.00E+00	123.81	0.00	0.00			
10	U-234	TRG	04/04/13 00:00	1.00E+00	132.22	0.00	0.00			
11	U-234	TRG	04/04/13 00:00	1.00E+00	100.34	0.00	0.00			
12	U-234	TRG	04/04/13 00:00	1.00E+00	95.45	0.00	0.00			
13	U-234	TRG	04/04/13 00:00	1.00E+00	102.84	0.00	0.00			
14	U-234	TRG	04/04/13 09:30	1.00E+00	144.40	0.00	0.00			
15	U-234	TRG	04/04/13 09:30	1.00E+00	91.62	0.00	0.00			
16	U-234	TRG	04/05/13 09:50	1.00E+00	90.80	0.00	0.00			
17	U-234	TRG	04/05/13 09:50	1.00E+00	93.69	0.00	0.00			
18	U-234	TRG	04/05/13 11:10	1.00E+00	105.27	0.00	0.00			
19	U-234	TRG	04/05/13 11:10	1.00E+00	109.45	0.00	0.00			

Work Order: 13-04051-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04051	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	04/19/13 11:36		A_Spec	Alpha_018	170	5.80 E+02	7.00 E-03	17.8
02	U-234	MBL	04/19/13 11:36		A_Spec	Alpha_022	170	3.49 E+00	3.00 E-03	15.3
03	U-234	DUP	04/19/13 11:36		A_Spec	Alpha_024	170	1.98 E+02	8.00 E-03	17.1
04	U-234	DO	04/19/13 11:36		A_Spec	Alpha_025	170	2.08 E+02	6.00 E-03	17.4
05	U-234	TRG	04/19/13 11:36		A_Spec	Alpha_027	170	2.11 E+02	4.00 E-03	17.3
06	U-234	TRG	04/19/13 11:36		A_Spec	Alpha_029	170	1.70 E+01	0.00 E+00	19.5
07	U-234	TRG	04/19/13 11:57		A_Spec	Alpha_033	170	7.00 E+00	0.00 E+00	18.2
08	U-234	TRG	04/19/13 11:57		A_Spec	Alpha_034	170	2.14 E+02	1.00 E-03	18.6
09	U-234	TRG	04/19/13 11:57		A_Spec	Alpha_035	170	2.32 E+02	2.00 E-03	18.3
10	U-234	TRG	04/19/13 11:57		A_Spec	Alpha_037	170	2.27 E+01	2.00 E-03	17.8
11	U-234	TRG	04/19/13 11:57		A_Spec	Alpha_040	170	1.47 E+01	2.00 E-03	19
12	U-234	TRG	04/19/13 11:57		A_Spec	Alpha_041	170	1.13 E+01	4.00 E-03	19.8
13	U-234	TRG	04/19/13 11:57		A_Spec	Alpha_042	170	1.27 E+01	2.00 E-03	18.5
14	U-234	TRG	04/19/13 14:33		A_Spec	Alpha_003	170.02	1.49 E+00	3.00 E-03	17.5
15	U-234	TRG	04/19/13 14:33		A_Spec	Alpha_004	170	2.96 E+00	1.20 E-02	19.4
16	U-234	TRG	04/19/13 14:33		A_Spec	Alpha_010	170.02	2.74 E+02	1.30 E-02	19.7
17	U-234	TRG	04/19/13 14:33		A_Spec	Alpha_011	170	2.21 E+02	1.00 E-03	19.7
18	U-234	TRG	04/19/13 14:33		A_Spec	Alpha_013	170	4.02 E+01	5.00 E-03	18.7
19	U-234	TRG	04/19/13 14:33		A_Spec	Alpha_014	170	4.05 E+01	9.00 E-03	18.5

Preliminary Data Report & Analytical Calculations

Work Order: 13-04051-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-04051
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	8.02E+00	1.09E+00	8.88E-02	7.94E+00	100.95	OK		OK	
02	U-238	MBL	BLANK	pCi/l	2.11E-02	4.54E-02	8.82E-02					OK	OK
03	U-238	DUP	PZ-105-SS TOT	pCi/l	1.82E+00	3.62E-01	6.27E-02				OK	OK	
04	U-238	DO	PZ-105-SS TOT	pCi/l	1.64E+00	3.32E-01	6.00E-02					OK	
05	U-238	TRG	PZ-105-SS DIS	pCi/l	1.42E+00	3.00E-01	8.65E-02					OK	
06	U-238	TRG	S-10 TOT	pCi/l	2.41E-01	1.18E-01	8.46E-02					OK	
07	U-238	TRG	S-10 DIS	pCi/l	8.91E-02	8.62E-02	1.07E-01					OK	
08	U-238	TRG	LR-104 TOT	pCi/l	2.11E+00	3.84E-01	5.78E-02					OK	
09	U-238	TRG	LR-104 DIS	pCi/l	1.94E+00	3.58E-01	4.88E-02					OK	
10	U-238	TRG	DUP 01 TOT	pCi/l	1.21E-01	7.40E-02	4.68E-02					OK	
11	U-238	TRG	DUP 01 DIS	pCi/l	1.43E-01	9.20E-02	7.82E-02					OK	
12	U-238	TRG	DUP 02 TOT	pCi/l	1.04E-01	8.94E-02	1.17E-01					OK	
13	U-238	TRG	DUP 02 DIS	pCi/l	1.32E-01	8.79E-02	7.31E-02					OK	
14	U-238	TRG	FB at PZ-110-SS TOT	pCi/l	-7.13E-03	2.17E-02	5.91E-02					OK	
15	U-238	TRG	FB at PZ-110-SS DIS	pCi/l	-1.26E-02	3.12E-02	8.90E-02					OK	
16	U-238	TRG	MW-103 TOT	pCi/l	3.72E+00	6.30E-01	8.86E-02					OK	
17	U-238	TRG	MW-103 DIS	pCi/l	3.00E+00	5.31E-01	9.01E-02					OK	
18	U-238	TRG	PZ-200-SS TOT	pCi/l	5.22E-01	1.74E-01	5.61E-02					OK	
19	U-238	TRG	PZ-200-SS DIS	pCi/l	5.84E-01	1.84E-01	6.26E-02					OK	

Work Order: 13-04051-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-04051
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	110.41	0.00	0.00			
02	U-238	MBL	04/09/13 00:00	1.00E+00	134.21	0.00	0.00			
03	U-238	DUP	04/04/13 15:06	1.00E+00	117.95	0.00	0.00			
04	U-238	DO	04/04/13 15:06	1.00E+00	121.42	0.00	0.00			
05	U-238	TRG	04/04/13 15:06	1.00E+00	125.70	0.00	0.00			
06	U-238	TRG	04/04/13 15:25	1.00E+00	101.21	0.00	0.00			
07	U-238	TRG	04/04/13 15:25	1.00E+00	81.32	0.00	0.00			
08	U-238	TRG	04/04/13 15:52	1.00E+00	117.88	0.00	0.00			
09	U-238	TRG	04/04/13 15:52	1.00E+00	123.81	0.00	0.00			
10	U-238	TRG	04/04/13 00:00	1.00E+00	132.22	0.00	0.00			
11	U-238	TRG	04/04/13 00:00	1.00E+00	100.34	0.00	0.00			
12	U-238	TRG	04/04/13 00:00	1.00E+00	95.45	0.00	0.00			
13	U-238	TRG	04/04/13 00:00	1.00E+00	102.84	0.00	0.00			
14	U-238	TRG	04/04/13 09:30	1.00E+00	144.40	0.00	0.00			
15	U-238	TRG	04/04/13 09:30	1.00E+00	91.62	0.00	0.00			
16	U-238	TRG	04/05/13 09:50	1.00E+00	90.80	0.00	0.00			
17	U-238	TRG	04/05/13 09:50	1.00E+00	93.69	0.00	0.00			
18	U-238	TRG	04/05/13 11:10	1.00E+00	105.27	0.00	0.00			
19	U-238	TRG	04/05/13 11:10	1.00E+00	109.45	0.00	0.00			

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Client: Engineering Management Support, Inc.
Eberline Services Work Order: 13-04051
Analysis Code: UUISO
Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	04/19/13 11:36		A_Spec	Alpha_018	170	5.95 E+02	7.00 E-03	17.8
02	U-238	MBL	04/19/13 11:36		A_Spec	Alpha_022	170	1.64 E+00	8.00 E-03	15.3
03	U-238	DUP	04/19/13 11:36		A_Spec	Alpha_024	170	1.39 E+02	2.00 E-03	17.1
04	U-238	DO	04/19/13 11:36		A_Spec	Alpha_025	170	1.31 E+02	2.00 E-03	17.4
05	U-238	TRG	04/19/13 11:36		A_Spec	Alpha_027	170	1.16 E+02	9.00 E-03	17.3
06	U-238	TRG	04/19/13 11:36		A_Spec	Alpha_029	170	1.80 E+01	6.00 E-03	19.5
07	U-238	TRG	04/19/13 11:57		A_Spec	Alpha_033	170	5.00 E+00	0.00 E+00	18.2
08	U-238	TRG	04/19/13 11:57		A_Spec	Alpha_034	170	1.75 E+02	2.00 E-03	18.6
09	U-238	TRG	04/19/13 11:57		A_Spec	Alpha_035	170	1.66 E+02	1.00 E-03	18.3
10	U-238	TRG	04/19/13 11:57		A_Spec	Alpha_037	170	1.08 E+01	1.00 E-03	17.8
11	U-238	TRG	04/19/13 11:57		A_Spec	Alpha_040	170	1.03 E+01	4.00 E-03	19
12	U-238	TRG	04/19/13 11:57		A_Spec	Alpha_041	170	7.45 E+00	1.50 E-02	19.8
13	U-238	TRG	04/19/13 11:57		A_Spec	Alpha_042	170	9.49 E+00	3.00 E-03	18.5
14	U-238	TRG	04/19/13 14:33		A_Spec	Alpha_003	170.02	-6.80 E-01	4.00 E-03	17.5
15	U-238	TRG	04/19/13 14:33		A_Spec	Alpha_004	170	-8.50 E-01	5.00 E-03	19.4
16	U-238	TRG	04/19/13 14:33		A_Spec	Alpha_010	170.02	2.51 E+02	5.00 E-03	19.7
17	U-238	TRG	04/19/13 14:33		A_Spec	Alpha_011	170	2.10 E+02	6.00 E-03	19.7
18	U-238	TRG	04/19/13 14:33		A_Spec	Alpha_013	170	3.88 E+01	1.00 E-03	18.7
19	U-238	TRG	04/19/13 14:33		A_Spec	Alpha_014	170	4.47 E+01	2.00 E-03	18.5

Preliminary Data Report & Analytical Calculations

Work Order: 13-04051-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-04051
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	4.29E-01	1.74E-01	7.98E-02					OK	
02	U-235	MBL	BLANK	pCi/l	3.70E-02	5.53E-02	8.99E-02					OK	OK
03	U-235	DUP	PZ-105-SS TOT	pCi/l	1.11E-01	8.52E-02	6.78E-02				NA	OK	
04	U-235	DO	PZ-105-SS TOT	pCi/l	1.09E-01	8.69E-02	9.32E-02					OK	
05	U-235	TRG	PZ-105-SS DIS	pCi/l	8.02E-02	7.36E-02	8.51E-02					OK	
06	U-235	TRG	S-10 TOT	pCi/l	2.76E-02	4.69E-02	7.95E-02					OK	
07	U-235	TRG	S-10 DIS	pCi/l	1.83E-02	4.39E-02	9.21E-02					OK	
08	U-235	TRG	LR-104 TOT	pCi/l	1.65E-01	1.03E-01	8.98E-02					OK	
09	U-235	TRG	LR-104 DIS	pCi/l	1.59E-01	9.98E-02	8.69E-02					OK	
10	U-235	TRG	DUP 01 TOT	pCi/l	1.15E-02	2.76E-02	5.80E-02					OK	
11	U-235	TRG	DUP 01 DIS	pCi/l	3.44E-02	5.84E-02	1.03E-01					OK	
12	U-235	TRG	DUP 02 TOT	pCi/l	5.55E-03	3.59E-02	9.78E-02					OK	
13	U-235	TRG	DUP 02 DIS	pCi/l	1.18E-01	9.06E-02	7.20E-02					OK	
14	U-235	TRG	FB at PZ-110-SS TOT	pCi/l	3.45E-02	4.46E-02	6.21E-02					OK	
15	U-235	TRG	FB at PZ-110-SS DIS	pCi/l	-3.50E-03	3.96E-02	1.21E-01					OK	
16	U-235	TRG	MW-103 TOT	pCi/l	3.73E-01	1.71E-01	1.03E-01					OK	
17	U-235	TRG	MW-103 DIS	pCi/l	2.66E-01	1.42E-01	1.06E-01					OK	
18	U-235	TRG	PZ-200-SS TOT	pCi/l	6.38E-02	6.59E-02	6.95E-02					OK	
19	U-235	TRG	PZ-200-SS DIS	pCi/l	3.76E-02	5.62E-02	9.15E-02					OK	

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-04051
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-235	LCS	04/09/13 00:00	1.00E+00	110.41	0.00	0.00			
02	U-235	MBL	04/09/13 00:00	1.00E+00	134.21	0.00	0.00			
03	U-235	DUP	04/04/13 15:06	1.00E+00	117.95	0.00	0.00			
04	U-235	DO	04/04/13 15:06	1.00E+00	121.42	0.00	0.00			
05	U-235	TRG	04/04/13 15:06	1.00E+00	125.70	0.00	0.00			
06	U-235	TRG	04/04/13 15:25	1.00E+00	101.21	0.00	0.00			
07	U-235	TRG	04/04/13 15:25	1.00E+00	81.32	0.00	0.00			
08	U-235	TRG	04/04/13 15:52	1.00E+00	117.88	0.00	0.00			
09	U-235	TRG	04/04/13 15:52	1.00E+00	123.81	0.00	0.00			
10	U-235	TRG	04/04/13 00:00	1.00E+00	132.22	0.00	0.00			
11	U-235	TRG	04/04/13 00:00	1.00E+00	100.34	0.00	0.00			
12	U-235	TRG	04/04/13 00:00	1.00E+00	95.45	0.00	0.00			
13	U-235	TRG	04/04/13 00:00	1.00E+00	102.84	0.00	0.00			
14	U-235	TRG	04/04/13 09:30	1.00E+00	144.40	0.00	0.00			
15	U-235	TRG	04/04/13 09:30	1.00E+00	91.62	0.00	0.00			
16	U-235	TRG	04/05/13 09:50	1.00E+00	90.80	0.00	0.00			
17	U-235	TRG	04/05/13 09:50	1.00E+00	93.69	0.00	0.00			
18	U-235	TRG	04/05/13 11:10	1.00E+00	105.27	0.00	0.00			
19	U-235	TRG	04/05/13 11:10	1.00E+00	109.45	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-04051-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04051	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	04/19/13 11:36		A_Spec	Alpha_018	170	2.57 E+01	2.00 E-03	17.8
02	U-235	MBL	04/19/13 11:36		A_Spec	Alpha_022	170	2.32 E+00	4.00 E-03	15.3
03	U-235	DUP	04/19/13 11:36		A_Spec	Alpha_024	170	6.83 E+00	1.00 E-03	17.1
04	U-235	DO	04/19/13 11:36		A_Spec	Alpha_025	170	7.00 E+00	0.00 E+00	17.4
05	U-235	TRG	04/19/13 11:36		A_Spec	Alpha_027	170	5.32 E+00	4.00 E-03	17.3
06	U-235	TRG	04/19/13 11:36		A_Spec	Alpha_029	170	1.66 E+00	2.00 E-03	19.5
07	U-235	TRG	04/19/13 11:57		A_Spec	Alpha_033	170	8.30 E-01	1.00 E-03	18.2
08	U-235	TRG	04/19/13 11:57		A_Spec	Alpha_034	170	1.10 E+01	0.00 E+00	18.6
09	U-235	TRG	04/19/13 11:57		A_Spec	Alpha_035	170	1.10 E+01	0.00 E+00	18.3
10	U-235	TRG	04/19/13 11:57		A_Spec	Alpha_037	170	8.30 E-01	1.00 E-03	17.8
11	U-235	TRG	04/19/13 11:57		A_Spec	Alpha_040	170	2.00 E+00	0.00 E+00	19
12	U-235	TRG	04/19/13 11:57		A_Spec	Alpha_041	170	3.20 E-01	4.00 E-03	19.8
13	U-235	TRG	04/19/13 11:57		A_Spec	Alpha_042	170	6.83 E+00	1.00 E-03	18.5
14	U-235	TRG	04/19/13 14:33		A_Spec	Alpha_003	170.02	2.66 E+00	2.00 E-03	17.5
15	U-235	TRG	04/19/13 14:33		A_Spec	Alpha_004	170	-1.90 E-01	7.00 E-03	19.4
16	U-235	TRG	04/19/13 14:33		A_Spec	Alpha_010	170.02	2.03 E+01	4.00 E-03	19.7
17	U-235	TRG	04/19/13 14:33		A_Spec	Alpha_011	170	1.50 E+01	0.00 E+00	19.7
18	U-235	TRG	04/19/13 14:33		A_Spec	Alpha_013	170	3.83 E+00	1.00 E-03	18.7
19	U-235	TRG	04/19/13 14:33		A_Spec	Alpha_014	170	2.32 E+00	4.00 E-03	18.5

Count Room Report
Client: Engineering Management Su

13-04051-UUISO-1 (pCi/l) in WA
Tracer ID: U-10a

Printed: 4/19/2013 5:59 AM
Page 1 of 1

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/09/13 00:00	1.0000	0.6104	11.6574		0.00		
02	MBL	BLANK	04/09/13 00:00	1.0000	0.6068	11.5887		0.00		
03	DUP	PZ-105-SS TOT	04/04/13 15:06	1.0000	0.6050	11.5543		0.00		
04	DO	PZ-105-SS TOT	04/04/13 15:06	1.0000	0.5980	11.4206		0.00		
05	TRG	PZ-105-SS DIS	04/04/13 15:06	1.0000	0.6003	11.4645		0.00		
06	TRG	S-10 TOT	04/04/13 15:25	1.0000	0.6041	11.5371		0.00		
07	TRG	S-10 DIS	04/04/13 15:25	1.0000	0.5991	11.4416		0.00		
08	TRG	LR-104 TOT	04/04/13 15:52	1.0000	0.6016	11.4894		0.00		
09	TRG	LR-104 DIS	04/04/13 15:52	1.0000	0.6002	11.4626		0.00		
10	TRG	DUP 01 TOT	04/04/13 00:00	1.0000	0.5979	11.4187		0.00		
11	TRG	DUP 01 DIS	04/04/13 00:00	1.0000	0.5993	11.4454		0.00		
12	TRG	DUP 02 TOT	04/04/13 00:00	1.0000	0.5998	11.4550		0.00		
13	TRG	DUP 02 DIS	04/04/13 00:00	1.0000	0.6012	11.4817		0.00		
14	TRG	FB at PZ-110-SS TOT	04/04/13 09:30	1.0000	0.5945	11.3538		0.00		
15	TRG	FB at PZ-110-SS DIS	04/04/13 09:30	1.0000	0.5956	11.3748		0.00		
16	TRG	MW-103 TOT	04/05/13 09:50	1.0000	0.5933	11.3308		0.00		
17	TRG	MW-103 DIS	04/05/13 09:50	1.0000	0.5965	11.3920		0.00		
18	TRG	PZ-200-SS TOT	04/05/13 11:10	1.0000	0.5933	11.3308		0.00		
19	TRG	PZ-200-SS DIS	04/05/13 11:10	1.0000	0.5962	11.3862		0.00		

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-04051	1	UUISO	4/16/2013 8:22	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	4/16/2013	0.500	0.5133				8.15	0.293	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	4/16/2013	0.500	0.5133				7.94	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	19.098	4/16/2013	0.6104	0.6300
02	U-232	U-10a	19.098	4/16/2013	0.6068	0.6300
03	U-232	U-10a	19.098	4/16/2013	0.6050	0.6300
04	U-232	U-10a	19.098	4/16/2013	0.5980	0.6300
05	U-232	U-10a	19.098	4/16/2013	0.6003	0.6300
06	U-232	U-10a	19.098	4/16/2013	0.6041	0.6300
07	U-232	U-10a	19.098	4/16/2013	0.5991	0.6300
08	U-232	U-10a	19.098	4/16/2013	0.6016	0.6300
09	U-232	U-10a	19.098	4/16/2013	0.6002	0.6300
10	U-232	U-10a	19.098	4/16/2013	0.5979	0.6300
11	U-232	U-10a	19.098	4/16/2013	0.5993	0.6300
12	U-232	U-10a	19.098	4/16/2013	0.5998	0.6300
13	U-232	U-10a	19.098	4/16/2013	0.6012	0.6300
14	U-232	U-10a	19.098	4/16/2013	0.5945	0.6300
15	U-232	U-10a	19.098	4/16/2013	0.5956	0.6300
16	U-232	U-10a	19.098	4/16/2013	0.5933	0.6300
17	U-232	U-10a	19.098	4/16/2013	0.5965	0.6300
18	U-232	U-10a	19.098	4/16/2013	0.5933	0.6300
19	U-232	U-10a	19.098	4/16/2013	0.5962	0.6300

0.6104 g
0.6068 g
-0.6050 g
-0.5980 g
-0.6003 g
-0.6041 g
-0.5991 g
-0.6016 g
-0.6002 g
-0.5979 g
-0.5993 g
-0.5998 g
-0.6012 g
-0.5945 g
-0.5956 g
-0.5933 g
-0.5965 g
-0.5933 g
-0.5962 g

Printer Tapes

LCS

0.5133 g

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04051	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-105-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-105-SS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-105-SS DIS	TRG					1.0000E+00	1.0000E+00				
06	S-10 TOT	TRG					1.0000E+00	1.0000E+00				
07	S-10 DIS	TRG					1.0000E+00	1.0000E+00				
08	LR-104 TOT	TRG					1.0000E+00	1.0000E+00				
09	LR-104 DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP 01 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP 01 DIS	TRG					1.0000E+00	1.0000E+00				
12	DUP 02 TOT	TRG					1.0000E+00	1.0000E+00				
13	DUP 02 DIS	TRG					1.0000E+00	1.0000E+00				
14	FB at PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
15	FB at PZ-110-SS DIS	TRG					1.0000E+00	1.0000E+00				
16	MW-103 TOT	TRG					1.0000E+00	1.0000E+00				
17	MW-103 DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-200-SS TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-200-SS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: JB Date: 4/16/13

LCS 4/19/13

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_018
Chamber Serial Number:
Detector Serial Number: 18
Env. Background: System Bkgd 54576
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/19/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:36:31 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: 0.1961 +/- 0.0110
Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
Chem. Recovery Factor: 1.1041 +/- 0.0651

Control Certificate Name: NatU_U-8A
Chem. Recov. of Control: U-238 0.984027 +/- 0.074385
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	5.271	386.47	9.99	1.53	0.00E+000	20.9
U-234		4.726	579.81	8.15	1.19	0.00E+000	25.5
U-235		4.406	25.66	38.99	0.34	0.00E+000	3.9
U-238		4.151	594.81	8.05	1.19	0.00E+000	8.5

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	5.23E+000 +/- 5.74E-001	9.62E-002 +/- 1.05E-002
U-234	0.991	4761.50*	7.85E+000 +/- 1.07E+000	8.92E-002 +/- 9.78E-003
U-235	0.997	4385.50*	4.29E-001 +/- 1.74E-001	7.98E-002 +/- 8.75E-003
U-238	0.992	4184.40*	8.02E+000 +/- 1.09E+000	8.88E-002 +/- 9.74E-003

AG 4/22/13

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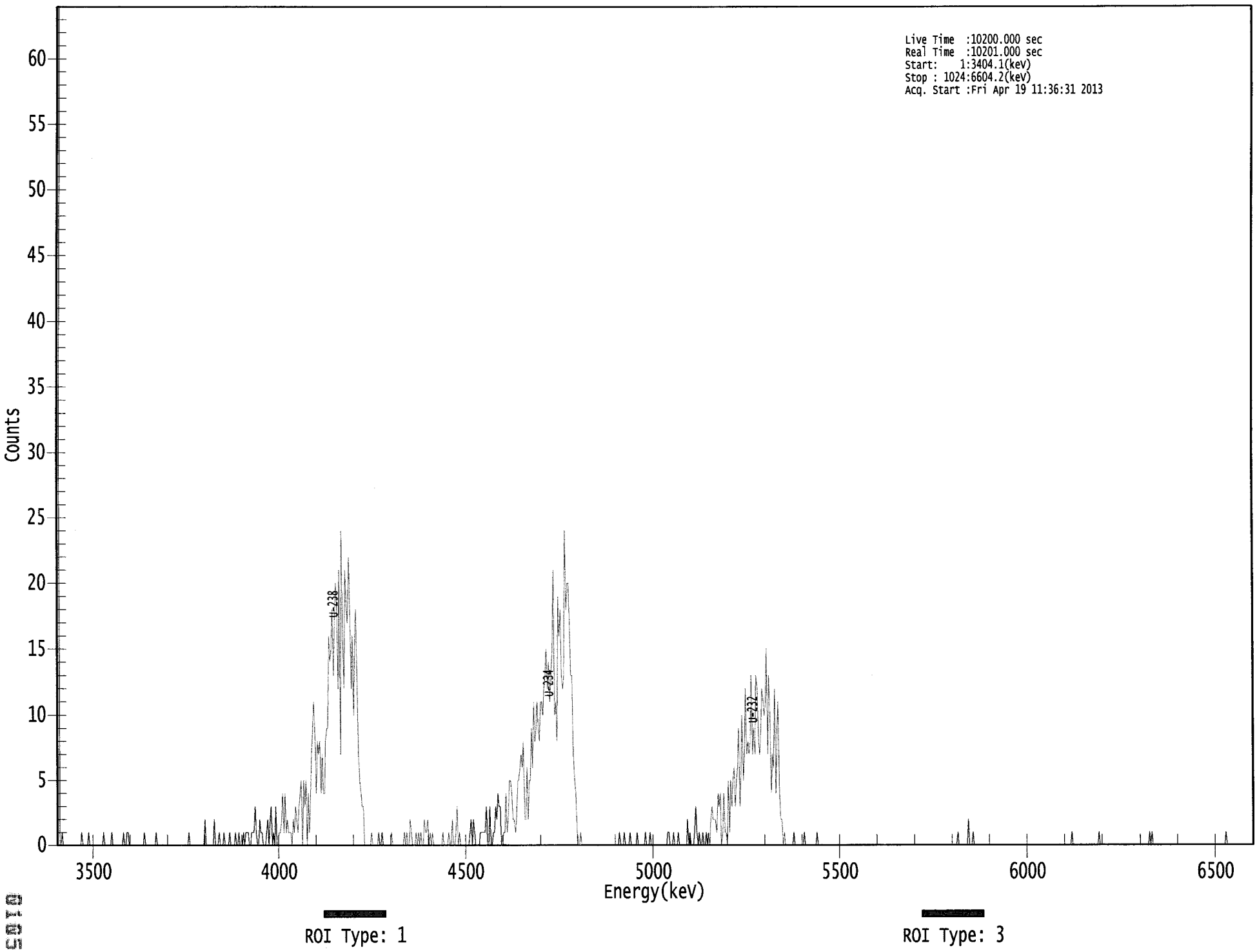

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	10201	10200	0	0	1	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	1	0	0
25:	0	0	0	1	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	1	0	0	0	0	0	0	1
49:	0	0	0	0	0	0	0	0
57:	0	1	0	0	1	1	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	1	0	0	0	0
81:	0	0	0	0	0	1	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	1	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	2
129:	0	0	0	0	0	0	0	2
137:	0	0	0	1	0	0	0	1
145:	0	0	0	0	1	0	0	0
153:	0	1	0	0	1	0	0	0
161:	1	0	1	1	1	0	0	1
169:	1	1	3	1	0	0	2	1
177:	1	0	0	0	1	2	0	2
185:	3	0	1	0	3	0	0	1
193:	1	2	4	1	4	1	2	1
201:	1	1	0	2	1	3	2	1
209:	3	4	5	0	5	3	5	0
217:	4	1	4	7	9	11	8	4
225:	8	7	8	4	7	4	4	8
233:	9	9	16	14	15	18	13	17
241:	20	18	12	21	7	24	16	12
249:	21	18	17	22	18	12	16	10
257:	15	18	13	7	5	4	3	3
265:	0	0	0	0	0	0	1	0
273:	0	0	0	0	1	0	0	1
281:	0	0	0	0	0	0	0	1
289:	0	0	0	0	0	0	0	0
297:	0	0	1	0	1	0	0	2
305:	1	0	0	0	1	0	1	0
313:	1	0	0	2	1	1	2	0
321:	1	0	1	0	0	0	0	0
329:	0	0	0	1	0	0	0	0
337:	1	0	0	2	0	0	1	3
345:	0	1	0	0	0	0	0	0
353:	0	0	1	2	0	2	1	0
361:	0	0	0	1	1	1	1	1

369:	3	0	0	3	0	0	1	1

Sample Title: 01

Channel								
377:	3	2	4	3	3	0	0	1
385:	1	4	1	2	5	5	4	2
393:	2	1	2	5	5	6	7	6
401:	8	2	2	6	2	5	5	9
409:	6	11	8	9	11	9	8	11
417:	11	10	12	13	15	12	14	11
425:	13	15	21	10	11	8	19	16
433:	18	13	12	13	24	18	20	20
441:	17	13	13	7	5	4	1	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	0
481:	0	0	1	0	0	0	1	0
489:	0	0	0	1	0	0	0	0
497:	0	1	0	0	0	0	0	0
505:	1	0	0	0	1	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	1	1	0	0	0
529:	1	0	0	0	1	0	0	0
537:	0	0	0	0	2	0	1	0
545:	0	0	1	3	1	0	1	0
553:	0	1	0	0	1	0	1	0
561:	2	3	2	2	2	1	4	3
569:	4	0	1	4	1	1	0	5
577:	1	5	3	5	6	3	5	6
585:	9	3	6	10	5	7	12	7
593:	8	7	8	13	7	9	7	13
601:	12	8	7	9	12	11	10	11
609:	15	7	13	10	4	7	6	12
617:	4	9	11	4	2	2	0	1
625:	0	0	0	0	0	0	0	1
633:	0	0	0	0	0	0	0	0
641:	1	0	0	0	0	0	0	0
649:	0	0	0	1	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	1	0	0	0	0
777:	0	0	0	0	2	0	0	0
785:	1	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 01

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	1	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	1	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	1	0
937:	1	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	1
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

ICB 4/19/13

Apex-Alpha™

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_022
Chamber Serial Number:
Detector Serial Number: 22
Env. Background: System Bkgd 54577
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/19/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:36:32 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.607 mL
Effective Efficiency: 0.2055 +/- 0.0113
Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
Chem. Recovery Factor: 1.3421 +/- 0.0781

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	402.64	9.79	1.36	0.00E+000	17.1
U-234		4.751	3.49	113.53	0.51	0.00E+000	3.1
U-235		4.381	2.32	149.12	0.68	0.00E+000	3.1
U-238		4.189	1.64	214.83	1.36	0.00E+000	3.1

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*	5.20E+000 +/- 5.60E-001	8.86E-002 +/- 9.54E-003
U-234	0.999	4761.50*	4.51E-002 +/- 5.14E-002	6.78E-002 +/- 7.30E-003
U-235	1.000	4385.50*	3.70E-002 +/- 5.53E-002	8.99E-002 +/- 9.69E-003
U-238	1.000	4184.40*	2.11E-002 +/- 4.54E-002	8.82E-002 +/- 9.50E-003

AG
4/22/13

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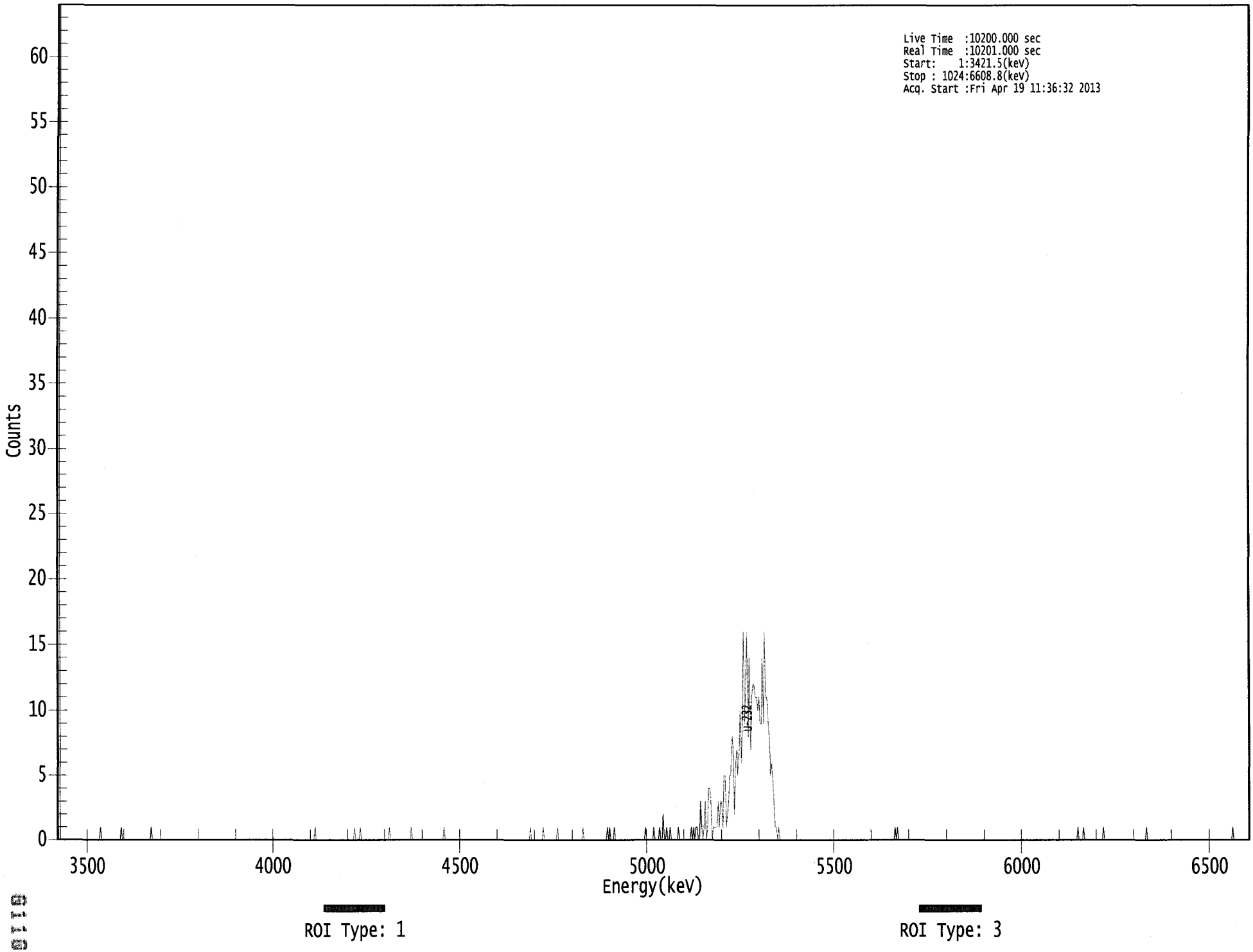


****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	10201	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	1	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	1
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	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	1	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:	1	0	0	0	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	1	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	1	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	1	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	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	1
409:	0	0	0	0	0	0	0	0
417:	0	0	1	0	0	0	0	0
425:	0	0	0	0	0	0	1	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	1	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	1	0	1	0	0	0	1
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	1	0	0	0	0	0
513:	0	1	0	0	0	0	1	0
521:	0	2	0	0	1	0	0	1
529:	0	0	0	0	0	0	1	0
537:	0	0	0	0	0	0	0	0
545:	0	1	0	1	0	1	1	0
553:	0	3	1	0	1	3	0	1
561:	4	4	3	0	1	1	1	1
569:	3	1	3	3	1	5	5	1
577:	2	3	5	5	8	7	2	6
585:	7	5	7	10	6	10	16	9
593:	12	16	8	14	7	11	12	12
601:	11	11	10	11	9	9	14	9
609:	16	11	11	9	8	5	6	5
617:	3	1	1	0	1	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	1	0	1	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 02

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

IDB 4/29/13

Apex-Alpha™

Sample Description: PZ-105-SS TOT-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_024
Chamber Serial Number:
Detector Serial Number: 24
Env. Background: System Bkgd 54578
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/4/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:36:33 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.605 mL
Effective Efficiency: 0.2017 +/- 0.0112
Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
Chem. Recovery Factor: 1.1795 +/- 0.0690

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	5.243	393.98	9.89	1.02	0.00E+000	9.3
U-234		4.703	197.64	14.00	1.36	0.00E+000	4.7
U-235		4.387	6.83	76.08	0.17	0.00E+000	3.1
U-238		4.137	138.66	16.67	0.34	0.00E+000	5.1

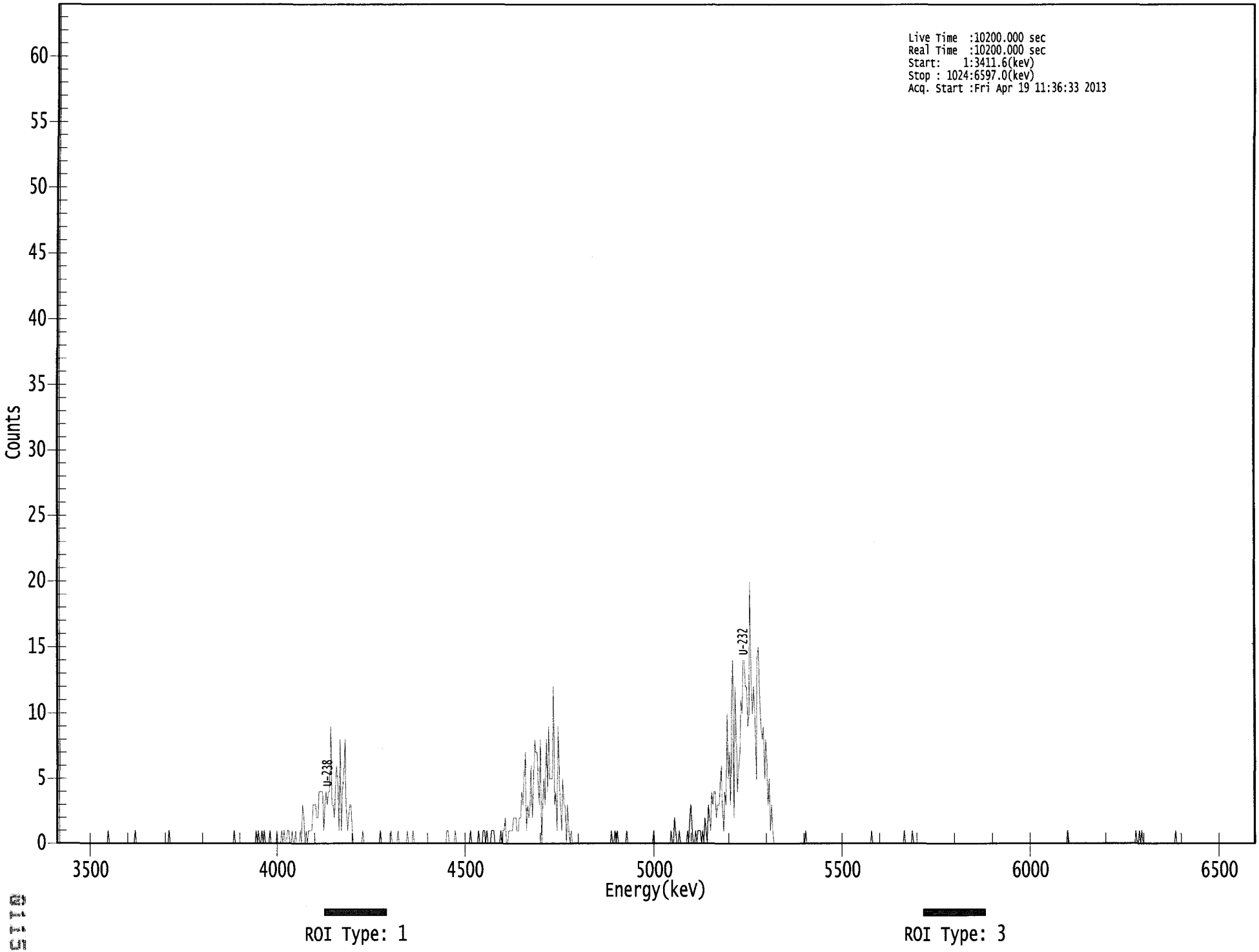
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.975	5302.50*	5.19E+000 +/- 5.64E-001	8.30E-002 +/- 9.02E-003
U-234	0.976	4761.50*	2.60E+000 +/- 4.61E-001	9.02E-002 +/- 9.81E-003
U-235	1.000	4385.50*	1.11E-001 +/- 8.52E-002	6.78E-002 +/- 7.37E-003
U-238	0.984	4184.40*	1.82E+000 +/- 3.62E-001	6.27E-002 +/- 6.81E-003

AG 4/22/13

0000055917.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	0	0	0	0	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	1	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:	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	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:	1	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	1	0	1	0	0
177:	1	0	1	0	0	0	0	1
185:	0	0	0	0	0	1	0	0
193:	0	1	0	1	0	0	1	1
201:	0	0	1	0	0	1	0	0
209:	0	1	0	3	2	0	1	0
217:	1	1	1	1	3	3	3	2
225:	2	4	4	4	4	1	3	4
233:	3	4	4	9	3	3	2	4
241:	6	5	1	8	1	4	5	8
249:	3	1	2	3	3	1	0	0
257:	0	0	0	0	0	0	1	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	1	0	0
281:	0	0	0	0	0	0	1	0
289:	0	0	0	0	1	0	0	0
297:	0	0	0	0	1	0	0	0
305:	0	1	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	1	1
337:	0	0	0	0	0	1	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	1	0	0	0	0	0
361:	0	1	0	0	0	1	1	0

369:	1	0	0	0	1	1	1	0

Sample Title: 03

Channel								
377:	0	0	0	0	1	0	1	1
385:	2	0	0	1	1	1	1	2
393:	2	2	1	1	2	2	4	3
401:	5	7	1	3	2	3	6	2
409:	4	8	7	7	5	3	8	0
417:	3	5	3	8	4	9	5	5
425:	5	12	3	4	1	9	5	3
433:	1	5	3	3	0	3	1	0
441:	1	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	1	0	0	1	0	1
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	1	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	1	0	0
529:	2	1	0	0	1	0	0	0
537:	0	0	0	1	0	2	3	1
545:	0	0	1	0	1	1	1	0
553:	1	0	2	1	0	3	2	1
561:	4	3	4	4	2	3	3	4
569:	6	3	1	4	3	10	5	7
577:	3	11	14	2	12	8	4	6
585:	7	11	10	14	14	12	12	9
593:	10	20	12	10	12	10	5	14
601:	15	11	9	8	9	5	8	6
609:	3	5	1	3	1	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	1	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:	1	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	1	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: 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	1
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	1	0	0	1	0	1	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	1	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

ICB 4/19/13

Sample Description: PZ-105-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_025
Chamber Serial Number:
Detector Serial Number: 25
Env. Background: System Bkgd 54579
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/4/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:36:34 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: 0.2107 +/- 0.0115
Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
Chem. Recovery Factor: 1.2142 +/- 0.0702

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	406.81	9.73	1.19	0.00E+000	4.8
U-234		4.736	207.98	13.63	1.02	0.00E+000	10.4
U-235		4.362	7.00	79.20	0.00	0.00E+000	3.1
U-238		4.166	130.66	17.17	0.34	0.00E+000	13.2

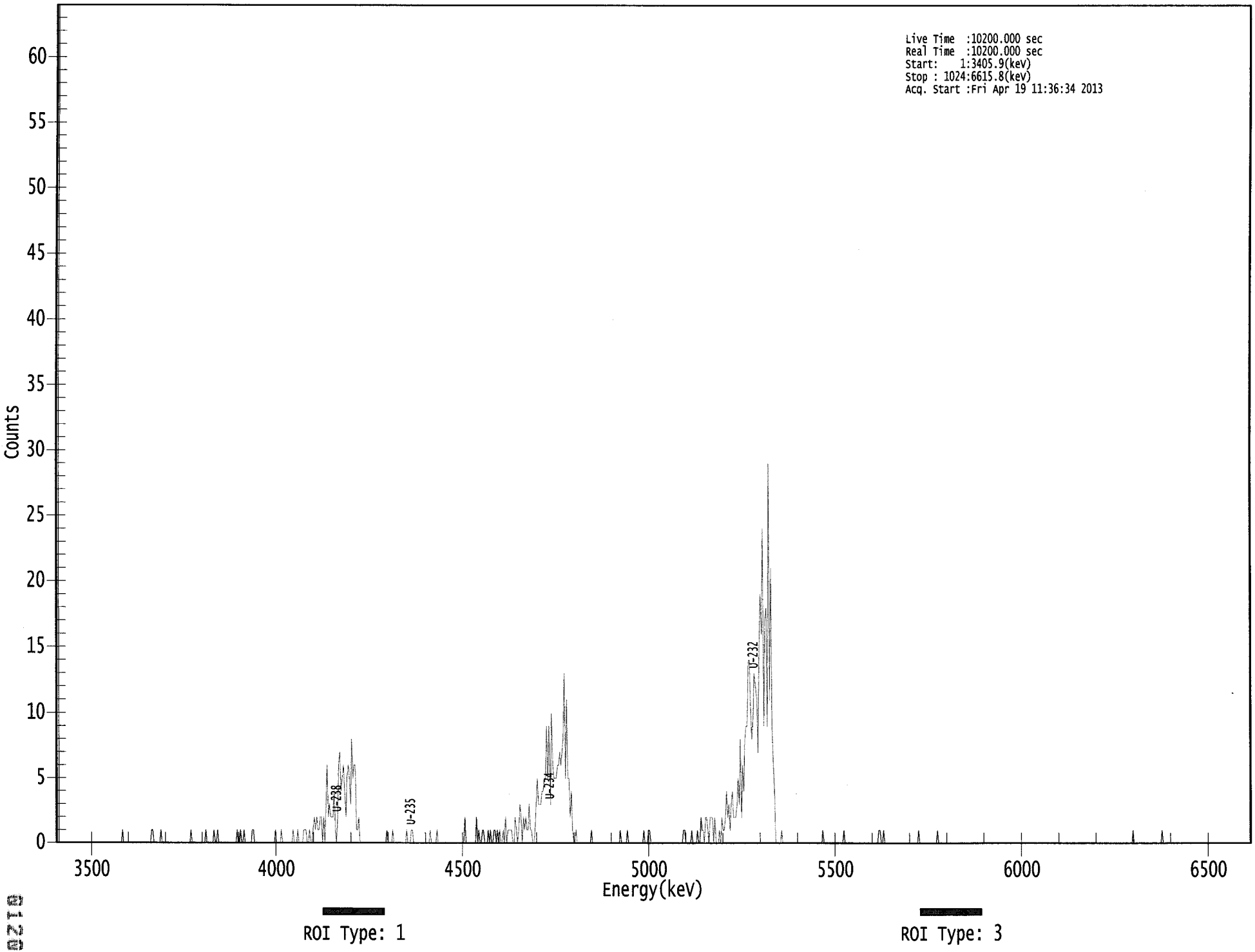
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.13E+000 +/- 5.50E-001	8.30E-002 +/- 8.91E-003
U-234	0.995	4761.50*	2.62E+000 +/- 4.55E-001	7.94E-002 +/- 8.52E-003
U-235	0.996	4385.50*	1.09E-001 +/- 8.69E-002	9.32E-002 +/- 1.00E-002
U-238	0.998	4184.40*	1.64E+000 +/- 3.32E-001	6.00E-002 +/- 6.43E-003

AG
4/22/13

0000055918.CNF



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

Sample Title: 04

Elapsed Live time: 10200
Elapsed Real Time: 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	1	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	1	1	0	0	0	0
89:	0	0	1	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	1	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	1	0	0	0	0	0	0
137:	1	0	0	1	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	1	0	0	1
161:	0	0	1	0	0	0	0	0
169:	0	1	1	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	1	0	0
193:	0	0	1	0	0	0	0	0
201:	0	0	0	0	1	0	0	0
209:	1	0	0	0	0	1	1	1
217:	0	0	1	0	0	1	2	1
225:	2	1	1	2	2	0	2	0
233:	3	6	2	3	2	2	2	4
241:	1	0	2	6	7	4	5	6
249:	4	2	5	6	5	3	8	5
257:	6	6	1	1	2	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	1	0	0	0
289:	0	1	0	0	0	0	0	0
297:	0	0	0	0	0	1	0	0
305:	0	1	1	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	1	0	0	0	0	0	1
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	2
353:	0	0	0	0	0	0	0	0
361:	0	2	0	1	0	0	1	1

369:	0	0	0	1	0	1	0	0

Sample Title: 04

Channel								
377:	1	1	0	1	0	1	0	0
385:	1	0	2	0	1	1	1	1
393:	0	0	2	1	0	1	3	2
401:	0	2	1	2	1	1	3	1
409:	1	0	0	1	3	5	3	3
417:	3	4	4	5	5	9	5	9
425:	3	10	6	5	5	5	6	6
433:	7	6	7	8	13	5	11	5
441:	5	2	4	1	0	0	1	0
449:	0	0	0	0	0	0	0	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	0	0	0	1	0	0	0
489:	0	0	1	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	1	0	0	0	1	1	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	1	0	0	0	0
545:	0	1	0	0	0	0	1	0
553:	0	2	1	1	0	2	2	1
561:	0	2	2	2	0	2	0	0
569:	0	1	0	2	1	1	2	4
577:	2	3	1	3	4	2	2	2
585:	3	5	3	8	2	6	4	8
593:	9	9	14	14	10	8	10	13
601:	12	11	7	15	19	16	24	9
609:	17	18	9	29	11	21	9	6
617:	4	0	0	0	0	0	1	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	0	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:	0	0	0	0	0	0	0	0
705:	0	1	1	0	0	1	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	1	0	0	0	0
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	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	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	1	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

ICB 4/19/13

Apex-Alpha™

Sample Description: PZ-105-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_027
Chamber Serial Number:
Detector Serial Number: 27
Env. Background: System Bkgd 54580
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/4/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:36:35 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: 0.2171 +/- 0.0117
Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
Chem. Recovery Factor: 1.2570 +/- 0.0718

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	5.290	420.81	9.57	1.19	0.00E+000	23.5
U-234		4.740	211.32	13.51	0.68	0.00E+000	22.0
U-235		4.394	5.32	91.11	0.68	0.00E+000	3.2
U-238		4.158	116.47	18.30	1.53	0.00E+000	5.4

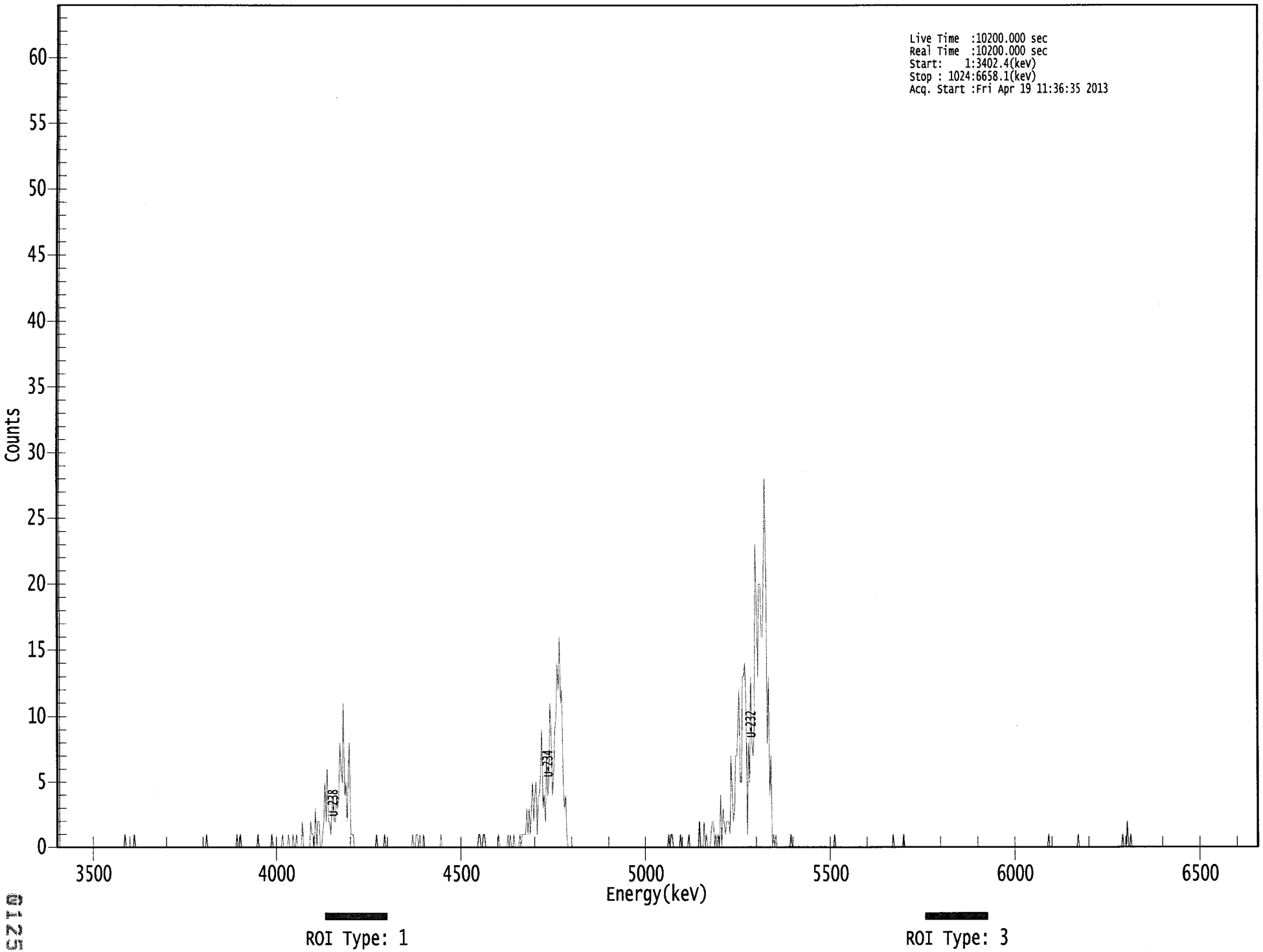
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.15E+000 +/- 5.45E-001	8.06E-002 +/- 8.53E-003
U-234	0.997	4761.50*	2.58E+000 +/- 4.43E-001	6.90E-002 +/- 7.30E-003
U-235	0.999	4385.50*	8.02E-002 +/- 7.36E-002	8.51E-002 +/- 9.00E-003
U-238	0.995	4184.40*	1.42E+000 +/- 3.00E-001	8.65E-002 +/- 9.16E-003

AG
4/22/13

0000055919.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: 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	1	0	0	0	0	0
65:	0	0	1	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:	1	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	1	0	0	1	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	1	0	0	0
177:	0	0	0	0	0	0	0	0
185:	1	0	0	0	0	0	0	0
193:	0	1	0	0	0	0	1	0
201:	0	0	1	0	0	1	0	0
209:	0	0	2	0	0	0	0	0
217:	0	2	1	1	0	3	0	2
225:	2	0	0	1	2	5	2	6
233:	2	2	1	3	4	2	2	4
241:	3	4	8	6	5	11	4	5
249:	2	6	8	1	1	1	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	1	0	0	0	0	0	0
281:	1	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:	1	0	0	1	1	0	1	0
313:	0	1	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:	1	1	0	0	1	1	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
377:	0	1	0	0	0	0	0	0
385:	0	1	0	1	0	0	1	0
393:	0	0	0	1	0	1	1	1
401:	1	3	1	3	1	3	5	2
409:	4	5	1	4	4	6	9	3
417:	4	2	7	4	5	11	9	4
425:	6	9	10	14	12	16	11	12
433:	5	3	4	1	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:	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	1	0	1	1	0	0
529:	0	0	0	0	1	0	0	0
537:	0	0	0	1	0	0	0	0
545:	0	0	0	0	2	0	0	0
553:	2	0	1	0	0	0	1	2
561:	2	0	1	0	1	0	4	0
569:	3	2	1	2	2	2	1	7
577:	4	2	3	7	7	9	12	5
585:	5	13	13	14	11	1	8	5
593:	13	8	7	9	23	19	13	20
601:	20	16	16	22	28	21	8	13
609:	4	7	0	1	0	1	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	1	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	1
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	1	0	0	0	0	0	0
721:	0	0	1	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: 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	1	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	1	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	1	0	0	0
913:	2	0	0	1	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

ICB 4/19/13

Apex-Alpha™

Sample Description: S-10 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_029
Chamber Serial Number:
Detector Serial Number: 29
Env. Background: System Bkgd 54581
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/4/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:36:36 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.604 mL
Effective Efficiency: 0.1969 +/- 0.0110
Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
Chem. Recovery Factor: 1.0121 +/- 0.0597

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	383.98	10.02	1.02	0.00E+000	19.0
U-234		4.741	17.00	48.92	0.00	0.00E+000	3.1
U-235		4.408	1.66	169.38	0.34	0.00E+000	3.1
U-238		4.178	17.98	47.73	1.02	0.00E+000	3.1

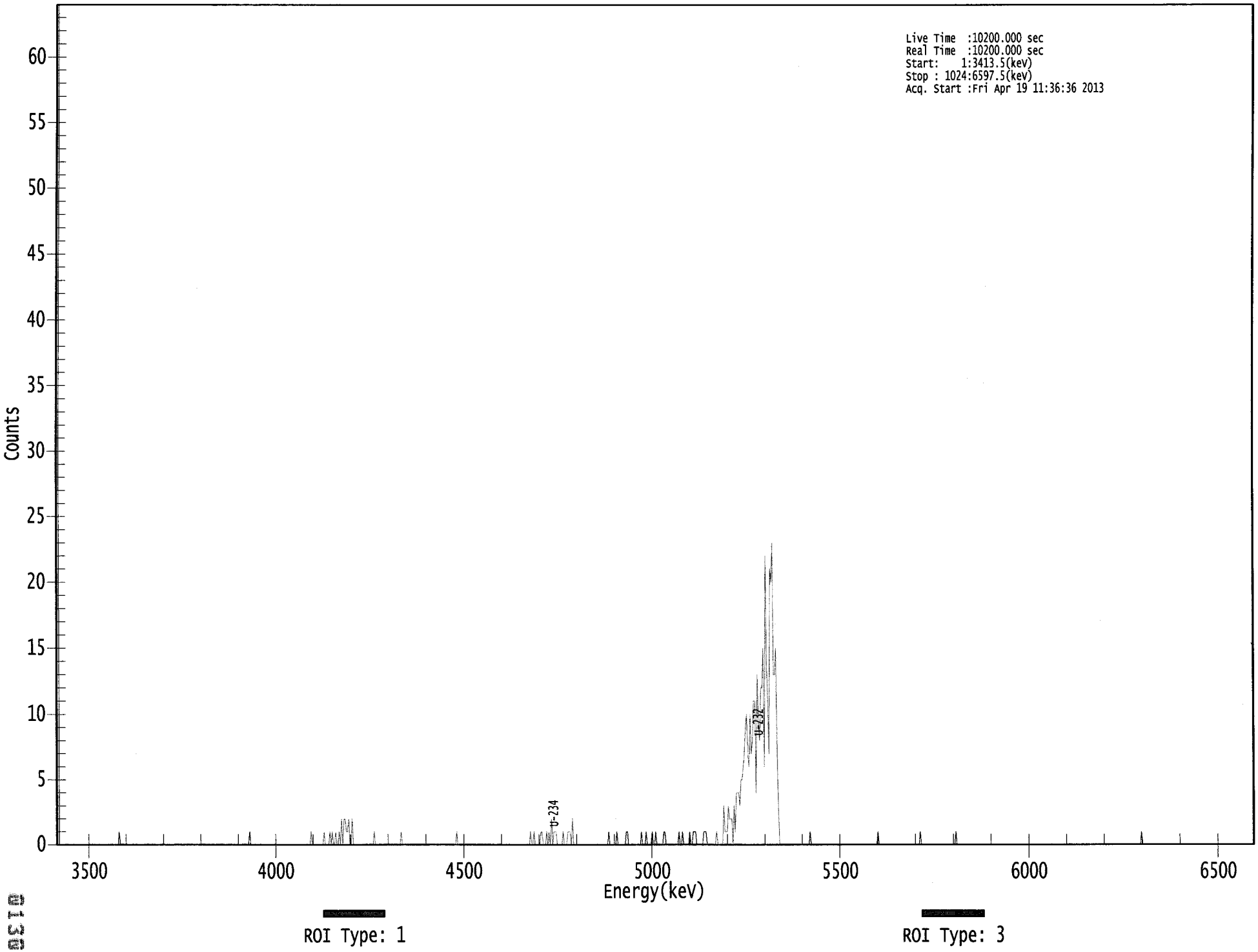
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.18E+000 +/- 5.69E-001	8.50E-002 +/- 9.34E-003
U-234	0.997	4761.50*	2.29E-001 +/- 1.15E-001	8.09E-002 +/- 8.88E-003
U-235	0.996	4385.50*	2.76E-002 +/- 4.69E-002	7.95E-002 +/- 8.74E-003
U-238	1.000	4184.40*	2.41E-001 +/- 1.18E-001	8.46E-002 +/- 9.29E-003

AG 4/22/13

0000055920.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: 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	1	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	0	0
217:	0	0	0	1	0	0	0	0
225:	0	0	0	0	0	0	1	0
233:	0	0	0	1	0	1	0	0
241:	1	0	0	1	0	2	0	2
249:	2	1	1	2	0	0	2	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	1	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:	1	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	1
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: 06

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	1	0
409:	0	1	0	0	0	0	0	1
417:	1	0	0	0	1	0	1	0
425:	2	0	1	1	1	0	0	0
433:	0	0	1	0	0	0	1	1
441:	1	0	2	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	1	0	0	0	0	0	0
481:	1	0	0	0	0	0	0	0
489:	1	1	0	0	0	0	0	0
497:	0	0	0	0	0	1	0	0
505:	0	1	0	0	0	0	1	0
513:	0	1	0	0	0	0	0	0
521:	1	1	0	0	0	0	0	0
529:	0	0	0	0	0	1	0	0
537:	1	0	0	0	0	0	1	0
545:	0	1	1	1	0	0	0	0
553:	0	0	1	1	1	0	0	0
561:	0	0	0	0	0	1	0	0
569:	0	0	0	3	1	1	1	3
577:	2	2	2	0	3	1	4	4
585:	4	3	5	5	6	7	9	10
593:	7	6	10	7	8	11	11	4
601:	13	9	8	12	12	15	6	22
609:	14	11	7	21	20	23	13	13
617:	15	7	3	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	1	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	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	0	0	0	0	0	0
737:	0	0	0	1	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	1	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	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	1
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 4/19/13

Apex-Alpha™

Sample Description: S-10 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 07
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: 4/4/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:57:43 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.3 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.599 mL
Effective Efficiency: 0.1484 +/- 0.0094
Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
Chem. Recovery Factor: 0.8132 +/- 0.0535

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	5.292	287.00	11.59	0.00	0.00E+000	23.8
U-234		4.757	7.00	79.20	0.00	0.00E+000	4.5
U-235		4.356	0.83	239.53	0.17	0.00E+000	3.0
U-238		4.163	5.00	96.02	0.00	0.00E+000	3.0

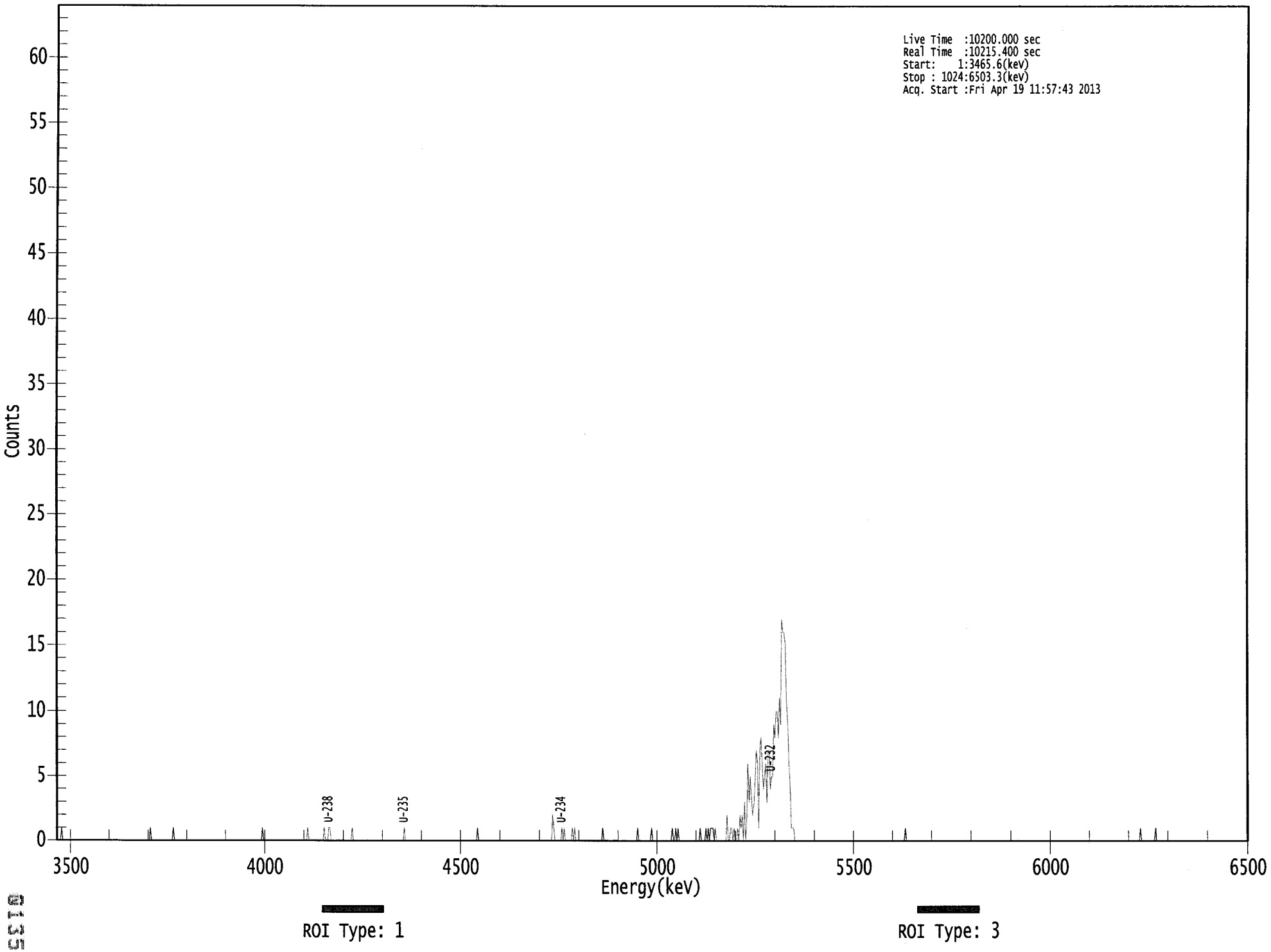
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.14E+000 +/- 6.39E-001	1.07E-001 +/- 1.33E-002
U-234	1.000	4761.50*	1.25E-001 +/- 1.00E-001	1.07E-001 +/- 1.33E-002
U-235	0.994	4385.50*	1.83E-002 +/- 4.39E-002	9.21E-002 +/- 1.15E-002
U-238	0.997	4184.40*	8.91E-002 +/- 8.62E-002	1.07E-001 +/- 1.33E-002

AG
4/22/13

0000055930.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: 10215

Channel								
1:	0	0	0	0	1	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	1	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	1	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	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	1	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	1
233:	0	0	0	1	1	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	1
257:	0	0	0	0	0	0	0	0
265:	0	0	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	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	0	0	0	0	0	0
361:	0	0	0	1	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	2	1	0	0	0
433:	0	0	0	1	0	1	0	0
441:	0	0	0	0	1	0	1	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	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	1	0	0	0
505:	0	0	0	0	0	0	0	0
513:	1	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	1	0	0	1	0	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	1	0	0	0	0	1
561:	0	1	0	1	1	1	0	1
569:	0	0	0	0	0	0	0	0
577:	0	2	0	0	1	1	0	1
585:	0	0	1	0	2	1	2	0
593:	3	0	2	6	3	5	3	2
601:	3	5	7	6	1	7	8	6
609:	4	5	6	3	7	7	4	5
617:	5	9	8	10	10	8	11	9
625:	17	16	16	15	11	9	6	4
633:	1	1	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	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	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	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	1	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	1	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

JCB 4/19/13

Apex-Alpha™

Sample Description:	LR-104 TOT
Spectrum File:	\\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification:	1304051A-UU
Sample Identification:	08
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:	4/4/2013 7:30:32 AM
Acquisition Date/Time:	4/19/2013 11:57:45 AM
Acquisition Live Time:	170.0 minutes
Acquisition Real Time:	170.3 minutes
Tracer Certificate:	U232_UU-10A
Tracer Quantity:	0.602 mL
Effective Efficiency:	0.2188 +/- 0.0117
Counting Efficiency:	0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
Chem. Recovery Factor:	1.1788 +/- 0.0666
Peak Match Tolerance:	0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.274	424.83	9.51	0.17	0.00E+000	32.2
U-234		4.728	213.83	13.41	0.17	0.00E+000	15.1
U-235		4.415	11.00	61.72	0.00	0.00E+000	5.9
U-238		4.155	174.66	14.85	0.34	0.00E+000	7.4

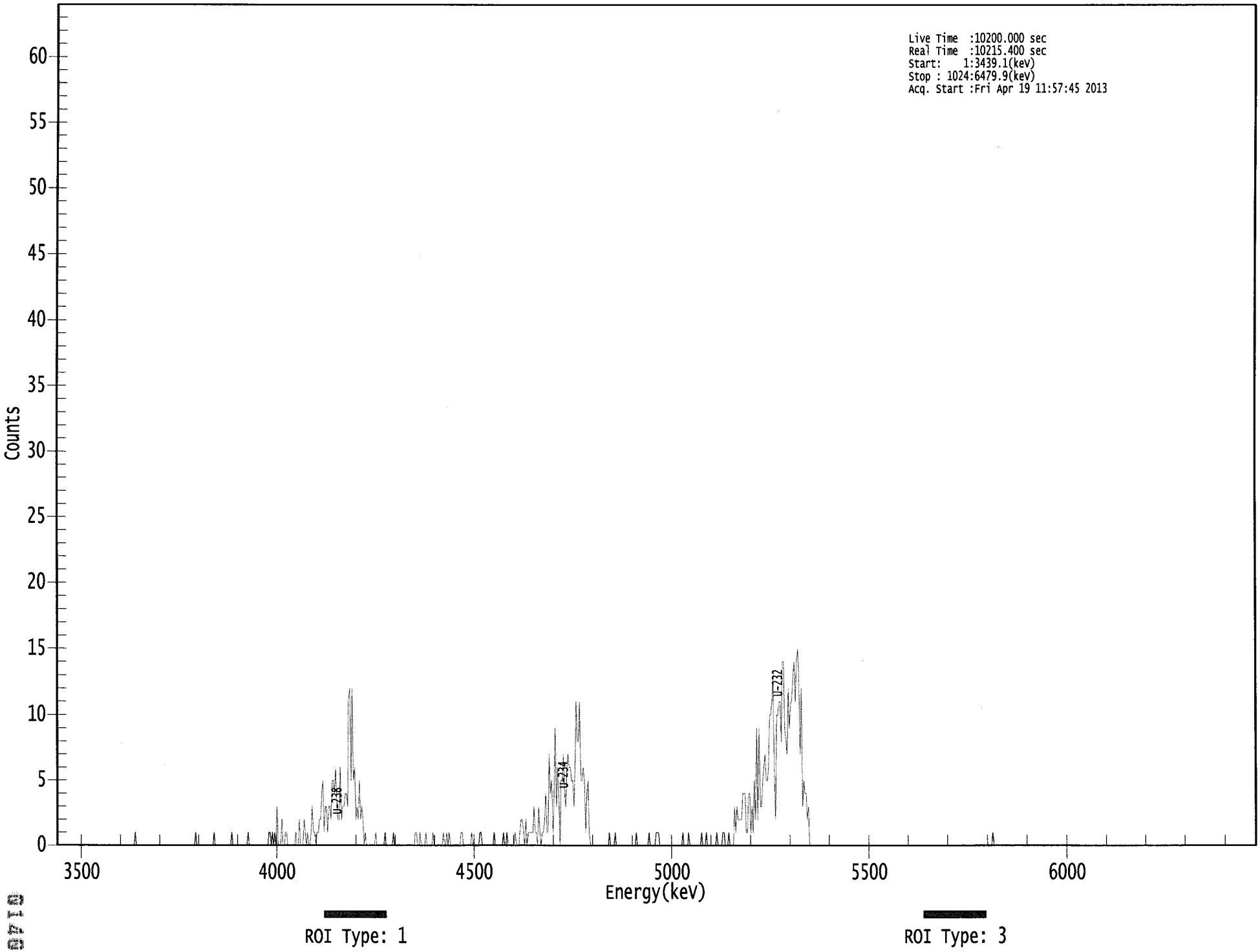
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.16E+000 +/- 5.43E-001	5.07E-002 +/- 5.33E-003
U-234	0.992	4761.50*	2.60E+000 +/- 4.42E-001	5.07E-002 +/- 5.33E-003
U-235	0.994	4385.50*	1.65E-001 +/- 1.03E-001	8.98E-002 +/- 9.45E-003
U-238	0.994	4184.40*	2.11E+000 +/- 3.84E-001	5.78E-002 +/- 6.08E-003

AG
4/22/13

0000055931.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: 10215

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	1	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	1
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	1
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	1	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	1	1
185:	0	1	0	1	0	3	0	0
193:	0	2	0	0	1	1	0	0
201:	0	0	0	0	0	1	0	0
209:	2	0	0	0	2	1	0	1
217:	0	0	1	3	1	1	0	1
225:	1	2	2	4	5	1	3	3
233:	1	3	3	2	5	5	4	6
241:	3	2	2	6	2	3	3	4
249:	4	3	11	12	5	12	5	6
257:	2	3	2	5	2	3	2	0
265:	1	0	0	0	0	0	0	0
273:	0	1	0	0	0	0	0	0
281:	0	1	0	0	0	0	0	0
289:	1	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	1	1	0	0	1
313:	0	0	0	0	1	0	0	0
321:	0	0	1	0	0	0	0	0
329:	0	0	0	1	0	0	1	0
337:	1	0	0	0	0	0	0	0
345:	0	0	1	1	0	0	0	0
353:	0	0	0	1	0	0	0	0
361:	0	0	1	1	0	0	0	0

369:	0	0	0	0	0	0	1	0

Sample Title: 08

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

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	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

MP 4/19/13

Apex-Alpha™

Sample Description: LR-104 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 09
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: 4/4/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:57:40 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.3 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.600 mL
Effective Efficiency: 0.2261 +/- 0.0120
Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
Chem. Recovery Factor: 1.2381 +/- 0.0692

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	5.308	438.00	9.38	0.00	0.00E+000	30.0
U-234		4.757	231.66	12.89	0.34	0.00E+000	5.9
U-235		4.391	11.00	61.72	0.00	0.00E+000	2.9
U-238		4.186	165.83	15.23	0.17	0.00E+000	7.4

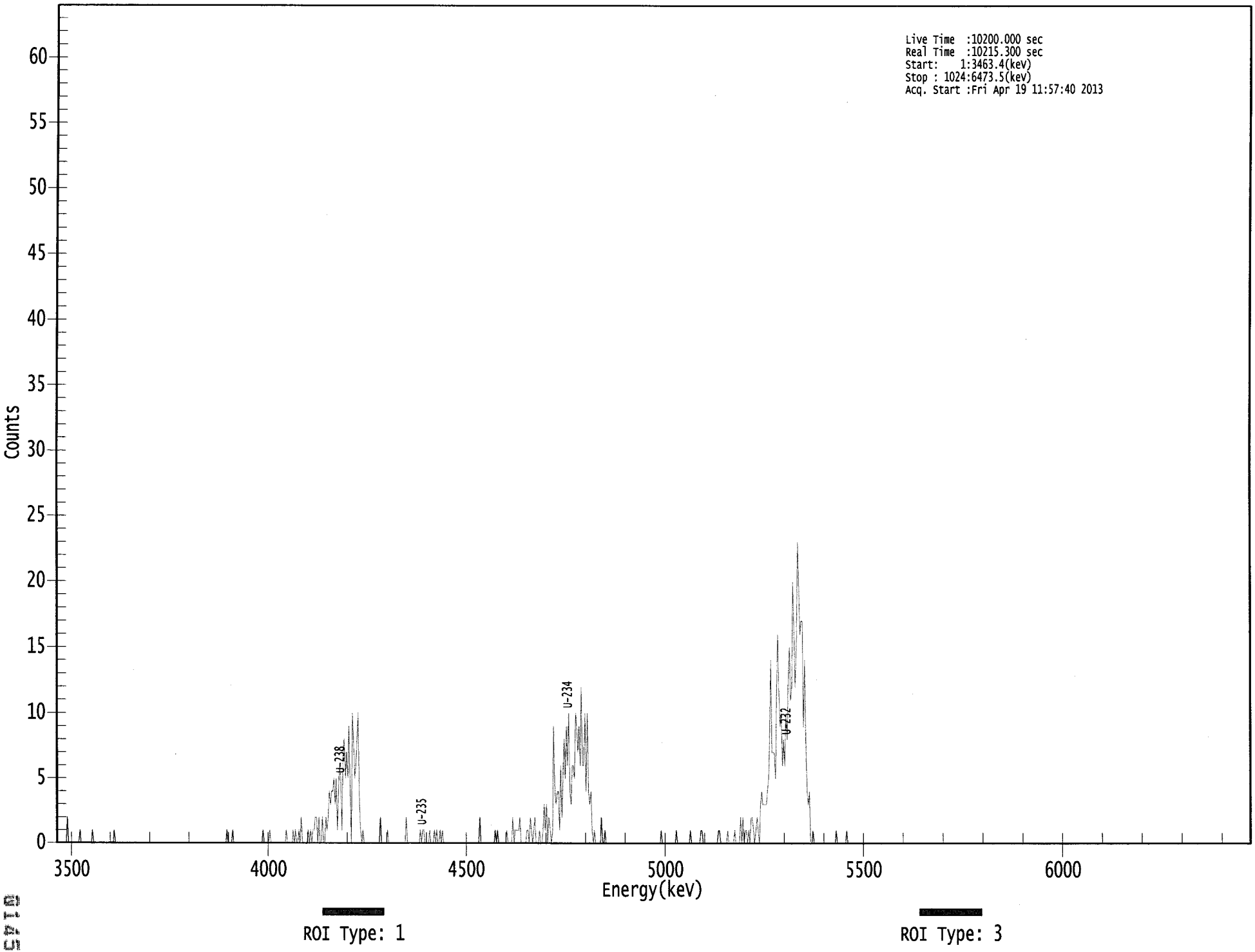
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	1.000	5302.50*	5.15E+000 +/- 5.35E-001	7.05E-002 +/- 7.33E-003
U-234	1.000	4761.50*	2.72E+000 +/- 4.51E-001	5.62E-002 +/- 5.84E-003
U-235	1.000	4385.50*	1.59E-001 +/- 9.98E-002	8.69E-002 +/- 9.04E-003
U-238	1.000	4184.40*	1.94E+000 +/- 3.58E-001	4.88E-002 +/- 5.08E-003

AG
4/22/13

0000055932.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: 10215

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	2	0	0	0	0	0	0
17:	0	0	0	0	1	0	0	0
25:	0	0	0	0	0	0	0	1
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	1	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	1	0	0	0	0
153:	1	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:	1	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	1	0
201:	0	0	0	0	1	0	1	0
209:	0	1	0	2	0	0	0	0
217:	0	1	0	1	0	1	1	2
225:	2	0	2	0	0	2	0	0
233:	2	1	2	4	3	4	4	5
241:	3	5	1	4	6	5	1	7
249:	8	5	7	5	9	4	0	10
257:	8	5	6	8	10	3	1	0
265:	1	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	2
281:	0	0	0	0	0	1	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	2	0	0
305:	0	0	0	0	0	0	0	0
313:	0	1	0	1	1	0	0	0
321:	0	1	0	0	0	1	0	1
329:	0	0	1	0	1	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	2	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 09

Channel								
377:	0	1	0	1	0	0	0	0
385:	0	0	0	1	0	0	0	0
393:	2	0	1	1	1	1	2	0
401:	0	0	0	0	1	1	0	2
409:	1	0	1	2	0	0	0	1
417:	0	0	1	3	1	3	0	2
425:	1	0	1	9	4	3	4	4
433:	1	6	2	5	8	5	9	6
441:	10	4	3	6	6	5	10	9
449:	7	9	6	12	6	6	10	4
457:	10	4	3	4	1	0	1	0
465:	0	0	0	0	2	0	0	1
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	1
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	1	0	0	0
537:	0	0	0	0	0	0	0	0
545:	1	0	0	0	0	0	0	0
553:	0	1	1	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	1	1	0	0	0	0	0	0
577:	1	0	0	0	0	0	1	0
585:	0	0	0	2	0	2	0	1
593:	1	0	1	0	2	2	1	0
601:	1	2	1	0	3	4	3	3
609:	3	3	4	5	8	14	7	7
617:	7	5	11	16	12	9	10	6
625:	8	6	10	8	12	15	11	12
633:	20	16	12	15	23	20	16	17
641:	17	9	14	8	4	3	4	0
649:	0	1	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	1	0	0
673:	0	0	0	0	0	0	1	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: 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	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB 4/19/13

Apex-Alpha™

Sample Description:	DUP 01 TOT
Spectrum File:	\\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification:	1304051A-UU
Sample Identification:	10
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:	4/4/2013 7:30:32 AM
Acquisition Date/Time:	4/19/2013 11:57:41 AM
Acquisition Live Time:	170.0 minutes
Acquisition Real Time:	170.3 minutes
Tracer Certificate:	U232_UU-10A
Tracer Quantity:	0.598 mL
Effective Efficiency:	0.2357 +/- 0.0123
Counting Efficiency:	0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
Chem. Recovery Factor:	1.3222 +/- 0.0733
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	455.00	9.20	0.00	0.00E+000	38.2
U-234		4.749	22.66	41.53	0.34	0.00E+000	2.9
U-235		4.406	0.83	239.53	0.17	0.00E+000	2.9
U-238		4.165	10.83	60.10	0.17	0.00E+000	2.9

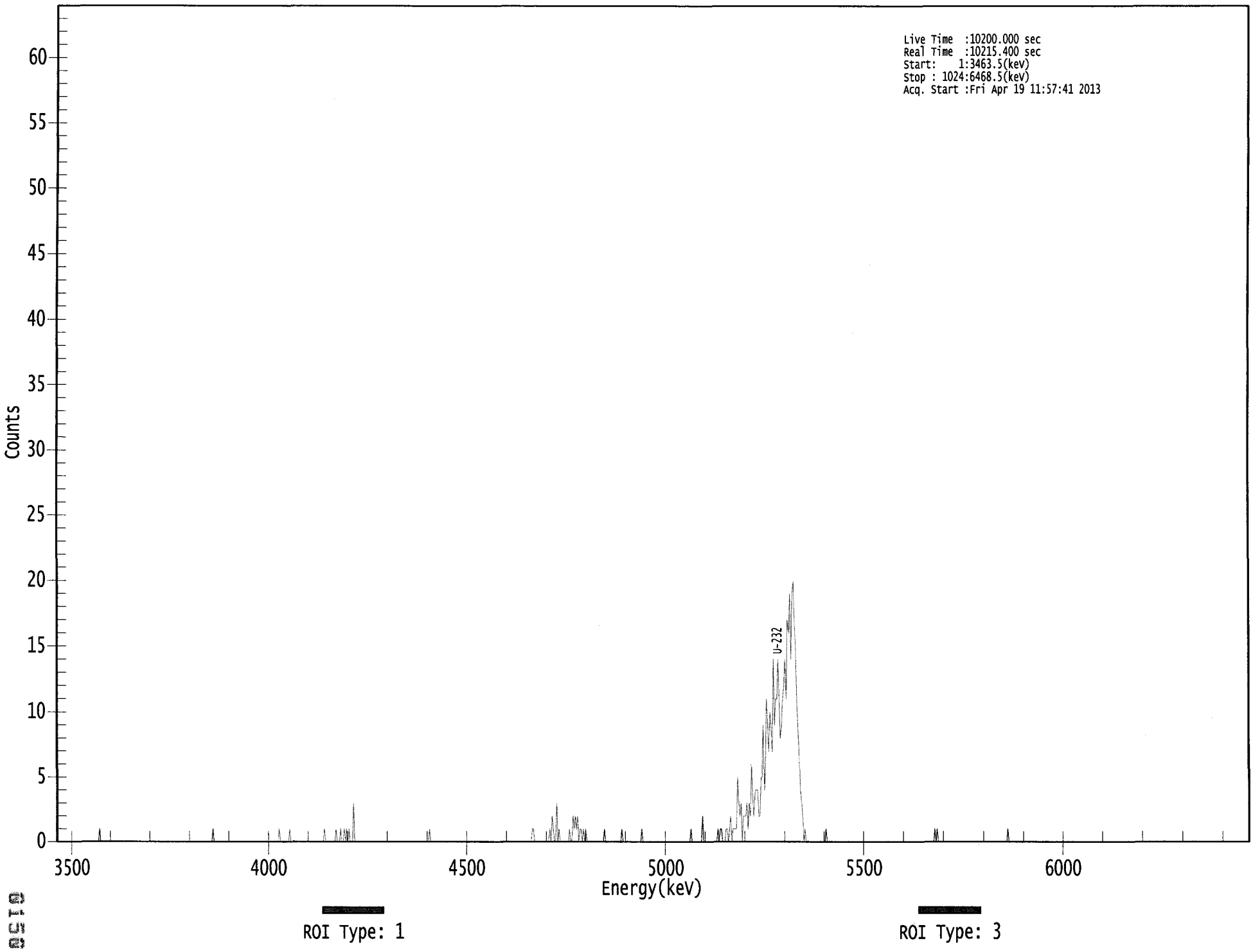
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.13E+000 +/- 5.25E-001	6.76E-002 +/- 6.92E-003
U-234	0.999	4761.50*	2.55E-001 +/- 1.09E-001	5.38E-002 +/- 5.52E-003
U-235	0.997	4385.50*	1.15E-002 +/- 2.76E-002	5.80E-002 +/- 5.94E-003
U-238	0.997	4184.40*	1.21E-001 +/- 7.40E-002	4.68E-002 +/- 4.79E-003

AG
4/22/13

0000055933.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: 10215

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	1	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	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:	1	0	0	0	0	0	0	0
201:	0	1	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	1
233:	0	0	0	0	0	0	0	0
241:	0	1	0	0	0	1	0	0
249:	1	0	1	0	1	0	0	0
257:	3	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	1	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	1	1	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	1	0	2	1	0	0	3	0
433:	1	0	0	0	0	0	0	0
441:	0	1	0	0	2	1	2	1
449:	2	0	1	1	0	1	0	1
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	1
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	1	0
489:	0	0	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	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	1	0	0	0	0	0	0
553:	0	0	0	2	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	1	0	1	1	0	0	0	1
577:	1	0	1	2	0	1	1	1
585:	1	5	3	2	3	0	2	2
593:	2	3	1	3	2	6	3	2
601:	4	4	4	2	2	5	5	9
609:	4	6	11	9	7	10	9	7
617:	14	9	11	11	14	11	8	9
625:	11	12	14	11	17	16	19	14
633:	19	20	17	15	11	9	7	4
641:	3	2	0	1	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	1	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	1	0	1	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: 10

Channel								
809:	0	0	0	0	0	0	0	0
817:	1	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

ICB 4/19/13

Apex-Alpha™

Sample Description: DUP 01 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 11
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: 4/4/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:57:49 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.3 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.599 mL
Effective Efficiency: 0.1906 +/- 0.0109
Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
Chem. Recovery Factor: 1.0034 +/- 0.0597

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.274	368.83	10.21	0.17	0.00E+000	70.0
U-234		4.732	14.66	51.88	0.34	0.00E+000	3.0
U-235		4.365	2.00	169.74	0.00	0.00E+000	3.0
U-238		4.142	10.32	63.32	0.68	0.00E+000	3.0

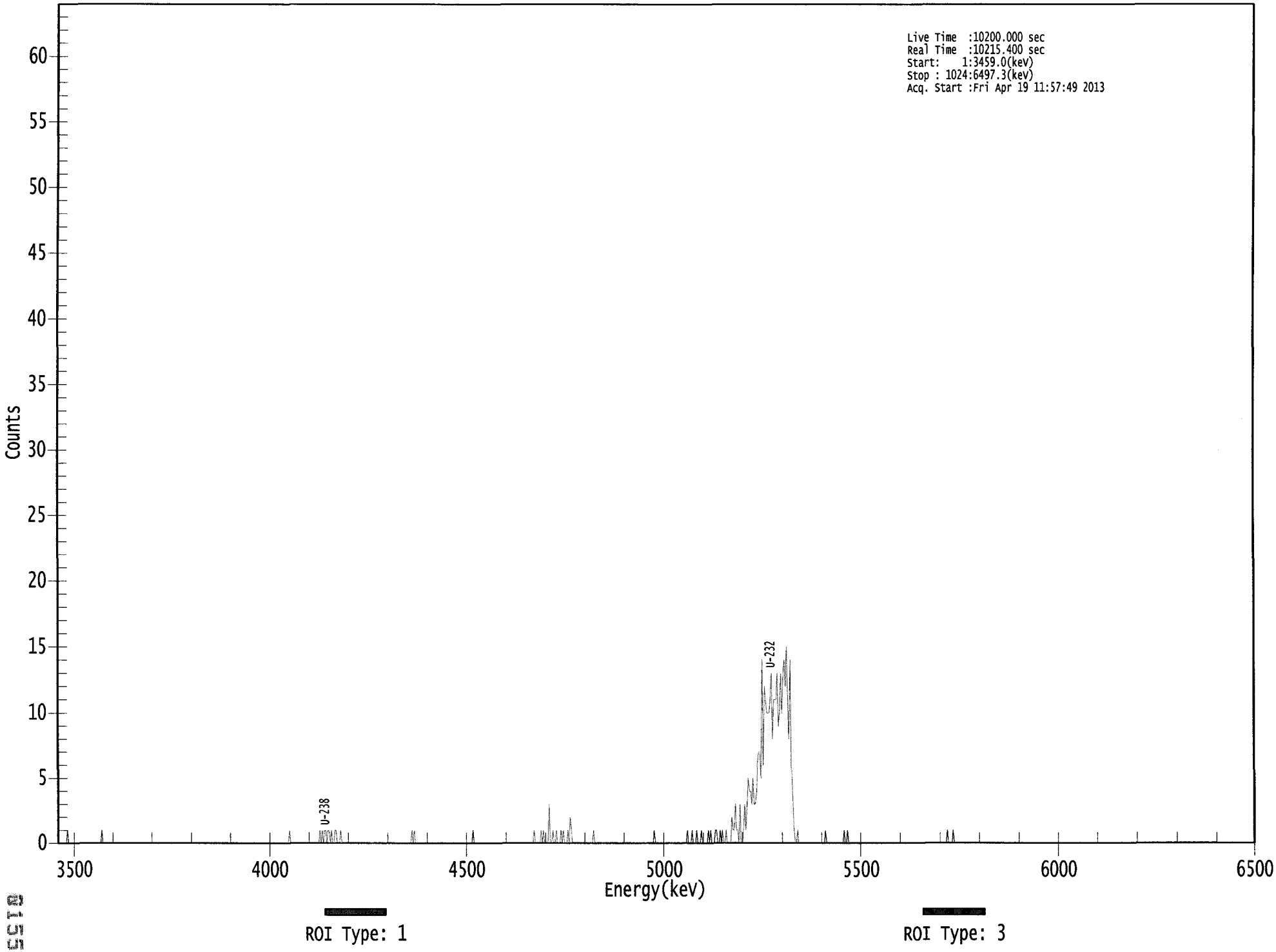
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.14E+000 +/- 5.74E-001	5.81E-002 +/- 6.49E-003
U-234	0.994	4761.50*	2.04E-001 +/- 1.08E-001	6.66E-002 +/- 7.43E-003
U-235	0.997	4385.50*	3.44E-002 +/- 5.84E-002	1.03E-001 +/- 1.15E-002
U-238	0.987	4184.40*	1.43E-001 +/- 9.20E-002	7.82E-002 +/- 8.73E-003

AG 4/22/13

0000055934.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: 10215

Channel								
1:	0	0	0	0	0	0	0	0
9:	1	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	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	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	1
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	1	0	1	1	0
233:	1	1	0	1	0	0	1	1
241:	0	0	0	1	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	1	0	1	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	1	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	0	0	0	0
409:	1	0	0	0	0	0	1	0
417:	1	0	0	0	0	3	0	0
425:	1	0	0	1	0	0	0	1
433:	0	1	0	0	0	1	0	2
441:	1	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	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	1
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	1	0	0	0	1
545:	0	0	0	1	0	0	0	1
553:	0	0	0	0	0	1	0	1
561:	0	0	0	1	1	0	0	1
569:	0	1	0	0	1	0	0	0
577:	0	2	1	1	3	1	1	0
585:	3	0	0	1	3	1	3	5
593:	4	4	3	5	3	3	4	6
601:	7	7	5	14	6	12	11	10
609:	10	10	11	13	8	11	11	11
617:	13	9	10	13	10	13	14	12
625:	15	11	8	14	6	3	1	0
633:	0	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	1	0	0	1	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	1	0	0	0	0	1	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

KCB 4/19/13

Apex-Alpha™

Sample Description: DUP 02 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 12
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: 4/4/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:57:46 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.3 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.600 mL
Effective Efficiency: 0.1888 +/- 0.0108
Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
Chem. Recovery Factor: 0.9545 +/- 0.0570

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	365.66	10.26	0.34	0.00E+000	24.3
U-234		4.733	11.32	60.27	0.68	0.00E+000	3.0
U-235		4.411	0.32	646.93	0.68	0.00E+000	3.0
U-238		4.166	7.45	84.98	2.55	0.00E+000	4.5

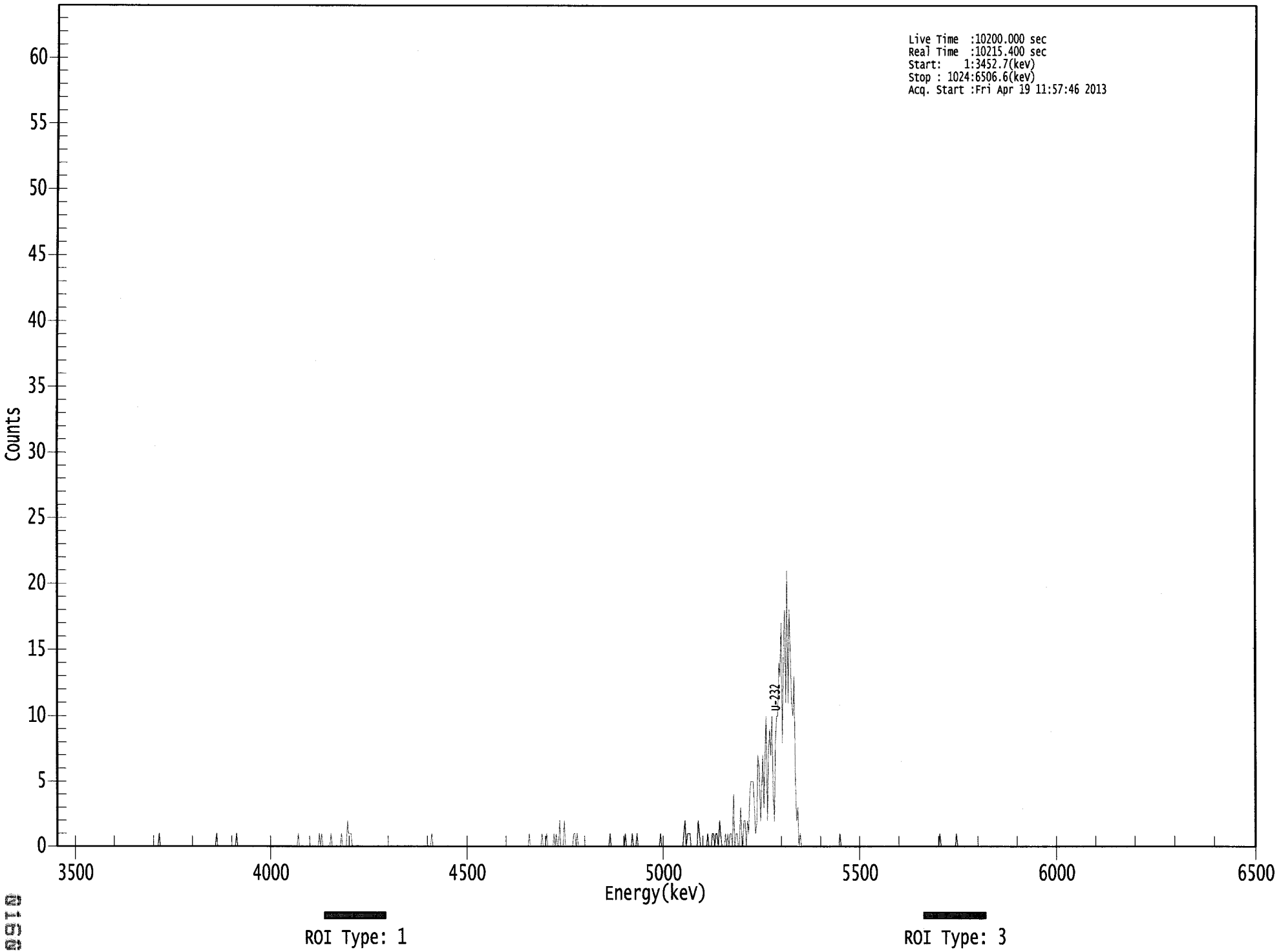
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.14E+000 +/- 5.76E-001	6.72E-002 +/- 7.53E-003
U-234	0.994	4761.50*	1.59E-001 +/- 9.76E-002	7.93E-002 +/- 8.88E-003
U-235	0.995	4385.50*	5.55E-003 +/- 3.59E-002	9.78E-002 +/- 1.10E-002
U-238	0.998	4184.40*	1.04E-001 +/- 8.94E-002	1.17E-001 +/- 1.32E-002

AG 4/22/13

0000055936.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: 10215

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:	1	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	1	0	0	0	0	0	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	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	1
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	1	0	0	0	0
233:	0	0	0	1	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	2	1	1	1	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	1	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: 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:	0	0	0	0	1	0	0	0
409:	0	0	0	0	0	0	0	1
417:	0	0	0	1	0	0	0	0
425:	0	1	0	1	0	0	2	0
433:	0	0	2	0	0	0	0	0
441:	0	0	1	1	0	1	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	1	0	0	0	0	0	0
481:	0	0	0	0	0	0	1	0
489:	0	0	0	0	1	0	0	0
497:	1	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	1	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	1	2	0	1	1	1	0	0
545:	0	0	0	0	2	1	0	0
553:	0	0	0	0	1	0	0	0
561:	1	1	0	1	1	0	2	1
569:	0	0	0	1	0	1	0	1
577:	1	0	4	0	1	1	0	0
585:	3	1	0	2	2	0	2	1
593:	4	5	5	5	3	1	2	7
601:	6	2	4	7	3	7	10	2
609:	7	9	7	10	4	2	8	10
617:	10	14	13	17	8	15	18	11
625:	21	11	18	14	11	10	13	5
633:	2	3	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	0	0	0	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	1	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	1	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	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™

KAB 4/19/13

Sample Description: DUP 02 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 13
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: 4/4/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 11:57:47 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.3 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.601 mL
Effective Efficiency: 0.1899 +/- 0.0108
Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
Chem. Recovery Factor: 1.0284 +/- 0.0613

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	5.283	368.49	10.22	0.51	0.00E+000	4.6
U-234		4.731	12.66	55.94	0.34	0.00E+000	3.0
U-235		4.435	6.83	76.08	0.17	0.00E+000	3.0
U-238		4.164	9.49	65.59	0.51	0.00E+000	4.5

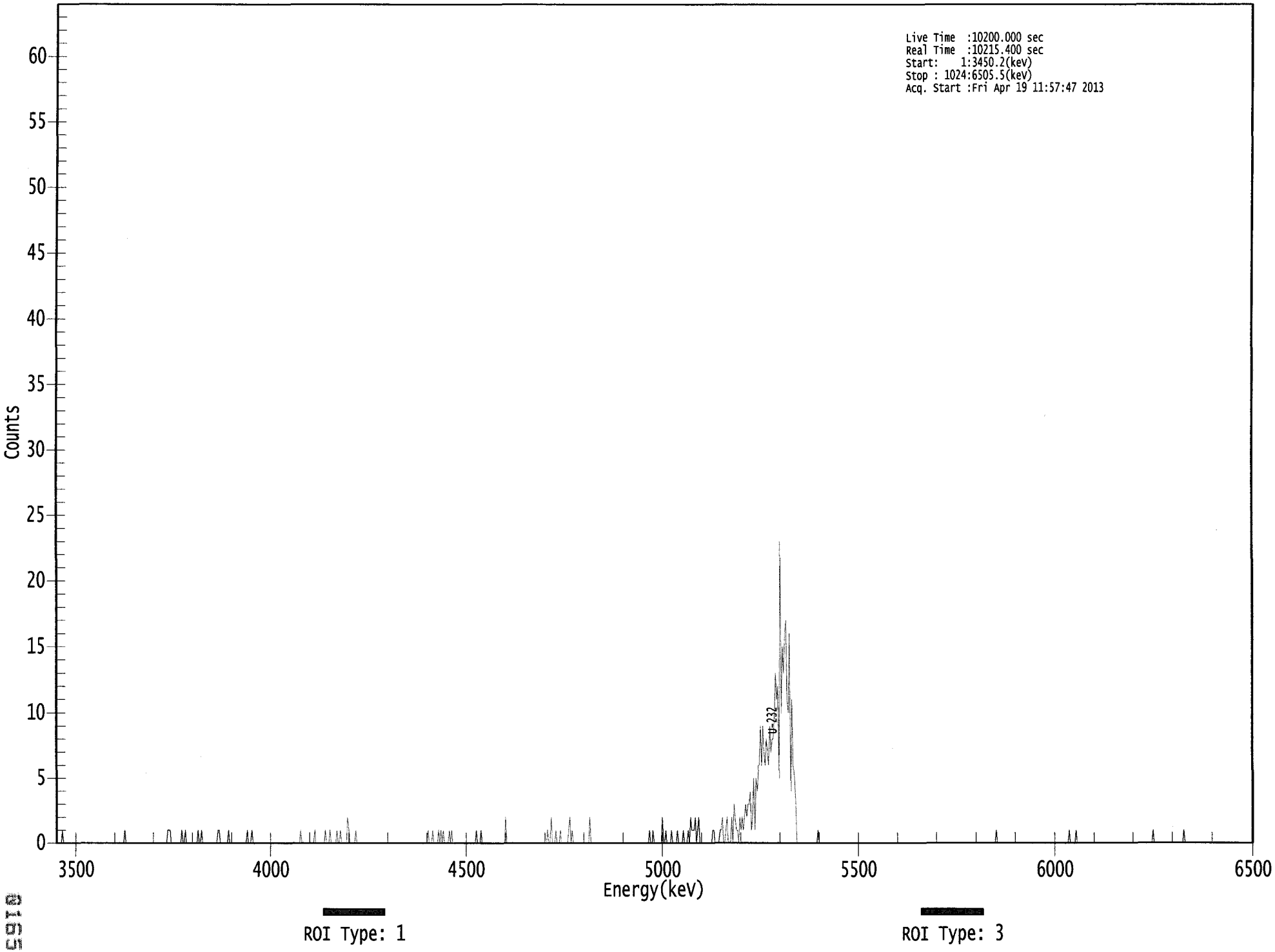
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.15E+000 +/- 5.76E-001	7.34E-002 +/- 8.20E-003
U-234	0.993	4761.50*	1.77E-001 +/- 1.01E-001	6.69E-002 +/- 7.47E-003
U-235	0.983	4385.50*	1.18E-001 +/- 9.06E-002	7.20E-002 +/- 8.04E-003
U-238	0.997	4184.40*	1.32E-001 +/- 8.79E-002	7.31E-002 +/- 8.16E-003

AG 4/22/13

0000055937.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: 10215

Channel								
1:	0	0	0	0	0	1	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	1	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:	1	1	1	0	0	0	0	0
105:	0	0	0	0	1	0	0	1
113:	0	0	0	0	0	0	0	0
121:	0	0	1	0	0	1	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	1	1	0	0	0
145:	0	0	0	0	1	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	1	0	0	0
169:	1	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	1	0	0	0	0	0
217:	0	0	0	0	0	0	1	0
225:	0	0	0	0	0	0	0	1
233:	0	0	0	1	0	0	0	0
241:	0	1	0	0	1	0	0	0
249:	0	0	2	1	0	0	0	0
257:	0	1	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	1
321:	0	0	0	1	0	0	0	0
329:	1	0	1	0	1	0	0	0
337:	0	1	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:	1	0	0	0	1	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 13

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	2	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	1	0	0
425:	2	0	0	0	1	0	0	0
433:	1	0	0	0	0	0	0	1
441:	2	0	1	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	2	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	1	0	0	1
513:	0	0	0	0	0	0	0	2
521:	0	0	1	0	0	0	0	1
529:	0	0	0	0	1	0	0	0
537:	0	1	0	0	0	1	0	2
545:	1	1	1	2	0	1	2	0
553:	0	0	0	0	0	0	0	0
561:	0	0	1	1	0	0	0	0
569:	1	1	2	0	0	1	2	0
577:	0	0	2	0	3	2	1	1
585:	0	2	1	2	1	2	3	2
593:	3	3	4	1	2	5	1	5
601:	4	6	6	9	6	9	7	6
609:	8	7	6	9	7	8	8	10
617:	13	11	12	5	23	10	15	13
625:	16	17	11	10	16	4	11	6
633:	5	3	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	1	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	1	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	0	0	0	0	0
865:	0	0	1	0	0	0	0	0
873:	1	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	1	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	1	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™

Sample Description: FB AT PZ-110-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000560
Batch Identification: 1304051A-UU
Sample Identification: 14
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 7:30:32 AM
Acquisition Date/Time: 4/19/2013 2:33:37 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.595 mL
Effective Efficiency: 0.2522 +/- 0.0129
Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
Chem. Recovery Factor: 1.4440 +/- 0.0784

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	5.286	483.98	8.92	1.02	0.00E+000	31.9
U-234		4.750	1.49	190.03	0.51	0.00E+000	3.0
U-235		4.396	2.66	128.85	0.34	0.00E+000	3.0
U-238		4.149	-0.68	304.42	0.68	0.00E+000	0.0

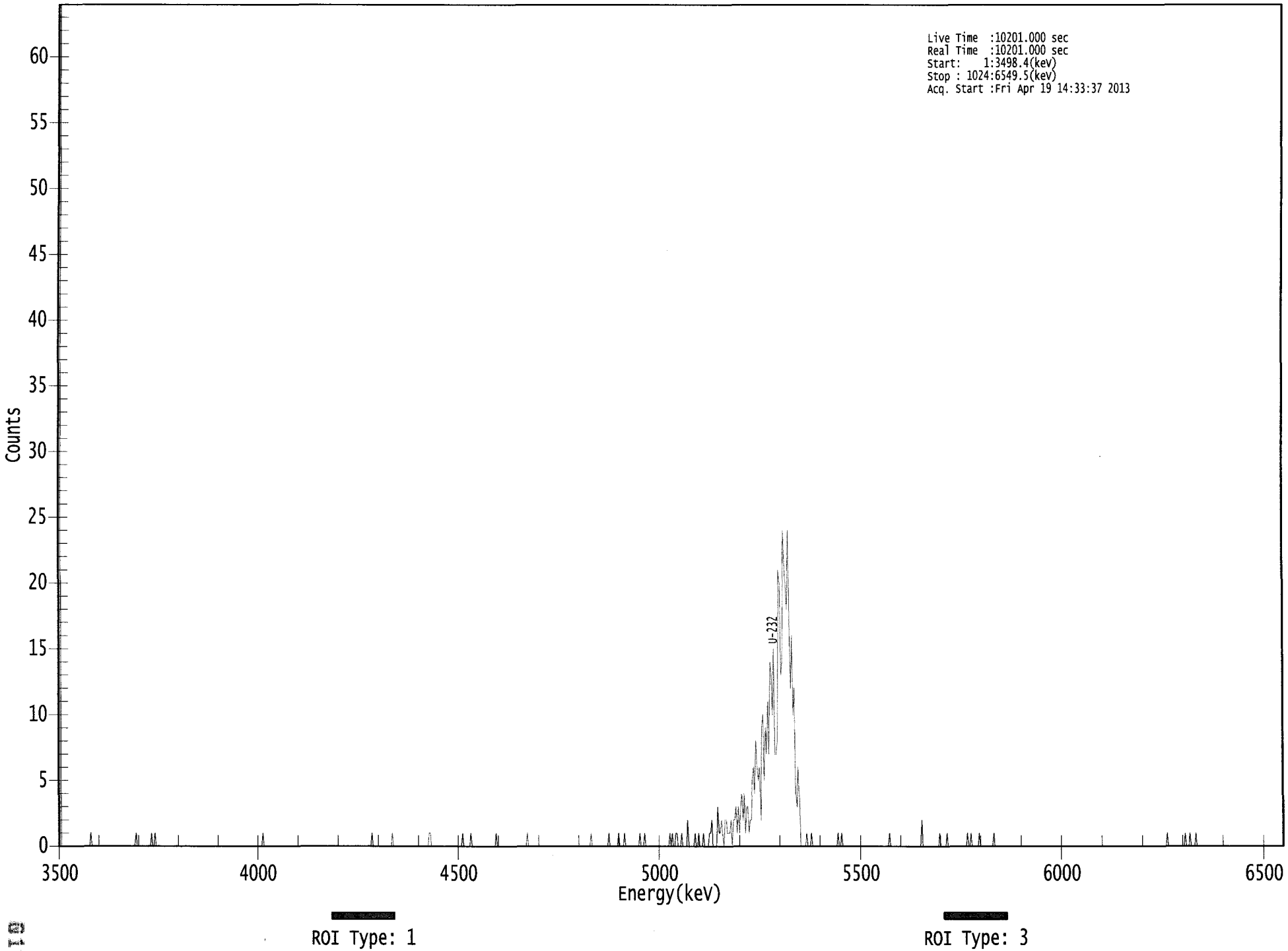
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.10E+000 +/- 5.10E-001	6.64E-002 +/- 6.63E-003
U-234	0.999	4761.50*	1.57E-002 +/- 2.98E-002	5.52E-002 +/- 5.52E-003
U-235	0.999	4385.50*	3.45E-002 +/- 4.46E-002	6.21E-002 +/- 6.21E-003
U-238	0.991	4184.40*	-7.13E-003 +/- 2.17E-002	5.91E-002 +/- 5.91E-003

AG
4/23/13

0000056095.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: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	1	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	1	0	0	0	0	0	0
73:	0	0	0	0	0	0	1	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	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	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	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	1
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	1	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	1
313:	1	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	1	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	1

369:	0	0	0	0	0	0	0	0

Sample Title: 14

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	1	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	1	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	1	0	0
465:	0	0	0	0	0	1	0	0
473:	0	0	1	0	0	0	0	0
481:	0	0	0	0	0	0	0	1
489:	0	0	0	1	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	1	0	1	0	0	1	1	0
521:	0	0	1	0	0	0	0	2
529:	0	0	0	0	0	1	0	0
537:	1	0	0	0	1	0	0	0
545:	0	1	1	2	0	0	0	0
553:	3	1	1	2	1	0	2	2
561:	1	1	1	2	0	2	2	3
569:	1	3	1	3	4	2	4	1
577:	3	3	1	2	2	5	6	4
585:	8	6	5	6	2	9	10	5
593:	9	7	11	7	14	13	10	15
601:	7	7	8	21	20	13	14	24
609:	22	19	18	24	17	12	16	10
617:	12	4	3	6	4	0	0	0
625:	0	0	1	0	0	0	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	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	1
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	2	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	1	0	0	0	0	0	1
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	1	0	0	1	0	0	0	0
769:	0	0	1	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	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	1	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	1	0	0
945:	0	1	0	0	0	0	1	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	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 4/19/13

Apex-Alpha™

Sample Description: FB AT PZ-110-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 15
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 7:30:32 AM
Acquisition Date/Time: 4/19/2013 2:33:38 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.596 mL
Effective Efficiency: 0.1778 +/- 0.0105
Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
Chem. Recovery Factor: 0.9162 +/- 0.0565

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	5.286	341.81	10.62	1.19	0.00E+000	21.8
U-234		4.692	2.96	153.11	2.04	0.00E+000	2.9
U-235		4.324	-0.19	1131.2	1.19	0.00E+000	2.9
U-238		4.134	-0.85	246.69	0.85	0.00E+000	0.0

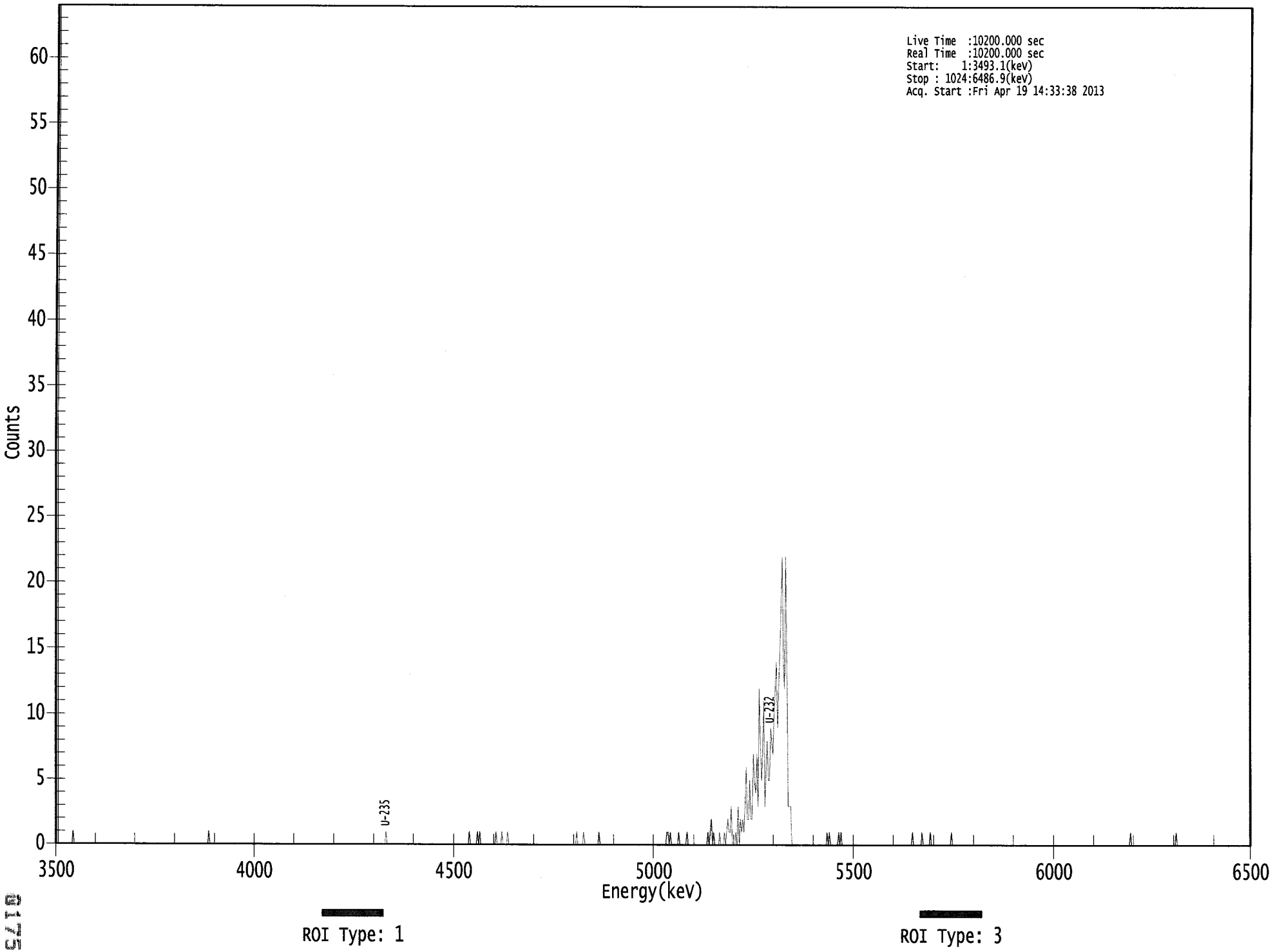
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.11E+000 +/- 5.89E-001	9.84E-002 +/- 1.14E-002
U-234	0.967	4761.50*	4.42E-002 +/- 6.79E-002	1.16E-001 +/- 1.34E-002
U-235	0.974	4385.50*	-3.50E-003 +/- 3.96E-002	1.21E-001 +/- 1.40E-002
U-238	0.982	4184.40*	-1.26E-002 +/- 3.12E-002	8.90E-002 +/- 1.03E-002

AG 4/22/13

0000055943.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:	10200	10200	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	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	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	1	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	1	0	0	0	0
361:	0	0	1	0	1	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 15

Channel								
377:	0	0	1	0	0	0	0	1
385:	0	0	0	0	1	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	1
449:	0	0	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	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	1	1	0	1
529:	0	0	0	0	0	0	1	0
537:	0	0	0	0	0	1	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	1
561:	0	1	2	0	1	0	0	0
569:	0	1	0	0	0	1	0	1
577:	2	1	1	3	0	0	0	1
585:	0	3	0	2	1	2	1	3
593:	6	2	2	5	2	2	7	5
601:	4	7	3	12	8	5	7	11
609:	3	6	8	5	5	9	8	7
617:	10	12	14	9	12	15	18	22
625:	14	12	22	12	3	3	3	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	0	1
665:	0	0	0	0	0	0	0	1
673:	0	1	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	1	0
737:	0	0	0	0	0	0	1	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	1
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: 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:	1	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	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™

KB 4/19/13

Sample Description: MW-103 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 16
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: 4/5/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 2:33:33 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.593 mL
Effective Efficiency: 0.1786 +/- 0.0105
Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
Chem. Recovery Factor: 0.9080 +/- 0.0560

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	342.13	10.63	1.87	0.00E+000	17.1
U-234		4.730	273.79	11.90	2.21	0.00E+000	23.8
U-235		4.398	20.32	44.32	0.68	0.00E+000	2.9
U-238		4.145	251.15	12.39	0.85	0.00E+000	15.3

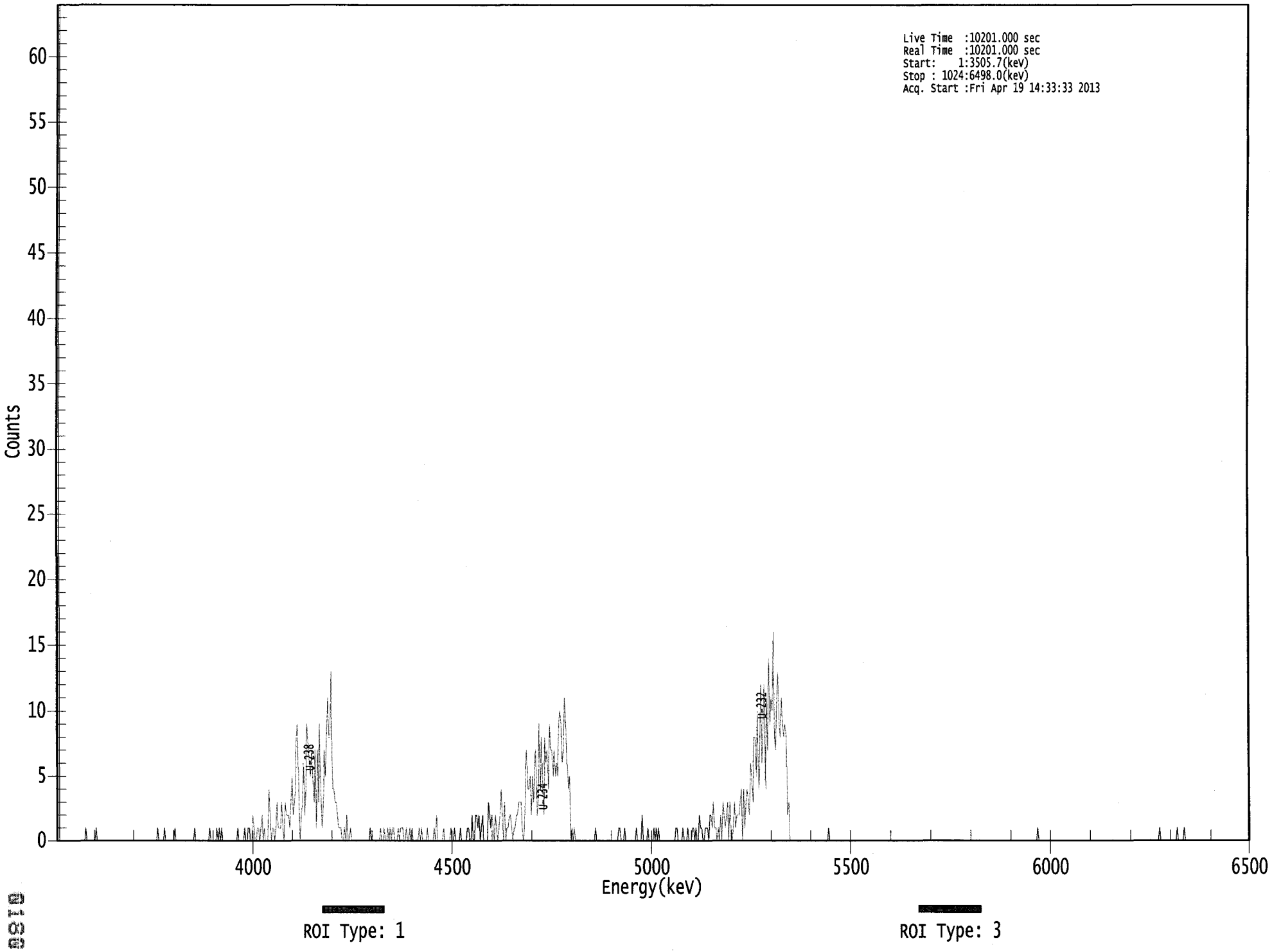
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.09E+000 +/- 5.87E-001	1.13E-001 +/- 1.30E-002
U-234	0.993	4761.50*	4.07E+000 +/- 6.75E-001	1.19E-001 +/- 1.37E-002
U-235	0.999	4385.50*	3.73E-001 +/- 1.71E-001	1.03E-001 +/- 1.19E-002
U-238	0.989	4184.40*	3.72E+000 +/- 6.30E-001	8.86E-002 +/- 1.02E-002

AG
4/22/13

0000055938.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: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	1	0	0	0	0	0	0
33:	0	0	1	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	1
89:	0	0	0	0	0	1	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	1
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	1	0	0	0
137:	0	0	1	0	1	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	1	0	0	0
161:	0	0	1	0	0	1	1	0
169:	0	2	1	0	0	1	1	0
177:	1	2	0	1	0	0	0	4
185:	2	0	1	1	0	1	3	1
193:	1	1	3	1	0	3	2	2
201:	2	1	3	5	2	3	4	8
209:	9	3	0	2	3	6	2	4
217:	9	8	6	5	7	5	3	7
225:	1	7	3	9	3	1	3	7
233:	5	8	11	8	8	13	4	4
241:	3	3	2	1	1	1	0	0
249:	1	0	2	0	0	1	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	1	0
273:	0	0	0	0	0	0	0	1
281:	0	0	1	0	0	1	0	1
289:	0	1	1	0	0	0	1	0
297:	1	1	1	0	0	1	0	0
305:	1	0	1	0	0	0	0	0
313:	1	0	1	0	0	0	0	1
321:	0	0	0	0	0	1	0	2
329:	0	0	0	0	0	1	0	0
337:	0	0	0	1	0	0	1	0
345:	0	0	0	1	0	0	0	0
353:	0	1	1	0	0	2	0	0
361:	2	2	1	2	0	1	2	0

369:	0	0	0	3	2	1	2	1

Sample Title: 16

Channel								
377:	0	2	1	0	1	2	4	2
385:	0	3	0	1	1	2	2	1
393:	0	1	1	2	2	3	3	3
401:	1	0	1	5	7	4	4	5
409:	2	5	3	6	7	2	3	9
417:	4	8	4	2	8	6	7	4
425:	9	7	7	5	7	5	6	5
433:	9	10	9	6	7	11	9	6
441:	4	5	0	1	0	1	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	1
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	1	1	0	0	0
489:	1	0	0	0	0	0	0	0
497:	0	0	1	0	0	0	0	2
505:	0	0	0	0	1	0	0	0
513:	0	1	0	1	0	1	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	1	1	0	0
537:	0	0	1	0	0	0	1	0
545:	0	0	1	1	0	1	0	0
553:	2	1	1	0	0	1	1	1
561:	0	2	2	1	3	1	1	0
569:	1	0	2	0	3	2	1	2
577:	3	0	3	1	0	1	3	1
585:	2	2	2	3	4	0	4	1
593:	3	4	3	2	6	5	3	8
601:	8	5	10	4	7	12	6	9
609:	12	4	11	7	14	9	11	10
617:	16	8	7	11	13	9	8	11
625:	9	8	9	8	2	3	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	1
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: 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	1	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	1	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	1	0	0	0	0	0	1
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

ICB 4/19/13

Apex-Alpha™

Sample Description: MW-103 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 17
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: 4/5/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 2:33:34 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.596 mL
Effective Efficiency: 0.1849 +/- 0.0107
Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
Chem. Recovery Factor: 0.9369 +/- 0.0577

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	355.98	10.41	1.02	0.00E+000	17.3
U-234		4.731	220.83	13.20	0.17	0.00E+000	15.7
U-235		4.407	15.00	52.27	0.00	0.00E+000	2.7
U-238		4.150	209.98	13.56	1.02	0.00E+000	9.4

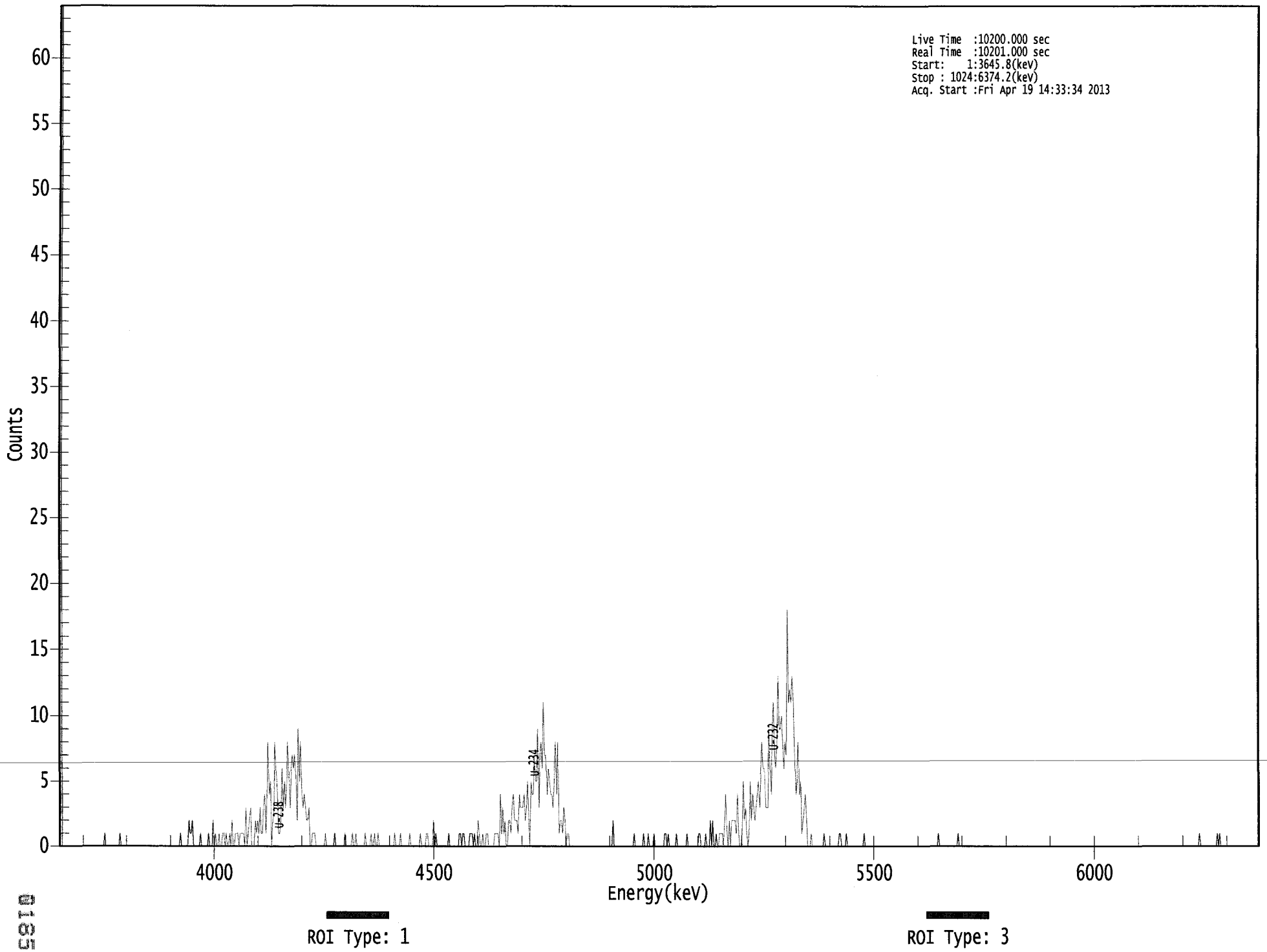
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.11E+000 +/- 5.80E-001	9.05E-002 +/- 1.03E-002
U-234	0.993	4761.50*	3.17E+000 +/- 5.52E-001	5.99E-002 +/- 6.80E-003
U-235	0.997	4385.50*	2.66E-001 +/- 1.42E-001	1.06E-001 +/- 1.20E-002
U-238	0.992	4184.40*	3.00E+000 +/- 5.31E-001	9.01E-002 +/- 1.02E-002

AG
4/22/13

0000055939.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: 10201

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

369:	0	0	0	0	1	1	1	1

Sample Title: 17

Channel								
377:	0	4	1	3	1	2	0	0
385:	2	2	1	3	4	2	2	2
393:	1	4	3	3	3	4	2	3
401:	5	2	0	5	4	4	7	5
409:	5	9	3	7	8	6	11	7
417:	7	4	6	5	4	4	3	5
425:	8	4	8	1	2	2	1	3
433:	2	0	1	1	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	2	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	1	0	0	0	0
497:	0	0	0	1	0	0	0	1
505:	0	0	0	0	1	0	0	0
513:	0	0	0	0	0	1	1	0
521:	1	0	0	0	0	0	0	1
529:	0	0	0	0	0	0	0	0
537:	1	0	0	0	0	0	0	0
545:	0	0	1	1	0	0	0	0
553:	1	0	0	0	2	0	2	0
561:	0	1	0	0	1	1	1	0
569:	2	4	1	0	2	0	2	2
577:	2	2	1	4	1	0	0	1
585:	5	2	3	1	0	1	5	2
593:	4	3	2	3	4	5	3	5
601:	8	6	6	3	3	3	9	6
609:	4	9	11	7	6	8	13	9
617:	9	10	8	6	8	7	18	11
625:	12	11	13	11	8	4	5	8
633:	4	5	1	2	3	4	2	0
641:	0	0	1	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	1	1	0	0	0	0
673:	1	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	1
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	0	1
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: 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	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	1	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	1	0	1	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB 4/19/13

Apex-Alpha™

Sample Description:	PZ-200-SS TOT
Spectrum File:	\\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification:	1304051A-UU
Sample Identification:	18
Sample Geometry:	Shelf 2
Procedure Description:	U iso
Detector Name:	Alpha_013
Chamber Serial Number:	
Detector Serial Number:	13
Env. Background:	System Bkgd 54574
Reagent Blank:	<not performed>
Sample Size:	1.000E+000 +/- 0.000E+000 liter
Sample Date/Time:	4/5/2013 7:30:32 AM
Acquisition Date/Time:	4/19/2013 2:33:35 PM
Acquisition Live Time:	170.0 minutes
Acquisition Real Time:	170.0 minutes
Tracer Certificate:	U232_UU-10A
Tracer Quantity:	0.593 mL
Effective Efficiency:	0.1967 +/- 0.0111
Counting Efficiency:	0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
Chem. Recovery Factor:	1.0527 +/- 0.0626
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	376.81	10.12	1.19	0.00E+000	5.2
U-234		4.738	40.15	31.31	0.85	0.00E+000	4.7
U-235		4.435	3.83	102.72	0.17	0.00E+000	2.8
U-238		4.160	38.83	31.53	0.17	0.00E+000	3.3

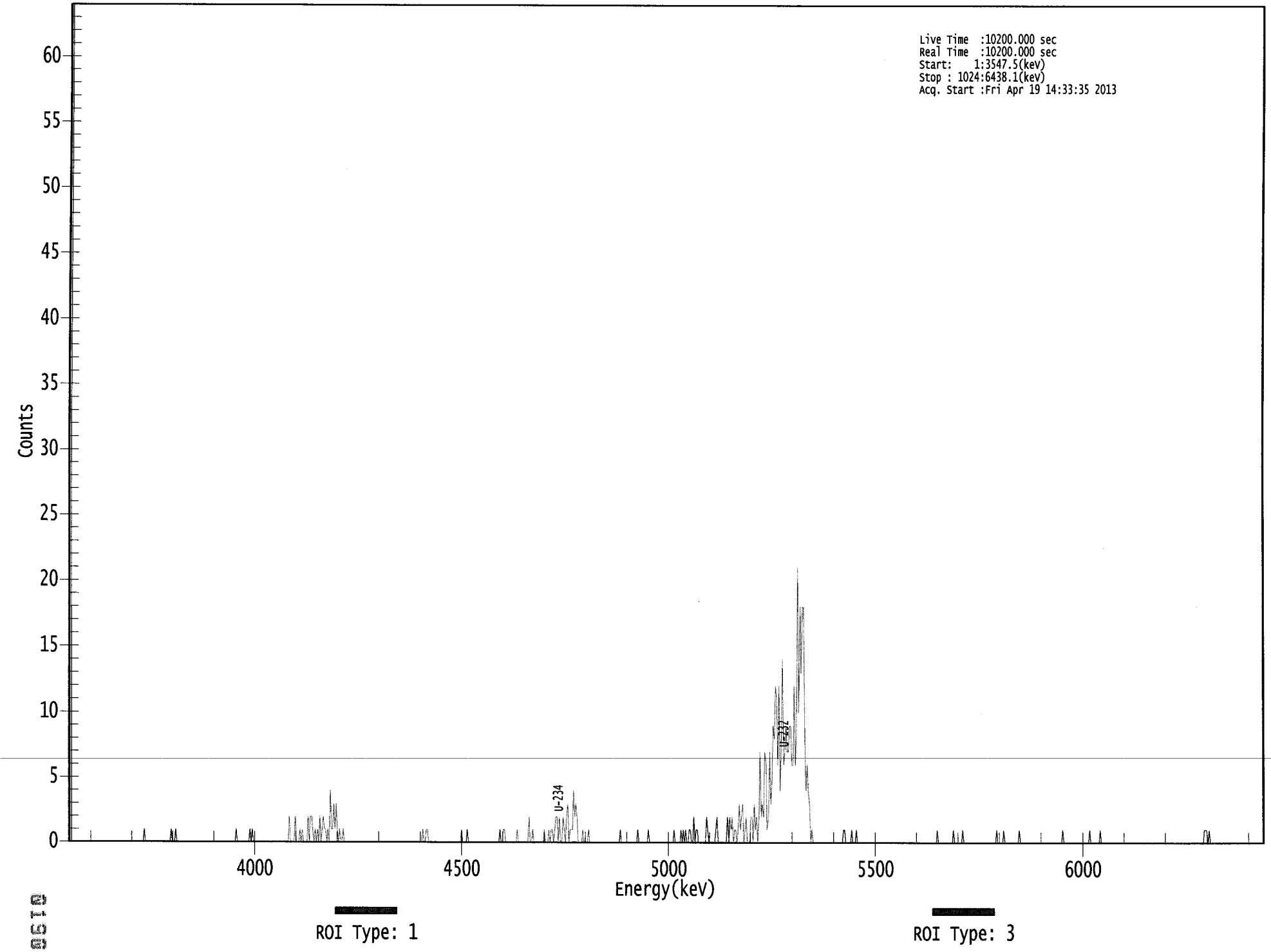
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.09E+000 +/- 5.63E-001	8.89E-002 +/- 9.85E-003
U-234	0.996	4761.50*	5.42E-001 +/- 1.80E-001	8.08E-002 +/- 8.95E-003
U-235	0.983	4385.50*	6.38E-002 +/- 6.59E-002	6.95E-002 +/- 7.70E-003
U-238	0.996	4184.40*	5.22E-001 +/- 1.74E-001	5.61E-002 +/- 6.21E-003

AG 4/22/13

0000055940.CNF



0159

****
***** 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	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	1	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	1	0	0	0	1	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:	1	0	0	0	0	0	0	0
153:	0	0	0	0	1	0	1	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	2	0
193:	0	0	0	2	0	0	0	1
201:	0	1	0	0	0	0	2	0
209:	2	2	1	0	1	0	1	0
217:	2	0	1	2	1	1	0	1
225:	0	4	1	1	3	1	3	1
233:	0	1	0	0	1	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:	1	0	0	1	1	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	1	0	0	0	0	1	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	1	0	0	1	1	0

Sample Title: 18

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	2	0	0	1	0
401:	0	0	0	0	0	0	0	0
409:	1	0	0	0	1	0	1	1
417:	0	1	2	2	0	2	0	0
425:	2	1	0	2	3	0	1	1
433:	1	4	2	3	2	0	0	0
441:	0	1	0	0	0	0	1	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	1	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	1	0	0	0	0	0	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	1
521:	0	0	0	0	0	1	0	1
529:	0	1	0	0	1	1	0	0
537:	2	0	1	1	0	0	0	0
545:	0	0	0	2	1	0	0	0
553:	0	0	0	1	2	0	0	0
561:	0	0	0	0	0	2	0	2
569:	1	2	0	1	1	0	1	3
577:	1	2	3	0	1	2	0	0
585:	0	2	2	0	3	1	2	0
593:	2	7	2	3	2	7	6	1
601:	2	7	3	5	9	8	12	11
609:	6	12	4	8	14	6	7	9
617:	7	7	9	9	6	6	12	6
625:	9	21	10	18	13	18	18	8
633:	4	6	4	3	0	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:	1	1	0	0	0	0	0	1
673:	0	0	0	1	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	1	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	1	0
761:	0	0	0	0	0	0	1	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	1	0	0	0	0

801:	0	1	0	0	0	0	0	0

Sample Title: 18

Channel								
809:	0	0	0	0	0	0	1	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	1	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	1	0	0	0	0	0
881:	0	0	0	1	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	1	1	1	0
977:	1	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

ICB 4/19/13

Apex-Alpha™

Sample Description: PZ-200-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000559
Batch Identification: 1304051A-UU
Sample Identification: 19
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_014
Chamber Serial Number:
Detector Serial Number: 14
Env. Background: System Bkgd 54575
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/5/2013 7:30:32 AM
Acquisition Date/Time: 4/19/2013 2:33:36 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.596 mL
Effective Efficiency: 0.2020 +/- 0.0113
Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
Chem. Recovery Factor: 1.0945 +/- 0.0644

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.280	388.79	9.97	2.21	0.00E+000	11.2
U-234		4.724	40.47	31.48	1.53	0.00E+000	3.7
U-235		4.364	2.32	149.12	0.68	0.00E+000	2.9
U-238		4.160	44.66	29.46	0.34	0.00E+000	3.9

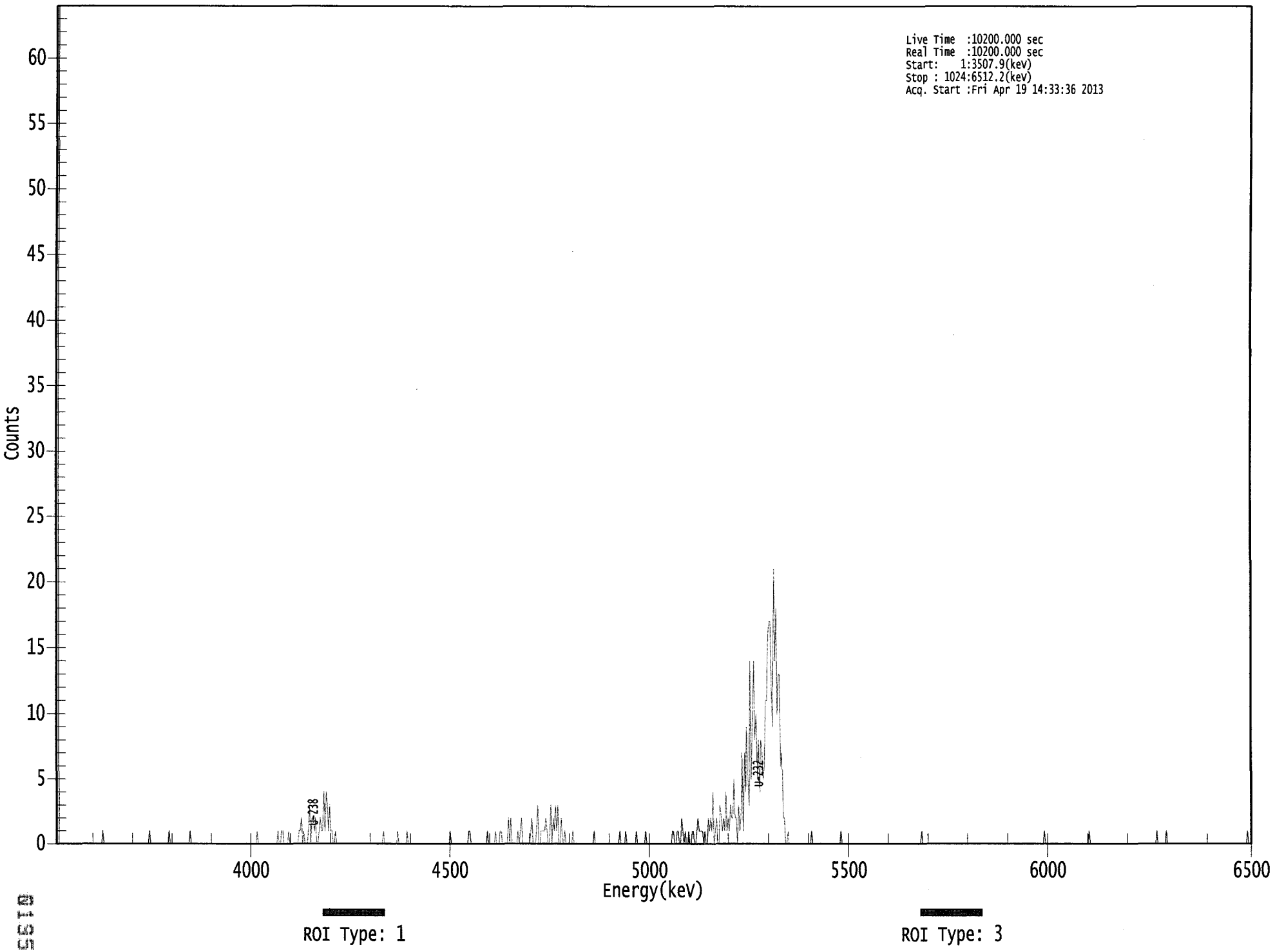
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.11E+000 +/- 5.60E-001	1.05E-001 +/- 1.15E-002
U-234	0.990	4761.50*	5.32E-001 +/- 1.77E-001	9.34E-002 +/- 1.02E-002
U-235	0.997	4385.50*	3.76E-002 +/- 5.62E-002	9.15E-002 +/- 1.00E-002
U-238	0.996	4184.40*	5.84E-001 +/- 1.84E-001	6.26E-002 +/- 6.85E-003

AG 4/22/13

0000055941.CNF



5518

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

Sample Title: 19

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:	1	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	1	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	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	1	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	1
193:	0	0	1	1	0	0	0	0
201:	1	0	0	0	0	0	0	0
209:	0	1	1	2	0	1	0	0
217:	0	1	3	0	2	2	1	2
225:	0	0	1	2	1	1	4	1
233:	4	3	1	3	1	1	0	0
241:	1	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	1	0	0	0	0	0	0
289:	0	0	0	0	0	1	0	0
297:	0	0	0	0	0	1	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	1	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	1	1	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	1	0	0	0	0	0

Sample Title: 19

Channel								
377:	0	1	0	0	0	1	1	0
385:	0	0	0	0	2	0	2	0
393:	0	0	0	0	1	0	1	2
401:	0	0	0	0	0	0	0	1
409:	2	0	0	0	1	3	0	0
417:	1	1	1	1	2	1	0	0
425:	3	0	2	1	3	1	3	0
433:	0	2	0	0	1	0	0	0
441:	0	0	0	1	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	1	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	1	0	0	0	0	0	0	0
497:	0	1	0	0	0	0	0	0
505:	0	1	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:	1	1	0	0	1	1	0	0
537:	2	1	0	1	0	0	1	0
545:	0	1	1	0	0	1	2	1
553:	1	1	1	0	1	0	0	2
561:	1	2	1	4	0	1	2	0
569:	0	3	2	1	2	1	4	1
577:	2	1	3	2	2	5	2	2
585:	0	3	1	2	7	1	7	4
593:	9	5	3	14	5	9	14	8
601:	10	5	8	4	8	7	5	6
609:	11	11	16	17	17	12	9	21
617:	14	18	10	13	13	6	7	2
625:	2	0	0	1	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	1
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:	1	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	1	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	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	1	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:	0	0	0	0	0	0	1	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	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	1	0	0	0	0

4/19/2013 5:45:48 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 4/19/2013
Time : 5:45:48 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	4/19/2013 5:25:30 AM
Alpha_004	21f	ALL	Passed	4/19/2013 5:25:31 AM
Alpha_005	21f	ALL	Not Done	
Alpha_006	21f	ALL	Not Done	
Alpha_007	21f	ALL	Not Done	
Alpha_008	21f	ALL	Not Done	
Alpha_009	21f	ALL	Not Done	
Alpha_010	21f	ALL	Passed	4/19/2013 5:25:31 AM
Alpha_011	21f	ALL	Passed	4/19/2013 5:25:32 AM
Alpha_012	21f	ALL	Not Done	
Alpha_013	21f	ALL	Passed	4/19/2013 5:25:33 AM
Alpha_014	21f	ALL	Passed	4/19/2013 5:25:34 AM
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	4/19/2013 5:25:35 AM
Alpha_019	AIM730	ALL	Not Done	
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	4/19/2013 5:25:35 AM
Alpha_023	AIM730	ALL	Not Done	
Alpha_024	AIM730	ALL	Passed	4/19/2013 5:25:36 AM
Alpha_025	AIM730	ALL	Passed	4/19/2013 5:25:37 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	4/19/2013 5:25:38 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	4/19/2013 5:25:39 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	4/19/2013 5:25:40 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:41 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:43 AM
Alpha_036	Alpha Analyst100DC	ALL	Not Done	
Alpha_037	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:44 AM
Alpha_038	Alpha Analyst100DC	ALL	Not Done	
Alpha_039	Alpha Analyst100DC	ALL	Not Done	
Alpha_040	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:46 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:47 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:49 AM

Review of QA Results - Pulser Check

4/19/2013 5:45:48 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:50 AM
Alpha_045	Alpha Analyst100DC	ALL	Not Done	
Alpha_046	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:52 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:53 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	4/19/2013 5:25:55 AM

APPROVED BY: _____

APPROVAL DATE: 4/19/13

****
***** 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