ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #13-07098-OR

August 9, 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 # 13-07098

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

Date for Partial	Initials	Date	Initials	Checklist Items
		7/16/13	KC	Sample Log-In
		8-1-13	JG	Data Compilation
		8-5-13	MT	First Technical Data Review
		8/5/13	MSK	Second Technical Data Review
		8/6/13	[illegible]	Data Entry/Electronic Deliverable
		8/6/13	[illegible]	Case Narrative
		8/7/13	KBS	Electronic Deliverable Proof
		8/7/13	MSK	Samples Analyzed within Holding Time Yes? [X] No? [ ]
		8/7/13	MSK	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: _____ 8/9/13

Laboratory Manager — Date

Copy No. _____

Radiochemistry Services

0002A

SECTION I

CHAIN OF CUSTODY
&
pH CHECK SHEET

REC'D JUL 15 2013

13-07098

Chain of Custody Record

№ 1604

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

EBERLINE SERVICES

Project Name: West Lake OU-1	Project Number:
Send Report To: Paul Rosasco	Sampler (Print Name): Jonathan Williams
Address: 7220 W. Jefferson Ave	Sampler (Print Name):
Suite 406	Shipment Method: Courier
Lakewood, Co 80235	Airbill Number: —
Phone:	Laboratory Receiving:
Fax:	

Analysis Requested: Diss U-235 U-238 U-234; Diss Ra-226, Ra-228; Diss Thor 232, 230, 228; Tot U-238, 235, 234; Tot Ra-226, 228; Tot Thor-232, 230, 228

Page 1 of 3

① samples pre-preserved w/ HNO_3

Purchase Order #:

Field Sample ID		Sample Date	Sample Time	Sample Matrix	Number of Containers	Diss U	Diss Ra	Diss Thor	Tot U	Tot Ra	Tot Thor	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
PZ-111-SD	4,5	7/9/2013	1042	Aqueous	2	✓	✓	✓	✓	✓	✓	①	
S-5	6,7	↑	1050	↑	2	✓	✓	✓	✓	✓	✓	↑	
FB@PZ-110-SS	8		1140		1				✓	✓	✓		
PZ-110-SS	9,10		1213		2	✓	✓	✓	✓	✓	✓		
I-4	11,12		1225		3 *	✓	✓	✓	✓	✓	✓		Extra container is TOTAL eyr 07/16/13
PZ-100-SS	13,14		1336		2	✓	✓	✓	✓	✓	✓		
D-3	15,16		1342		2	✓	✓	✓	✓	✓	✓		
PZ-100-SD	17,18		1432		2	✓	✓	✓	✓	✓	✓		
PZ-112-AS	19,20	↓	1446		2	✓	✓	✓	✓	✓	✓		
Dup 01		7/9/2013	N/A		2	✓	✓	✓	✓	✓	✓		
PZ-201A-SS		7/10/2013	1023		2	✓	✓	✓	✓	✓	✓		
D-85		↑	1052		3	✓	✓	✓	✓	✓	✓		
PZ-106-SD			1141		2	✓	✓	✓	✓	✓	✓		
S-84			1146		2	✓	✓	✓	✓	✓	✓		
PZ-106-SS			1243		2	✓	✓	✓	✓	✓	✓		
PZ-113-AD		↓	1302	↓	2	✓	✓	✓	✓	✓	✓	↓	
PZ-113-AS		7/10/2013	1400	Aqueous	3	✓	✓	✓	✓	✓	✓	①	

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	First Capitol Courier	7/15/2013	0800
Relinquished by: (Signature) D. Chambers	Received by: (Signature) CHAMBERS	7/15/13	1640
Relinquished by: (Signature)	Received by: (Signature) Kenny Salis	7-15-13	1640

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 #	13-07098
Lab Deadline	8/6/2013
Analysis	UUISO - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Fxns 04,06,08,09,11,13,15,17 & 19 are TOTAL Fxns 05,07,10,12,14,16,18 & 20 are DISSOLVED	04	36	T1.2
	05	36	T1.2
	06	45	T1.2
	07	45	T1.2
	08	43	T1.2
	09	41	T1.2
	10	41	T1.2
	11	44	T1.2
	12	44	T1.2
MUST USE Fxn 11 as DUP	13	46	T1.2
	14	46	T1.2
	15	43	T1.2
	16	43	T1.2
	17	39	T1.2
	18	39	T1.2
	19	45	T1.2
	20	45	T1.2

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	JWolfe	7/19/13 0500
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	JWolfe	7/22/13 0700
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	0700 TRM	7/22/13
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	0905 TRM	7/25/13
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	1000	7/25
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	ICB	7/25/13 1659
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 #	13-07098
Lab Deadline	See Comments
Analysis	UUISO - Level 4
Sample Matrix	WA

Comments

Re-Analysis: 2Fxns 04,06,08,09,11,13,15,17 & 19 are TOTAL

Fxns 05,07,10,12,14,16,18 & 20 are DISSOLVED

Original Lab Deadline: 08/13/13
Rerun Lab Deadline: 08/13/13MUST USE Fxn 11 as DUP

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	36	T1.2
05	36	T1.2
06	45	T1.2
07	45	T1.2
08	43	T1.2
09	41	T1.2
10	41	T1.2
11	44	T1.2
12	44	T1.2
13	46	T1.2
14	46	T1.2
15	43	T1.2
16	43	T1.2
17	39	T1.2
18	39	T1.2
19	45	T1.2
20	45	T1.2

	Location (circle one)					Technician Initials	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	7/29/13 1000
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[illegible]	7/29/13 2045
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0400 TRM	7/30/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0833 TRM	8/1/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0820	8/1/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB 8/1/13	1234
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 #	13-07098
Lab Deadline	8/6/2013
Analysis	ThISO - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Fxns 04,06,08,09,11,13,15,17 & 19 are TOTAL	04	36	T1.2
Fxns 05,07,10,12,14,16,18 & 20 are DISSOLVED	05	36	T1.2
	06	45	T1.2
	07	45	T1.2
	08	43	T1.2
	09	41	T1.2
	10	41	T1.2
	11	44	T1.2
	12	44	T1.2
MUST USE Fxn 11 as DUP	13	46	T1.2
	14	46	T1.2
	15	43	T1.2
	16	43	T1.2
	17	39	T1.2
	18	39	T1.2
	19	45	T1.2
	20	45	T1.2

	Location (circle one)					Initials	Date
Received by	Sample Storage (circled)	Rough Prep	Prep	Separations	Count Room	JWolfe	7/19/13 0500
Relinquished by	Sample Storage	Rough Prep	Prep (circled)	Separations	Count Room	JWolfe	7/22/13 0815
Received by	Sample Storage	Rough Prep	Prep	Separations (circled)	Count Room	0815 RM	7/22/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations (circled)	Count Room	1800 RM	7/25/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room (circled)	1002	7/2[illegible]
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room (circled)	[illegible]	[illegible]
Received by	Sample Storage (circled)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-07098
Lab Deadline	8/6/2013
Analysis	Ra226 - Level 4
Sample Matrix	Water

Comments

Fxns 04,06,08,09,11,13,15,17 & 19 are TOTAL

Fxns 05,07,10,12,14,16,18 & 20 are DISSOLVED

MUST USE Fxn 11 as DUP

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	36	T1.2
05	36	T1.2
06	45	T1.2
07	45	T1.2
08	43	T1.2
09	41	T1.2
10	41	T1.2
11	44	T1.2
12	44	T1.2
13	46	T1.2
14	46	T1.2
15	43	T1.2
16	43	T1.2
17	39	T1.2
18	39	T1.2
19	45	T1.2
20	45	T1.2

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	JWolfe	7/18/13 0500
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	JWolfe	7/19/13 1300
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AW	7/19/13 1930
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	AW	7/23/13 1830
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	AG	7/24/13 1730
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 #	13-07098
Lab Deadline	8/6/2013
Analysis	Ra228 - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Fxns 04,06,08,09,11,13,15,17 & 19 are TOTAL Fxns 05,07,10,12,14,16,18 & 20 are DISSOLVED	04	36	T1.2
	05	36	T1.2
	06	45	T1.2
	07	45	T1.2
	08	43	T1.2
	09	41	T1.2
	10	41	T1.2
	11	44	T1.2
	12	44	T1.2
MUST USE Fxn 11 as DUP	13	46	T1.2
	14	46	T1.2
	15	43	T1.2
	16	43	T1.2
	17	39	T1.2
	18	39	T1.2
	19	45	T1.2
	20	45	T1.2

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	JWolfe	7/19/13 0500
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	JWolfe	7/19/13 1300
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JW	7/19/13 1930
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JW	7/23/13 1830
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	AG	7/24/13 1730
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JW	7/24/13 1810
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JW	7/31/13 0753
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)		
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order
13-07098
Received By
KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	T1.2		
02	BLANK	0		WA	T1.2		
03	DUP	0		WA	T1.2		
04	PZ-111-SD TOT ✓	2		WA	T1.2	8.00	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	36
			2	<2	<2	4.0000	35
05	PZ-111-SD DIS ✓	2		WA	T1.2	0.00	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				36
			2				35
06	S-5 TOT ✓	2		WA	T1.2	8.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	38
			2	<2	<2	4.0000	45
07	S-5 DIS ✓	2		WA	T1.2	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				38
			2				45
08	FB PZ-110-SS TOT ✓	1		WA	T1.2	4.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	43
09	PZ-110-SS TOT ✓	2		WA	T1.2	8.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	40
			2	<2	<2	4.0000	41
10	PZ-110-SS DIS ✓	2		WA	T1.2	0.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				40
			2				41
11	I-4 TOT ✓	3		WA	T1.2	12.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	44
			2	<2	<2	4.0000	41
			3	<2	<2	4.0000	40
12	I-4 DIS ✓	3		WA	T1.2	0.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				44
			2				41
			3				40
13	PZ-100-SS TOT ✓	2		WA	T1.2	8.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	46
			2	<2	<2	4.0000	37
14	PZ-100-SS DIS ✓	2		WA	T1.2	0.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				46
			2				37
15	D-3 TOT ✓	2		WA	T1.2	8.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	43
			2	<2	<2	4.0000	42
16	D-3 DIS ✓	2		WA	T1.2	0.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				43
			2				42
17	PZ-100-SD TOT ✓	2		WA	T1.2	8.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	39
			2	<2	<2	4.0000	35
18	PZ-100-SD DIS ✓	2		WA	T1.2	0.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				39
			2				35
19	PZ-112-AS TOT ✓	2		WA	T1.2	8.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	45

✓ KJ 7/16/13

Received by: [signature] Date: 7/16/13

MP-001, Rev 5
Effective: 11/22/02

0010

EBERLINE SERVICES

(Volumes, pH, & CPM)

Received By
KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
			2	<2	<2	4.0000	40
20	PZ-112-AS DIS ✓	2		WA	T1.2	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				45
			2				40

KCJ 07/16/13

Received by: Kristen Coulston Date: 7/16/13

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	07/15/2013	28	13-07098
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
West Lake OU-1	West Lake OU-1	W	08/06/2013	08/12/2013	08/13/2013

Internal ID	Client ID	Sample Date	Matrix	Storage	Ra226	Ra228	ThISO	UUISO																					Ttl
01	LCS	07/16/13	WA	T1.2	X	X	X	X																					4
02	BLANK	07/16/13	WA	T1.2	X	X	X	X																					4
03	DUP	07/16/13	WA	T1.2	X	X	X	X																					4
04	PZ-111-SD TOT	07/09/13 10:42	WA	T1.2	X	X	X	X																					4
05	PZ-111-SD DIS	07/09/13 10:42	WA	T1.2	X	X	X	X																					4
06	S-5 TOT	07/09/13 10:50	WA	T1.2	X	X	X	X																					4
07	S-5 DIS	07/09/13 10:50	WA	T1.2	X	X	X	X																					4
08	FB @ PZ-110-SS TOT	07/09/13 11:40	WA	T1.2	X	X	X	X																					4
09	PZ-110-SS TOT	07/09/13 12:13	WA	T1.2	X	X	X	X																					4
10	PZ-110-SS DIS	07/09/13 12:13	WA	T1.2	X	X	X	X																					4
11	I-4 TOT	07/09/13 12:25	WA	T1.2	X	X	X	X																					4
12	I-4 DIS	07/09/13 12:25	WA	T1.2	X	X	X	X																					4
13	PZ-100-SS TOT	07/09/13 13:36	WA	T1.2	X	X	X	X																					4
14	PZ-100-SS DIS	07/09/13 13:36	WA	T1.2	X	X	X	X																					4
15	D-3 TOT	07/09/13 13:42	WA	T1.2	X	X	X	X																					4
16	D-3 DIS	07/09/13 13:42	WA	T1.2	X	X	X	X																					4
17	PZ-100-SD TOT	07/09/13 14:32	WA	T1.2	X	X	X	X																					4
18	PZ-100-SD DIS	07/09/13 14:32	WA	T1.2	X	X	X	X																					4
19	PZ-112-AS TOT	07/09/13 14:46	WA	T1.2	X	X	X	X																					4
20	PZ-112-AS DIS	07/09/13 14:46	WA	T1.2	X	X	X	X																					4
				Totals Per Analysis (non QA samples)	17	17	17	17	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		Report Data	
	Paul V. Rosasco, P.E. Engineering Management Support, Inc. 7220 West Jefferson Avenue, Suite 406 Lakewood, CO 80235		Paul V. Rosasco, P.E. Engineering Management Support, Inc 7220 West Jefferson Ave, Suite 406 Lakewood, CO 80235
Voice	303-640-3426	*Voice*	303-940-3426
Fax		*Fax*	
Contact	Lyn Fitzgerald		
Voice	303-601-4255		
Fax			

Printed: 7/17/2013 8:12 AM

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 13-07098

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 Carlola DATE: 7/16/13

SECTION III

CASE NARRATIVE

EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
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EBS-OR-35923

August 9, 2013

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CASE NARRATIVE
Work Order # 13-07098-OR

SAMPLE RECEIPT

This work order contains nine water samples received 07/15/2013. Eight samples were analyzed as total and dissolved for Isotopic Uranium, Isotopic Thorium and Radium-226/228. One sample was analyzed as total for Isotopic Uranium, Isotopic Thorium and Radium-226/228.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
PZ-111-SD TOT	13-07098-04	PZ-100-SS TOT	13-07098-13
PZ-111-SD DIS	13-07098-05	PZ-100-SS DIS	13-07098-14
S-5 TOT	13-07098-06	D-3 TOT	13-07098-15
S-5 DIS	13-07098-07	D-3 DIS	13-07098-16
FB @ PZ-110-SS TOT	13-07098-08	PZ-100-SD TOT	13-07098-17
PZ-110-SS TOT	13-07098-09	PZ-100-SD DIS	13-07098-18
PZ-110-SS DIS	13-07098-10	PZ-112-AS TOT	13-07098-19
I-4 TOT	13-07098-11	PZ-112-AS DIS	13-07098-20
I-4 DIS	13-07098-12		

ANALYTICAL METHODS

Isotopic Uranium and Isotopic Thorium were analyzed using Method HASL 300, 4.5.2. Radium-226 was analyzed using Method EPA 903.0. Radium-228 was analyzed using Method EPA 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 prepared by removing representative aliquots followed 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.

1st Analytical Attempt

Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was low for sample numbers S-5 TOT, I-4 TOT and I-4 DIS. These samples appear to have an elemental interference present. Chemical recovery was acceptable for all other samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234, Uranium-235 and Uranium-238 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-234 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

2nd Analytical Attempt

Sample numbers S-5 TOT, I-4 TOT and I-4 DIS were reanalyzed due to low chemical recoveries in the first analytical attempt. Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was still low for sample numbers S-5 TOT, I-4 TOT and I-4 DIS. In this case, low chemical recoveries are related to apparent elemental interferences. Due to limited sample volume a third analytical attempt was not possible. Chemical recovery was acceptable for the laboratory control sample and method blank. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 and Uranium-238 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-235 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 prepared by removing representative aliquots followed 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.

ANALYTICAL RESULTS CONTINUED

RADIUM-226

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. This was followed by selective sulfate precipitations of the Radium. Samples were then mounted by semi-micro-precipitations onto micro-porous filters. Samples were counted by alpha spectroscopy using an energy specific region of interest for Radium-226. Chemical recovery was calculated by the use of a Barium-133 tracer, which was determined by HPGe gamma spectroscopy.

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

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 results greater than the detection limit. 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: 8/9/2013

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SECTION IV

ANALYTICAL RESULTS SUMMARY

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Project: West Lake OU-1
SDG: 1307098
Received: 07/15/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
LCS13-07098-01	13-07098-01	07/24/2013 12:43:34	Radium-226	E903.0	10.65	1.25	2.57	0.27		pCi/l
LCS13-07098-01	13-07098-01	07/31/2013 08:18:29	Radium-228	E904.0	10.57	0.83	2.53	0.10		pCi/l
LCS13-07098-01	13-07098-01	07/25/2013 13:26:17	Thorium-228	HASL 300, 4.5.2	5.26	0.82	0.96	0.09		pCi/l
LCS13-07098-01	13-07098-01	07/25/2013 13:26:17	Thorium-230	HASL 300, 4.5.2	5.12	0.80	1.02	0.08		pCi/l
LCS13-07098-01	13-07098-01	07/25/2013 13:26:17	Thorium-232	HASL 300, 4.5.2	5.35	0.83	0.96	0.06		pCi/l
LCS13-07098-01	13-07098-01	07/25/2013 10:13:39	Uranium-234	HASL 300, 4.5.2	7.89	1.13	1.26	0.11		pCi/l
LCS13-07098-01	13-07098-01	08/01/2013 09:15:55	Uranium-234	HASL 300, 4.5.2	8.36	1.46	1.57	0.12		pCi/l
LCS13-07098-01	13-07098-01	07/25/2013 10:13:39	Uranium-235	HASL 300, 4.5.2	0.49	0.20	0.20	0.09		pCi/l
LCS13-07098-01	13-07098-01	08/01/2013 09:15:55	Uranium-235	HASL 300, 4.5.2	0.74	0.31	0.31	0.15		pCi/l
LCS13-07098-01	13-07098-01	07/25/2013 10:13:39	Uranium-238	HASL 300, 4.5.2	7.96	1.14	1.27	0.06		pCi/l
LCS13-07098-01	13-07098-01	08/01/2013 09:15:55	Uranium-238	HASL 300, 4.5.2	7.38	1.31	1.42	0.12		pCi/l
BLANK13-07098-02	13-07098-02	07/24/2013 12:43:29	Radium-226	E903.0	0.13	0.18	0.18	0.29	U	pCi/l
BLANK13-07098-02	13-07098-02	07/31/2013 08:18:30	Radium-228	E904.0	2.43	0.42	0.70	0.11		pCi/l
BLANK13-07098-02	13-07098-02	07/25/2013 13:26:19	Thorium-228	HASL 300, 4.5.2	0.08	0.07	0.07	0.06	J	pCi/l
BLANK13-07098-02	13-07098-02	07/25/2013 13:26:19	Thorium-230	HASL 300, 4.5.2	0.16	0.09	0.10	0.06		pCi/l
BLANK13-07098-02	13-07098-02	07/25/2013 13:26:19	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.03	0.06	U	pCi/l
BLANK13-07098-02	13-07098-02	07/25/2013 10:13:40	Uranium-234	HASL 300, 4.5.2	0.13	0.08	0.08	0.06	J	pCi/l
BLANK13-07098-02	13-07098-02	08/01/2013 09:15:56	Uranium-234	HASL 300, 4.5.2	0.13	0.09	0.09	0.10	J	pCi/l
BLANK13-07098-02	13-07098-02	07/25/2013 10:13:40	Uranium-235	HASL 300, 4.5.2	0.04	0.05	0.05	0.07	U	pCi/l
BLANK13-07098-02	13-07098-02	08/01/2013 09:15:56	Uranium-235	HASL 300, 4.5.2	0.06	0.07	0.07	0.10	U	pCi/l
BLANK13-07098-02	13-07098-02	07/25/2013 10:13:40	Uranium-238	HASL 300, 4.5.2	0.06	0.06	0.06	0.07	U	pCi/l
BLANK13-07098-02	13-07098-02	08/01/2013 09:15:56	Uranium-238	HASL 300, 4.5.2	0.08	0.07	0.07	0.07	J	pCi/l
I-4 TOT_07_09_2013 DUP	13-07098-03	07/24/2013 12:43:30	Radium-226	E903.0	1.08	0.39	0.45	0.23		pCi/l
I-4 TOT_07_09_2013 DUP	13-07098-03	07/31/2013 08:18:30	Radium-228	E904.0	3.00	0.44	0.81	0.10		pCi/l
I-4 TOT_07_09_2013 DUP	13-07098-03	07/25/2013 13:26:13	Thorium-228	HASL 300, 4.5.2	0.00	0.07	0.07	0.15	U	pCi/l
I-4 TOT_07_09_2013 DUP	13-07098-03	07/25/2013 13:26:13	Thorium-230	HASL 300, 4.5.2	0.08	0.10	0.10	0.15	U	pCi/l
I-4 TOT_07_09_2013 DUP	13-07098-03	07/25/2013 13:26:13	Thorium-232	HASL 300, 4.5.2	0.03	0.07	0.07	0.14	U	pCi/l
I-4 TOT_07_09_2013 DUP	13-07098-03	08/01/2013 09:15:51	Uranium-234	HASL 300, 4.5.2	0.20	0.30	0.30	0.51	U	pCi/l
I-4 TOT_07_09_2013 DUP	13-07098-03	08/01/2013 09:15:51	Uranium-235	HASL 300, 4.5.2	0.27	0.37	0.37	0.58	U	pCi/l
I-4 TOT_07_09_2013 DUP	13-07098-03	08/01/2013 09:15:51	Uranium-238	HASL 300, 4.5.2	-0.09	0.16	0.16	0.49	U	pCi/l

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Project: West Lake OU-1
SDG: 1307098
Received: 07/15/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
PZ-111-SD TOT_07_09_2013	13-07098-04	07/24/2013 12:43:31	Radium-226	E903.0	1.05	0.37	0.43	0.16		pCi/l
PZ-111-SD TOT_07_09_2013	13-07098-04	07/31/2013 08:18:31	Radium-228	E904.0	3.72	0.51	0.98	0.11		pCi/l
PZ-111-SD TOT_07_09_2013	13-07098-04	07/25/2013 13:26:15	Thorium-228	HASL 300, 4.5.2	0.02	0.05	0.05	0.09	U	pCi/l
PZ-111-SD TOT_07_09_2013	13-07098-04	07/25/2013 13:26:15	Thorium-230	HASL 300, 4.5.2	0.07	0.07	0.07	0.10	U	pCi/l
PZ-111-SD TOT_07_09_2013	13-07098-04	07/25/2013 13:26:15	Thorium-232	HASL 300, 4.5.2	0.02	0.05	0.05	0.08	U	pCi/l
PZ-111-SD TOT_07_09_2013	13-07098-04	07/25/2013 10:13:42	Uranium-234	HASL 300, 4.5.2	0.35	0.14	0.14	0.09		pCi/l
PZ-111-SD TOT_07_09_2013	13-07098-04	07/25/2013 10:13:42	Uranium-235	HASL 300, 4.5.2	0.06	0.07	0.07	0.10	U	pCi/l
PZ-111-SD TOT_07_09_2013	13-07098-04	07/25/2013 10:13:42	Uranium-238	HASL 300, 4.5.2	0.26	0.12	0.12	0.07		pCi/l
PZ-111-SD DIS_07_09_2013	13-07098-05	07/24/2013 12:43:32	Radium-226	E903.0	1.53	0.47	0.57	0.24		pCi/l
PZ-111-SD DIS_07_09_2013	13-07098-05	07/31/2013 08:18:35	Radium-228	E904.0	4.77	0.58	1.22	0.11		pCi/l
PZ-111-SD DIS_07_09_2013	13-07098-05	07/25/2013 16:25:50	Thorium-228	HASL 300, 4.5.2	0.01	0.05	0.05	0.11	U	pCi/l
PZ-111-SD DIS_07_09_2013	13-07098-05	07/25/2013 16:25:50	Thorium-230	HASL 300, 4.5.2	0.11	0.08	0.08	0.06	J	pCi/l
PZ-111-SD DIS_07_09_2013	13-07098-05	07/25/2013 16:25:50	Thorium-232	HASL 300, 4.5.2	-0.01	0.03	0.03	0.08	U	pCi/l
PZ-111-SD DIS_07_09_2013	13-07098-05	07/25/2013 10:13:43	Uranium-234	HASL 300, 4.5.2	0.30	0.13	0.13	0.06		pCi/l
PZ-111-SD DIS_07_09_2013	13-07098-05	07/25/2013 10:13:43	Uranium-235	HASL 300, 4.5.2	0.05	0.06	0.06	0.08	U	pCi/l
PZ-111-SD DIS_07_09_2013	13-07098-05	07/25/2013 10:13:43	Uranium-238	HASL 300, 4.5.2	0.18	0.10	0.10	0.08		pCi/l
S-5 TOT_07_09_2013	13-07098-06	07/24/2013 12:43:32	Radium-226	E903.0	0.98	0.67	0.70	0.80	J	pCi/l
S-5 TOT_07_09_2013	13-07098-06	07/31/2013 08:18:35	Radium-228	E904.0	5.52	0.80	1.48	0.17		pCi/l
S-5 TOT_07_09_2013	13-07098-06	07/25/2013 16:25:51	Thorium-228	HASL 300, 4.5.2	0.15	0.13	0.13	0.17	J	pCi/l
S-5 TOT_07_09_2013	13-07098-06	07/25/2013 16:25:51	Thorium-230	HASL 300, 4.5.2	0.10	0.11	0.11	0.15	U	pCi/l
S-5 TOT_07_09_2013	13-07098-06	07/25/2013 16:25:51	Thorium-232	HASL 300, 4.5.2	0.18	0.13	0.13	0.12	J	pCi/l
S-5 TOT_07_09_2013	13-07098-06	08/01/2013 09:15:52	Uranium-234	HASL 300, 4.5.2	1.10	0.91	0.91	0.79	J	pCi/l
S-5 TOT_07_09_2013	13-07098-06	08/01/2013 09:15:52	Uranium-235	HASL 300, 4.5.2	0.17	0.41	0.41	0.85	U	pCi/l
S-5 TOT_07_09_2013	13-07098-06	08/01/2013 09:15:52	Uranium-238	HASL 300, 4.5.2	-0.06	0.33	0.33	0.79	U	pCi/l
S-5 DIS_07_09_2013	13-07098-07	07/24/2013 12:43:33	Radium-226	E903.0	0.83	0.62	0.64	0.66	J	pCi/l
S-5 DIS_07_09_2013	13-07098-07	07/31/2013 08:18:35	Radium-228	E904.0	4.01	0.62	1.10	0.15		pCi/l
S-5 DIS_07_09_2013	13-07098-07	07/25/2013 16:25:44	Thorium-228	HASL 300, 4.5.2	0.07	0.09	0.09	0.15	U	pCi/l
S-5 DIS_07_09_2013	13-07098-07	07/25/2013 16:25:44	Thorium-230	HASL 300, 4.5.2	0.01	0.05	0.05	0.11	U	pCi/l
S-5 DIS_07_09_2013	13-07098-07	07/25/2013 16:25:44	Thorium-232	HASL 300, 4.5.2	-0.01	0.04	0.04	0.11	U	pCi/l
S-5 DIS_07_09_2013	13-07098-07	07/25/2013 13:24:25	Uranium-234	HASL 300, 4.5.2	0.17	0.19	0.19	0.22	U	pCi/l
S-5 DIS_07_09_2013	13-07098-07	07/25/2013 13:24:25	Uranium-235	HASL 300, 4.5.2	0.16	0.20	0.20	0.24	U	pCi/l
S-5 DIS_07_09_2013	13-07098-07	07/25/2013 13:24:25	Uranium-238	HASL 300, 4.5.2	0.29	0.25	0.25	0.28	J	pCi/l

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Project: West Lake OU-1
SDG: 1307098
Received: 07/15/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
FB @ PZ-110-SS TOT_07_09_2013	13-07098-08	07/24/2013 12:44:02	Radium-226	E903.0	0.03	0.10	0.10	0.22	U	pCi/l
FB @ PZ-110-SS TOT_07_09_2013	13-07098-08	07/31/2013 08:18:36	Radium-228	E904.0	2.86	0.47	0.80	0.12		pCi/l
FB @ PZ-110-SS TOT_07_09_2013	13-07098-08	07/25/2013 16:25:45	Thorium-228	HASL 300, 4.5.2	0.00	0.04	0.04	0.10	U	pCi/l
FB @ PZ-110-SS TOT_07_09_2013	13-07098-08	07/25/2013 16:25:45	Thorium-230	HASL 300, 4.5.2	0.09	0.07	0.07	0.07	J	pCi/l
FB @ PZ-110-SS TOT_07_09_2013	13-07098-08	07/25/2013 16:25:45	Thorium-232	HASL 300, 4.5.2	0.03	0.04	0.04	0.06	U	pCi/l
FB @ PZ-110-SS TOT_07_09_2013	13-07098-08	07/25/2013 13:24:26	Uranium-234	HASL 300, 4.5.2	0.05	0.07	0.07	0.11	U	pCi/l
FB @ PZ-110-SS TOT_07_09_2013	13-07098-08	07/25/2013 13:24:26	Uranium-235	HASL 300, 4.5.2	0.04	0.06	0.06	0.10	U	pCi/l
FB @ PZ-110-SS TOT_07_09_2013	13-07098-08	07/25/2013 13:24:26	Uranium-238	HASL 300, 4.5.2	0.13	0.09	0.09	0.07	J	pCi/l
PZ-110-SS TOT_07_09_2013	13-07098-09	07/24/2013 12:44:03	Radium-226	E903.0	4.12	0.79	1.18	0.23		pCi/l
PZ-110-SS TOT_07_09_2013	13-07098-09	07/31/2013 08:18:28	Radium-228	E904.0	4.11	0.56	1.08	0.12		pCi/l
PZ-110-SS TOT_07_09_2013	13-07098-09	07/25/2013 16:25:46	Thorium-228	HASL 300, 4.5.2	0.05	0.06	0.07	0.09	U	pCi/l
PZ-110-SS TOT_07_09_2013	13-07098-09	07/25/2013 16:25:46	Thorium-230	HASL 300, 4.5.2	0.20	0.13	0.13	0.08	J	pCi/l
PZ-110-SS TOT_07_09_2013	13-07098-09	07/25/2013 16:25:46	Thorium-232	HASL 300, 4.5.2	0.02	0.05	0.05	0.11	U	pCi/l
PZ-110-SS TOT_07_09_2013	13-07098-09	07/25/2013 13:24:19	Uranium-234	HASL 300, 4.5.2	0.10	0.09	0.09	0.11	J	pCi/l
PZ-110-SS TOT_07_09_2013	13-07098-09	07/25/2013 13:24:19	Uranium-235	HASL 300, 4.5.2	0.11	0.09	0.09	0.10	J	pCi/l
PZ-110-SS TOT_07_09_2013	13-07098-09	07/25/2013 13:24:19	Uranium-238	HASL 300, 4.5.2	0.02	0.04	0.04	0.10	U	pCi/l
PZ-110-SS DIS_07_09_2013	13-07098-10	07/24/2013 12:44:05	Radium-226	E903.0	3.43	0.70	1.01	0.21		pCi/l
PZ-110-SS DIS_07_09_2013	13-07098-10	07/31/2013 08:18:28	Radium-228	E904.0	5.20	0.60	1.32	0.11		pCi/l
PZ-110-SS DIS_07_09_2013	13-07098-10	07/25/2013 16:25:47	Thorium-228	HASL 300, 4.5.2	-0.01	0.04	0.04	0.11	U	pCi/l
PZ-110-SS DIS_07_09_2013	13-07098-10	07/25/2013 16:25:47	Thorium-230	HASL 300, 4.5.2	0.10	0.07	0.08	0.07	J	pCi/l
PZ-110-SS DIS_07_09_2013	13-07098-10	07/25/2013 16:25:47	Thorium-232	HASL 300, 4.5.2	0.06	0.06	0.06	0.07	U	pCi/l
PZ-110-SS DIS_07_09_2013	13-07098-10	07/25/2013 13:24:20	Uranium-234	HASL 300, 4.5.2	0.08	0.08	0.08	0.10	U	pCi/l
PZ-110-SS DIS_07_09_2013	13-07098-10	07/25/2013 13:24:20	Uranium-235	HASL 300, 4.5.2	0.01	0.05	0.05	0.12	U	pCi/l
PZ-110-SS DIS_07_09_2013	13-07098-10	07/25/2013 13:24:20	Uranium-238	HASL 300, 4.5.2	0.06	0.07	0.07	0.10	U	pCi/l
I-4 TOT_07_09_2013	13-07098-11	07/24/2013 12:44:06	Radium-226	E903.0	1.37	0.52	0.60	0.28		pCi/l
I-4 TOT_07_09_2013	13-07098-11	07/31/2013 08:18:28	Radium-228	E904.0	5.20	0.59	1.32	0.11		pCi/l
I-4 TOT_07_09_2013	13-07098-11	07/25/2013 16:25:48	Thorium-228	HASL 300, 4.5.2	0.01	0.07	0.07	0.14	U	pCi/l
I-4 TOT_07_09_2013	13-07098-11	07/25/2013 16:25:48	Thorium-230	HASL 300, 4.5.2	0.06	0.07	0.07	0.11	U	pCi/l
I-4 TOT_07_09_2013	13-07098-11	07/25/2013 16:25:48	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.03	0.07	U	pCi/l
I-4 TOT_07_09_2013	13-07098-11	08/01/2013 09:15:53	Uranium-234	HASL 300, 4.5.2	0.60	0.51	0.51	0.43	J	pCi/l
I-4 TOT_07_09_2013	13-07098-11	08/01/2013 09:15:53	Uranium-235	HASL 300, 4.5.2	0.32	0.44	0.44	0.67	U	pCi/l
I-4 TOT_07_09_2013	13-07098-11	08/01/2013 09:15:53	Uranium-238	HASL 300, 4.5.2	0.17	0.29	0.29	0.49	U	pCi/l

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
I-4 DIS_07_09_2013	13-07098-12	07/24/2013 12:44:08	Radium-226	E903.0	0.96	0.50	0.54	0.31		pCi/l
I-4 DIS_07_09_2013	13-07098-12	07/31/2013 08:18:29	Radium-228	E904.0	5.89	0.68	1.49	0.13		pCi/l
I-4 DIS_07_09_2013	13-07098-12	07/25/2013 16:25:49	Thorium-228	HASL 300, 4.5.2	0.06	0.06	0.06	0.09	U	pCi/l
I-4 DIS_07_09_2013	13-07098-12	07/25/2013 16:25:49	Thorium-230	HASL 300, 4.5.2	0.11	0.08	0.08	0.08	J	pCi/l
I-4 DIS_07_09_2013	13-07098-12	07/25/2013 16:25:49	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.05	0.06	U	pCi/l
I-4 DIS_07_09_2013	13-07098-12	08/01/2013 09:15:54	Uranium-234	HASL 300, 4.5.2	1.47	0.84	0.84	0.58		pCi/l
I-4 DIS_07_09_2013	13-07098-12	08/01/2013 09:15:54	Uranium-235	HASL 300, 4.5.2	0.67	0.63	0.63	0.71	J	pCi/l
I-4 DIS_07_09_2013	13-07098-12	08/01/2013 09:15:54	Uranium-238	HASL 300, 4.5.2	0.18	0.36	0.36	0.67	U	pCi/l
PZ-100-SS TOT_07_09_2013	13-07098-13	07/24/2013 12:44:09	Radium-226	E903.0	4.04	0.80	1.17	0.23		pCi/l
PZ-100-SS TOT_07_09_2013	13-07098-13	07/31/2013 08:17:08	Radium-228	E904.0	1.99	0.84	0.96	1.60	J	pCi/l
PZ-100-SS TOT_07_09_2013	13-07098-13	07/25/2013 16:27:29	Thorium-228	HASL 300, 4.5.2	0.04	0.06	0.06	0.09	U	pCi/l
PZ-100-SS TOT_07_09_2013	13-07098-13	07/25/2013 16:27:29	Thorium-230	HASL 300, 4.5.2	0.17	0.11	0.11	0.07	J	pCi/l
PZ-100-SS TOT_07_09_2013	13-07098-13	07/25/2013 16:27:29	Thorium-232	HASL 300, 4.5.2	0.03	0.05	0.05	0.09	U	pCi/l
PZ-100-SS TOT_07_09_2013	13-07098-13	07/25/2013 13:24:23	Uranium-234	HASL 300, 4.5.2	4.99	0.79	0.87	0.12		pCi/l
PZ-100-SS TOT_07_09_2013	13-07098-13	07/25/2013 13:24:23	Uranium-235	HASL 300, 4.5.2	0.40	0.18	0.18	0.11		pCi/l
PZ-100-SS TOT_07_09_2013	13-07098-13	07/25/2013 13:24:23	Uranium-238	HASL 300, 4.5.2	2.22	0.44	0.47	0.09		pCi/l
PZ-100-SS DIS_07_09_2013	13-07098-14	07/24/2013 12:44:11	Radium-226	E903.0	3.19	0.64	0.93	0.20		pCi/l
PZ-100-SS DIS_07_09_2013	13-07098-14	07/31/2013 08:17:09	Radium-228	E904.0	0.74	0.66	0.68	1.33	J	pCi/l
PZ-100-SS DIS_07_09_2013	13-07098-14	07/25/2013 16:27:31	Thorium-228	HASL 300, 4.5.2	0.05	0.07	0.07	0.10	U	pCi/l
PZ-100-SS DIS_07_09_2013	13-07098-14	07/25/2013 16:27:31	Thorium-230	HASL 300, 4.5.2	0.02	0.05	0.05	0.10	U	pCi/l
PZ-100-SS DIS_07_09_2013	13-07098-14	07/25/2013 16:27:31	Thorium-232	HASL 300, 4.5.2	0.05	0.06	0.06	0.07	U	pCi/l
PZ-100-SS DIS_07_09_2013	13-07098-14	07/25/2013 13:24:24	Uranium-234	HASL 300, 4.5.2	4.82	0.82	0.89	0.11		pCi/l
PZ-100-SS DIS_07_09_2013	13-07098-14	07/25/2013 13:24:24	Uranium-235	HASL 300, 4.5.2	0.26	0.15	0.16	0.13	J	pCi/l
PZ-100-SS DIS_07_09_2013	13-07098-14	07/25/2013 13:24:24	Uranium-238	HASL 300, 4.5.2	1.86	0.42	0.44	0.07		pCi/l
D-3 TOT_07_09_2013	13-07098-15	07/24/2013 12:44:13	Radium-226	E903.0	3.53	0.94	1.20	0.30		pCi/l
D-3 TOT_07_09_2013	13-07098-15	07/31/2013 08:17:09	Radium-228	E904.0	4.81	0.96	1.45	1.60		pCi/l
D-3 TOT_07_09_2013	13-07098-15	07/25/2013 16:27:24	Thorium-228	HASL 300, 4.5.2	0.15	0.13	0.13	0.13	J	pCi/l
D-3 TOT_07_09_2013	13-07098-15	07/25/2013 16:27:24	Thorium-230	HASL 300, 4.5.2	0.15	0.12	0.12	0.13	J	pCi/l
D-3 TOT_07_09_2013	13-07098-15	07/25/2013 16:27:24	Thorium-232	HASL 300, 4.5.2	0.00	0.04	0.04	0.09	U	pCi/l
D-3 TOT_07_09_2013	13-07098-15	07/25/2013 13:24:44	Uranium-234	HASL 300, 4.5.2	0.18	0.19	0.19	0.24	U	pCi/l
D-3 TOT_07_09_2013	13-07098-15	07/25/2013 13:24:44	Uranium-235	HASL 300, 4.5.2	0.10	0.15	0.15	0.22	U	pCi/l
D-3 TOT_07_09_2013	13-07098-15	07/25/2013 13:24:44	Uranium-238	HASL 300, 4.5.2	0.09	0.17	0.17	0.32	U	pCi/l

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Project: West Lake OU-1
SDG: 1307098
Received: 07/15/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
D-3 DIS_07_09_2013	13-07098-16	07/24/2013 12:44:15	Radium-226	E903.0	3.72	0.99	1.27	0.49		pCi/l
D-3 DIS_07_09_2013	13-07098-16	07/31/2013 08:17:10	Radium-228	E904.0	6.18	1.03	1.74	1.60		pCi/l
D-3 DIS_07_09_2013	13-07098-16	07/25/2013 16:27:26	Thorium-228	HASL 300, 4.5.2	0.18	0.11	0.11	0.09	J	pCi/l
D-3 DIS_07_09_2013	13-07098-16	07/25/2013 16:27:26	Thorium-230	HASL 300, 4.5.2	0.09	0.07	0.07	0.06	J	pCi/l
D-3 DIS_07_09_2013	13-07098-16	07/25/2013 16:27:26	Thorium-232	HASL 300, 4.5.2	0.03	0.05	0.05	0.08	U	pCi/l
D-3 DIS_07_09_2013	13-07098-16	07/25/2013 13:24:44	Uranium-234	HASL 300, 4.5.2	0.19	0.18	0.18	0.19	J	pCi/l
D-3 DIS_07_09_2013	13-07098-16	07/25/2013 13:24:44	Uranium-235	HASL 300, 4.5.2	0.14	0.17	0.17	0.21	U	pCi/l
D-3 DIS_07_09_2013	13-07098-16	07/25/2013 13:24:44	Uranium-238	HASL 300, 4.5.2	0.04	0.11	0.11	0.24	U	pCi/l
PZ-100-SD TOT_07_09_2013	13-07098-17	07/24/2013 12:44:17	Radium-226	E903.0	1.87	0.51	0.64	0.18		pCi/l
PZ-100-SD TOT_07_09_2013	13-07098-17	07/31/2013 08:17:12	Radium-228	E904.0	1.35	0.67	0.73	1.27	J	pCi/l
PZ-100-SD TOT_07_09_2013	13-07098-17	07/25/2013 16:27:27	Thorium-228	HASL 300, 4.5.2	0.02	0.04	0.04	0.08	U	pCi/l
PZ-100-SD TOT_07_09_2013	13-07098-17	07/25/2013 16:27:27	Thorium-230	HASL 300, 4.5.2	0.10	0.07	0.07	0.06	J	pCi/l
PZ-100-SD TOT_07_09_2013	13-07098-17	07/25/2013 16:27:27	Thorium-232	HASL 300, 4.5.2	0.01	0.02	0.02	0.05	U	pCi/l
PZ-100-SD TOT_07_09_2013	13-07098-17	07/25/2013 13:24:45	Uranium-234	HASL 300, 4.5.2	0.42	0.16	0.16	0.07		pCi/l
PZ-100-SD TOT_07_09_2013	13-07098-17	07/25/2013 13:24:45	Uranium-235	HASL 300, 4.5.2	0.05	0.06	0.06	0.07	U	pCi/l
PZ-100-SD TOT_07_09_2013	13-07098-17	07/25/2013 13:24:45	Uranium-238	HASL 300, 4.5.2	0.34	0.14	0.15	0.07		pCi/l
PZ-100-SD DIS_07_09_2013	13-07098-18	07/24/2013 12:44:19	Radium-226	E903.0	1.85	0.47	0.61	0.12		pCi/l
PZ-100-SD DIS_07_09_2013	13-07098-18	07/31/2013 08:17:12	Radium-228	E904.0	0.67	0.62	0.64	1.25	J	pCi/l
PZ-100-SD DIS_07_09_2013	13-07098-18	07/25/2013 16:27:34	Thorium-228	HASL 300, 4.5.2	0.03	0.06	0.06	0.11	U	pCi/l
PZ-100-SD DIS_07_09_2013	13-07098-18	07/25/2013 16:27:34	Thorium-230	HASL 300, 4.5.2	0.09	0.08	0.08	0.08	J	pCi/l
PZ-100-SD DIS_07_09_2013	13-07098-18	07/25/2013 16:27:34	Thorium-232	HASL 300, 4.5.2	0.02	0.05	0.05	0.08	U	pCi/l
PZ-100-SD DIS_07_09_2013	13-07098-18	07/25/2013 13:24:46	Uranium-234	HASL 300, 4.5.2	0.44	0.20	0.20	0.14		pCi/l
PZ-100-SD DIS_07_09_2013	13-07098-18	07/25/2013 13:24:46	Uranium-235	HASL 300, 4.5.2	0.03	0.07	0.07	0.15	U	pCi/l
PZ-100-SD DIS_07_09_2013	13-07098-18	07/25/2013 13:24:46	Uranium-238	HASL 300, 4.5.2	0.34	0.18	0.18	0.11		pCi/l
PZ-112-AS TOT_07_09_2013	13-07098-19	07/24/2013 12:44:21	Radium-226	E903.0	2.27	0.74	0.88	0.26		pCi/l
PZ-112-AS TOT_07_09_2013	13-07098-19	07/31/2013 08:17:13	Radium-228	E904.0	3.39	0.69	1.03	1.09		pCi/l
PZ-112-AS TOT_07_09_2013	13-07098-19	07/25/2013 16:27:36	Thorium-228	HASL 300, 4.5.2	0.06	0.07	0.07	0.07	U	pCi/l
PZ-112-AS TOT_07_09_2013	13-07098-19	07/25/2013 16:27:36	Thorium-230	HASL 300, 4.5.2	0.16	0.11	0.11	0.10	J	pCi/l
PZ-112-AS TOT_07_09_2013	13-07098-19	07/25/2013 16:27:36	Thorium-232	HASL 300, 4.5.2	0.02	0.05	0.05	0.10	U	pCi/l
PZ-112-AS TOT_07_09_2013	13-07098-19	07/25/2013 13:24:47	Uranium-234	HASL 300, 4.5.2	0.19	0.15	0.15	0.16	J	pCi/l
PZ-112-AS TOT_07_09_2013	13-07098-19	07/25/2013 13:24:47	Uranium-235	HASL 300, 4.5.2	0.05	0.08	0.08	0.14	U	pCi/l
PZ-112-AS TOT_07_09_2013	13-07098-19	07/25/2013 13:24:47	Uranium-238	HASL 300, 4.5.2	0.09	0.09	0.09	0.10	U	pCi/l

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
PZ-112-AS DIS_07_09_2013	13-07098-20	07/24/2013 12:44:24	Radium-226	E903.0	1.19	0.52	0.58	0.38		pCi/l
PZ-112-AS DIS_07_09_2013	13-07098-20	07/31/2013 08:17:13	Radium-228	E904.0	1.96	0.75	0.87	1.40	J	pCi/l
PZ-112-AS DIS_07_09_2013	13-07098-20	07/25/2013 16:27:32	Thorium-228	HASL 300, 4.5.2	0.07	0.07	0.08	0.09	U	pCi/l
PZ-112-AS DIS_07_09_2013	13-07098-20	07/25/2013 16:27:32	Thorium-230	HASL 300, 4.5.2	0.13	0.10	0.10	0.10	J	pCi/l
PZ-112-AS DIS_07_09_2013	13-07098-20	07/25/2013 16:27:32	Thorium-232	HASL 300, 4.5.2	-0.04	0.05	0.05	0.17	U	pCi/l
PZ-112-AS DIS_07_09_2013	13-07098-20	07/25/2013 13:24:48	Uranium-234	HASL 300, 4.5.2	0.25	0.18	0.19	0.15	J	pCi/l
PZ-112-AS DIS_07_09_2013	13-07098-20	07/25/2013 13:24:48	Uranium-235	HASL 300, 4.5.2	0.15	0.16	0.16	0.19	U	pCi/l
PZ-112-AS DIS_07_09_2013	13-07098-20	07/25/2013 13:24:48	Uranium-238	HASL 300, 4.5.2	-0.03	0.07	0.07	0.19	U	pCi/l

SECTION V

ANALYTICAL STANDARDS

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

U-8

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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

Description of Solution

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

Radioimpurities: Refer to attached technical data sheet

Radioactive Daughters: Refer to attached technical data sheet

Radionuclide Concentration

(Total U) 0.1228 μCi/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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

ERIC ALLAS
QUALITY CONTROL

29 DECEMBER 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
3017 N. SAN FERNANDO BLVD.
BURBANK, CALIFORNIA 91504
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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

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

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

Radionuclide of Interest	$^{234, 235, 238}U$	Reference Date	1/1/1995 0:00
Parent Solution Conc.	1.7796E+04 dpm/ml		

Chemical Composition of Standard Solution
Uranly Nitrate in 1M HNO_3

Dilution Instructions: **Dilution Solvent Used** 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	4.0000 ml		
Total Activity:	7.1182E+04 dpm	Final Activity Concentration:	7.1182E+01 dpm/ml
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.

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

Isotopic ratios from manufacturer's data sheet

Expiration Date: September 6, 2013

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

QC Approval _____ Date: 9/26/12

Tracer Solution for Environmental Analysis & Disequilibrium Studies

Product Description & Measurement Certificate

Description	Principal radionuclide:	**uranium 232** (U-232)	Product code: **UDP10050**
	Daughter Nuclide:	Th-228	Batch Number: 92/232/67
Measurement	Reference date:		01 March 2000
	Radioactive concentration U-232		6.739E+03 becquerels per gram of solution
	which is equivalent to		1.821E-01 microcuries per gram of solution
	Mass of solution		5.35[illegible] grams
	Volume of solution		5.035 millilitres
	Total activity of U-232		3.61E+04 becquerels
	which is equivalent to		9.76E-01 microcuries

Method of measurement (see reverse of this certificate)

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

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

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

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

Not measured

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

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

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

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

Approved Signatory

Roger Wiltshire

Project Ref. AE2315

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

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

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

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

CURRENT DATE: 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
Certified Activity: 9.760E-01 µCi
Certified Concentration: µCi per gram

Reference Date: 3/1/2000 0:00

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

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

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

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

Reference Date: 3/1/2000 0:00

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

Dilution Instructions:

Dilution Solvent Used: 2M HNO_3

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 2.1670E+01 dpm/ml

NOTES:

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

Expiration Date: December 7, 2013

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

QC Approval _____ Date: 12/13/12

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

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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:	$Th(NO_3)_4$ in 0.1N HNO_3	
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

ISOTOPE PRODUCTS LABORATORIES
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Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

Reference Date: 11/1/1991 0:00

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

Dilution Instructions:

Dilution Solvent Used: 0.1N HNO_3

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 2.2999E+01 dpm/ml

NOTES:

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

Expiration Date: March 4, 2014

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

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

QC Approval _____ Date: 3/21/13

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

CURRENT DATE: 3/4/2013 0:00

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

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

Radionuclide: ^{230}Thorium
Reference Date: 11/1/1991 0:00
Certified Activity: 1.036E+00 µCi
Certified Concentration: µCi per gram

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

Chemical Composition of Standard Solution

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

Dilution Instructions:

Dilution Solvent Used: 0.1N HNO_3

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 2.300E+03 dpm/ml

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

Expiration Date: March 4, 2014

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

QC Approval _____ Date: 3/21/13

Th-8

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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

Description of Solution

a. Mass of solution:	11.9712 g (in a 10 ml flame sealed ampoule)
b. Chemical form:	Th(NO3)4 in water
c. Carrier content:	None added
d. Density:	Approx. 1.21 g/ml @ 20°C.

Radioimpurities: None detected (other than daughters).

Radioactive Daughters

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

Radionuclide Concentration

(Th-232) 0.00779 μCi/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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

Anna U. Khan
QUALITY CONTROL

Nov. 8, 1993
Date Signed

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

CURRENT DATE: 10/9/2012 0:00

SOLUTION REFERENCE #: IPL 435-104-2 SOLUTION #: Th-8

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

Radionuclide: $^{232\&228}Th$ Reference Date: 11/1/1993 0:00
Certified Activity: 9.330E-02 µCi
Certified Concentration: µCi per gram

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

Chemical Composition of Standard Solution
$Th(NO_3)_4$ in H_2O

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

	MP-009	Date	11/9/2012 0:00
Solution Reference #	IPL 435-104-2	Solution #	Th-8b

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

Radionuclide of Interest	$^{228\ \&\ 232}Th$	Reference Date	11/1/1993 0:00
Parent Solution Conc.	2.07E+02 dpm/ml		

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

Dilution Instructions: **Dilution Solvent Used** 1% Nitric Acid

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	500.0000 ml		
Total Activity:	1.0355E+05 dpm	Final Activity Concentration:	1.0355E+02 dpm/ml
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

0039

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

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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: 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

Solution Reference #	IPL 867-54	Date	11/9/2012 0:00
		Solution #	Th-18a

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

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

Reference Date: 1/15/2002 0:00

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

Dilution Instructions:

Dilution Solvent Used: 0.1M HNO_3

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 2.2490E+01 dpm/ml

NOTES:

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

Expiration Date: October 9, 2013

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

QC Approval _____ Date: 11/12/12

Ba-6 (& 6a)

National Institute of Standards & Technology

Certificate

ORIGINAL

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

ORIGINAL

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

Radiological Hazard

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

Chemical Hazard

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

Storage and Handling

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

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

Preparation

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

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

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

QCP-009

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

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

CURRENT DATE: 6/16/2013 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: June 16, 2014

Verified & Approved By _____ Date: 7/1/13

QC Approval _____ Date: 7/2/13

0043

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

QCP-009

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

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

QCP-009-1-A

Solution Reference #: NIST SRM4251C
Date: 6/18/13
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: June 18, 2014

Verified & Approved By _____ Date: 7/1/13

QC Approval _____ Date: 7/2/13

Ra-5

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

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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

Description of Solution

a. Mass of solution:	5.1864 g (in a 5 ml Flame Sealed Ampoule)	
b. Chemical form:	Ra(NO3)2 in 1 N HNO3	
c. Carrier content:	None added	
d. Density:	1.0318	g/ml @ 20°C.

Radioimpurities: None detected(other than daughters)

Radioactive Daughters

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

Radionuclide Concentration

(Ra-226) 0.1929 μCi/g.

Method of Calibration

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

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±3.4%
b. Random uncertainty in assay:	±3.1%
c. Random uncertainty in weighing(s):	±0.2%
d. Total uncertainty at the 99% confidence level:	±4.6%

NIST Traceability

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

Leak Test(s)

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

Notes

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

Ana U. Kuan
QUALITY CONTROL

Feb. 3, 1994
Date Signed

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EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP 009

Rev.8; 11/01/03
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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 # IRL-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
8/9/11

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: 3/11/2013 0:00

SOLUTION REFERENCE #: Analytics 62680-416 | SOLUTION #: Ra-11

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

Radionuclide: ^{228}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 milliliters

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: March 26, 2014

Recertified By _____ Date: 5/30/13

QC Approval _____ Date: 5/30/13

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	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	0.45	96.39%	16.00%	100.00%	3.60%	8.18E+00	2.95E-01	7.89E+00	1.26E+00	U-8a	3.52E+01	3.60E+00	5.16E-01
U-238	0.02	99.85%	15.96%	100.00%	3.60%	7.98E+00	2.87E-01	7.96E+00	1.27E+00	U-8a	3.44E+01	3.60E+00	5.16E-01

Matrix Spike

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

Replicate Sample

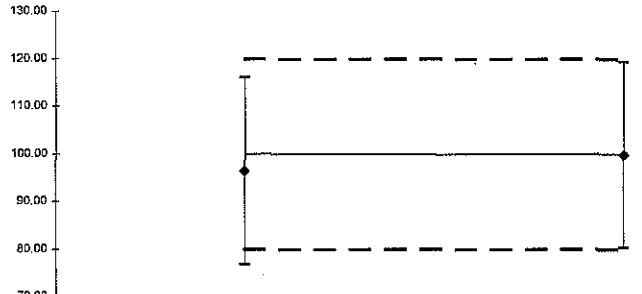
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
U-234	0.25	200.00	0.00E+00	4.37E-01	5.96E-02	1.63E-01
U-238	1.12	118.49	4.44E-01	5.58E-01	1.14E-01	1.59E-01
U-235	1.09	272.04	-3.31E-02	3.87E-01	2.17E-01	2.27E-01

QC Summary

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

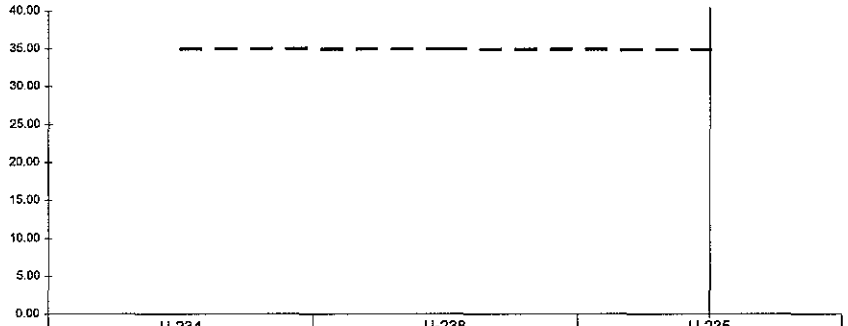
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	UUISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



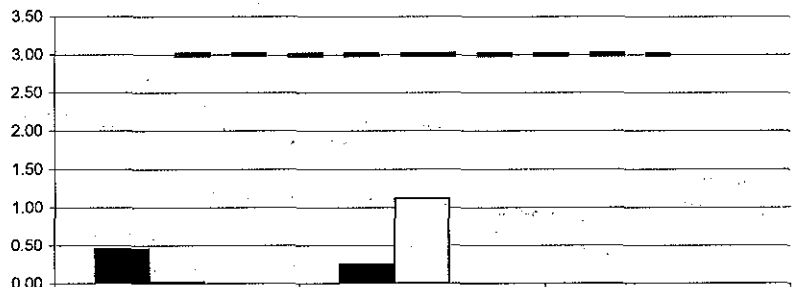
	U-234	U-238
Lower Error	76.79	80.29
Upper Error	115.99	119.40
%R	96.39	99.85
LCL	80	80
Mean	100	100
UCL	120	120

Replicate Sample RPD



	U-234	U-238	U-235
Lower Error	1207.24	194.65	726.73
Upper Error	-807.24	42.34	-182.64
RPD	200.00	118.49	272.04
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
U-234	0.45	0.25	0.00
U-238	0.02	1.12	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	UUISO	2	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	0.41	104.16%	18.82%	100.00%	3.60%	8.02E+00	2.89E-01	8.36E+00	1.57E+00	U-8a	3.52E+01	3.60E+00	5.05E-01
U-238	0.60	94.39%	19.18%	100.00%	3.60%	7.82E+00	2.82E-01	7.38E+00	1.42E+00	U-8a	3.44E+01	3.60E+00	5.05E-01

Matrix Spike

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

Replicate Sample

Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
U-234	1.33	100.96	5.99E-01	5.11E-01	1.97E-01	3.03E-01
U-238	1.53	635.14	1.70E-01	2.90E-01	-8.85E-02	1.61E-01
U-235	0.14	13.93	3.16E-01	4.42E-01	2.75E-01	3.73E-01

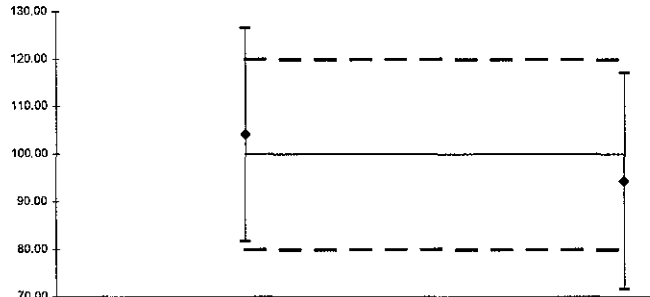
QC Summary

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

Version

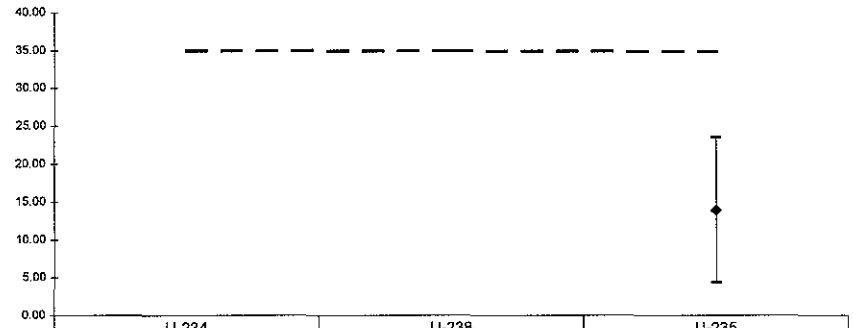
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	UUISO	2	pCi	l	Engineering Management Support, Inc.

LCS % Recovery



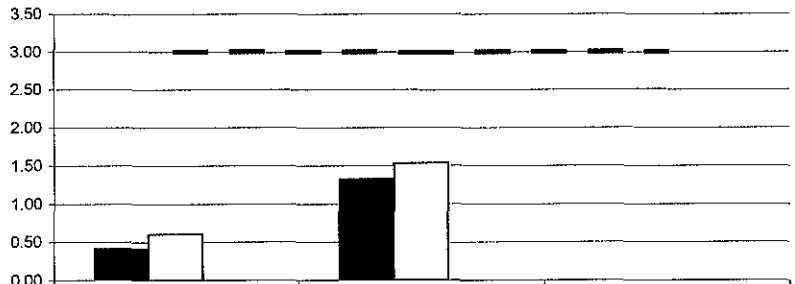
	U-234	U-238
Lower Error	81.74	71.61
Upper Error	126.58	117.18
%R	104.16	94.39
LCL	80	80
Mean	100	100
UCL	120	120

Replicate Sample RPD



	U-234	U-238	U-235
Lower Error	152.58	2394.28	23.54
Upper Error	49.34	-1124.01	4.32
RPD	100.96	635.14	13.93
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
U-234	0.41	1.33	0.00
U-238	0.60	1.53	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	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	0.77	107.78%	18.25%	100.00%	3.60%	4.88E+00	1.76E-01	5.26E+00	9.60E-01	Th-8b	1.04E+02	3.60E+00	1.05E-01
TH-230	0.67	93.56%	20.00%	100.00%	2.70%	5.47E+00	1.48E-01	5.12E+00	1.02E+00	Th-1b	2.35E+01	2.70E+00	5.16E-01
TH-232	0.95	109.61%	17.89%	100.00%	3.60%	4.88E+00	1.76E-01	5.35E+00	9.57E-01	Th-8b	1.04E+02	3.60E+00	1.05E-01

Matrix Spike

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

Replicate Sample

Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
TH-228	0.25	200.00	1.21E-02	6.59E-02	0.00E+00	6.92E-02
TH-230	0.34	31.35	5.65E-02	7.05E-02	7.74E-02	9.99E-02
TH-232	0.56	104.08	1.02E-02	3.13E-02	3.24E-02	7.03E-02

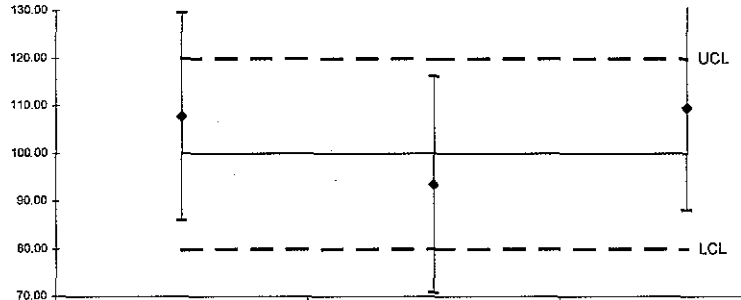
QC Summary

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

Version

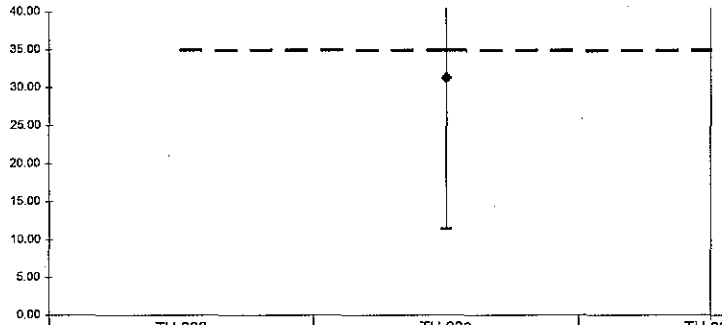
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	ThISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



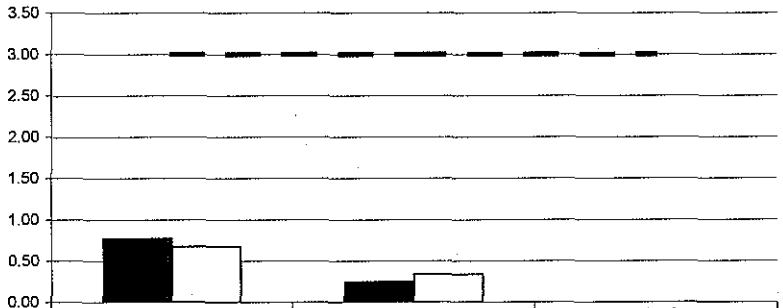
	TH-228	TH-230	TH-232
Lower Error	85.94	70.86	88.12
Upper Error	129.63	116.26	131.09
%R	107.78	93.56	109.61
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	1313.82	51.30	228.19
Upper Error	-913.82	11.40	-20.02
RPD	200.00	31.35	104.08
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	0.77	0.25	0.00
TH-230	0.67	0.34	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	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	0.27	103.42%	24.16%	100.00%	4.60%	1.03E+01	4.74E-01	1.07E+01	2.57E+00	Ra-5b	4.41E+01	4.60E+00	5.19E-01

Matrix Spike

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

Replicate Sample

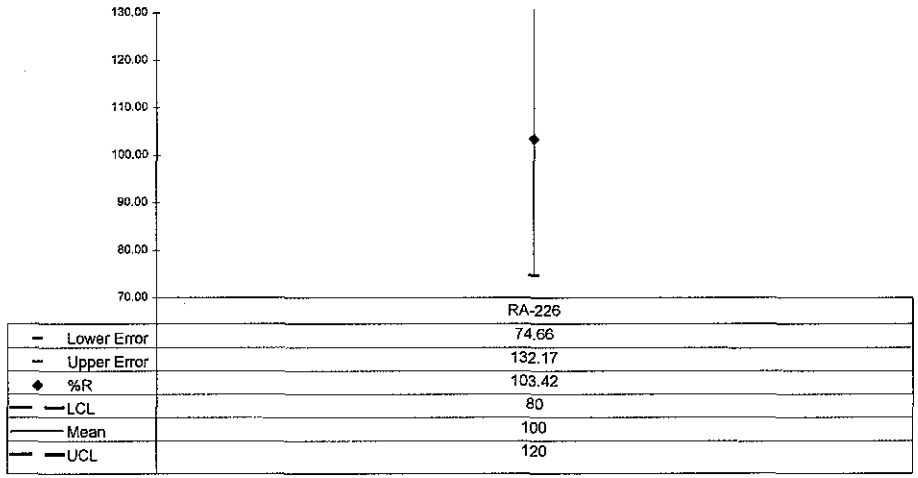
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-226	0.76	23.69	1.37E+00	5.97E-01	1.08E+00	4.53E-01

QC Summary

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

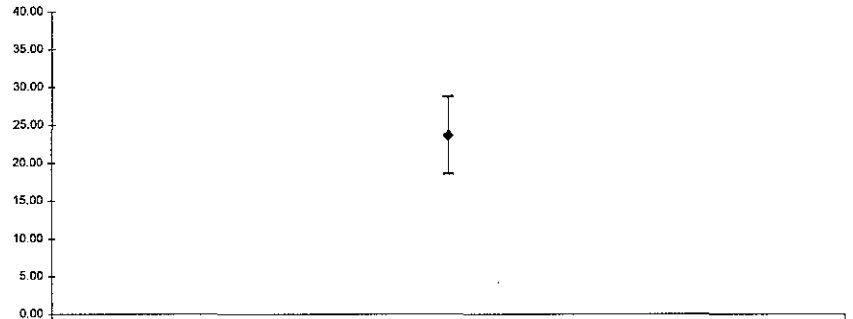
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	Ra226	1	pCi	l	Engineering Management Support, Inc.

LCS % Recovery



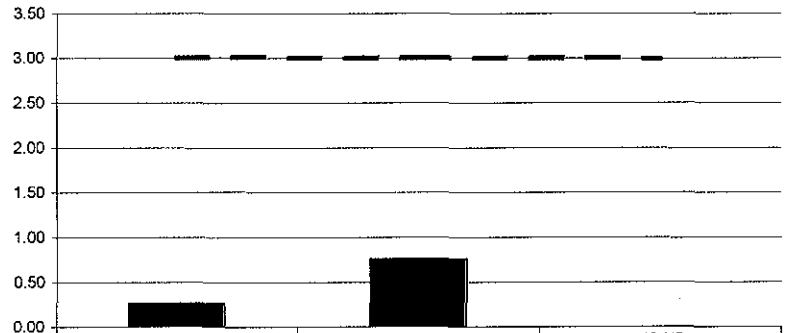
	RA-226
Lower Error	74.66
Upper Error	132.17
%R	103.42
LCL	80
Mean	100
UCL	120

Replicate Sample RPD



	RA-226
Lower Error	28.77
Upper Error	18.61
RPD	23.69
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-226	0.27	0.76	0.00
UCL	3	3	3

No Matrix Spike

Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	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	1.33	119.50%	23.95%	100.00%	5.10%	8.84E+00	4.51E-01	1.06E+01	2.53E+00	Ra-11	3.79E+01	5.10E+00	5.18E-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

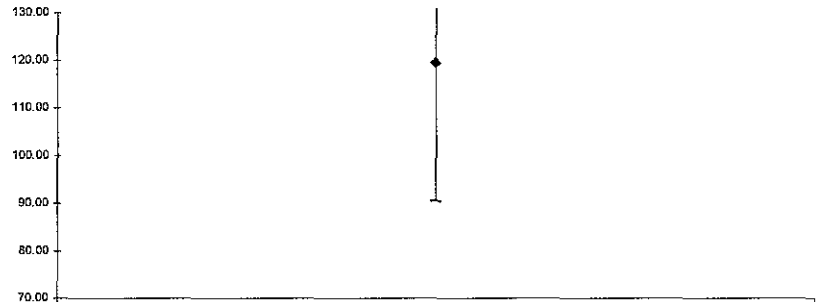
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-228	2.78	53.52	5.20E+00	1.32E+00	3.00E+00	8.11E-01

QC Summary

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

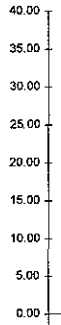
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07098	Ra228	1	pCi	l	Engineering Management Support, Inc.

LCS % Recovery



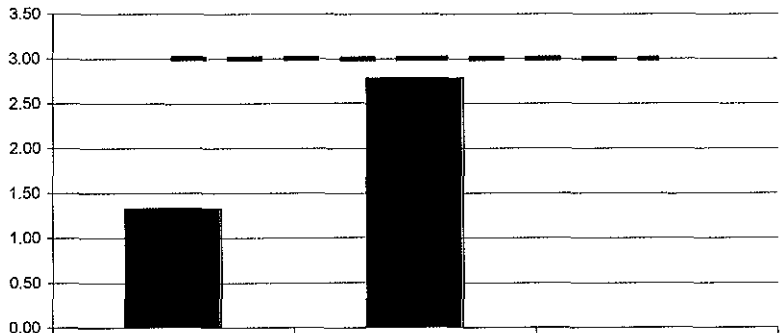
	RA-228
Lower Error	90.45
Upper Error	148.56
%R	119.50
LCL	80
Mean	100
UCL	120

Replicate Sample RPD



	RA-228
Lower Error	60.47
Upper Error	46.58
RPD	53.52
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-228	1.33	2.78	0.00
UCL	3	3	3

No Matrix Spike

Version

SECTION VII

LABORATORY TECHNICIAN'S NOTES

ISO U NOTES
Run 1

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	13-07098
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:47	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN- ADDED HNO3 TO PRESERVE SAMPLES EXCEPT FOR FRACTIONS 5, 8, 13, 14, 17 AND 18- THESE FRACTIONS WERE ALREADY PRESERVED

JWolfe 7/19/13

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	13-07098
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:47	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN- ADDED HNO3 TO PRESERVE SAMPLES EXCEPT FOR FRACTIONS 5, 8, 13, 14, 17 AND 18- THESE FRACTIONS WERE ALREADY PRESERVED
2	07/24/13 17:46	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.

7/24/13

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	13-07098
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:47	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN- ADDED HNO3 TO PRESERVE SAMPLES EXCEPT FOR FRACTIONS 5, 8, 13, 14, 17 AND 18- THESE FRACTIONS WERE ALREADY PRESERVED
2	07/24/13 17:46	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	07/25/13 06:06	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.

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-07098	
Analysis Code	Run
UUISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/19/2013
014076P	Anion Exchange Resin	Reagent Grade	JDEMELAS	7/24/2013
014127S	HCl - HF	6.5N - 0.04N	JDEMELAS	7/24/2013
014101S	Hydrochloric Acid	0.5N	JDEMELAS	7/24/2013
013985S	Hydrochloric Acid	6.5N	JDEMELAS	7/24/2013
014160S	Hydrochloric Acid	8N	JDEMELAS	7/24/2013
013896P	Hydrochloric Acid	Reagent Grade	JDEMELAS	7/24/2013
014175S	HCl - NH4I	8N - 0.1M	JDEMELAS	7/24/2013
014042S	Carbon substrate	Solution	RMARTZ	7/25/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	7/25/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	7/25/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	7/25/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	7/25/2013

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Date	Sample#	Client	Load Time	CT Time	Analysis	Tech
7/25/13	1307116A(1-4,6)	Ulon	1008	2hr	AM241	C
7/25/13	1307116A(1-3)	Ulon	1009	2hr	AM243	C
7/25/13	1307098A (7-14)	Eng. Manag. Ser	1224	2hr 50	UU	KB

[illegible signature]

Date	Sample#	Client	Load time	CT Time	Analysis	Tech
7/18/17	1707091A(4,6,8)	UCOR	0949	2hr	Am241	C
7/18/17	1707091A(1-4,6)	UCOR	0950	2hr	Am241	C
7/18/13	1307091A(2-4,6,8,11)	UCOR	1254	2hr 50min	Pu	KB
7/18/13	1307091A(4,6)	UCOR	1254	2hr 50min	PuNT	KB
~~7/18/13~~	~~1307091A(4,6,8)~~	~~UCOR~~	KB 7/18/13	~~2hr 50mins~~	~~Np~~	~~KB~~
7/18/13	1307091A(1-4,6,8)	UCOR	1615	2hr 50mins	Np	KB
7/19/17	Daily Purge	LAB	[illegible]	1 [illegible]	[illegible]	C
7/19/17	1707079A(4)	Unitech	0847	2hr	Th 230	C
7/19/17	1707081A(1-7)	Weston Sol.	0906	2hr	U U230	C
7/19/17	1707081A(1)	Weston Sol.	0906	2hr	Th 230	C
7/19/17	SECCAL	LAB	1205	2hr	[illegible]	—
7/19/13	Weekly Bkgd	Lab	1544	6hr 40m	αβ	AG
7/22	Daily Purge	LAB	[illegible]	1 [illegible]	[illegible]	—
7/22	1707090A(1-4)	UCOR	0910	2hr	Am241	C
7/22/17	1707080A(1-4)	UCOR	0911	2hr	U U230	C
7/22/17	1707082A(1,2)	Unitech	0913	2hr	U U230	C
7/22/13	1307090A(3-4)	UCOR	1240	2hr 50mins	Th	KB
7/22/13	1307090A(4)	UCOR	1240	2hr 50mins	Th NT	KB
7/22/13	1307088A(1-7)	TBE	1241	2hr 50min	Rad	KB
7/22/13	1307087A(9-18)	TBE	1612	2hr 50min	Rad	KB
7/23	Daily Purge	LAB	[illegible]	1 [illegible]	[illegible]	—
7/24	Daily Purge	LAB	[illegible]	1 [illegible]	[illegible]	—
7/25	Daily Purge	LAB	[illegible]	1 [illegible]	[illegible]	—
7/25/17	1307092A(1-4)	UCOR	1017	2hr	Th230	C
7/25/17	1707098A(1-6)	Eng Man	1013	2hr	U U230	C
7/25/13	1307098A(15-20)	Eng. Manag. Serv.	1724	2hr 50min	U	KB
7/25/13	1307109A(1-4)	UCOR	1725	2hr 50min	Rad	KB

ISO U NOTES
Run 2

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	13-07098
Analysis Code	UUISO
Run Number	2

#	Date	Dept	User	Notes
1	07/29/13 12:24	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN

JWolfe
7/29/13

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	13-07098
Analysis Code	UUISO
Run Number	2

#	Date	Dept	User	Notes
1	07/29/13 12:24	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	07/31/13 16:41	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to ~35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl – 0.1N NH4I, 35 ml of 6.5N HCl – 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.

John DeMelas
7/31/13

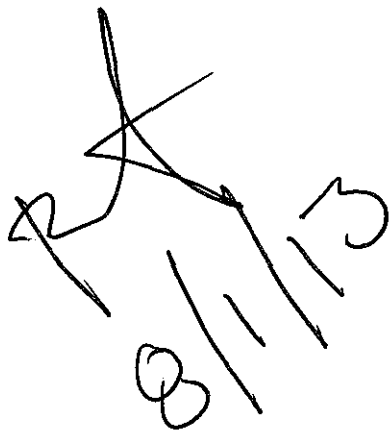
EBERLINE SERVICES

Work Order Analysis Notes

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

Internal Work Order	13-07098
Analysis Code	UUISO
Run Number	2

#	Date	Dept	User	Notes
1	07/29/13 12:24	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	07/31/13 16:41	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	08/01/13 06:14	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.



EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-07098	
Analysis Code	Run
UUISO	2

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014076P	Anion Exchange Resin	Reagent Grade	JDEMELAS	7/31/2013
014142P	Hydrochloric Acid	Reagent Grade	JDEMELAS	7/31/2013
014196S	Hydrochloric Acid	8N	JDEMELAS	7/31/2013
014206S	HCl - NH4l	8N - 0.1M	JDEMELAS	7/31/2013
014204S	HCl - HF	6.5N - 0.04N	JDEMELAS	7/31/2013
014199S	Hydrochloric Acid	6.5N	JDEMELAS	7/31/2013
014142D01	Hydrochloric Acid	0.5N	JDEMELAS	7/31/2013
014042S	Carbon substrate	Solution	RMARTZ	8/1/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	8/1/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	8/1/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	8/1/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	8/1/2013

Alpha #1

Date	Sample #	Client	Load Time	CT Time	Analyst	Tech
7/31/13	1307110A(1-8)	EMS	1829	2hr50mins	Th	[illegible]
8/1/13	Daily Pulse	[illegible]	0528	1 [illegible]	[illegible]	—
8/1/13	1307140A(1-4)	[illegible]	0545	2hr	[illegible]	[illegible]
8/1/13	1307098B(1-3, 6, 11, 12)	[illegible]	0915	2hr	[illegible]	[illegible]
8/1/13	1307111A(1, 2)	[illegible]	0916	2hr	[illegible]	[illegible]

ISO TH NOTES

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Work Order Analysis Notes

Oak Ridge Laboratory
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Oak Ridge, TN 37830
Voice: 865.481.0683
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Internal Work Order	13-07098
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:47	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN- ADDED HNO3 TO PRESERVE SAMPLES EXCEPT FOR FRACTIONS 5, 8, 13, 14, 17 AND 18- THESE FRACTIONS WERE ALREADY PRESERVED

JWolfe 7/19/13

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	13-07098
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:47	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN- ADDED HNO3 TO PRESERVE SAMPLES EXCEPT FOR FRACTIONS 5, 8, 13, 14, 17 AND 18- THESE FRACTIONS WERE ALREADY PRESERVED
2	07/24/13 11:26	CHEM	RMARTZ	PRECONDITIONED RESIN COLUMN WITH 50 ML 8N HNO3 & CENTRIFUGED SAMPLES; ADDED SAMPLES TO COLUMNS; AFTER SAMPLES RAN THROUGH THE COLUMNS, ADDED 40 ML 8N HNO3 & LET RUN THROUGH, & ELUTED SAMPLES WITH 50 ML 8N HCL INTO CLEAN 100 ML BEAKERS. TOOK SAMPLES TO DRYNESS ON HOTPLATE & ADDED 10 ML CONCENTRATED HCL TO SAMPLES; TRANSFERRED SAMPLES INTO C-TUBES WITH D.I. H2O.

7/24/13

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
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Internal Work Order	13-07098
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:47	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED SAMPLES DOWN- ADDED HNO3 TO PRESERVE SAMPLES EXCEPT FOR FRACTIONS 5, 8, 13, 14, 17 AND 18- THESE FRACTIONS WERE ALREADY PRESERVED
2	07/24/13 11:26	CHEM	RMARTZ	PRECONDITIONED RESIN COLUMN WITH 50 ML 8N HNO3 & CENTRIFUGED SAMPLES; ADDED SAMPLES TO COLUMNS; AFTER SAMPLES RAN THROUGH THE COLUMNS, ADDED 40 ML 8N HNO3 & LET RUN THROUGH, & ELUTED SAMPLES WITH 50 ML 8N HCL INTO CLEAN 100 ML BEAKERS. TOOK SAMPLES TO DRYNESS ON HOTPLATE & ADDED 10 ML CONCENTRATED HCL TO SAMPLES; TRANSFERRED SAMPLES INTO C-TUBES WITH D.I. H2O.
3	07/25/13 06:05	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.

7/25/13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-07098	
Analysis Code	Run
ThISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/19/2013
014160S	Hydrochloric Acid	8N	RMARTZ	7/24/2013
014168S	Nitric Acid	8N	RMARTZ	7/24/2013
014076P	Anion Exchange Resin	Reagent Grade	RMARTZ	7/24/2013
014042S	Carbon substrate	Solution	RMARTZ	7/25/2013
014040S	Cerrium Carrier	0.1mg/ml	RMARTZ	7/25/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	7/25/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	7/25/2013

Alpha #1

Date	Sample #	Client	Load Time	CT Time	Analysis	Tech
7/28/13	1307116A(1-4,6)	Ulon	1008	2hr	Am241	c
7/28/13	1307116A(1-3)	Ulon	1009	2hr	Am243	c
7/25/13	1307098A (7-14)	Eng. Manag. Ser	1724	2hr50m	UU	KB
~~7/25/13~~	~~1307099A(13-20)~~	~~Eng. Manag. Serv~~	KB 7/25/13	~~2hr50m~~	~~Th~~	~~KB~~
~~7/25/13~~	~~1307092A(3)~~	~~Ulon~~		~~2hr50m~~	~~UU~~	~~KB~~
7/25/13	1307098A (5-12)	Eng. Manag. Serv.	1626	2hr50m	Th	KB

Alpha #3

Date	Sample #	Client	Load Time	CT Time	Analyst	Tech
7/25/13	1307092ANY(4)	UCON	1011	2hrs	PANT	C
7/25/13	1307092ANY(4)	UCON	1012	2hrs	PANT	C
7/25/13	1307115A(1-3, 10-11)	TEST America	1725	2hr 50min	Rad	KB
7/25/13	1307114A(1-4, 6)	UCON	1725	2hr 50 min	Rad	KB
7/25/13	1307098A (1-4)	Eng. Manag. Serv	1726	2hr 50 min	Th.	KB
~~7/25/13~~	~~1307098A(13-12)~~	~~Eng. Manag. Serv.~~	KB 7/25/13	~~2hr 50 min~~	~~Th~~	~~KB~~
7/25/13	1307098A(13-20)	Eng. Manag. Serv.	1627	2hr 50mins	Th	KB
7/25/13	1307092A (3)	UCON	1628	2hr 50 min	U	KB

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	13-07098
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:45	PREP	JWOLFE	ALIQUOTED AND 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

JWolfe 7/19/13

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	13-07098
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:45	PREP	JWOLFE	ALIQUOTED AND 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	07/19/13 19:27	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	07/23/13 18:23	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.8 IN AP-006 REV 12 FOR RA 226 ANALYSIS-(SYRINGE FILTERED-PRECIP-FILTERED-DRIED-OBTAIN FINAL WEIGHT)-SUBMIT TO COUNT ROOM.

L. Walker
7/23/13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-07098	
Analysis Code	Run
Ra226	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	7/19/2013
013930D01	Ammonium Sulfate	200 mg/ml	JWOLFE	7/19/2013
014007D01	Barium Carrier	1 mg/ml	JWOLFE	7/19/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	7/19/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/19/2013
014140S	EDTA	0.25M	LWALKER	7/19/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	7/23/2013
013575D05	Ammonium Sulfate	200 mg/ml	LWALKER	7/23/2013

Alpha #1

Date	Sample ID	Client	Load Time	Count Time	Analyst	Tech
7/17	Daily Pulse	LAB	0527	10	[illegible]	—
7/17/13	1307091A(1-4,6,8)	Ucor	1649	2hr 50min	Rab	KB
7/18/13	Daily Pulse	LAB	0525	10	[illegible]	—
7/18/13	1307079A(1-4)	Unitech	0948	2hr	Am241	c
7/18/13	1307091A(1-7)	Ucor	0949	2hr	Am241	c
7/18/13	1307091A(1-4,6,8)	UCOR	1255	2hr 50min	UU	KB
7/18/13	1307091A(1)	UCOR	1255	2hr 50min	PU	KB
7/18/13	1307078A(6-11)	Accutest	1614	2hr 50min	Rab	KB
7/19/13	Daily Pulse	LAB	0522	1	[illegible]	—
7/19/13	1307078A(1-4)	Unitech	0544	2hr	NP237	c
7/19/13	1307079A(1-7)	Unitech	0547	2hr	Th230	c
7/19/13	SECCAL	LAB	0904	2hr	[illegible]	—
7/19/13	1307086A(1-7)	TBE	1179	2hr	Th230	—
7/19/13	Weekly Bkgd	Lab	1543	16hr 40m	AB	AG
7/22	Daily Pulse	LAB	0526	10	[illegible]	—
7/22	1307087A(5-7)	TBE	0551	2hr	Th230	c
7/22	1307082A(1-4)	Unitech	0909	2hr	Am241	c
7/22	1307090A(1-4)	Ucor	0910	2hr	Am241	c
7/22/13	1307090A(1-4,7)	UCOR	1239	2hr 50min	PU	KB
7/22/13	1307090A(4)	UCOR	1239	2hr 50min	PUNT	KB
7/22/13	1307090A(1-2)	UCOR	1240	2hr 50min	Th	KB
7/22/13	1307087A(1-8)	TBE	1611	2hr 50min	Rab	KB
7/23	Daily Pulse	LAB	0530	1	[illegible]	—
7/23/13	1307097A(1-5)	ACCESS	0855	2hr	Rab	c
7/23/13	1307092A(1-4)	Ucor	0949	2hr	Am241	c
7/23/13	1307097A(1-4)	Ucor	0949	2hr	Am241	c
7/24	Daily Pulse	LAB	0525	1	[illegible]	—
7/24/13	1307109A(1-4)	Ucor	0853	2hr	Am241	c
7/24/13	1307109A(1-4)	Ucor	0853	2hr	Am243	c
7/24/13	1307109A(1)	Ucor	1242	2hr	NP237	c
7/24/13	1307098A(1-7)	Tony M	1247	2hr	Rab	c

Alpha #1

Date	Sample #	Client	Load Time	Cnt Time	Analysis	Tech
7/18/13	1307091A(8)	UCOR	1254	2hr50min	PUNT	KB
7/18/13	1307091A(1-4,6,8)	UCOR	1257	2hr50min	Th	KB
7/18/13	1307091A(4,6,8)	UCOR	1257	2hr50min	YANT	KB
7/18/13	1307079A(1-5)	Unitech	1600	2hr50mins	PU	KB
7/18/13	1307074B(1-4)	Parsons	1613	5hr35mins	PU	KB
7/18/13	1307091A(4)	UCOR	1619	2hr50min	PU	KB
7/19/13	Daily Pulser	Lab	0722	1min	NA	C
7/19/13	SECCAL	LAB	0744	2hr30min	—	C
7/19/13	1307081A(2-7)	Westonsol.	0907	2hr	Th Zso	C
7/19/13	1307086A(8-13)	TBE	1206	2hr	Th Zso	C
7/19/13	1307087A(1-4)	TBE	1206	2hr	Th Zso	C
7/19/13	Weekly Bkgd	Lab	1545	16HR40min	αβ	AG
7/22/13	Daily Pulser	Lab	0726	1min	—	—
7/22/13	1307087A(13-19)	TBE	0912	2hr	Th Zso	C
7/22/13	1307082A(3,4)	Unitech	0913	2hr	U Zso	C
7/22/13	1307088A(1-7)	TBE	0914	2hr	Th Zso	C
7/22/13	1307082A(1-5)	Unitech	0915	2hr	Pu Zso	C
7/22/13	1307086A(1-13)	TBE	1241	2hr50min	Ra	KB
7/22/13	1307087A(19)	TBE	1612	2hr50min	Ra	KB
7/22/13	1307084A(1-5)	On Line	1615	2hr50min	Ra	KB
7/22/13	1307090A(1-4)	UCOR	1642	2hr50min	Ra	KB
7/22/13	1307092A(1-4)	UCOR	1700	2hr50min	Ra	KB
7/23/13	Daily Pulser	Lab	0730	1min	—	—
7/23/13	1307082A(1-4)	Unitech	0950	2hr	NP237	C
7/23/13	1307090A(1-4)	UCOR	0951	2hr	NP237	C
7/24/13	Daily Pulser	LAB	0725	1min	—	—
7/24/13	1307092A(1-4)	UCOR	0854	2hr	NP237	C
7/24/13	1307069A(1-4)	UCOR	0859	2hr	NP237	C
7/24/13	1307088A(8-20)	EnergySolutions	1247	2hr	Ra	—

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	13-07098
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:45	PREP	JWOLFE	ALIQUOTED AND 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

Jwolfe
7/19/13

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	13-07098
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:45	PREP	JWOLFE	ALIQUOTED AND 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	07/24/13 18:18	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	07/30/13 19:28	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)

L. Walker
7/30/13

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	13-07098
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	07/19/13 08:45	PREP	JWOLFE	ALIQUOTED AND 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	07/24/13 18:18	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	07/30/13 19:28	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)
4	07/31/13 06:31	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)

7.31.13

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-07098	
Analysis Code	Run
Ra228	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	7/19/2013
013930D01	Ammonium Sulfate	200 mg/ml	JWOLFE	7/19/2013
014007D01	Barium Carrier	1 mg/ml	JWOLFE	7/19/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	7/19/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/19/2013
011504D31	Ammonium Sulfide	2%	LWALKER	7/30/2013
014008D01	Lead Carrier	1.5 mg/ml	LWALKER	7/30/2013
014109P	Nitric Acid	Reagent Grade	LWALKER	7/30/2013
014060S	Yttrium Carrier	9 mg/ml	LWALKER	7/30/2013
013065D06	Sodium Hydroxide	10M	LWALKER	7/30/2013
014116S	Ammonium Oxalate	5%	TSMITH	7/31/2013
013910D07	Nitric Acid	1N	TSMITH	7/31/2013
013910D08	Nitric Acid	6N	TSMITH	7/31/2013
013065D06	Sodium Hydroxide	10M	TSMITH	7/31/2013
013065D07	Sodium Hydroxide	18M	TSMITH	7/31/2013

Date	Sample#	Client	Load Time	C/O Time	Misc/Proc	Ini
7/26/13	1307175SR(1-8)	UCBerkeley	1048	2L	SR207	C
7/26/13	1307186SR(2-4)	UCOR	1049	2L	SR207	C
7/26/13	1307019AB(1-4)	Hudson Ranch	1256	2hrs	αβ	KC
7/26/13	1307022AB(1-4)	Hudson Ranch	1257	2hrs	αβ	KC
7/26/13	1307116Pb(1-3)	UCOR	1258	2hrs	Pb^{210}	KC
7/26/13	1307150CL(1-3,5)	UCOR	1510	30mins	CL36	KC
7/26/13	1307158CL(1-3,5)	UCOR	1511	30mins	CL36	KC
7/27/13	WeeklyBkgd	Lab	1017	12hrs	αβ	KC
7/29/13	EFFdc	LAB	0810	70m	αβ	C
7/29/13	BKGDdc	LAB	0847	60m	αβ	
7/29/13	1307085AB(1-3,5-8)	CG Services	0952	1hr	αβ	C
7/29/13	1307085AB(4)	CG Services	1018	1hr	αβ	C
7/30/13	EFFdc	LAB	0516	70m	αβ	C
7/30/13	BKGDdc	LAB	0549	60m	αβ	C
7/30/13	1307150RA(1-4)	UCOR	0801	2L	RAs	C
7/30/13	1307158RA(1-4)	UCOR	0801	2L	RAs	C
7/30/13	1307158Pb(2-4)	UCOR	0846	2L	Pb210	C
7/30/13	1307158NP(1-4)	UCOR	1021	20min	NP237	C
7/30/13	1307128NP(1-4,6)	UCOR	1043	40m	NP237	C
7/30/13	1307090SR(2-4,6)	UCOR	1058	2L	SR90/4	C
7/30/13	1307058SR(2-7)	UCOR	1100	2L	SR90/4	C
7/30/13	1307090SR(1)	UCOR	1103	70m	SR90/4	C
7/30/13	1307160AB(1-3)	CALEnergy	1201	1hr	αβ	KC
7/30/13	1307160AB(4-7)	CALEnergy	1220	2L	αβ	C
7/30/13	1307072AB(1-4)	Hudson	1220	2L	αβ	C
7/30/13	1307081AB(2-4)	Accutest	1330	2L	αβ	C
7/31/13	EFFdc	LAB	0515	70min	αβ	C
7/31/13	BKGDdc	LAB	0552	60min	αβ	C
7/31/13	1307098RA(1-12)	EnergyMan	0819	2L	RAs	C

LBU110 Aqua

Date	Sample #	Client	Load Time	CT Time	Analyst	Check
7/30/13	1307044AB(1-4)	Hudson	1258	1h	LB	c
7/30/13	1307050AB(1)	Accutest	1321	30min	LB	c
7/30/13	1307050AB(2-7)	Accutest	1321	2h	LB	c
7/30/13	1307051AB(1)	Accutest	1351	30mins	LB	KB
7/31/13	Blank	LB	0515	60min	LB	c
7/31/13	EZEAL	LB	0624	30min	LB	c
7/31/13	1307098RA(1-20)	GuyMan	0818	2h	RLB	c
7/31/13	1307093AB(1-3)	Clean Harb	0821	15m	LB	c

SECTION VIII

ANALYTICAL DATA (ISOTOPIC URANIUM)

RUN 1

13-07098
UUISO
Run 1

Work Order	13-07098
Analysis Code	UUISO
Run	1
Date Received	7/15/2013
Lab Deadline	8/6/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	HASL 300, 4.5.2
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	U-232
Radiometric Sol#	U-10a
Tracer Act (dpm/g)	19.051
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/16/13 00:00	1.0000E+00
02	MBL	BLANK		07/16/13 00:00	1.0000E+00
03	DUP	I-4 TOT	44	07/09/13 12:25	1.0000E+00
04	TRG	PZ-111-SD TOT	36	07/09/13 10:42	1.0000E+00
05	TRG	PZ-111-SD DIS	36	07/09/13 10:42	1.0000E+00
06	TRG	S-5 TOT	45	07/09/13 10:50	1.0000E+00
07	TRG	S-5 DIS	45	07/09/13 10:50	1.0000E+00
08	TRG	FB @ PZ-110-SS TOT	43	07/09/13 11:40	1.0000E+00
09	TRG	PZ-110-SS TOT	41	07/09/13 12:13	1.0000E+00
10	TRG	PZ-110-SS DIS	41	07/09/13 12:13	1.0000E+00
11	DO	I-4 TOT	44	07/09/13 12:25	1.0000E+00
12	TRG	I-4 DIS	44	07/09/13 12:25	1.0000E+00
13	TRG	PZ-100-SS TOT	46	07/09/13 13:36	1.0000E+00
14	TRG	PZ-100-SS DIS	46	07/09/13 13:36	1.0000E+00
15	TRG	D-3 TOT	43	07/09/13 13:42	1.0000E+00
16	TRG	D-3 DIS	43	07/09/13 13:42	1.0000E+00
17	TRG	PZ-100-SD TOT	39	07/09/13 14:32	1.0000E+00
18	TRG	PZ-100-SD DIS	39	07/09/13 14:32	1.0000E+00
19	TRG	PZ-112-AS TOT	45	07/09/13 14:46	1.0000E+00
20	TRG	PZ-112-AS DIS	45	07/09/13 14:46	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	0.6105	11.6		0.00								
02	MBL	0.6056	11.5		0.00								
03	DUP	0.6051	11.5		0.00								
04	TRG	0.6040	11.5		0.00								
05	TRG	0.6032	11.5		0.00								
06	TRG	0.6032	11.5		0.00								
07	TRG	0.6031	11.5		0.00								
08	TRG	0.6013	11.5		0.00								
09	TRG	0.6013	11.5		0.00								
10	TRG	0.6008	11.4		0.00								
11	DO	0.6022	11.5		0.00								
12	TRG	0.6016	11.5		0.00								
13	TRG	0.5993	11.4		0.00								
14	TRG	0.6035	11.5		0.00								
15	TRG	0.6015	11.5		0.00								
16	TRG	0.5993	11.4		0.00								
17	TRG	0.5997	11.4		0.00								
18	TRG	0.6004	11.4		0.00								
19	TRG	0.6025	11.5		0.00								
20	TRG	0.6055	11.5		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			07/19/13 09:00	JWOLFE				
02	MBL			07/19/13 09:00	JWOLFE				
03	DUP			07/19/13 09:00	JWOLFE				
04	TRG			07/19/13 09:00	JWOLFE				
05	TRG			07/19/13 09:00	JWOLFE				
06	TRG			07/19/13 09:00	JWOLFE				
07	TRG			07/19/13 09:00	JWOLFE				
08	TRG			07/19/13 09:00	JWOLFE				
09	TRG			07/19/13 09:00	JWOLFE				
10	TRG			07/19/13 09:00	JWOLFE				
11	DO			07/19/13 09:00	JWOLFE				
12	TRG			07/19/13 09:00	JWOLFE				
13	TRG			07/19/13 09:00	JWOLFE				
14	TRG			07/19/13 09:00	JWOLFE				
15	TRG			07/19/13 09:00	JWOLFE				
16	TRG			07/19/13 09:00	JWOLFE				
17	TRG			07/19/13 09:00	JWOLFE				
18	TRG			07/19/13 09:00	JWOLFE				
19	TRG			07/19/13 09:00	JWOLFE				
20	TRG			07/19/13 09:00	JWOLFE				

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

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-07098
Client: Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-234	LCS	LCS	pCi/l	7.89E+00	1.13E+00	1.07E-01	8.18E+00	96.39	OK		OK	
02	U-234	MBL	BLANK	pCi/l	1.29E-01	7.98E-02	5.77E-02					OK	OK
03	U-234	DUP	I-4 TOT	pCi/l	5.96E-02	1.63E-01	3.37E-01				OK	OK	
04	U-234	TRG	PZ-111-SD TOT	pCi/l	3.49E-01	1.40E-01	8.56E-02					OK	
05	U-234	TRG	PZ-111-SD DIS	pCi/l	3.01E-01	1.26E-01	6.08E-02					OK	
06	U-234	TRG	S-5 TOT	pCi/l	2.15E-01	3.84E-01	6.84E-01					OK	
07	U-234	TRG	S-5 DIS	pCi/l	1.72E-01	1.88E-01	2.24E-01					OK	
08	U-234	TRG	FB @ PZ-110-SS TOT	pCi/l	5.43E-02	6.80E-02	1.07E-01					OK	
09	U-234	TRG	PZ-110-SS TOT	pCi/l	1.03E-01	8.82E-02	1.07E-01					OK	
10	U-234	TRG	PZ-110-SS DIS	pCi/l	8.28E-02	8.21E-02	9.67E-02					OK	
11	U-234	DO	I-4 TOT	pCi/l	0.00E+00	4.37E-01	9.45E-01					OK	
12	U-234	TRG	I-4 DIS	pCi/l	3.07E-02	1.99E-01	5.41E-01					OK	
13	U-234	TRG	PZ-100-SS TOT	pCi/l	4.99E+00	7.92E-01	1.24E-01					OK	
14	U-234	TRG	PZ-100-SS DIS	pCi/l	4.82E+00	8.19E-01	1.09E-01					OK	
15	U-234	TRG	D-3 TOT	pCi/l	1.83E-01	1.91E-01	2.39E-01					OK	
16	U-234	TRG	D-3 DIS	pCi/l	1.87E-01	1.80E-01	1.92E-01					OK	
17	U-234	TRG	PZ-100-SD TOT	pCi/l	4.19E-01	1.59E-01	6.76E-02					OK	
18	U-234	TRG	PZ-100-SD DIS	pCi/l	4.36E-01	2.02E-01	1.38E-01					OK	
19	U-234	TRG	PZ-112-AS TOT	pCi/l	1.95E-01	1.47E-01	1.63E-01					OK	
20	U-234	TRG	PZ-112-AS DIS	pCi/l	2.48E-01	1.85E-01	1.55E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07098
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-234	LCS	07/16/13 00:00	1.00E+00	103.24	0.00	0.00			
02	U-234	MBL	07/16/13 00:00	1.00E+00	128.59	0.00	0.00			
03	U-234	DUP	07/09/13 12:25	1.00E+00	33.37	0.00	0.00			
04	U-234	TRG	07/09/13 10:42	1.00E+00	118.22	0.00	0.00			
05	U-234	TRG	07/09/13 10:42	1.00E+00	107.28	0.00	0.00			
06	U-234	TRG	07/09/13 10:50	1.00E+00	17.24	0.00	0.00			
07	U-234	TRG	07/09/13 10:50	1.00E+00	32.43	0.00	0.00			
08	U-234	TRG	07/09/13 11:40	1.00E+00	99.74	0.00	0.00			
09	U-234	TRG	07/09/13 12:13	1.00E+00	86.82	0.00	0.00			
10	U-234	TRG	07/09/13 12:13	1.00E+00	70.23	0.00	0.00			
11	U-234	DO	07/09/13 12:25	1.00E+00	8.47	0.00	0.00			
12	U-234	TRG	07/09/13 12:25	1.00E+00	14.82	0.00	0.00			
13	U-234	TRG	07/09/13 13:36	1.00E+00	94.81	0.00	0.00			
14	U-234	TRG	07/09/13 13:36	1.00E+00	103.57	0.00	0.00			
15	U-234	TRG	07/09/13 13:42	1.00E+00	35.21	0.00	0.00			
16	U-234	TRG	07/09/13 13:42	1.00E+00	39.87	0.00	0.00			
17	U-234	TRG	07/09/13 14:32	1.00E+00	116.47	0.00	0.00			
18	U-234	TRG	07/09/13 14:32	1.00E+00	82.79	0.00	0.00			
19	U-234	TRG	07/09/13 14:46	1.00E+00	67.52	0.00	0.00			
20	U-234	TRG	07/09/13 14:46	1.00E+00	47.93	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07098
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	07/25/13 10:13		A_Spec	Alpha_023	170	5.24 E+02	9.00 E-03	17.1
02	U-234	MBL	07/25/13 10:13		A_Spec	Alpha_024	170	1.07 E+01	2.00 E-03	17.1
03	U-234	DUP	07/25/13 10:13		A_Spec	Alpha_025	170	1.30 E+00	1.00 E-02	17.4
04	U-234	TRG	07/25/13 10:13		A_Spec	Alpha_027	170	2.68 E+01	7.00 E-03	17.3
05	U-234	TRG	07/25/13 10:13		A_Spec	Alpha_029	170	2.37 E+01	2.00 E-03	19.5
06	U-234	TRG	07/25/13 10:13		A_Spec	Alpha_031	170	1.98 E+00	6.00 E-03	14.2
07	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_003	170.02	3.66 E+00	2.00 E-03	17.5
08	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_004	170	3.96 E+00	1.20 E-02	19.4
09	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_010	170	6.64 E+00	8.00 E-03	19.7
10	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_011	170.02	4.49 E+00	3.00 E-03	20.5
11	U-234	DO	07/25/13 13:24		A_Spec	Alpha_012	170.02	1.00 E+00	0.00 E+00	19.9
12	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_013	170.02	3.20 E-01	4.00 E-03	18.7
13	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_014	170	3.29 E+02	1.40 E-02	18.5
14	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_015	170.02	2.78 E+02	6.00 E-03	14.8
15	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_018	170.02	4.32 E+00	4.00 E-03	17.8
16	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_019	170.02	4.66 E+00	2.00 E-03	16.6
17	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_020	170.02	2.97 E+01	2.00 E-03	16.1
18	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_022	170.02	2.08 E+01	7.00 E-03	15.3
19	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_023	170.02	8.47 E+00	9.00 E-03	17.1
20	U-234	TRG	07/25/13 13:24		A_Spec	Alpha_024	170.02	7.66 E+00	2.00 E-03	17.1

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-07098
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	7.96E+00	1.14E+00	6.25E-02	7.98E+00	99.85	OK		OK	
02	U-238	MBL	BLANK	pCi/l	6.19E-02	5.88E-02	7.20E-02					OK	OK
03	U-238	DUP	I-4 TOT	pCi/l	1.14E-01	1.59E-01	2.40E-01				NA	OK	
04	U-238	TRG	PZ-111-SD TOT	pCi/l	2.63E-01	1.20E-01	7.30E-02					OK	
05	U-238	TRG	PZ-111-SD DIS	pCi/l	1.77E-01	9.80E-02	7.59E-02					OK	
06	U-238	TRG	S-5 TOT	pCi/l	2.99E-01	5.49E-01	9.84E-01					OK	
07	U-238	TRG	S-5 DIS	pCi/l	2.87E-01	2.51E-01	2.79E-01					OK	
08	U-238	TRG	FB @ PZ-110-SS TOT	pCi/l	1.32E-01	8.62E-02	6.53E-02					OK	
09	U-238	TRG	PZ-110-SS TOT	pCi/l	1.52E-02	4.48E-02	9.75E-02					OK	
10	U-238	TRG	PZ-110-SS DIS	pCi/l	6.40E-02	7.32E-02	9.63E-02					OK	
11	U-238	DO	I-4 TOT	pCi/l	4.44E-01	5.57E-01	6.55E-01					OK	
12	U-238	TRG	I-4 DIS	pCi/l	-6.49E-02	1.98E-01	5.38E-01					OK	
13	U-238	TRG	PZ-100-SS TOT	pCi/l	2.22E+00	4.43E-01	9.04E-02					OK	
14	U-238	TRG	PZ-100-SS DIS	pCi/l	1.86E+00	4.19E-01	7.21E-02					OK	
15	U-238	TRG	D-3 TOT	pCi/l	9.00E-02	1.73E-01	3.20E-01					OK	
16	U-238	TRG	D-3 DIS	pCi/l	4.00E-02	1.11E-01	2.40E-01					OK	
17	U-238	TRG	PZ-100-SD TOT	pCi/l	3.45E-01	1.44E-01	7.39E-02					OK	
18	U-238	TRG	PZ-100-SD DIS	pCi/l	3.44E-01	1.75E-01	1.09E-01					OK	
19	U-238	TRG	PZ-112-AS TOT	pCi/l	8.77E-02	9.09E-02	9.55E-02					OK	
20	U-238	TRG	PZ-112-AS DIS	pCi/l	-2.74E-02	6.78E-02	1.93E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-07098	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	07/16/13 00:00	1.00E+00	103.24	0.00	0.00			
02	U-238	MBL	07/16/13 00:00	1.00E+00	128.59	0.00	0.00			
03	U-238	DUP	07/09/13 12:25	1.00E+00	33.37	0.00	0.00			
04	U-238	TRG	07/09/13 10:42	1.00E+00	118.22	0.00	0.00			
05	U-238	TRG	07/09/13 10:42	1.00E+00	107.28	0.00	0.00			
06	U-238	TRG	07/09/13 10:50	1.00E+00	17.24	0.00	0.00			
07	U-238	TRG	07/09/13 10:50	1.00E+00	32.43	0.00	0.00			
08	U-238	TRG	07/09/13 11:40	1.00E+00	99.74	0.00	0.00			
09	U-238	TRG	07/09/13 12:13	1.00E+00	86.82	0.00	0.00			
10	U-238	TRG	07/09/13 12:13	1.00E+00	70.23	0.00	0.00			
11	U-238	DO	07/09/13 12:25	1.00E+00	8.47	0.00	0.00			
12	U-238	TRG	07/09/13 12:25	1.00E+00	14.82	0.00	0.00			
13	U-238	TRG	07/09/13 13:36	1.00E+00	94.81	0.00	0.00			
14	U-238	TRG	07/09/13 13:36	1.00E+00	103.57	0.00	0.00			
15	U-238	TRG	07/09/13 13:42	1.00E+00	35.21	0.00	0.00			
16	U-238	TRG	07/09/13 13:42	1.00E+00	39.87	0.00	0.00			
17	U-238	TRG	07/09/13 14:32	1.00E+00	116.47	0.00	0.00			
18	U-238	TRG	07/09/13 14:32	1.00E+00	82.79	0.00	0.00			
19	U-238	TRG	07/09/13 14:46	1.00E+00	67.52	0.00	0.00			
20	U-238	TRG	07/09/13 14:46	1.00E+00	47.93	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07098
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	07/25/13 10:13		A_Spec	Alpha_023	170	5.32 E+02	1.00 E-03	17.1
02	U-238	MBL	07/25/13 10:13		A_Spec	Alpha_024	170	5.15 E+00	5.00 E-03	17.1
03	U-238	DUP	07/25/13 10:13		A_Spec	Alpha_025	170	2.49 E+00	3.00 E-03	17.4
04	U-238	TRG	07/25/13 10:13		A_Spec	Alpha_027	170	2.03 E+01	4.00 E-03	17.3
05	U-238	TRG	07/25/13 10:13		A_Spec	Alpha_029	170	1.40 E+01	0.00 E+00	19.5
06	U-238	TRG	07/25/13 10:13		A_Spec	Alpha_031	170	2.77 E+00	1.90 E-02	14.2
07	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_003	170.02	6.15 E+00	5.00 E-03	17.5
08	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_004	170	9.66 E+00	2.00 E-03	19.4
09	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_010	170	9.80 E-01	6.00 E-03	19.7
10	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_011	170.02	3.49 E+00	3.00 E-03	20.5
11	U-238	DO	07/25/13 13:24		A_Spec	Alpha_012	170.02	2.83 E+00	1.00 E-03	19.9
12	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_013	170.02	-6.80 E-01	4.00 E-03	18.7
13	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_014	170	1.47 E+02	5.00 E-03	18.5
14	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_015	170.02	1.08 E+02	1.00 E-03	14.8
15	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_018	170.02	2.13 E+00	1.10 E-02	17.8
16	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_019	170.02	1.00 E+00	0.00 E+00	16.6
17	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_020	170.02	2.45 E+01	3.00 E-03	16.1
18	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_022	170.02	1.65 E+01	3.00 E-03	15.3
19	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_023	170.02	3.83 E+00	1.00 E-03	17.1
20	U-238	TRG	07/25/13 13:24		A_Spec	Alpha_024	170.02	-8.50 E-01	5.00 E-03	17.1

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-1

Run: 1

Analysis Code: UUISO

Eberline Services Work Order: 13-07098

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	4.95E-01	1.97E-01	8.87E-02					OK	
02	U-235	MBL	BLANK	pCi/l	3.96E-02	5.12E-02	7.12E-02					OK	OK
03	U-235	DUP	I-4 TOT	pCi/l	2.17E-01	2.26E-01	2.36E-01				NA	OK	
04	U-235	TRG	PZ-111-SD TOT	pCi/l	6.38E-02	7.18E-02	1.01E-01					OK	
05	U-235	TRG	PZ-111-SD DIS	pCi/l	5.48E-02	6.25E-02	8.23E-02					OK	
06	U-235	TRG	S-5 TOT	pCi/l	1.11E-01	2.68E-01	5.59E-01					OK	
07	U-235	TRG	S-5 DIS	pCi/l	1.64E-01	2.00E-01	2.41E-01					OK	
08	U-235	TRG	FB @ PZ-110-SS TOT	pCi/l	3.64E-02	5.90E-02	1.01E-01					OK	
09	U-235	TRG	PZ-110-SS TOT	pCi/l	1.05E-01	9.35E-02	1.01E-01					OK	
10	U-235	TRG	PZ-110-SS DIS	pCi/l	1.11E-02	4.65E-02	1.19E-01					OK	
11	U-235	DO	I-4 TOT	pCi/l	-3.31E-02	3.87E-01	8.11E-01					OK	
12	U-235	TRG	I-4 DIS	pCi/l	0.00E+00	3.28E-01	7.09E-01					OK	
13	U-235	TRG	PZ-100-SS TOT	pCi/l	3.99E-01	1.79E-01	1.06E-01					OK	
14	U-235	TRG	PZ-100-SS DIS	pCi/l	2.57E-01	1.54E-01	1.28E-01					OK	
15	U-235	TRG	D-3 TOT	pCi/l	9.58E-02	1.47E-01	2.18E-01					OK	
16	U-235	TRG	D-3 DIS	pCi/l	1.40E-01	1.71E-01	2.07E-01					OK	
17	U-235	TRG	PZ-100-SD TOT	pCi/l	4.94E-02	5.98E-02	7.28E-02					OK	
18	U-235	TRG	PZ-100-SD DIS	pCi/l	3.41E-02	7.38E-02	1.46E-01					OK	
19	U-235	TRG	PZ-112-AS TOT	pCi/l	4.71E-02	8.00E-02	1.36E-01					OK	
20	U-235	TRG	PZ-112-AS DIS	pCi/l	1.46E-01	1.60E-01	1.91E-01					OK	

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Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-07098	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	07/16/13 00:00	1.00E+00	103.24	0.00	0.00			
02	U-235	MBL	07/16/13 00:00	1.00E+00	128.59	0.00	0.00			
03	U-235	DUP	07/09/13 12:25	1.00E+00	33.37	0.00	0.00			
04	U-235	TRG	07/09/13 10:42	1.00E+00	118.22	0.00	0.00			
05	U-235	TRG	07/09/13 10:42	1.00E+00	107.28	0.00	0.00			
06	U-235	TRG	07/09/13 10:50	1.00E+00	17.24	0.00	0.00			
07	U-235	TRG	07/09/13 10:50	1.00E+00	32.43	0.00	0.00			
08	U-235	TRG	07/09/13 11:40	1.00E+00	99.74	0.00	0.00			
09	U-235	TRG	07/09/13 12:13	1.00E+00	86.82	0.00	0.00			
10	U-235	TRG	07/09/13 12:13	1.00E+00	70.23	0.00	0.00			
11	U-235	DO	07/09/13 12:25	1.00E+00	8.47	0.00	0.00			
12	U-235	TRG	07/09/13 12:25	1.00E+00	14.82	0.00	0.00			
13	U-235	TRG	07/09/13 13:36	1.00E+00	94.81	0.00	0.00			
14	U-235	TRG	07/09/13 13:36	1.00E+00	103.57	0.00	0.00			
15	U-235	TRG	07/09/13 13:42	1.00E+00	35.21	0.00	0.00			
16	U-235	TRG	07/09/13 13:42	1.00E+00	39.87	0.00	0.00			
17	U-235	TRG	07/09/13 14:32	1.00E+00	116.47	0.00	0.00			
18	U-235	TRG	07/09/13 14:32	1.00E+00	82.79	0.00	0.00			
19	U-235	TRG	07/09/13 14:46	1.00E+00	67.52	0.00	0.00			
20	U-235	TRG	07/09/13 14:46	1.00E+00	47.93	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-07098	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	07/25/13 10:13		A_Spec	Alpha_023	170	2.67 E+01	2.00 E-03	17.1
02	U-235	MBL	07/25/13 10:13		A_Spec	Alpha_024	170	2.66 E+00	2.00 E-03	17.1
03	U-235	DUP	07/25/13 10:13		A_Spec	Alpha_025	170	3.83 E+00	1.00 E-03	17.4
04	U-235	TRG	07/25/13 10:13		A_Spec	Alpha_027	170	3.98 E+00	6.00 E-03	17.3
05	U-235	TRG	07/25/13 10:13		A_Spec	Alpha_029	170	3.49 E+00	3.00 E-03	19.5
06	U-235	TRG	07/25/13 10:13		A_Spec	Alpha_031	170	8.30 E-01	1.00 E-03	14.2
07	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_003	170.02	2.83 E+00	1.00 E-03	17.5
08	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_004	170	2.15 E+00	5.00 E-03	19.4
09	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_010	170	5.49 E+00	3.00 E-03	19.7
10	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_011	170.02	4.90 E-01	3.00 E-03	20.5
11	U-235	DO	07/25/13 13:24		A_Spec	Alpha_012	170.02	-1.70 E-01	1.00 E-03	19.9
12	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_013	170.02	1.00 E+00	0.00 E+00	18.7
13	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_014	170	2.13 E+01	4.00 E-03	18.5
14	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_015	170.02	1.20 E+01	0.00 E+00	14.8
15	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_018	170.02	1.83 E+00	1.00 E-03	17.8
16	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_019	170.02	2.83 E+00	1.00 E-03	16.6
17	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_020	170.02	2.83 E+00	1.00 E-03	16.1
18	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_022	170.02	1.32 E+00	4.00 E-03	15.3
19	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_023	170.02	1.66 E+00	2.00 E-03	17.1
20	U-235	TRG	07/25/13 13:24		A_Spec	Alpha_024	170.02	3.66 E+00	2.00 E-03	17.1

Count Room Report
Client: Engineering Management Su

13-07098-UUISO-1 (pCi/l) in WA
Tracer ID: U-10a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/16/13 00:00	1.0000	0.6105	11.6306		0.00		
02	MBL	BLANK	07/16/13 00:00	1.0000	0.6056	11.5373		0.00		
03	DUP	I-4 TOT	07/09/13 12:25	1.0000	0.6051	11.5278		0.00		
04	TRG	PZ-111-SD TOT	07/09/13 10:42	1.0000	0.6040	11.5068		0.00		
05	TRG	PZ-111-SD DIS	07/09/13 10:42	1.0000	0.6032	11.4916		0.00		
06	TRG	S-5 TOT	07/09/13 10:50	1.0000	0.6032	11.4916		0.00		
07	TRG	S-5 DIS	07/09/13 10:50	1.0000	0.6031	11.4897		0.00		
08	TRG	FB @ PZ-110-SS TOT	07/09/13 11:40	1.0000	0.6013	11.4554		0.00		
09	TRG	PZ-110-SS TOT	07/09/13 12:13	1.0000	0.6013	11.4554		0.00		
10	TRG	PZ-110-SS DIS	07/09/13 12:13	1.0000	0.6008	11.4458		0.00		
11	DO	I-4 TOT	07/09/13 12:25	1.0000	0.6022	11.4725		0.00		
12	TRG	I-4 DIS	07/09/13 12:25	1.0000	0.6016	11.4611		0.00		
13	TRG	PZ-100-SS TOT	07/09/13 13:36	1.0000	0.5993	11.4173		0.00		
14	TRG	PZ-100-SS DIS	07/09/13 13:36	1.0000	0.6035	11.4973		0.00		
15	TRG	D-3 TOT	07/09/13 13:42	1.0000	0.6015	11.4592		0.00		
16	TRG	D-3 DIS	07/09/13 13:42	1.0000	0.5993	11.4173		0.00		
17	TRG	PZ-100-SD TOT	07/09/13 14:32	1.0000	0.5997	11.4249		0.00		
18	TRG	PZ-100-SD DIS	07/09/13 14:32	1.0000	0.6004	11.4382		0.00		
19	TRG	PZ-112-AS TOT	07/09/13 14:46	1.0000	0.6025	11.4782		0.00		
20	TRG	PZ-112-AS DIS	07/09/13 14:46	1.0000	0.6055	11.5354		0.00		

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-07098	1	UUISO	7/19/2013 8:59	JWOLFE	JW	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
U-234	U-8a	35.240	7/19/2013	0.500	0.5155				8.18	0.295	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	7/19/2013	0.500	0.5155				7.98	0.287	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	19.051	7/19/2013	0.6105	0.6300
02	U-232	U-10a	19.051	7/19/2013	0.6056	0.6300
03	U-232	U-10a	19.051	7/19/2013	0.6051	0.6300
04	U-232	U-10a	19.051	7/19/2013	0.6040	0.6300
05	U-232	U-10a	19.051	7/19/2013	0.6032	0.6300
06	U-232	U-10a	19.051	7/19/2013	0.6032	0.6300
07	U-232	U-10a	19.051	7/19/2013	0.6031	0.6300
08	U-232	U-10a	19.051	7/19/2013	0.6013	0.6300
09	U-232	U-10a	19.051	7/19/2013	0.6013	0.6300
10	U-232	U-10a	19.051	7/19/2013	0.6008	0.6300
11	U-232	U-10a	19.051	7/19/2013	0.6022	0.6300
12	U-232	U-10a	19.051	7/19/2013	0.6016	0.6300
13	U-232	U-10a	19.051	7/19/2013	0.5993	0.6300
14	U-232	U-10a	19.051	7/19/2013	0.6035	0.6300
15	U-232	U-10a	19.051	7/19/2013	0.6015	0.6300
16	U-232	U-10a	19.051	7/19/2013	0.5993	0.6300
17	U-232	U-10a	19.051	7/19/2013	0.5997	0.6300
18	U-232	U-10a	19.051	7/19/2013	0.6004	0.6300
19	U-232	U-10a	19.051	7/19/2013	0.6025	0.6300
20	U-232	U-10a	19.051	7/19/2013	0.6055	0.6300

Balance Printer Tapes

Tracer

0.6105 g
0.6056 g
-0.6051 g
-0.6040 g
-0.6032 g
-0.6032 g
-0.6031 g
-0.6013 g
-0.6013 g
-0.6008 g
-0.6022 g
-0.6016 g
-0.5993 g

-0.6035 g
-0.6015 g

-0.5993 g
-0.5997 g
-0.6004 g
-0.6025 g
-0.6055 g

LCS

0.5155 g

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 7/19/2013 8:49 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07098	1	UUISO	liters	8/6/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	I-4 TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-111-SD TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-111-SD DIS	TRG					1.0000E+00	1.0000E+00				
06	S-5 TOT	TRG					1.0000E+00	1.0000E+00				
07	S-5 DIS	TRG					1.0000E+00	1.0000E+00				
08	FB @ PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
10	PZ-110-SS DIS	TRG					1.0000E+00	1.0000E+00				
11	I-4 TOT	DO					1.0000E+00	1.0000E+00				
12	I-4 DIS	TRG					1.0000E+00	1.0000E+00				
13	PZ-100-SS TOT	TRG					1.0000E+00	1.0000E+00				
14	PZ-100-SS DIS	TRG					1.0000E+00	1.0000E+00				
15	D-3 TOT	TRG					1.0000E+00	1.0000E+00				
16	D-3 DIS	TRG					1.0000E+00	1.0000E+00				
17	PZ-100-SD TOT	TRG					1.0000E+00	1.0000E+00				
18	PZ-100-SD DIS	TRG					1.0000E+00	1.0000E+00				
19	PZ-112-AS TOT	TRG					1.0000E+00	1.0000E+00				
20	PZ-112-AS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: JWolfe Date: 7/19/13

KB 7/25/13

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_023
Chamber Serial Number:
Detector Serial Number: 23
Env. Background: System Bkgd 62759
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/25/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 10:13:39 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: 0.1765 +/- 0.0103
Counting Efficiency: 0.1710 +/- 0.0030 on 7/20/2013 6:18:25 PM
Chem. Recovery Factor: 1.0324 +/- 0.0631

Control Certificate Name: NatU_U-8A
Chem. Recov. of Control: U-238 0.973290 +/- 0.076642
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	5.285	347.00	10.54	0.00	0.00E+000	8.9
U-234		4.743	524.47	8.57	1.53	0.00E+000	46.0
U-235		4.382	26.66	38.24	0.34	0.00E+000	6.2
U-238		4.168	531.83	8.50	0.17	0.00E+000	62.8

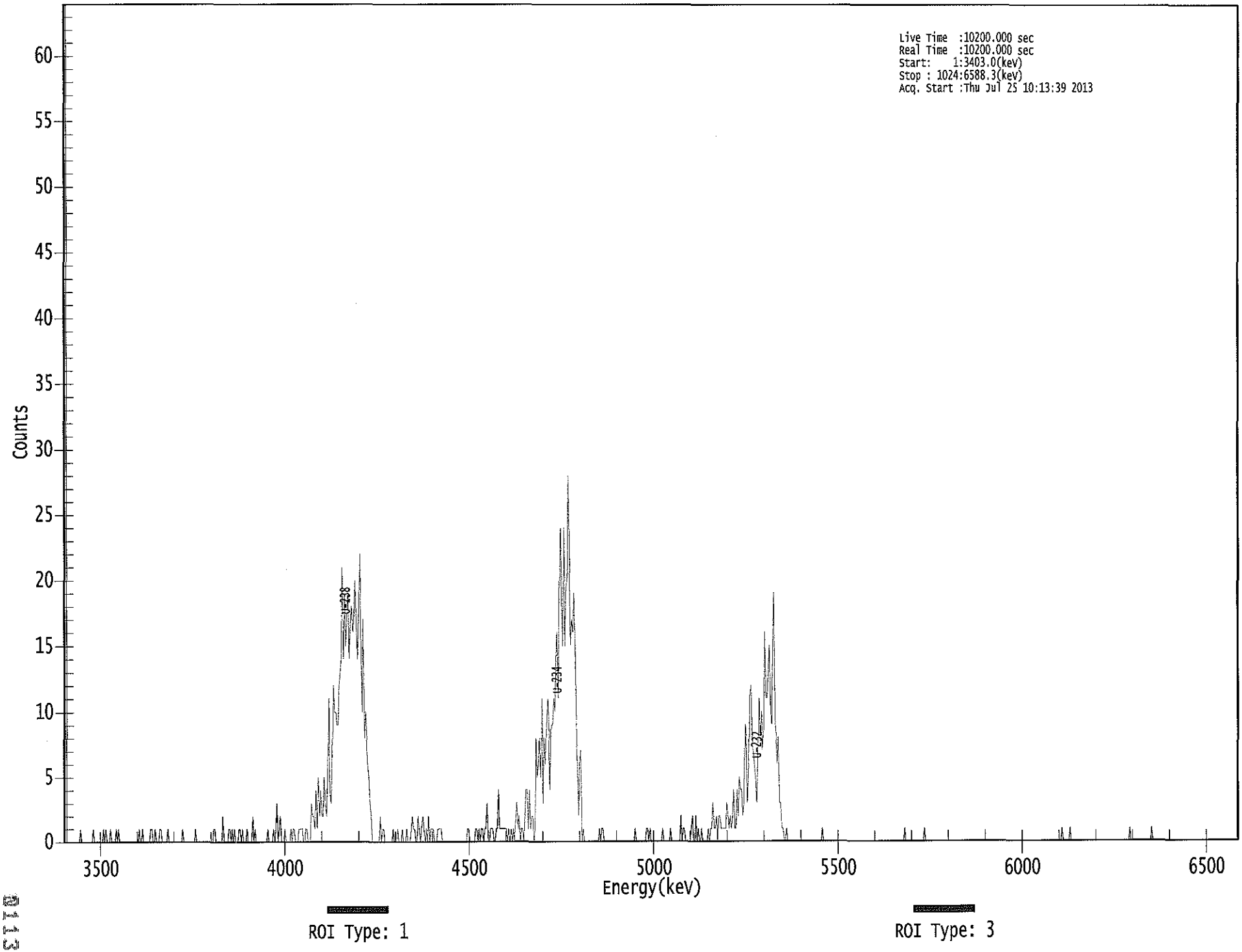
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.22E+000 +/- 5.98E-001	9.02E-002 +/- 1.03E-002
U-234	0.998	4761.50*	7.89E+000 +/- 1.13E+000	1.07E-001 +/- 1.23E-002
U-235	1.000	4385.50*	4.95E-001 +/- 1.97E-001	8.87E-002 +/- 1.02E-002
U-238	0.998	4184.40*	7.96E+000 +/- 1.14E+000	6.25E-002 +/- 7.16E-003

AG
7/26/13

0000063930.CNF



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

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	1	0
17:	0	0	0	0	0	0	0	0
25:	0	1	0	0	0	0	0	0
33:	0	0	1	0	1	0	0	0
41:	1	0	0	0	0	1	0	1
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	1	0	0	1	0	0	0
73:	0	0	0	1	1	0	0	1
81:	0	0	0	1	1	0	0	0
89:	0	0	1	0	0	0	0	0
97:	0	0	0	0	0	0	0	1
105:	0	0	0	0	0	0	0	0
113:	0	0	1	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	1	1	0	0	0	0
137:	0	0	2	0	0	0	0	1
145:	1	0	1	0	1	0	0	0
153:	1	1	0	1	0	0	0	1
161:	0	0	0	0	2	0	1	0
169:	0	0	0	0	0	0	0	0
177:	0	1	0	0	0	0	1	0
185:	1	3	0	1	2	0	0	0
193:	1	0	0	0	0	1	0	1
201:	1	0	0	0	1	1	1	1
209:	0	0	1	1	0	0	0	3
217:	2	2	1	4	1	5	2	4
225:	2	2	5	3	2	5	11	4
233:	3	6	12	10	10	9	9	12
241:	13	14	21	14	19	15	17	19
249:	14	17	18	16	17	20	17	14
257:	17	22	16	10	17	8	10	8
265:	6	5	3	2	0	0	0	0
273:	0	0	0	2	0	1	1	0
281:	0	0	0	0	0	0	1	0
289:	0	0	1	0	0	0	1	0
297:	0	0	1	0	0	0	1	2
305:	1	1	0	0	2	1	0	1
313:	2	1	0	1	0	2	0	1
321:	1	1	0	0	0	1	1	1
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	1
353:	1	0	0	0	0	0	1	1
361:	0	1	0	1	1	0	1	1

369:	3	0	0	1	1	1	0	0

Sample Title: 01

Channel								
377:	1	1	4	1	1	1	1	1
385:	1	1	0	1	0	1	0	1
393:	0	2	3	1	2	0	1	1
401:	0	2	4	4	1	4	1	2
409:	2	0	1	8	5	6	8	5
417:	11	3	8	6	9	11	9	4
425:	9	9	11	10	14	16	11	19
433:	24	19	15	24	15	19	21	28
441:	21	15	17	16	19	15	8	6
449:	2	6	7	0	1	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	1	0	1	1	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	1	0	0	0	0	0	0
505:	0	0	0	1	1	0	1	0
513:	0	0	0	0	0	0	0	0
521:	0	1	0	0	0	0	0	0
529:	1	0	0	0	0	0	0	0
537:	0	2	0	1	1	0	0	0
545:	0	0	1	2	0	0	2	0
553:	1	0	0	1	0	0	0	0
561:	0	1	0	1	1	3	1	1
569:	2	0	2	2	1	1	1	1
577:	1	3	2	1	2	1	2	4
585:	1	1	4	2	5	4	4	2
593:	3	9	8	3	5	11	12	8
601:	7	6	5	3	6	11	8	10
609:	7	9	16	11	11	13	15	10
617:	9	15	19	9	8	6	8	3
625:	3	1	1	0	0	1	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	1	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	1	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 01

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	1	0	0
873:	0	0	0	0	1	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	1	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	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

Apex-Alpha™

KB 7/25/13

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_024
Chamber Serial Number:
Detector Serial Number: 24
Env. Background: System Bkgd 62760
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/25/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 10:13:40 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.606 mL
Effective Efficiency: 0.2199 +/- 0.0118
Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
Chem. Recovery Factor: 1.2859 +/- 0.0730

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.252	428.81	9.48	1.19	0.00E+000	12.1
U-234		4.694	10.66	61.14	0.34	0.00E+000	3.1
U-235		4.404	2.66	128.85	0.34	0.00E+000	3.1
U-238		4.171	5.15	94.34	0.85	0.00E+000	3.1

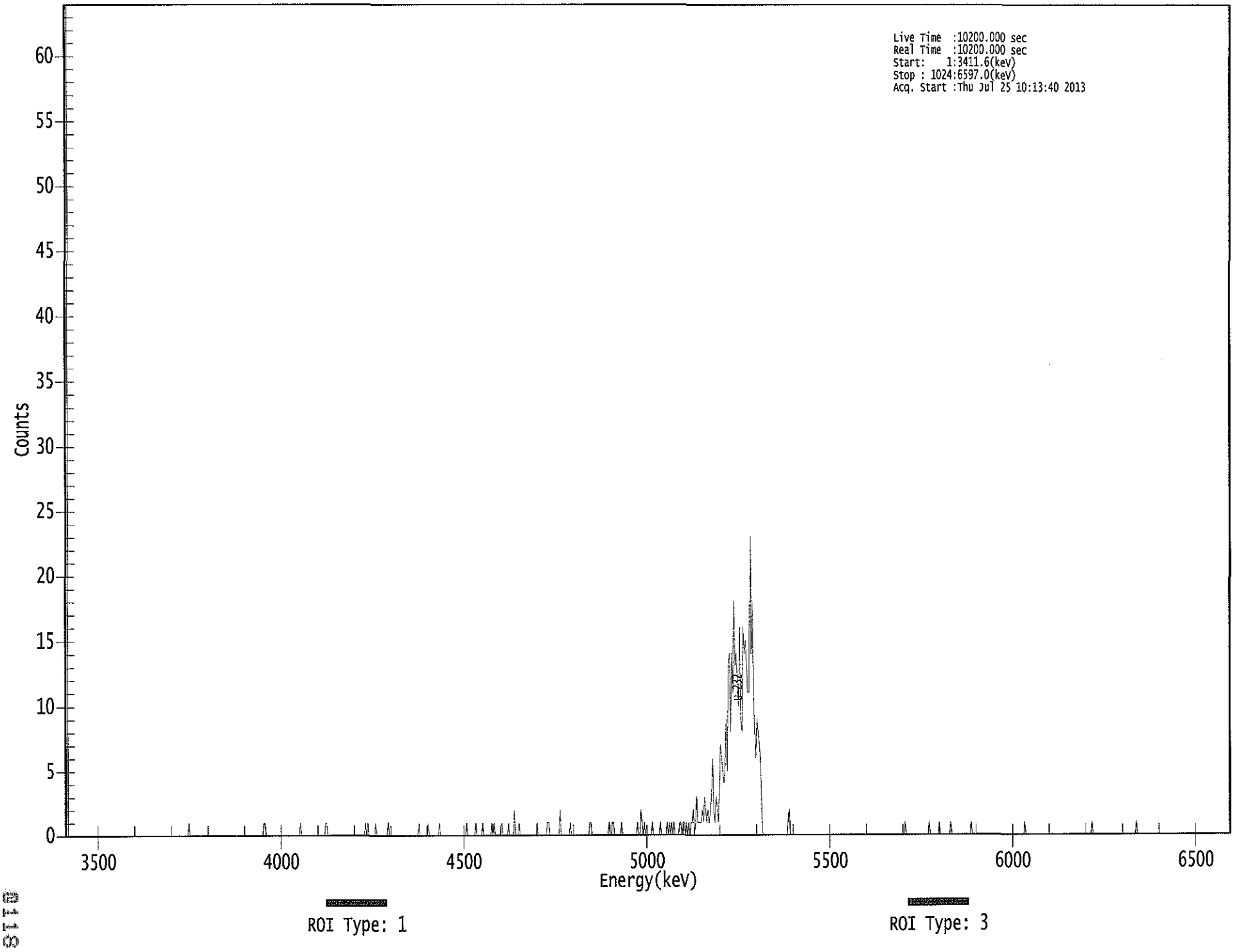
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.982	5302.50*	5.18E+000 +/- 5.43E-001	7.95E-002 +/- 8.35E-003
U-234	0.968	4761.50*	1.29E-001 +/- 7.98E-002	5.77E-002 +/- 6.06E-003
U-235	0.998	4385.50*	3.96E-002 +/- 5.12E-002	7.12E-002 +/- 7.48E-003
U-238	0.999	4184.40*	6.19E-002 +/- 5.88E-002	7.20E-002 +/- 7.56E-003

AG 7/26/13

0000063929.CNF



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

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	1	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	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	1	1
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	1	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	1	1	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	1	0	0	0	0	0	0
273:	1	0	0	0	0	0	0	0
281:	0	0	0	1	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	1	0
313:	0	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
361:	1	0	0	0	0	0	1	0

369:	0	0	0	0	0	0	1	0

Sample Title: 02

Channel								
377:	1	0	0	0	0	0	0	1
385:	0	0	0	0	0	1	0	0
393:	0	0	2	0	0	0	1	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	1	0
417:	0	0	0	0	0	0	0	1
425:	1	0	0	0	0	0	0	0
433:	0	0	2	0	0	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	1	1	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	1	0	0
481:	1	1	0	0	0	0	0	0
489:	1	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	1	0
505:	0	2	1	0	1	0	0	0
513:	0	0	0	1	0	0	0	0
521:	0	0	1	0	0	0	0	0
529:	1	0	1	0	1	0	1	0
537:	0	0	0	1	1	0	1	1
545:	0	1	0	1	0	1	1	2
553:	0	1	3	1	1	1	1	2
561:	1	3	2	1	2	1	2	3
569:	6	2	1	3	2	1	4	7
577:	6	5	4	5	9	5	13	14
585:	8	14	11	18	13	14	12	10
593:	16	9	8	16	14	15	13	11
601:	11	23	14	18	11	8	6	9
609:	8	7	6	2	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	1	2	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	1	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	1	0
761:	0	0	0	0	0	0	0	1
769:	0	0	0	0	0	0	0	0
777:	0	1	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	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	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	1	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	1	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	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

KG 7/25/13

Apex-Alpha™

Sample Description: I-4 TOT-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_025
Chamber Serial Number:
Detector Serial Number: 25
Env. Background: System Bkgd 62761
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 10:13:41 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: 0.0579 +/- 0.0056
Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
Chem. Recovery Factor: 0.3337 +/- 0.0330

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	112.83	18.47	0.17	0.00E+000	4.6
U-234		4.780	1.30	273.42	1.70	0.00E+000	3.1
U-235		4.385	3.83	102.72	0.17	0.00E+000	3.1
U-238		4.119	2.49	138.29	0.51	0.00E+000	3.1

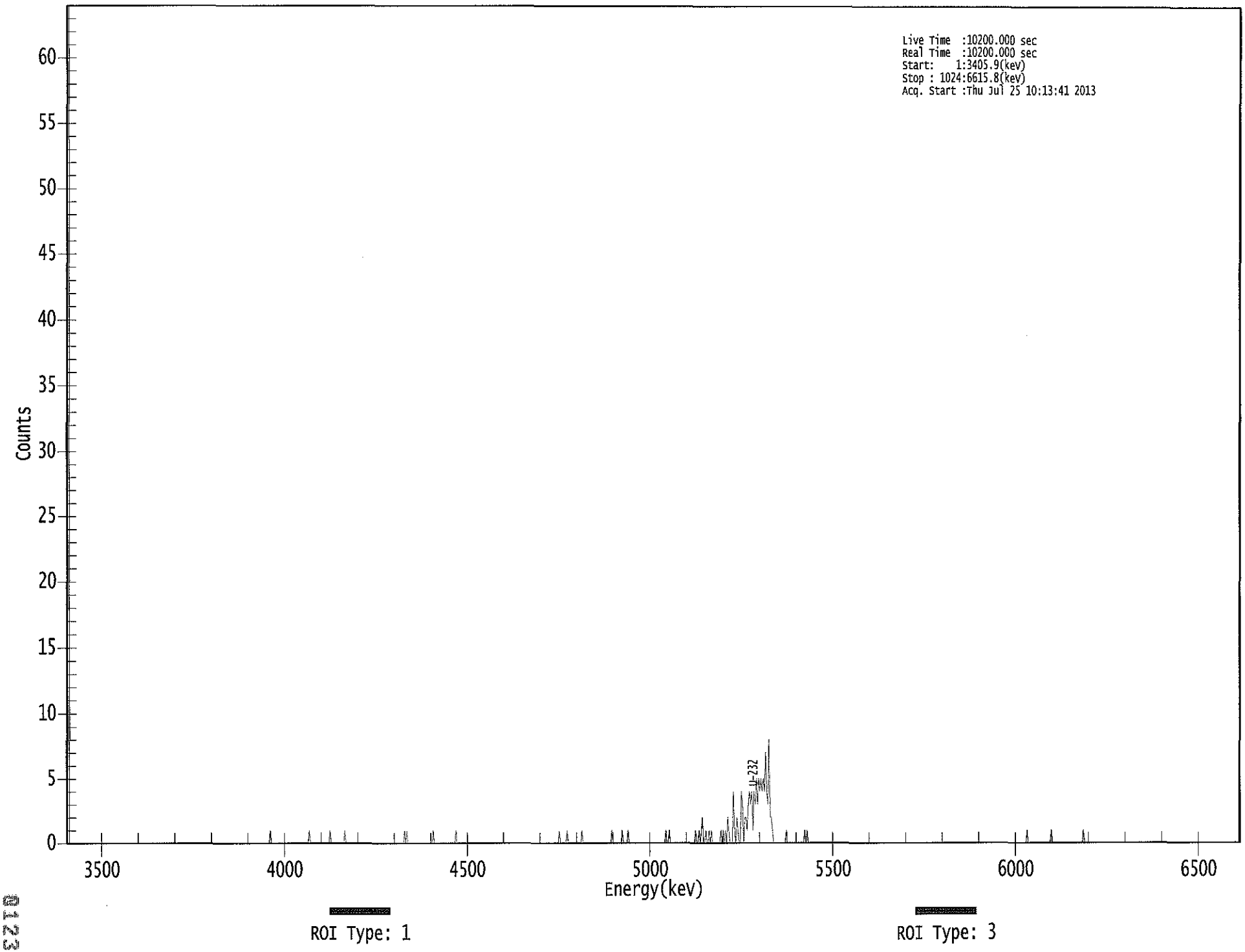
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.17E+000 +/- 9.84E-001	1.91E-001 +/- 3.64E-002
U-234	0.998	4761.50*	5.96E-002 +/- 1.63E-001	3.37E-001 +/- 6.40E-002
U-235	1.000	4385.50*	2.17E-001 +/- 2.26E-001	2.36E-001 +/- 4.49E-002
U-238	0.970	4184.40*	1.14E-001 +/- 1.59E-001	2.40E-001 +/- 4.55E-002

KG 7/26/13

0000063928.CNF



9226

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

Sample Title: 03

Elapsed Live time: 10200
Elapsed Real Time: 10200

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

369:	0	0	0	0	0	0	0	0

Sample Title: 03

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

801:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	1	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	1	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	1	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 7/25/13

Apex-Alpha™

Sample Description: PZ-111-SD TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_027
Chamber Serial Number:
Detector Serial Number: 27
Env. Background: System Bkgd 62762
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 10:13:42 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: 0.2042 +/- 0.0113
Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
Chem. Recovery Factor: 1.1822 +/- 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	5.282	397.15	9.85	0.85	0.00E+000	27.6
U-234		4.723	26.81	38.82	1.19	0.00E+000	4.0
U-235		4.385	3.98	112.01	1.02	0.00E+000	3.2
U-238		4.162	20.32	44.32	0.68	0.00E+000	6.4

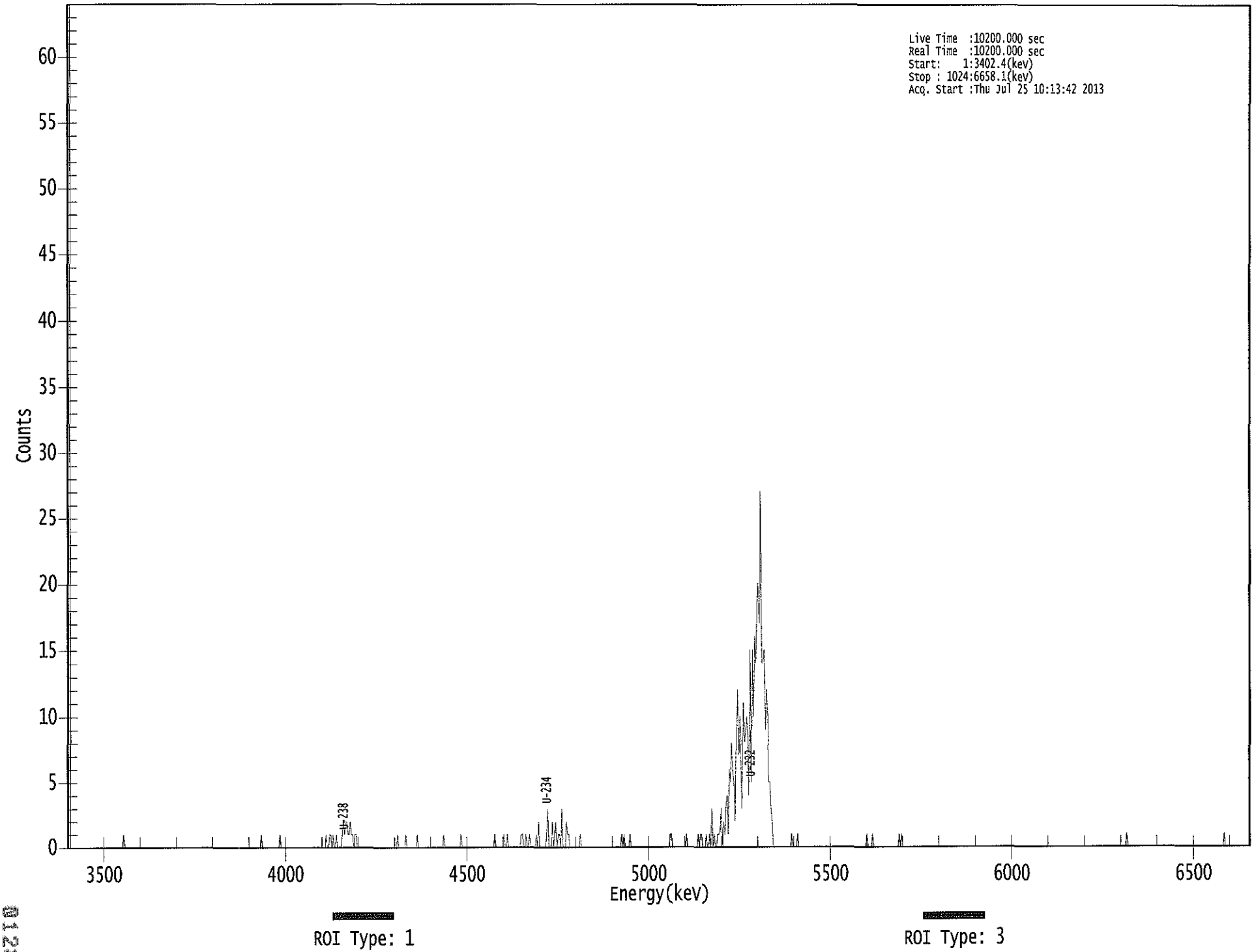
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.17E+000 +/- 5.59E-001	7.79E-002 +/- 8.43E-003
U-234	0.989	4761.50*	3.49E-001 +/- 1.40E-001	8.56E-002 +/- 9.28E-003
U-235	1.000	4385.50*	6.38E-002 +/- 7.18E-002	1.01E-001 +/- 1.09E-002
U-238	0.996	4184.40*	2.63E-001 +/- 1.20E-001	7.30E-002 +/- 7.91E-003

AG
7/26/13

0000063976.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:	1	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	1
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	1
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	1
225:	0	0	1	1	0	1	0	0
233:	1	0	0	0	0	1	2	1
241:	2	2	1	1	2	1	1	0
249:	1	1	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	1	0	0
289:	0	0	0	0	1	0	0	0
297:	0	0	0	0	0	0	1	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	1	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	1	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	1	0	0	0	0	0	0

Sample Title: 04

Channel								
377:	0	1	0	0	1	0	0	0
385:	0	0	0	0	0	0	0	0
393:	1	1	0	0	1	0	0	1
401:	0	0	0	0	0	1	0	2
409:	0	0	0	0	0	0	1	3
417:	0	0	0	2	0	1	2	0
425:	1	1	0	3	0	0	0	2
433:	1	1	0	0	0	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	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	1
481:	0	1	0	0	0	0	1	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	1	1	0	0	0	0	0
529:	0	0	0	0	0	0	0	1
537:	0	0	0	0	0	0	0	0
545:	0	1	0	1	1	0	0	0
553:	1	0	0	1	0	3	0	1
561:	0	0	1	1	1	3	0	2
569:	1	3	4	1	6	5	8	6
577:	5	2	8	12	7	10	7	3
585:	11	8	9	10	8	4	15	5
593:	15	10	16	14	18	20	17	27
601:	14	14	15	9	12	10	5	5
609:	3	2	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	1	0	0	0	0	1
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	1	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	1
721:	0	1	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 04

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

100
7/25/13

Apex-Alpha™

Sample Description: PZ-111-SD DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_029
Chamber Serial Number:
Detector Serial Number: 29
Env. Background: System Bkgd 62763
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 10:13:43 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.603 mL
Effective Efficiency: 0.2087 +/- 0.0114
Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
Chem. Recovery Factor: 1.0728 +/- 0.0620

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	5.285	405.32	9.75	0.68	0.00E+000	37.0
U-234		4.723	23.66	40.63	0.34	0.00E+000	3.1
U-235		4.403	3.49	113.53	0.51	0.00E+000	3.1
U-238		4.155	14.00	54.22	0.00	0.00E+000	4.7

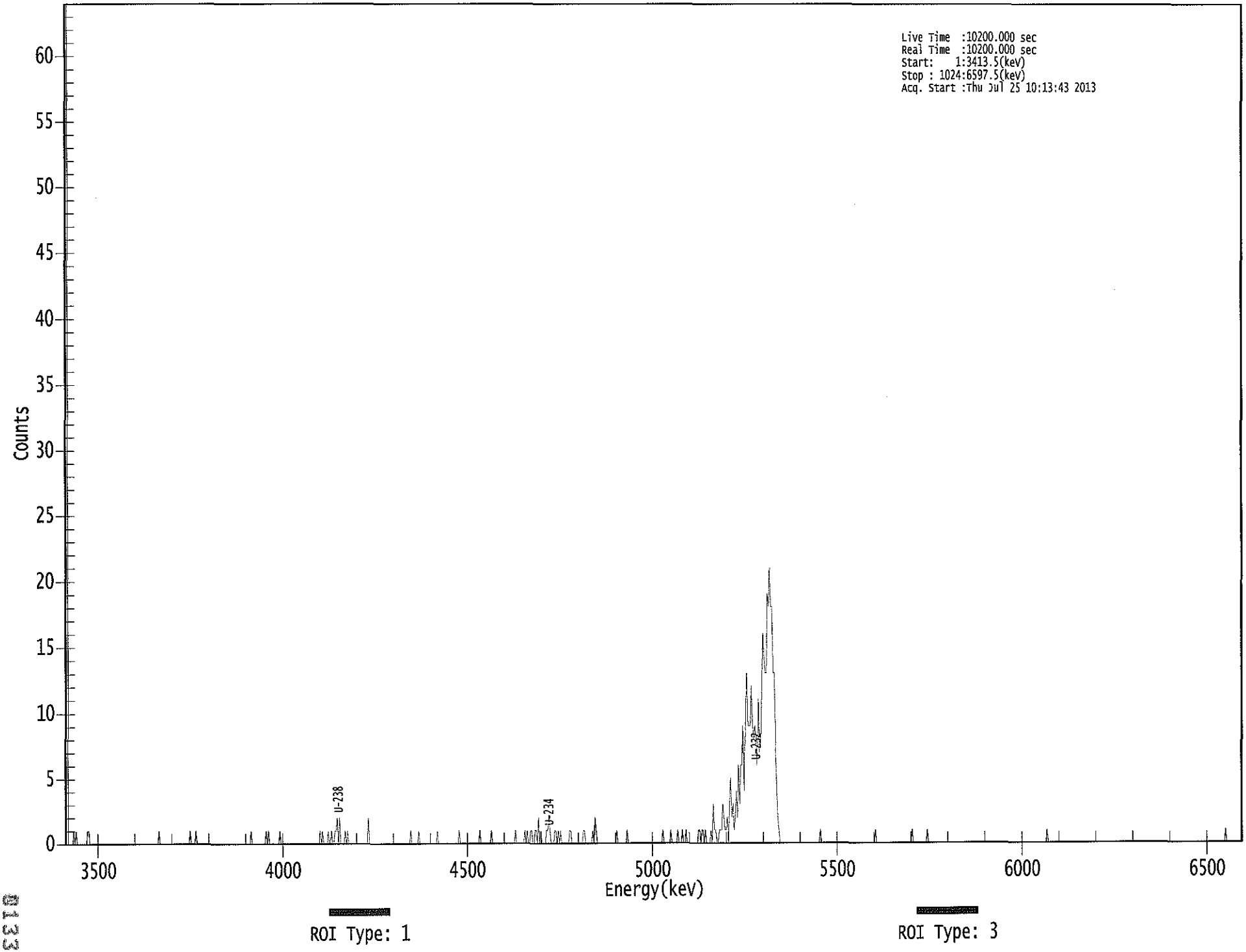
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.16E+000 +/- 5.54E-001	7.18E-002 +/- 7.71E-003
U-234	0.989	4761.50*	3.01E-001 +/- 1.26E-001	6.08E-002 +/- 6.53E-003
U-235	0.998	4385.50*	5.48E-002 +/- 6.25E-002	8.23E-002 +/- 8.84E-003
U-238	0.994	4184.40*	1.77E-001 +/- 9.80E-002	7.59E-002 +/- 8.16E-003

AG
7/26/13

0000063977.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	1
9:	0	1	0	0	0	0	0	0
17:	0	0	0	1	1	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	1	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	1	0	0	0
113:	0	1	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	1	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	0
177:	1	0	0	0	0	0	0	0
185:	0	0	1	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	1	0	1
225:	0	0	0	0	1	0	0	1
233:	0	0	1	1	2	0	2	0
241:	0	0	0	1	0	1	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	2
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	1	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	1	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	1	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	1	0	0	0	0	0	0	0

369:	0	0	1	0	0	0	0	0

Sample Title: 05

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	1
393:	0	0	0	0	0	0	0	1
401:	0	1	0	0	1	1	0	0
409:	1	1	0	2	0	1	0	0
417:	0	0	1	1	2	1	0	0
425:	0	1	1	0	1	0	1	0
433:	0	0	0	0	0	0	1	1
441:	0	0	0	0	0	0	0	0
449:	0	0	1	1	0	0	0	0
457:	0	0	1	0	2	1	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	1
481:	0	0	0	0	0	0	0	0
489:	1	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	1	0
529:	0	0	0	0	1	0	0	0
537:	1	0	0	1	0	0	0	0
545:	0	0	0	0	0	0	1	1
553:	0	1	1	0	1	0	0	0
561:	0	1	0	3	1	1	0	0
569:	1	1	1	3	2	1	1	2
577:	0	3	5	2	3	1	2	4
585:	2	6	3	6	6	9	4	10
593:	13	9	9	9	12	9	8	9
601:	8	6	11	7	8	12	16	14
609:	13	13	19	18	21	18	18	13
617:	13	8	5	2	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:	1	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:	1	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	1	0	0	0	0	0	0	0
745:	0	0	0	0	0	1	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB 7/25/13

Apex-Alpha™

Sample Description: S-5 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 07
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_003
Chamber Serial Number:
Detector Serial Number: 3
Env. Background: System Bkgd 62747
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:25 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.603 mL
Effective Efficiency: 0.0566 +/- 0.0056
Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
Chem. Recovery Factor: 0.3243 +/- 0.0325

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	109.98	18.79	1.02	0.00E+000	4.4
U-234		4.753	3.66	107.88	0.34	0.00E+000	3.0
U-235		4.374	2.83	120.54	0.17	0.00E+000	3.0
U-238		4.158	6.15	85.19	0.85	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	5.16E+000 +/- 9.97E-001	2.95E-001 +/- 5.71E-002
U-234	0.999	4761.50*	1.72E-001 +/- 1.88E-001	2.24E-001 +/- 4.33E-002
U-235	0.999	4385.50*	1.64E-001 +/- 2.00E-001	2.41E-001 +/- 4.66E-002
U-238	0.995	4184.40*	2.87E-001 +/- 2.51E-001	2.79E-001 +/- 5.40E-002

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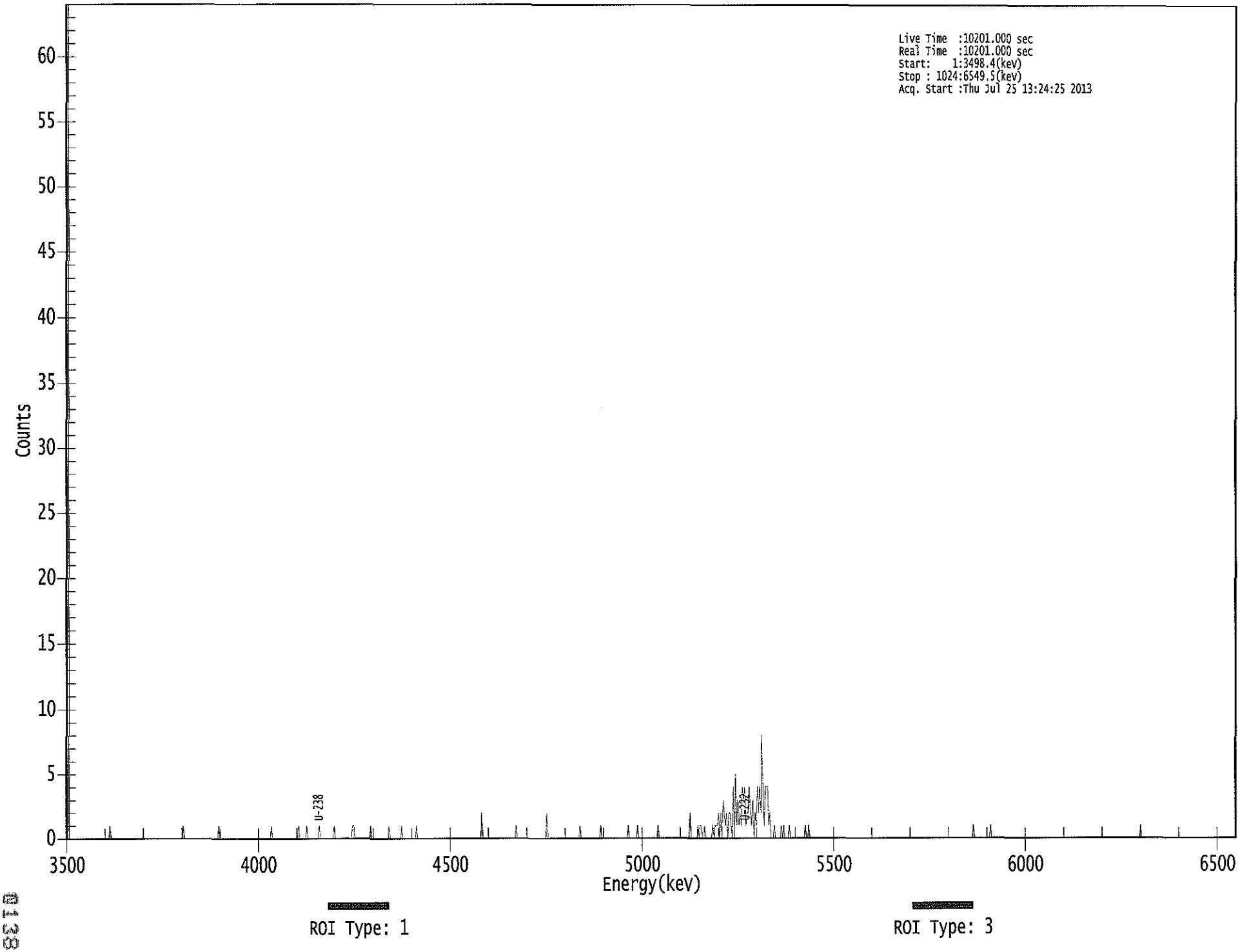
0000063979.CNF



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

Sample Title: 07

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	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	1	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	1	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	1	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	1	0	0	0	0
209:	0	0	1	0	0	0	0	0
217:	0	0	0	0	0	1	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	1	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	1	1	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	1	0	0	0	0	0
289:	0	0	0	0	0	1	0	0
297:	0	0	0	0	0	0	0	0
305:	0	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	0	0	0	0
361:	0	0	0	2	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	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	2	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	1	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	1	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	1	0	0	0	0
497:	0	0	0	1	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	1	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	2	0	0	0	0	0	0
553:	1	0	1	1	0	0	1	0
561:	0	0	0	0	0	1	0	1
569:	1	1	2	0	2	0	3	2
577:	1	2	0	2	2	1	0	4
585:	0	5	1	3	1	2	1	4
593:	3	4	1	2	2	4	2	1
601:	3	0	2	1	4	2	4	2
609:	8	3	1	4	4	4	1	2
617:	0	0	0	1	0	0	0	0
625:	0	1	0	1	0	0	0	0
633:	1	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	1	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	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	1	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
809:	1	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	1	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

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Apex-Alpha™

Sample Description: FB @ PZ-110-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 08
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_004
Chamber Serial Number:
Detector Serial Number: 4
Env. Background: System Bkgd 62748
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:26 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.601 mL
Effective Efficiency: 0.1935 +/- 0.0110
Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
Chem. Recovery Factor: 0.9974 +/- 0.0593

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	374.66	10.13	0.34	0.00E+000	35.7
U-234		4.722	3.96	124.69	2.04	0.00E+000	2.9
U-235		4.408	2.15	161.66	0.85	0.00E+000	2.9
U-238		4.134	9.66	64.35	0.34	0.00E+000	5.9

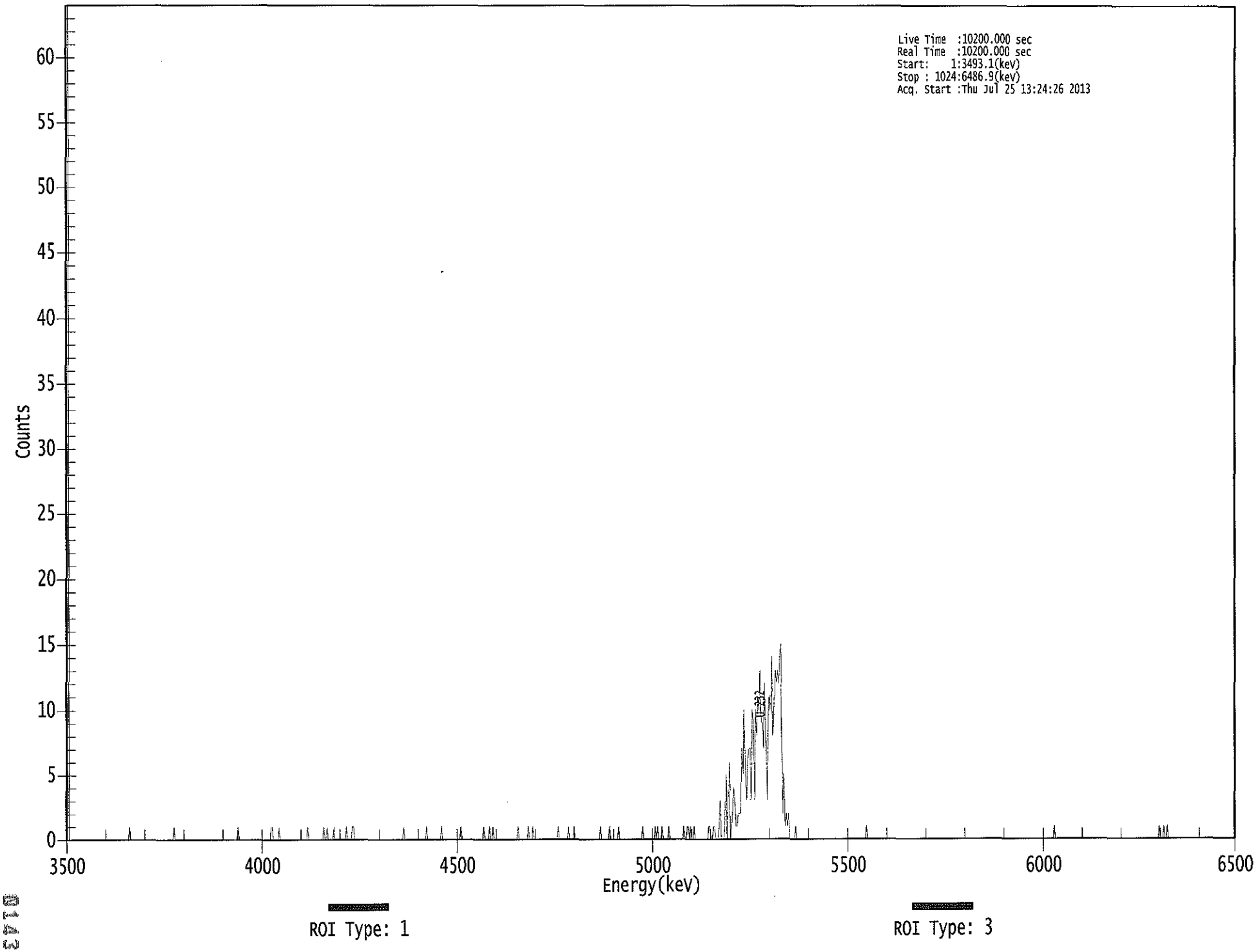
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.14E+000 +/- 5.70E-001	6.56E-002 +/- 7.28E-003
U-234	0.989	4761.50*	5.43E-002 +/- 6.80E-002	1.07E-001 +/- 1.19E-002
U-235	0.996	4385.50*	3.64E-002 +/- 5.90E-002	1.01E-001 +/- 1.12E-002
U-238	0.982	4184.40*	1.32E-001 +/- 8.62E-002	6.53E-002 +/- 7.24E-003

AG
7/26/13

0000063980.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: 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	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	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	1	0
97:	0	0	0	0	0	0	0	0
105:	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	1	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	1	1	0	0	0
185:	0	0	1	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	1	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	0	1	0	0	0
233:	0	0	1	0	0	0	0	0
241:	0	0	0	0	0	1	0	0
249:	0	0	1	1	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	1
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	1	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	1	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	1	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	1	0	0

369:	0	0	1	0	0	1	0	0

Sample Title: 08

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	1	0	0	0	0
401:	0	0	0	0	1	0	0	0
409:	1	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	1	0
433:	0	0	0	0	0	0	0	1
441:	0	0	0	0	1	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	1	0	0	0	0
473:	0	0	0	1	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	1	0	0	0	0	0	0	0
513:	0	0	0	1	0	1	0	0
521:	0	1	0	0	0	0	0	1
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	1	0	0	1
545:	1	0	1	0	0	1	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	1	1	0	0	1	1
569:	0	0	0	1	3	0	0	0
577:	1	5	0	3	6	0	1	2
585:	4	3	1	1	2	2	2	7
593:	5	10	5	3	6	7	7	3
601:	10	9	3	10	8	11	10	13
609:	9	9	7	12	8	3	9	11
617:	10	14	8	9	13	12	13	12
625:	14	15	7	2	5	1	2	1
633:	2	0	0	0	0	0	1	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	1	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: 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:	1	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	1	0	0	0
961:	1	0	0	1	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 7/25/13

Apex-Alpha™

Sample Description: PZ-11-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 09
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_010
Chamber Serial Number:
Detector Serial Number: 10
Env. Background: System Bkgd 62749
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:19 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.601 mL
Effective Efficiency: 0.1708 +/- 0.0102
Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
Chem. Recovery Factor: 0.8682 +/- 0.0542

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	5.278	330.64	10.80	1.36	0.00E+000	11.2
U-234		4.709	6.64	84.69	1.36	0.00E+000	5.9
U-235		4.428	5.49	88.08	0.51	0.00E+000	2.9
U-238		4.081	0.98	294.84	1.02	0.00E+000	5.9

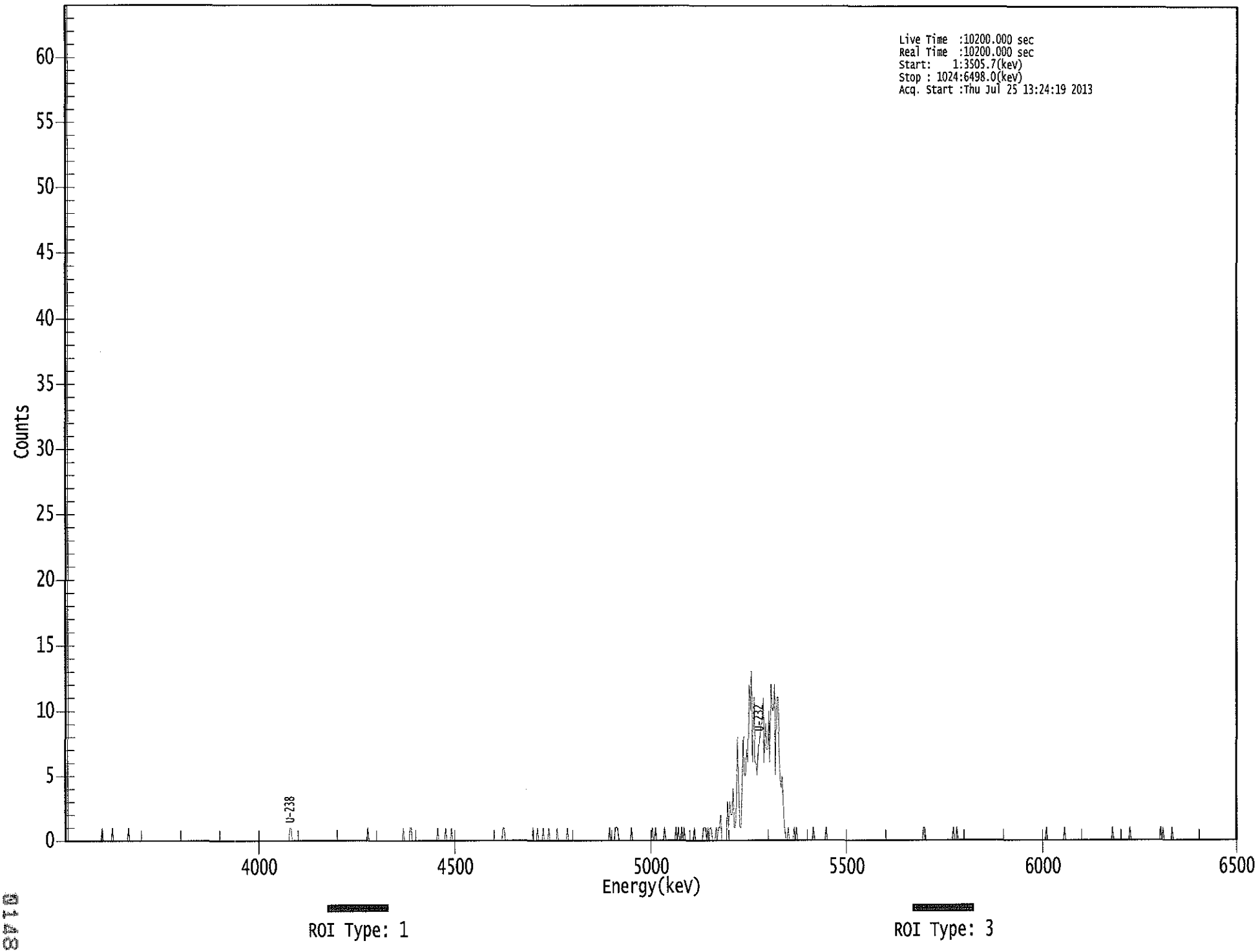
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.14E+000 +/- 6.02E-001	1.07E-001 +/- 1.25E-002
U-234	0.981	4761.50*	1.03E-001 +/- 8.82E-002	1.07E-001 +/- 1.25E-002
U-235	0.987	4385.50*	1.05E-001 +/- 9.35E-002	1.01E-001 +/- 1.18E-002
U-238	0.926	4184.40*	1.52E-002 +/- 4.48E-002	9.75E-002 +/- 1.14E-002

AG
7/26/13

0000063981.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: 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:	1	0	0	0	0	0	0	0
41:	0	1	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	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	1	1	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:	1	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	0	1	1	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	1	0	0
329:	0	0	0	0	1	0	0	0
337:	0	1	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: 09

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

801:	0	0	0	0	0	0	0	0

Sample Title: 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:	1	0	0	0	0	0	0	0
865:	0	0	0	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	1	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	1	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	1	0	1	0
961:	0	0	0	0	0	0	1	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 7/25/13

Apex-Alpha™

Sample Description: PZ-110-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 10
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_011
Chamber Serial Number:
Detector Serial Number: 11
Env. Background: System Bkgd 62750
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:20 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.601 mL
Effective Efficiency: 0.1440 +/- 0.0093
Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
Chem. Recovery Factor: 0.7023 +/- 0.0468

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.275	278.64	11.78	1.36	0.00E+000	6.6
U-234		4.719	4.49	98.45	0.51	0.00E+000	2.6
U-235		4.320	0.49	417.03	0.51	0.00E+000	2.6
U-238		4.163	3.49	113.53	0.51	0.00E+000	2.6

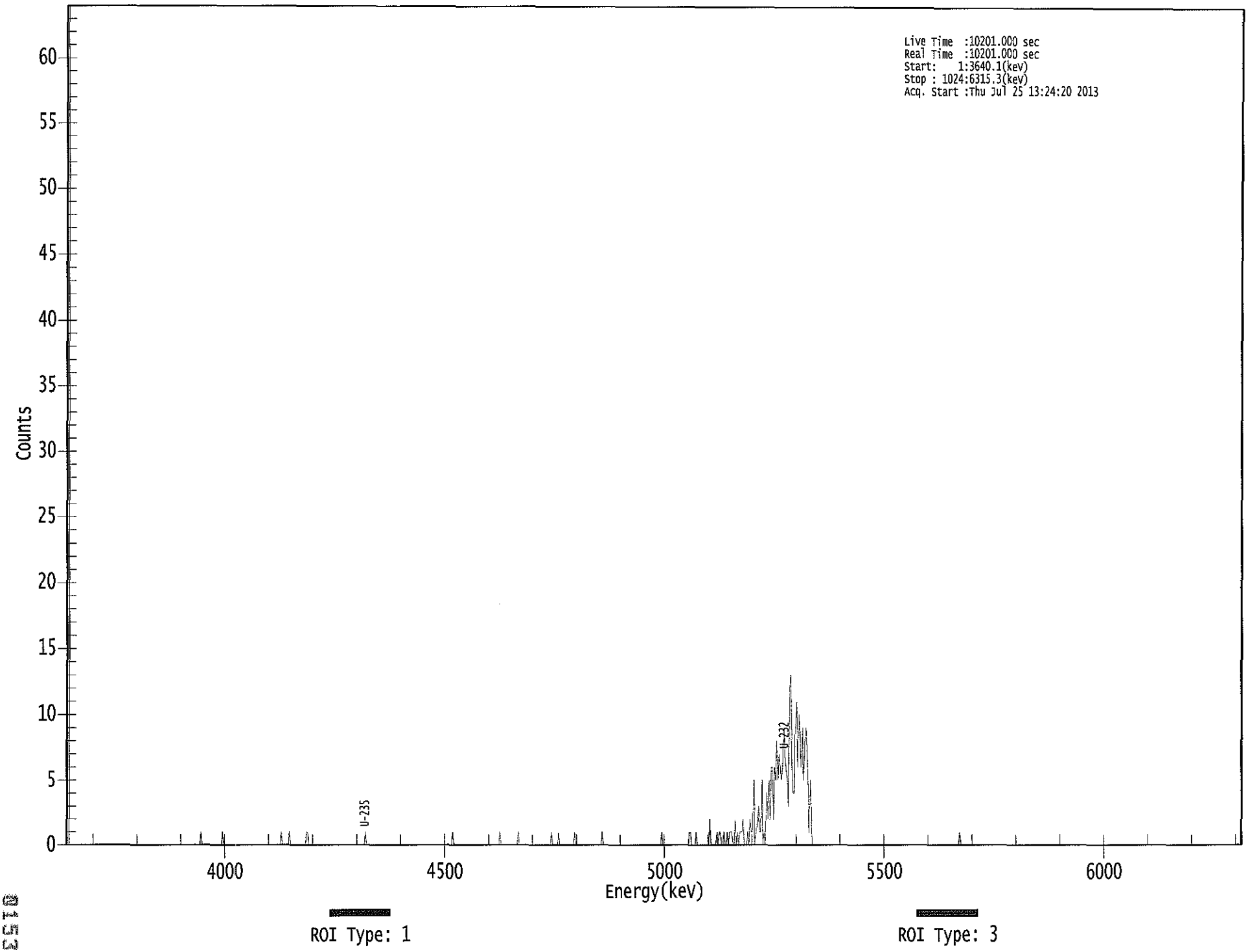
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.14E+000 +/- 6.48E-001	1.26E-001 +/- 1.59E-002
U-234	0.987	4761.50*	8.28E-002 +/- 8.21E-002	9.67E-002 +/- 1.22E-002
U-235	0.970	4385.50*	1.11E-002 +/- 4.65E-002	1.19E-001 +/- 1.50E-002
U-238	0.997	4184.40*	6.40E-002 +/- 7.32E-002	9.63E-002 +/- 1.21E-002

AG
7/26/13

0000063982.CNF



5219

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

Sample Title: 10

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	1	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	1	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	1	0	0	0	0
193:	0	0	1	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	1	1	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	1	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	1	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	1	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	1	0
425:	0	0	0	0	1	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	1	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	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	1	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	1	1
545:	0	0	0	0	1	0	0	0
553:	0	0	0	0	0	0	0	0
561:	2	0	0	0	0	0	1	0
569:	1	1	0	0	1	0	0	1
577:	0	1	1	1	0	0	2	0
585:	1	0	1	1	1	2	0	0
593:	0	1	0	2	1	1	5	0
601:	1	2	3	1	1	5	0	1
609:	0	4	2	5	2	6	6	2
617:	6	5	8	5	7	6	5	6
625:	9	7	6	5	3	12	13	6
633:	4	4	9	11	6	10	8	6
641:	9	5	7	9	8	5	1	5
649:	2	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	1	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 10

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

ICB 7/25/13

Apex-Alpha™

Sample Description: PZ-100-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 13
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_014
Chamber Serial Number:
Detector Serial Number: 14
Env. Background: System Bkgd 62753
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:23 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.599 mL
Effective Efficiency: 0.1750 +/- 0.0104
Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
Chem. Recovery Factor: 0.9481 +/- 0.0588

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	337.64	10.69	1.36	0.00E+000	18.3
U-234		4.734	328.62	10.86	2.38	0.00E+000	6.9
U-235		4.401	21.32	43.23	0.68	0.00E+000	3.7
U-238		4.152	147.15	16.21	0.85	0.00E+000	4.8

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.13E+000 +/- 5.95E-001	1.04E-001 +/- 1.21E-002
U-234	0.994	4761.50*	4.99E+000 +/- 7.92E-001	1.24E-001 +/- 1.44E-002
U-235	0.998	4385.50*	3.99E-001 +/- 1.79E-001	1.06E-001 +/- 1.23E-002
U-238	0.992	4184.40*	2.22E+000 +/- 4.43E-001	9.04E-002 +/- 1.05E-002

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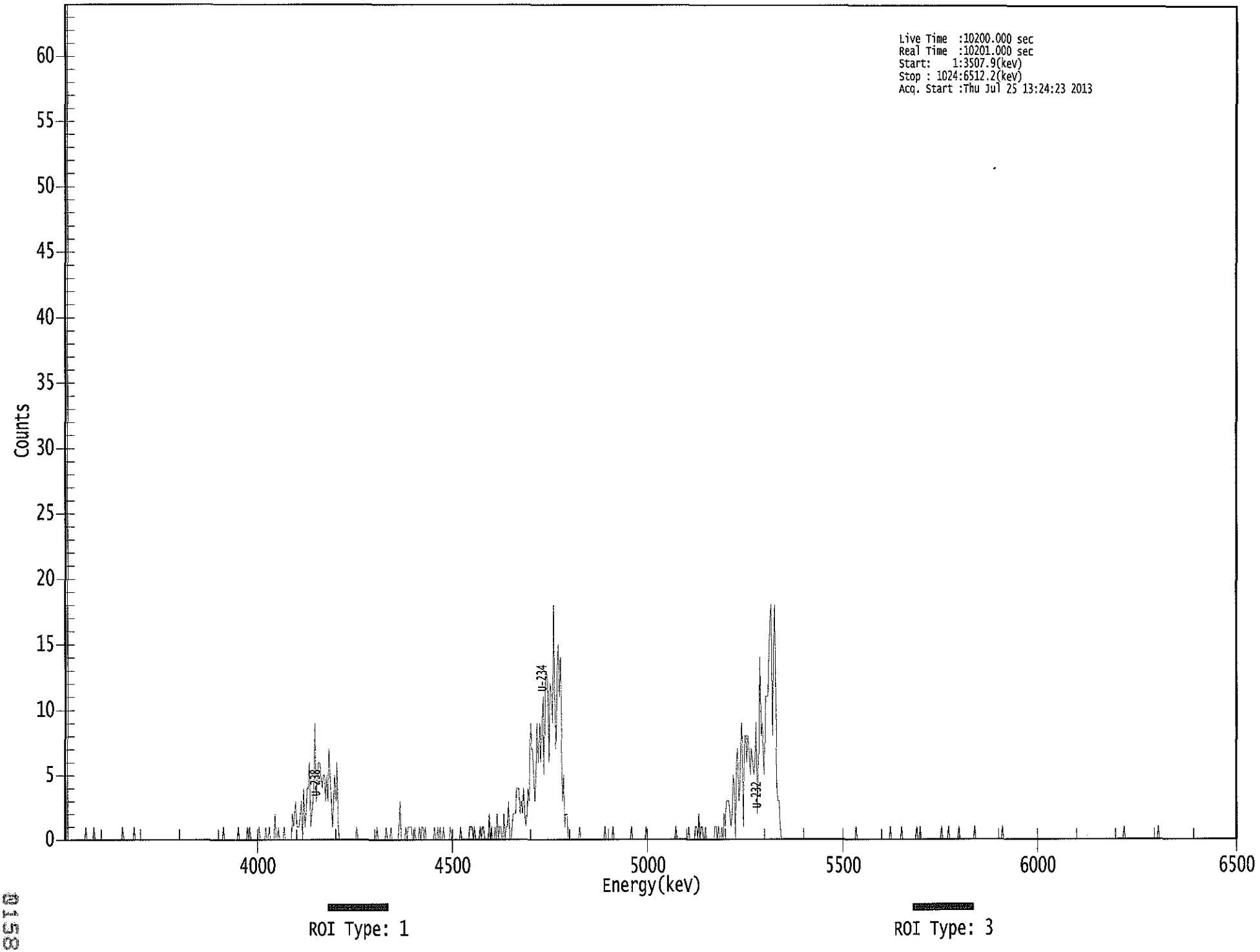

8516

****
***** 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: 10201

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

369:	0	0	2	0	1	0	0	1

Sample Title: 13

Channel								
377:	0	2	0	1	1	0	0	2
385:	0	1	1	3	0	0	1	2
393:	2	2	4	4	4	2	3	2
401:	4	2	1	2	4	3	9	7
409:	7	5	3	5	9	6	9	6
417:	9	11	5	12	13	12	6	12
425:	11	9	18	10	7	13	15	11
433:	14	8	3	5	1	2	2	0
441:	0	0	0	0	0	0	0	0
449:	0	1	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	1
473:	0	0	0	0	0	0	1	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	1	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	1	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	1	0	0
537:	0	0	0	0	0	0	0	0
545:	1	0	0	0	0	0	1	1
553:	0	2	0	1	1	0	0	1
561:	0	0	0	0	0	0	0	1
569:	1	0	1	0	0	1	0	2
577:	1	3	3	3	2	1	2	5
585:	4	0	6	7	3	4	9	7
593:	1	8	8	6	8	7	5	7
601:	6	5	6	9	2	7	14	8
609:	9	7	5	11	11	11	14	17
617:	18	8	14	18	11	4	3	3
625:	1	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	1	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	0	0	0	0	0	0
729:	0	0	1	0	0	0	0	0
737:	0	0	0	0	0	0	0	1
745:	0	0	1	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	1	0	0
769:	0	0	0	1	0	0	0	0
777:	0	0	0	0	1	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	1	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 13

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	1	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	1	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	1	0	0	0	0	0
961:	0	0	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™

JCB 7/25/13

Sample Description: PZ-100-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 14
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_015
Chamber Serial Number:
Detector Serial Number: 15
Env. Background: System Bkgd 62754
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:24 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.604 mL
Effective Efficiency: 0.1530 +/- 0.0096
Counting Efficiency: 0.1477 +/- 0.0027 on 7/20/2013 6:27:27 PM
Chem. Recovery Factor: 1.0357 +/- 0.0673

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	5.285	297.32	11.38	0.68	0.00E+000	5.5
U-234		4.739	277.98	11.78	1.02	0.00E+000	15.6
U-235		4.367	12.00	58.89	0.00	0.00E+000	3.0
U-238		4.159	107.83	18.89	0.17	0.00E+000	4.9

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*	5.16E+000 +/- 6.32E-001	9.79E-002 +/- 1.20E-002
U-234	0.997	4761.50*	4.82E+000 +/- 8.19E-001	1.09E-001 +/- 1.34E-002
U-235	0.998	4385.50*	2.57E-001 +/- 1.54E-001	1.28E-001 +/- 1.57E-002
U-238	0.995	4184.40*	1.86E+000 +/- 4.19E-001	7.21E-002 +/- 8.83E-003

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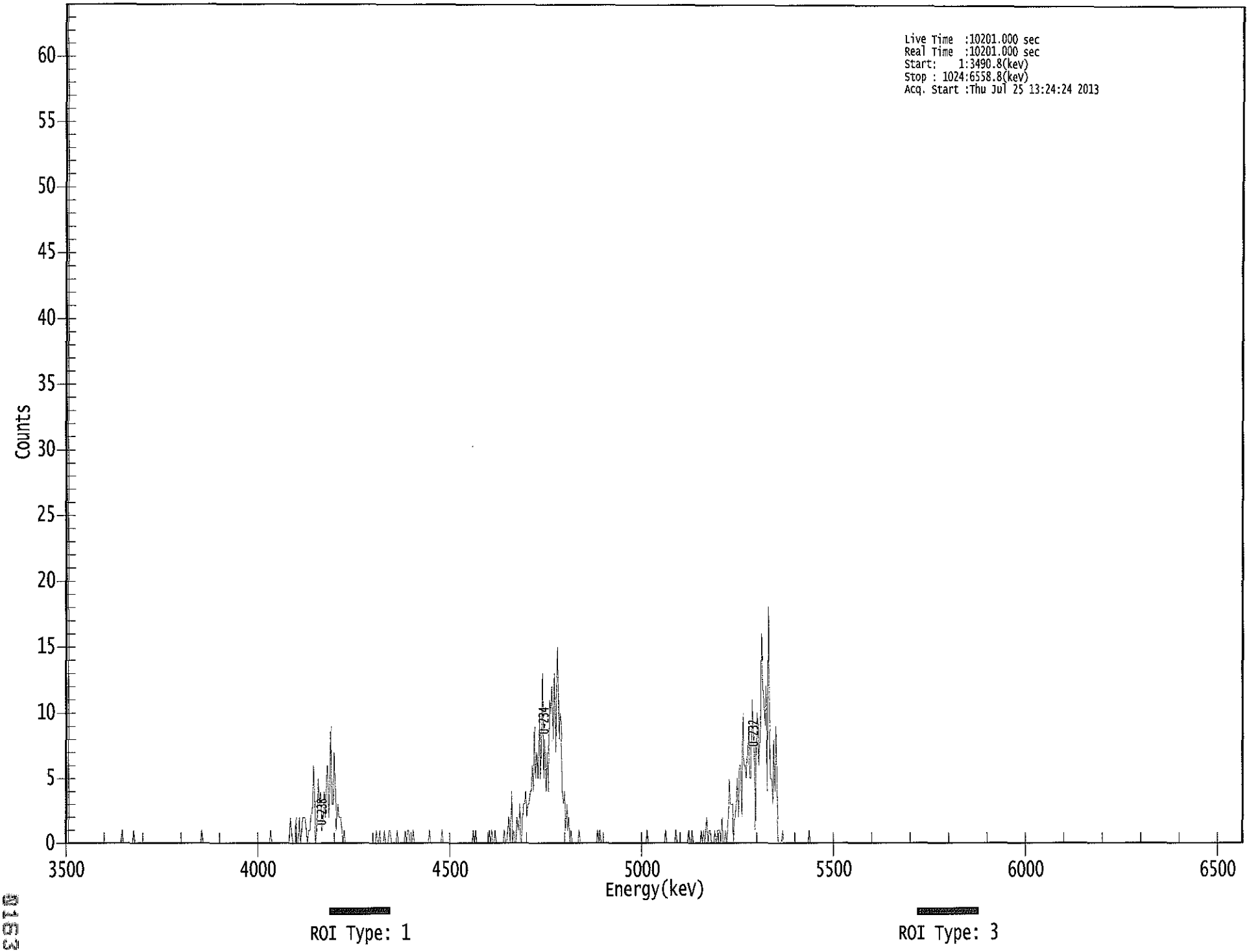


****
***** S P E C T R A L D A T A R E P O R T *****
****

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	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	1	0	0	0	0	0	0
57:	0	0	0	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:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	1	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	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	2	1	0	0	0
201:	2	0	0	2	0	1	2	2
209:	2	1	0	1	1	2	3	6
217:	3	0	1	5	3	4	1	1
225:	4	2	5	6	2	4	9	3
233:	3	7	4	1	3	2	2	2
241:	1	0	1	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	1	0
273:	0	1	0	0	0	1	0	0
281:	0	1	1	0	0	0	0	0
289:	1	0	0	0	0	0	0	1
297:	0	1	1	0	0	0	1	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	1	0	0	0
321:	0	0	0	0	0	0	0	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	0
353:	0	0	1	0	1	0	0	0
361:	0	0	0	0	0	0	0	0

369:	1	0	1	0	0	1	0	0

Sample Title: 14

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

801:	0	0	0	0	0	0	0	0

Sample Title: 14

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

Apex-Alpha™

IAB 7/25/13

Sample Description: D-3 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 15
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_018
Chamber Serial Number:
Detector Serial Number: 18
Env. Background: System Bkgd 62755
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:44 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.601 mL
Effective Efficiency: 0.0626 +/- 0.0059
Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
Chem. Recovery Factor: 0.3521 +/- 0.0338

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	5.255	121.15	17.88	0.85	0.00E+000	4.4
U-234		4.705	4.32	102.62	0.68	0.00E+000	3.1
U-235		4.441	1.83	152.56	0.17	0.00E+000	3.1
U-238		4.151	2.13	191.23	1.87	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

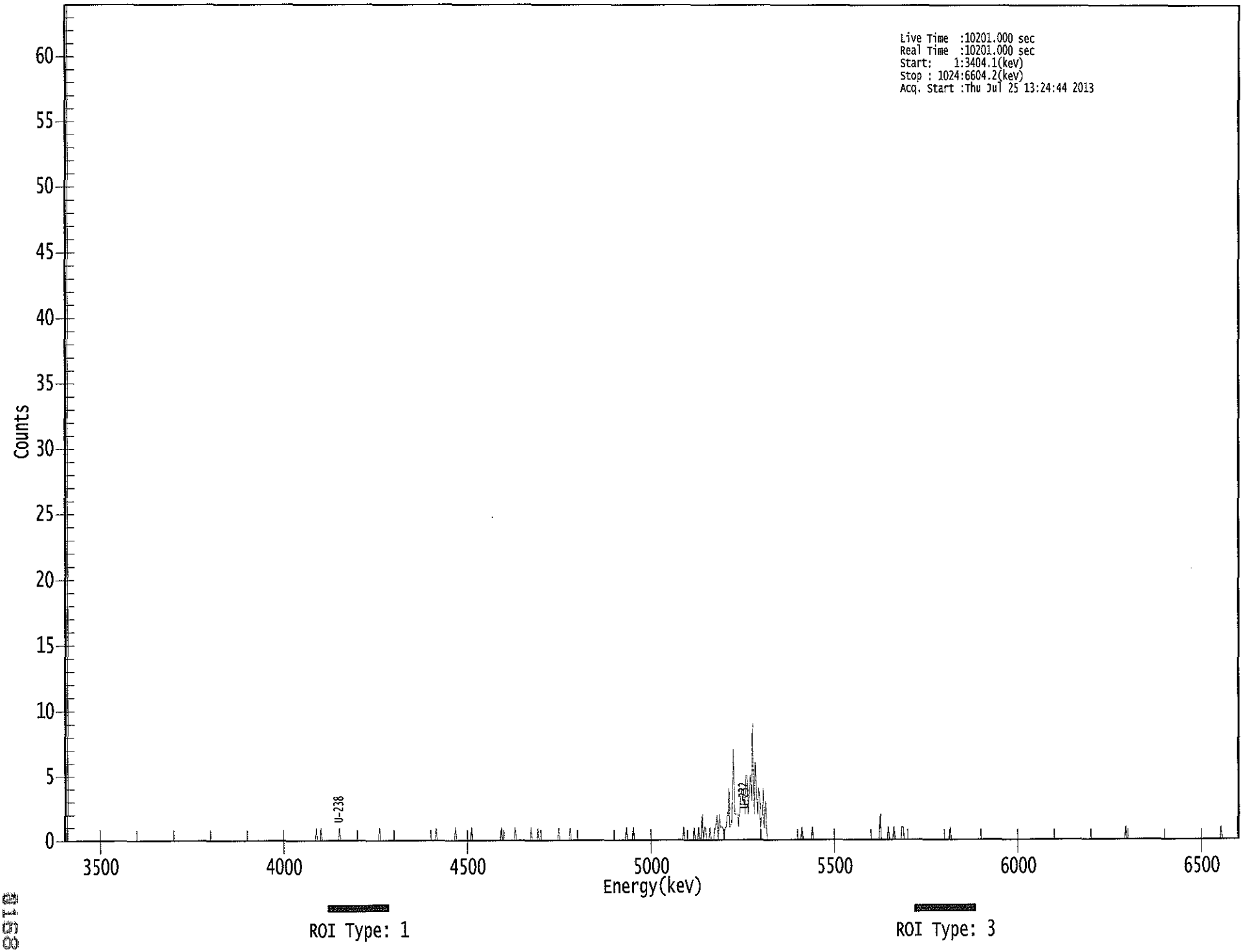
NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.984	5302.50*	5.14E+000 +/- 9.49E-001	2.54E-001 +/- 4.69E-002
U-234	0.978	4761.50*	1.83E-001 +/- 1.91E-001	2.39E-001 +/- 4.41E-002
U-235	0.978	4385.50*	9.58E-002 +/- 1.47E-001	2.18E-001 +/- 4.03E-002
U-238	0.992	4184.40*	9.00E-002 +/- 1.73E-001	3.20E-001 +/- 5.90E-002

AG 7/26/13

US EPA ARCHIVE DOCUMENT

0000063987.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: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	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	1	0	0	0	1
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	1
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	1	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	1	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	1	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	1	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 15

Channel								
377:	0	0	0	0	1	0	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	1	0
409:	0	0	0	0	1	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	1	0
433:	0	0	0	0	0	0	0	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	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	1	0	0	0	0	0	1
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	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	0
545:	0	0	0	0	1	0	0	0
553:	1	0	0	2	0	1	1	0
561:	0	0	1	0	0	0	1	1
569:	2	0	2	1	1	1	0	1
577:	1	2	4	1	1	3	7	2
585:	2	2	2	1	3	4	3	4
593:	2	5	5	2	4	5	3	9
601:	2	6	4	2	4	3	1	2
609:	4	1	3	1	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	1	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	2	0
713:	0	0	0	0	0	1	0	0
721:	0	0	1	0	0	0	0	0
729:	0	1	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	1	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:	0	0	0	0	1	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	1
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

IAB 7/25/13

Apex-Alpha™

Sample Description: D-3 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 16
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_019
Chamber Serial Number:
Detector Serial Number: 19
Env. Background: System Bkgd 62756
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:44 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.599 mL
Effective Efficiency: 0.0662 +/- 0.0061
Counting Efficiency: 0.1659 +/- 0.0029 on 2/17/2013 10:45:23 AM
Chem. Recovery Factor: 0.3987 +/- 0.0372

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	5.261	127.66	17.37	0.34	0.00E+000	6.5
U-234		4.738	4.66	94.59	0.34	0.00E+000	3.3
U-235		4.380	2.83	120.54	0.17	0.00E+000	3.3
U-238		4.179	1.00	277.19	0.00	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	0.988	5302.50*	5.13E+000 +/- 9.20E-001	1.92E-001 +/- 3.45E-002
U-234	0.996	4761.50*	1.87E-001 +/- 1.80E-001	1.92E-001 +/- 3.44E-002
U-235	1.000	4385.50*	1.40E-001 +/- 1.71E-001	2.07E-001 +/- 3.71E-002
U-238	1.000	4184.40*	4.00E-002 +/- 1.11E-001	2.40E-001 +/- 4.30E-002

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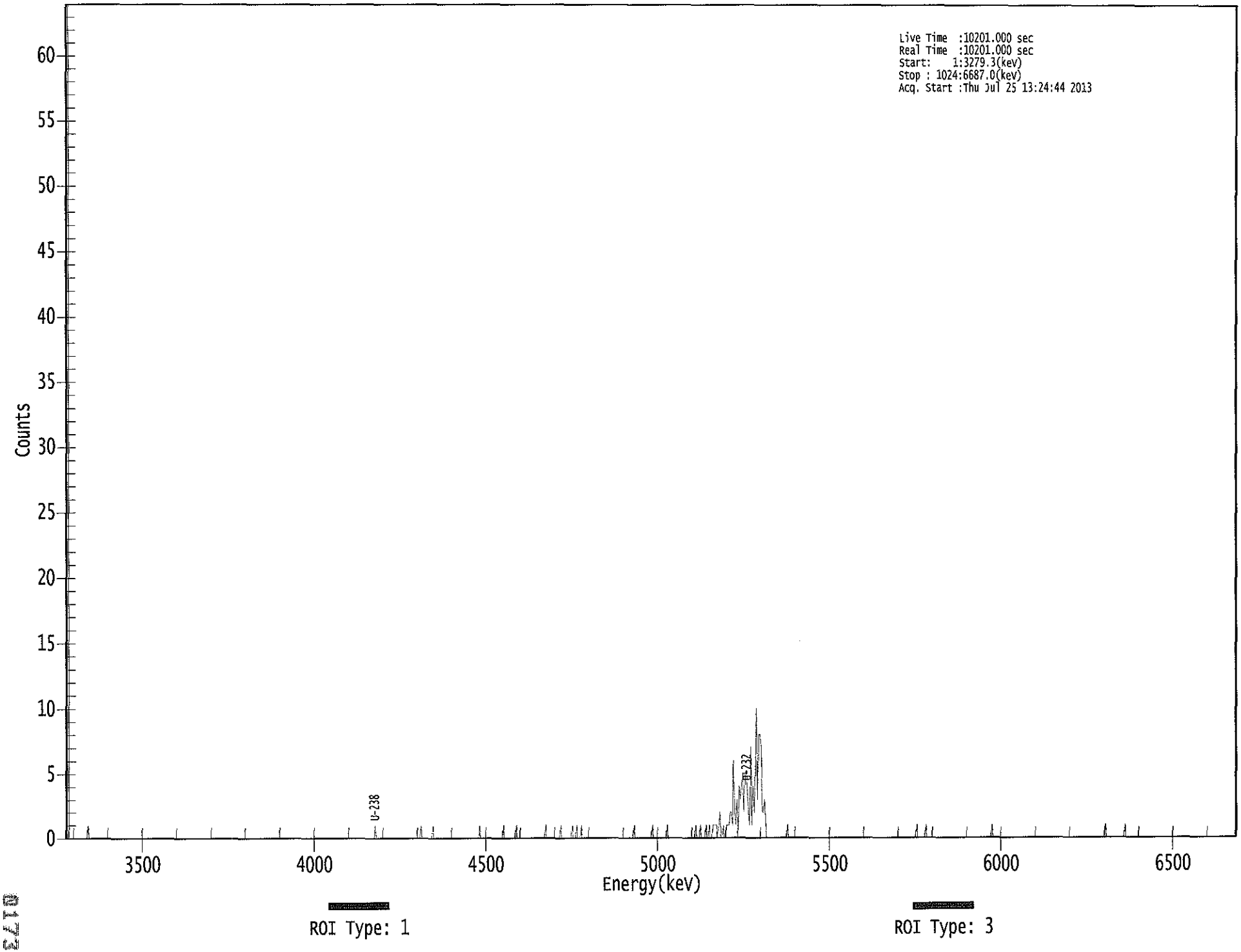
0000063988.CNF



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

369:	0	0	0	0	0	0	0	0

Sample Title: 16

Channel								
377:	0	0	0	0	0	0	1	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	1	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	1	0	0	0	0	0	0	0
441:	0	0	1	0	0	0	1	0
449:	0	0	1	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	1	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	1	0	0	0	0	0	0	0
521:	0	0	0	0	0	1	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	1	0
553:	0	0	1	0	0	0	0	1
561:	0	0	1	0	0	1	1	1
569:	1	0	1	2	0	0	1	0
577:	0	1	1	1	2	2	1	6
585:	2	1	3	0	4	3	4	5
593:	2	5	5	4	2	1	7	1
601:	4	2	6	10	3	8	8	7
609:	2	2	3	1	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	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	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	1
745:	0	0	0	0	0	0	0	1
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	1	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	1	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	1	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™

Sample Description:	PZ-100-SD TOT
Spectrum File:	\\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification:	1307098A-UU
Sample Identification:	17
Sample Geometry:	Shelf 2
Procedure Description:	U iso
Detector Name:	Alpha_020
Chamber Serial Number:	
Detector Serial Number:	20
Env. Background:	System Bkgd 62757
Reagent Blank:	<not performed>
Sample Size:	1.000E+000 +/- 0.000E+000 liter
Sample Date/Time:	7/9/2013 9:15:58 AM
Acquisition Date/Time:	7/25/2013 1:24:45 PM
Acquisition Live Time:	170.0 minutes
Acquisition Real Time:	170.0 minutes
Tracer Certificate:	U232_UU-10A
Tracer Quantity:	0.600 mL
Effective Efficiency:	0.1877 +/- 0.0108
Counting Efficiency:	0.1612 +/- 0.0029 on 7/20/2013 6:29:23 PM
Chem. Recovery Factor:	1.1647 +/- 0.0701
Peak Match Tolerance:	0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.286	362.47	10.32	1.53	0.00E+000	12.6
U-234		4.723	29.66	36.23	0.34	0.00E+000	4.9
U-235		4.365	2.83	120.54	0.17	0.00E+000	3.3
U-238		4.150	24.49	40.09	0.51	0.00E+000	4.4

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.13E+000 +/- 5.78E-001	1.01E-001 +/- 1.13E-002
U-234	0.989	4761.50*	4.19E-001 +/- 1.59E-001	6.76E-002 +/- 7.62E-003
U-235	0.997	4385.50*	4.94E-002 +/- 5.98E-002	7.28E-002 +/- 8.20E-003
U-238	0.992	4184.40*	3.45E-001 +/- 1.44E-001	7.39E-002 +/- 8.32E-003

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0177

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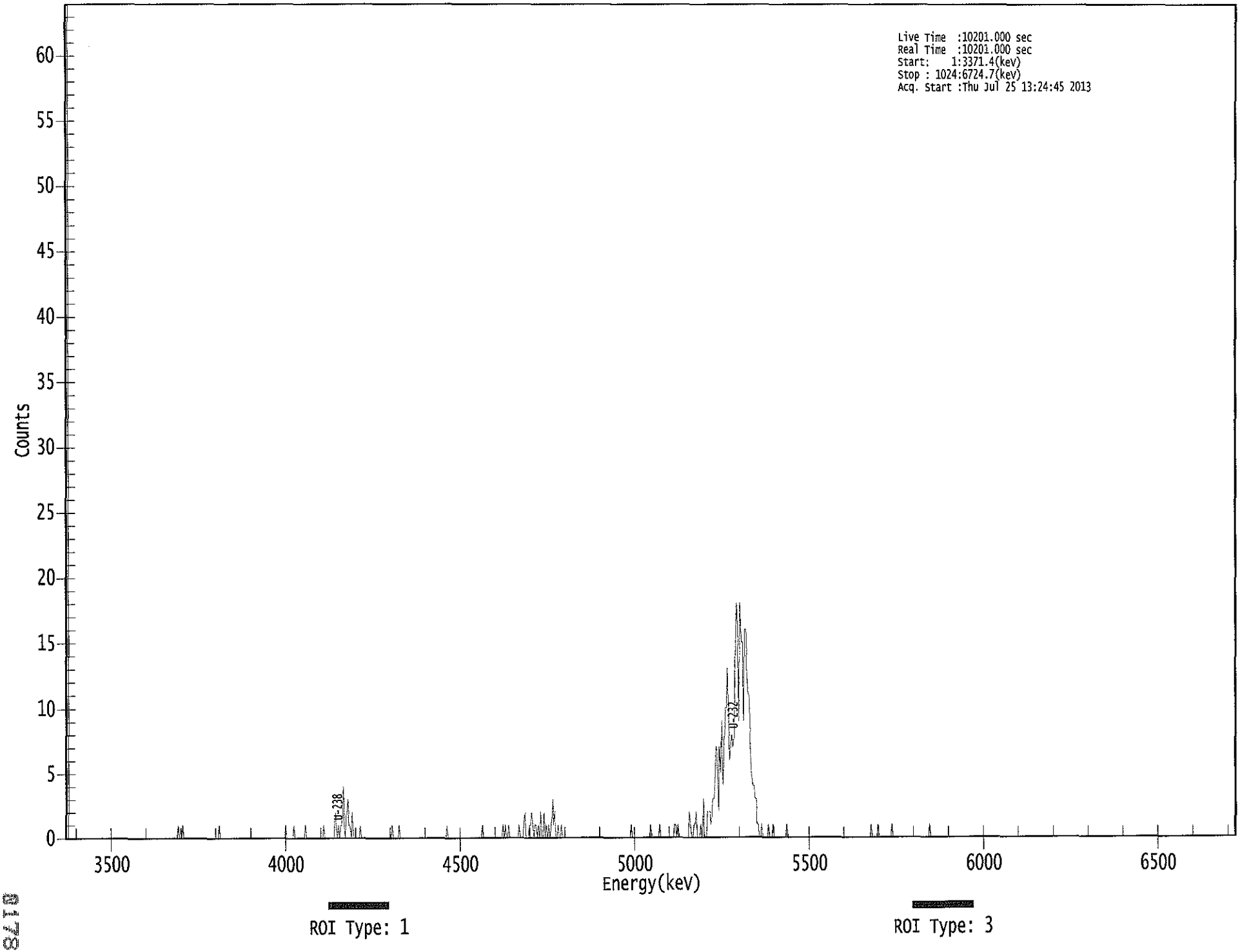


****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 17

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	1	0	0	0	1	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	1
201:	0	0	0	0	0	0	0	0
209:	0	1	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	0	0	0	0	0
233:	0	0	0	2	1	0	1	0
241:	1	1	4	1	0	2	3	1
249:	1	0	2	0	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	1	0	0
289:	0	0	0	1	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	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	1	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 17

Channel								
377:	0	0	0	0	0	0	1	0
385:	1	0	0	1	0	0	0	0
393:	0	0	0	0	1	0	0	0
401:	1	2	0	0	0	1	1	2
409:	1	0	1	1	0	1	0	2
417:	0	0	2	0	1	0	1	0
425:	1	3	1	2	0	0	1	0
433:	0	1	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	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	1	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	1
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	1	1	0	1
537:	0	0	0	0	0	0	0	0
545:	0	2	1	0	0	1	1	2
553:	0	0	0	1	0	3	0	0
561:	0	2	2	2	1	3	3	4
569:	7	7	2	7	5	9	4	6
577:	10	10	13	9	6	7	8	7
585:	8	15	18	16	9	18	15	15
593:	9	16	16	13	11	11	7	5
601:	4	4	3	3	1	1	0	0
609:	1	0	0	0	0	0	1	0
617:	0	0	1	0	0	0	0	0
625:	0	0	0	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	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:	1	0	0	0	0	0	1	0
713:	0	0	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	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: 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	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™

IGB 7/25/13

Sample Description: PZ-100-SD DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 18
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_022
Chamber Serial Number:
Detector Serial Number: 22
Env. Background: System Bkgd 62758
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:46 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.600 mL
Effective Efficiency: 0.1268 +/- 0.0086
Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
Chem. Recovery Factor: 0.8279 +/- 0.0586

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.249	245.13	12.57	1.87	0.00E+000	34.3
U-234		4.689	20.81	44.38	1.19	0.00E+000	4.7
U-235		4.389	1.32	215.98	0.68	0.00E+000	3.1
U-238		4.109	16.49	49.13	0.51	0.00E+000	3.1

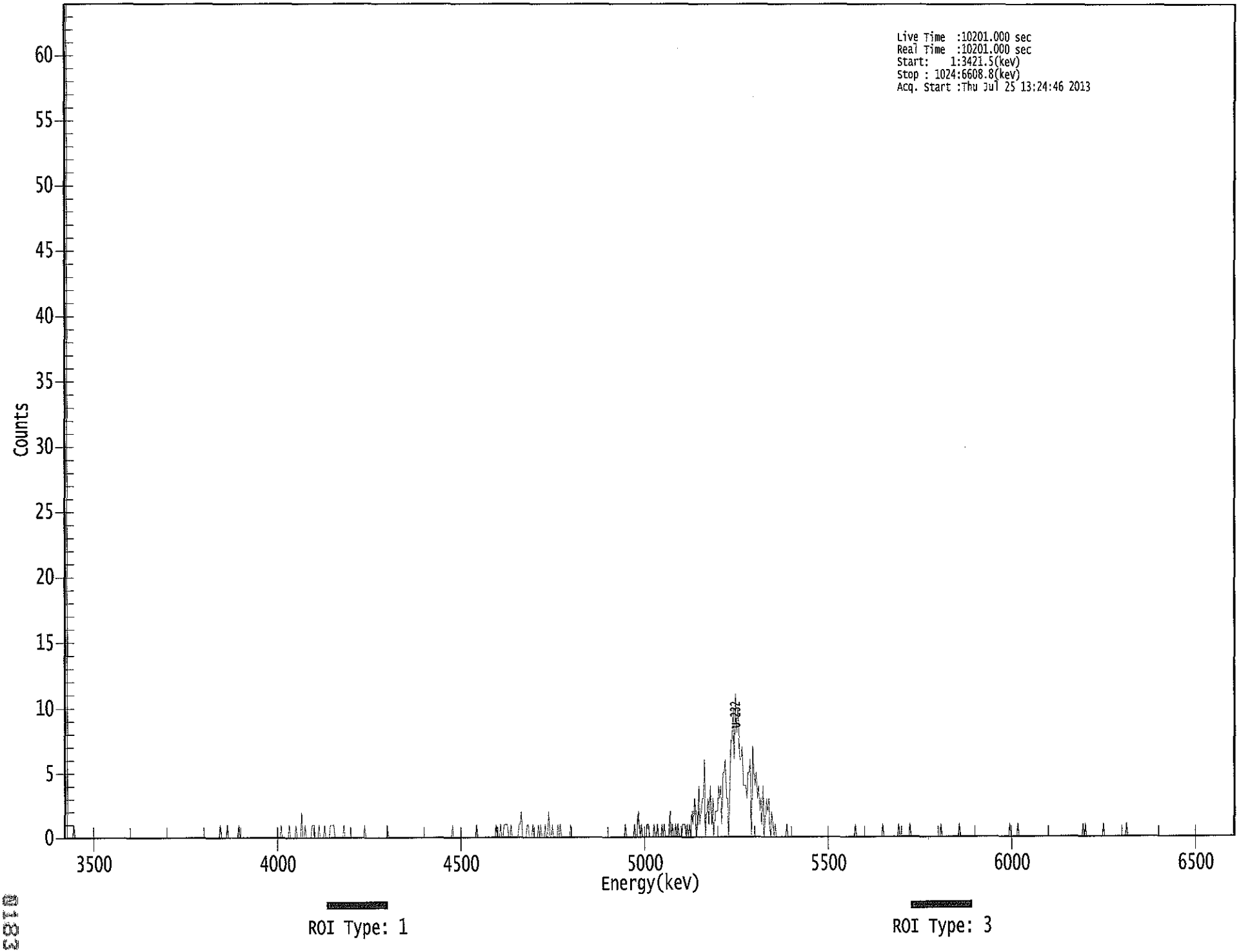
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.980	5302.50*	5.13E+000 +/- 6.86E-001	1.59E-001 +/- 2.12E-002
U-234	0.964	4761.50*	4.36E-001 +/- 2.02E-001	1.38E-001 +/- 1.84E-002
U-235	1.000	4385.50*	3.41E-002 +/- 7.38E-002	1.46E-001 +/- 1.95E-002
U-238	0.960	4184.40*	3.44E-001 +/- 1.75E-001	1.09E-001 +/- 1.46E-002

AG 7/26/13

0000063990.CNF



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

Sample Title: 18

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	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	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	1	0	0	0	0	0	1	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	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	0	0	1	0	0	0
201:	0	0	1	0	0	0	0	2
209:	0	0	1	0	0	0	0	0
217:	1	1	1	0	0	0	1	0
225:	0	0	0	1	0	0	0	0
233:	1	1	1	1	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	1	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	1	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	1	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 18

Channel								
377:	0	1	0	0	0	1	0	0
385:	1	1	1	1	0	0	1	0
393:	0	0	0	0	0	1	1	2
401:	0	0	0	0	1	1	0	0
409:	0	1	0	0	0	0	1	0
417:	1	0	0	0	1	0	0	2
425:	0	0	1	0	0	0	0	1
433:	0	1	0	0	0	0	0	0
441:	0	0	1	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	1	0	0	0	0	0
497:	0	0	1	0	0	2	1	0
505:	1	0	0	0	0	1	1	0
513:	0	0	0	1	0	0	1	0
521:	0	0	1	0	1	0	0	0
529:	0	2	0	1	0	0	1	0
537:	1	0	0	0	1	1	1	0
545:	1	0	1	0	2	1	3	2
553:	0	1	4	1	2	3	3	6
561:	0	2	3	1	4	1	3	0
569:	2	2	2	4	3	4	1	5
577:	5	6	3	3	0	4	7	8
585:	10	6	11	8	10	8	6	6
593:	7	4	4	4	3	5	5	6
601:	0	7	5	4	5	3	4	2
609:	3	1	4	0	1	3	2	3
617:	1	0	2	1	0	1	0	0
625:	0	0	0	0	0	0	0	1
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	1	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	1	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	1	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	1	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	1	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 18

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	1	0	0	0	0	0
833:	0	1	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	1	0	1	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	1	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	1	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

LCB 7/25/13

Apex-Alpha™

Sample Description: PZ-112-AS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 19
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_023
Chamber Serial Number:
Detector Serial Number: 23
Env. Background: System Bkgd 62759
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:47 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.603 mL
Effective Efficiency: 0.1155 +/- 0.0082
Counting Efficiency: 0.1710 +/- 0.0030 on 7/20/2013 6:18:25 PM
Chem. Recovery Factor: 0.6752 +/- 0.0493

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	5.285	224.00	13.13	0.00	0.00E+000	5.3
U-234		4.722	8.47	74.12	1.53	0.00E+000	3.1
U-235		4.409	1.66	169.38	0.34	0.00E+000	3.1
U-238		4.156	3.83	102.72	0.17	0.00E+000	3.1

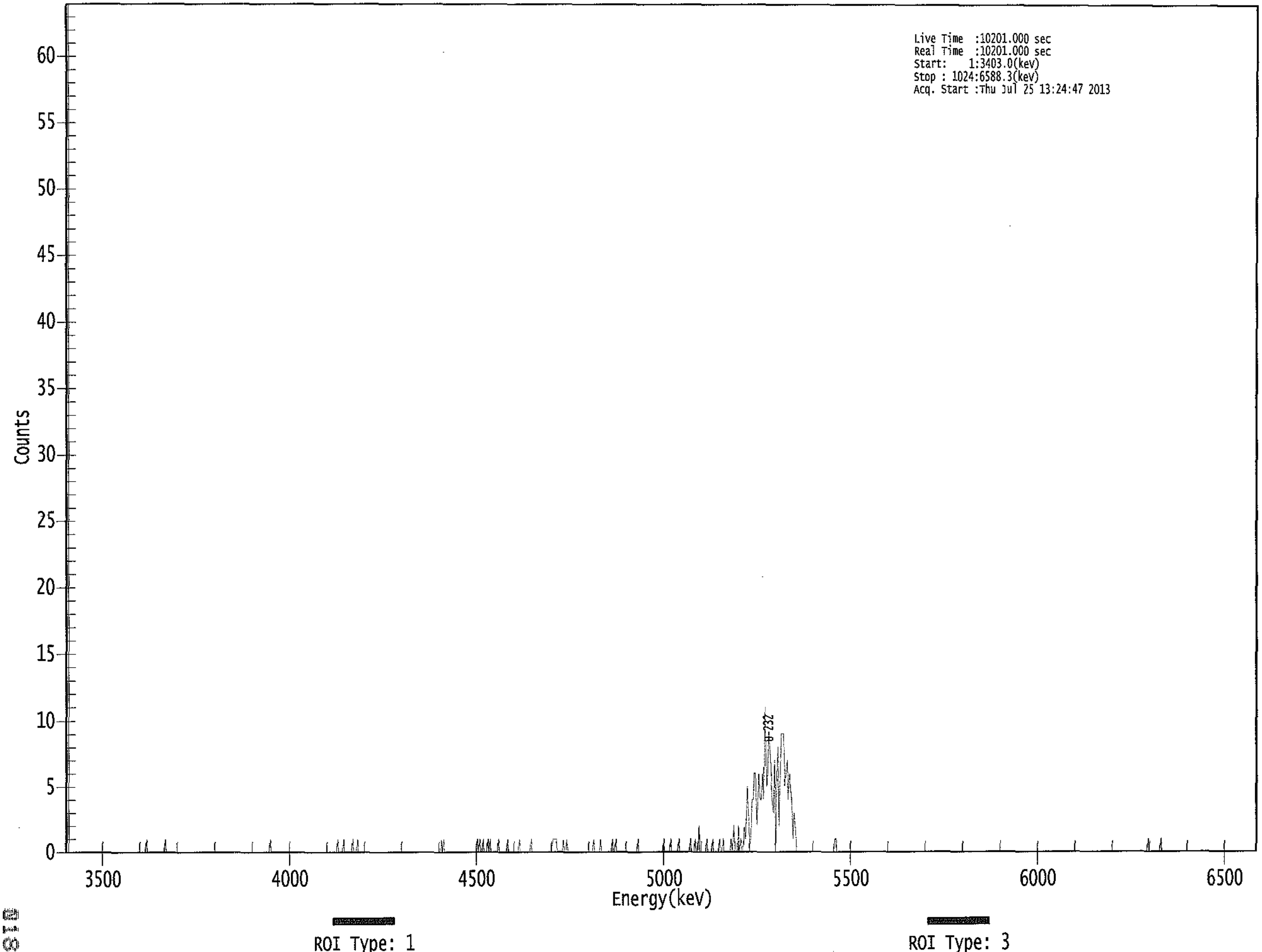
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.15E+000 +/- 7.15E-001	1.38E-001 +/- 1.91E-002
U-234	0.989	4761.50*	1.95E-001 +/- 1.47E-001	1.63E-001 +/- 2.27E-002
U-235	0.996	4385.50*	4.71E-002 +/- 8.00E-002	1.36E-001 +/- 1.88E-002
U-238	0.994	4184.40*	8.77E-002 +/- 9.09E-002	9.55E-002 +/- 1.33E-002

AG 7/26/13

0000063991.CNF



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

Sample Title: 19

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	1	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	1	0	0
89:	0	0	0	0	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	1
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	1	0	0	0	0	1	0
241:	0	0	0	0	0	0	1	0
249:	0	0	1	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	1	0	1	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	1	0	1	0	0	1	0
361:	0	0	1	0	1	0	0	0

369:	0	0	0	1	0	0	0	0

Sample Title: 19

Channel								
377:	0	0	0	1	0	0	0	0
385:	0	0	0	0	0	1	0	0
393:	0	0	0	0	0	0	0	1
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	1	1	1	1	0	0
425:	0	0	0	1	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	0	1	0	0
457:	0	0	0	1	0	0	0	0
465:	0	0	0	0	0	1	0	0
473:	1	0	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	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	1	0	0	0	0	0	1
521:	0	0	0	0	0	0	1	0
529:	0	0	0	0	0	0	0	0
537:	1	0	0	0	1	0	0	2
545:	0	0	0	0	0	0	1	0
553:	0	0	0	1	0	0	0	0
561:	0	1	0	0	1	0	0	0
569:	0	0	0	1	0	2	0	0
577:	0	2	0	1	0	0	2	1
585:	3	5	2	0	2	4	4	6
593:	6	2	4	6	4	4	6	4
601:	11	5	6	9	8	6	4	3
609:	7	0	6	8	2	6	9	9
617:	9	5	6	7	4	6	5	4
625:	1	3	2	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	1	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	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 19

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

JCB 7/25/13

Sample Description: PZ-112-AS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-UU
Sample Identification: 20
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_024
Chamber Serial Number:
Detector Serial Number: 24
Env. Background: System Bkgd 62760
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 9:15:58 AM
Acquisition Date/Time: 7/25/2013 1:24:48 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.605 mL
Effective Efficiency: 0.0820 +/- 0.0068
Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
Chem. Recovery Factor: 0.4793 +/- 0.0406

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	5.260	159.81	15.57	1.19	0.00E+000	3.5
U-234		4.730	7.66	72.63	0.34	0.00E+000	3.1
U-235		4.357	3.66	107.88	0.34	0.00E+000	0.0
U-238		4.131	-0.85	246.67	0.85	0.00E+000	0.0

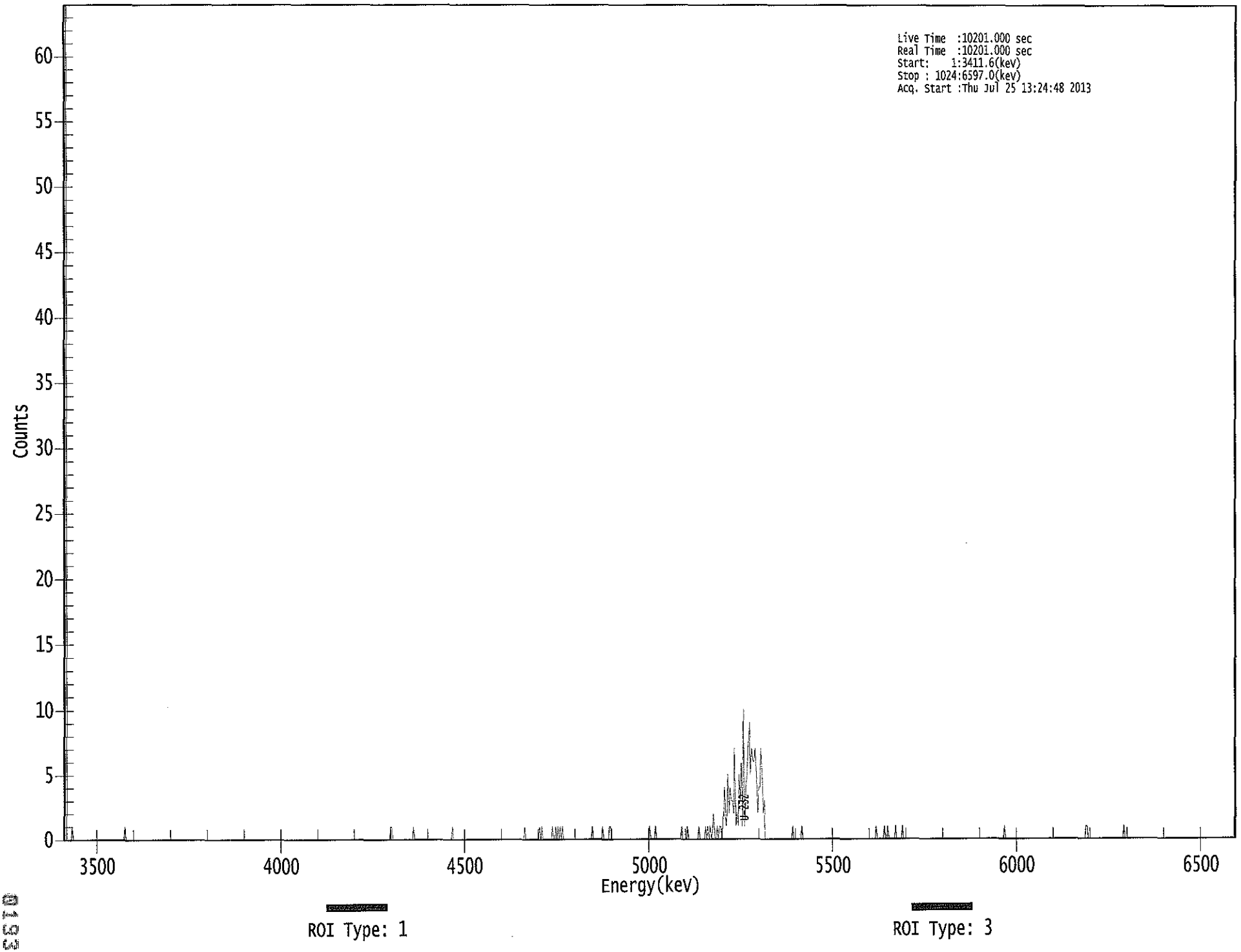
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.987	5302.50*	5.18E+000 +/- 8.39E-001	2.13E-001 +/- 3.46E-002
U-234	0.993	4761.50*	2.48E-001 +/- 1.85E-001	1.55E-001 +/- 2.51E-002
U-235	0.994	4385.50*	1.46E-001 +/- 1.60E-001	1.91E-001 +/- 3.10E-002
U-238	0.980	4184.40*	-2.74E-002 +/- 6.78E-002	1.93E-001 +/- 3.13E-002

AG
7/26/13

0000063992.CNF



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

Sample Title: 20

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	1
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	1	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	1
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	1	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	0	0	0
337:	0	0	0	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 20

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	1	0	0	0	0	0
409:	0	0	0	0	0	0	0	1
417:	0	1	0	0	0	0	0	0
425:	0	0	1	0	0	1	0	1
433:	0	1	0	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	1	0	0
465:	0	0	0	0	0	0	1	0
473:	0	0	0	0	1	1	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	1
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:	0	0	0	1	0	0	0	0
545:	1	0	0	0	0	0	0	0
553:	0	0	1	0	0	0	0	0
561:	1	0	1	0	1	0	1	2
569:	0	0	1	0	1	1	0	1
577:	4	2	1	5	2	4	3	3
585:	2	7	1	2	1	5	3	6
593:	1	10	1	4	5	7	9	5
601:	7	6	6	7	5	2	4	4
609:	7	5	2	3	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	1	0	0	0
641:	0	0	0	0	1	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	1	0	0
713:	0	0	0	0	1	0	0	1
721:	0	0	0	0	0	0	1	0
729:	0	0	0	0	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	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: 20

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	1	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	1	1	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	1	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

7/25/2013 5:32:50 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 7/25/2013
Time : 5:32:50 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	7/25/2013 5:16:27 AM
Alpha_004	21f	ALL	Passed	7/25/2013 5:16:28 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	7/25/2013 5:16:29 AM
Alpha_011	21f	ALL	Passed	7/25/2013 5:16:29 AM
Alpha_012	21f	ALL	Passed	7/25/2013 5:16:30 AM
Alpha_013	21f	ALL	Passed	7/25/2013 5:16:31 AM
Alpha_014	21f	ALL	Passed	7/25/2013 5:16:32 AM
Alpha_015	21f	ALL	Passed	7/25/2013 5:16:33 AM
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	7/25/2013 5:16:34 AM
Alpha_019	AIM730	ALL	Passed	7/25/2013 5:16:34 AM
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	7/25/2013 5:16:35 AM
Alpha_023	AIM730	ALL	Passed	7/25/2013 5:16:36 AM
Alpha_024	AIM730	ALL	Passed	7/25/2013 5:16:37 AM
Alpha_025	AIM730	ALL	Passed	7/25/2013 5:16:38 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	7/25/2013 5:16:38 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	7/25/2013 5:16:39 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Passed	7/25/2013 5:16:40 AM
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:41 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:42 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:44 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:45 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:46 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:48 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:49 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:51 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:52 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:54 AM

Review of QA Results - Pulser Check

7/25/2013 5:32:50 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Not Done	
Alpha_045	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:56 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:57 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:59 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:17:00 AM

APPROVED BY: _____

APPROVAL DATE: 7/25/13

****
***** LIBRARY LISTING REPORT *****
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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

RUN 2

Work Order	13-07098
Analysis Code	UUISO
Run	2
Date Received	7/15/2013
Lab Deadline	8/6/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	HASL 300, 4.5.2
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	U-232
Radiometric Sol#	U-10a
Tracer Act (dpm/g)	19.045
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/16/13 00:00	1.0000E+00
02	MBL	BLANK		07/16/13 00:00	1.0000E+00
03	DUP	I-4 TOT	44	07/09/13 12:25	5.0000E-01
06	TRG	S-5 TOT	45	07/09/13 10:50	5.0000E-01
11	DO	I-4 TOT	44	07/09/13 12:25	5.0000E-01
12	TRG	I-4 DIS	44	07/09/13 12:25	5.0000E-01

* 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.

13-07098
UUISO
Run 2

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	0.6118	11.7		0.00								
02	MBL	0.6109	11.6		0.00								
03	DUP	0.6022	11.5		0.00								
06	TRG	0.5848	11.1		0.00								
11	DO	0.6073	11.6		0.00								
12	TRG	0.6096	11.6		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.

13-07098
UUISO
Run 2

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			07/29/13 12:18	JWOLFE				
02	MBL			07/29/13 12:18	JWOLFE				
03	DUP			07/29/13 12:18	JWOLFE				
06	TRG			07/29/13 12:18	JWOLFE				
11	DO			07/29/13 12:18	JWOLFE				
12	TRG			07/29/13 12:18	JWOLFE				

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

Eberline Services
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-2

Run	2
Analysis Code	UUISO
Eberline Services Work Order	13-07098
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-234	LCS	LCS	pCi/l	8.36E+00	1.46E+00	1.24E-01	8.02E+00	104.16	OK		OK	
02	U-234	MBL	BLANK	pCi/l	1.28E-01	8.82E-02	9.59E-02					OK	OK
03	U-234	DUP	I-4 TOT	pCi/l	1.97E-01	3.03E-01	5.12E-01				NA	OK	
06	U-234	TRG	S-5 TOT	pCi/l	1.10E+00	9.06E-01	7.90E-01					OK	
11	U-234	DO	I-4 TOT	pCi/l	5.99E-01	5.09E-01	4.29E-01					OK	
12	U-234	TRG	I-4 DIS	pCi/l	1.47E+00	8.35E-01	5.78E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-2

Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-07098	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	07/16/13 00:00	1.00E+00	64.50	0.00	0.00			
02	U-234	MBL	07/16/13 00:00	1.00E+00	108.06	0.00	0.00			
03	U-234	DUP	07/09/13 12:25	5.00E-01	36.14	0.00	0.00			
06	U-234	TRG	07/09/13 10:50	5.00E-01	15.67	0.00	0.00			
11	U-234	DO	07/09/13 12:25	5.00E-01	25.97	0.00	0.00			
12	U-234	TRG	07/09/13 12:25	5.00E-01	27.71	0.00	0.00			

5525

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-2

Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-07098	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	08/01/13 09:15		A_Spec	Alpha_003	170	3.54 E+02	3.00 E-03	17.5
02	U-234	MBL	08/01/13 09:15		A_Spec	Alpha_004	170	1.01 E+01	1.10 E-02	19.4
03	U-234	DUP	08/01/13 09:15		A_Spec	Alpha_010	170.02	2.64 E+00	8.00 E-03	19.7
06	U-234	TRG	08/01/13 09:15		A_Spec	Alpha_011	170	6.66 E+00	2.00 E-03	20.5
11	U-234	DO	08/01/13 09:15		A_Spec	Alpha_012	170.02	5.83 E+00	1.00 E-03	19.9
12	U-234	TRG	08/01/13 09:15		A_Spec	Alpha_013	170.02	1.43 E+01	4.00 E-03	18.7

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-2

Run	2
Analysis Code	UUISO
Eberline Services Work Order	13-07098
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	7.38E+00	1.31E+00	1.23E-01	7.82E+00	94.39	OK		OK	
02	U-238	MBL	BLANK	pCi/l	8.18E-02	6.64E-02	6.62E-02					OK	OK
03	U-238	DUP	I-4 TOT	pCi/l	-8.85E-02	1.61E-01	4.90E-01				NA	OK	
06	U-238	TRG	S-5 TOT	pCi/l	-5.59E-02	3.32E-01	7.87E-01					OK	
11	U-238	DO	I-4 TOT	pCi/l	1.70E-01	2.90E-01	4.89E-01					OK	
12	U-238	TRG	I-4 DIS	pCi/l	1.85E-01	3.60E-01	6.73E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-2

Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-07098	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	07/16/13 00:00	1.00E+00	64.50	0.00	0.00			
02	U-238	MBL	07/16/13 00:00	1.00E+00	108.06	0.00	0.00			
03	U-238	DUP	07/09/13 12:25	5.00E-01	36.14	0.00	0.00			
06	U-238	TRG	07/09/13 10:50	5.00E-01	15.67	0.00	0.00			
11	U-238	DO	07/09/13 12:25	5.00E-01	25.97	0.00	0.00			
12	U-238	TRG	07/09/13 12:25	5.00E-01	27.71	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-2

Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-07098	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	08/01/13 09:15		A_Spec	Alpha_003	170	3.14 E+02	3.00 E-03	17.5
02	U-238	MBL	08/01/13 09:15		A_Spec	Alpha_004	170	6.49 E+00	3.00 E-03	19.4
03	U-238	DUP	08/01/13 09:15		A_Spec	Alpha_010	170.02	-1.19 E+00	7.00 E-03	19.7
06	U-238	TRG	08/01/13 09:15		A_Spec	Alpha_011	170	-3.40 E-01	2.00 E-03	20.5
11	U-238	DO	08/01/13 09:15		A_Spec	Alpha_012	170.02	1.66 E+00	2.00 E-03	19.9
12	U-238	TRG	08/01/13 09:15		A_Spec	Alpha_013	170.02	1.81 E+00	7.00 E-03	18.7

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-2

Client	Eberline Services Work Order	Analysis Code	Run
Engineering Management Support, Inc.	13-07098	UUISO	2

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	7.41E-01	3.09E-01	1.53E-01					OK	
02	U-235	MBL	BLANK	pCi/l	5.95E-02	7.01E-02	1.03E-01					OK	OK
03	U-235	DUP	I-4 TOT	pCi/l	2.75E-01	3.72E-01	5.81E-01				NA	OK	
06	U-235	TRG	S-5 TOT	pCi/l	1.69E-01	4.08E-01	8.51E-01					OK	
11	U-235	DO	I-4 TOT	pCi/l	3.16E-01	4.41E-01	6.65E-01					OK	
12	U-235	TRG	I-4 DIS	pCi/l	6.73E-01	6.28E-01	7.13E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-2

Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-07098	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	07/16/13 00:00	1.00E+00	64.50	0.00	0.00			
02	U-235	MBL	07/16/13 00:00	1.00E+00	108.06	0.00	0.00			
03	U-235	DUP	07/09/13 12:25	5.00E-01	36.14	0.00	0.00			
06	U-235	TRG	07/09/13 10:50	5.00E-01	15.67	0.00	0.00			
11	U-235	DO	07/09/13 12:25	5.00E-01	25.97	0.00	0.00			
12	U-235	TRG	07/09/13 12:25	5.00E-01	27.71	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-UUISO-2

Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-07098	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	08/01/13 09:15		A_Spec	Alpha_003	170	2.55 E+01	3.00 E-03	17.5
02	U-235	MBL	08/01/13 09:15		A_Spec	Alpha_004	170	3.81 E+00	7.00 E-03	19.4
03	U-235	DUP	08/01/13 09:15		A_Spec	Alpha_010	170.02	2.98 E+00	6.00 E-03	19.7
06	U-235	TRG	08/01/13 09:15		A_Spec	Alpha_011	170	8.30 E-01	1.00 E-03	20.5
11	U-235	DO	08/01/13 09:15		A_Spec	Alpha_012	170.02	2.49 E+00	3.00 E-03	19.9
12	U-235	TRG	08/01/13 09:15		A_Spec	Alpha_013	170.02	5.32 E+00	4.00 E-03	18.7

2.52

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	07/16/13 00:00	1.0000	0.6118	11.6517		0.00		
02	MBL	BLANK	07/16/13 00:00	1.0000	0.6109	11.6346		0.00		
03	DUP	I-4 TOT	07/09/13 12:25	0.5000	0.6022	11.4689		0.00		
06	TRG	S-5 TOT	07/09/13 10:50	0.5000	0.5848	11.1375		0.00		
11	DO	I-4 TOT	07/09/13 12:25	0.5000	0.6073	11.5660		0.00		
12	TRG	I-4 DIS	07/09/13 12:25	0.5000	0.6096	11.6098		0.00		

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-07098	2	UUISO	7/29/2013 12:17	JWOLFE	JW	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	*Sol #*	*Activity dpm/g*	*Solution Date*	*Approx Addition*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*
U-234	U-8a	35.240	7/29/2013	0.500	0.5054				8.02	0.289	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	7/29/2013	0.500	0.5054				7.82	0.282	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	19.045	7/29/2013	0.6118	0.6300
02	U-232	U-10a	19.045	7/29/2013	0.6109	0.6300
03	U-232	U-10a	19.045	7/29/2013	0.6022	0.6300
06	U-232	U-10a	19.045	7/29/2013	0.5848	0.6300
11	U-232	U-10a	19.045	7/29/2013	0.6073	0.6300
12	U-232	U-10a	19.045	7/29/2013	0.6096	0.6300

Balance Printer Tapes

Tracer

0.6118 g
0.6109 g
-0.6022 g

-0.5848 g
-0.6073 g

-0.6096 g

LCS

0.5054 g

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07098	2	UUISO	liters	8/6/2013	JWOLFE

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	I-4 TOT	DUP					5.0000E-01	5.0000E-01				
06	S-5 TOT	TRG					5.0000E-01	5.0000E-01				
11	I-4 TOT	DO					5.0000E-01	5.0000E-01				
12	I-4 DIS	TRG					5.0000E-01	5.0000E-01				

Comments	

Technician: JWolfe Date: 7/29/13

IGB 8/1/13

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000647
Batch Identification: 1307098B-UU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_003
Chamber Serial Number:
Detector Serial Number: 3
Env. Background: System Bkgd 63304
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 8/1/2013 7:18:50 AM
Acquisition Date/Time: 8/1/2013 9:15:55 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.612 mL
Effective Efficiency: 0.1126 +/- 0.0080
Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
Chem. Recovery Factor: 0.6450 +/- 0.0475

Control Certificate Name: NatU_U-8A
Chem. Recov. of Control: U-238 0.920150 +/- 0.088027
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	5.276	221.81	13.20	1.19	0.00E+000	5.6
U-234		4.726	354.49	10.42	0.51	0.00E+000	24.9
U-235		4.385	25.49	39.27	0.51	0.00E+000	4.5
U-238		4.153	314.49	11.06	0.51	0.00E+000	12.2

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.23E+000 +/- 7.29E-001	1.55E-001 +/- 2.17E-002
U-234	0.991	4761.50*	8.36E+000 +/- 1.46E+000	1.24E-001 +/- 1.73E-002
U-235	1.000	4385.50*	7.41E-001 +/- 3.09E-001	1.53E-001 +/- 2.13E-002
U-238	0.993	4184.40*	7.38E+000 +/- 1.31E+000	1.23E-001 +/- 1.72E-002

AG 8/1/13

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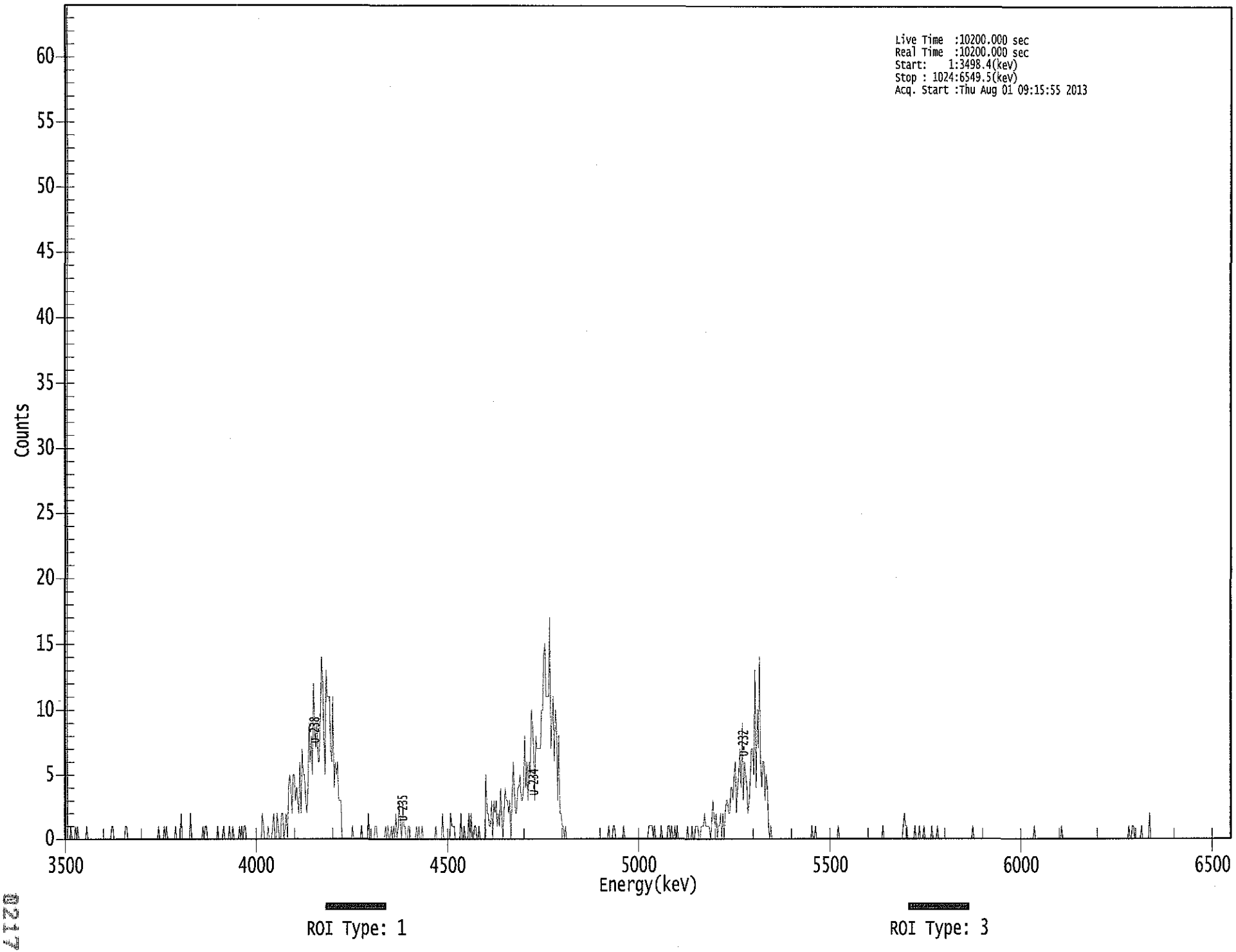

0217

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

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	10200	10200	0	0	0	1	0	0
9:	0	1	0	1	0	0	0	0
17:	0	0	0	1	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	1	1	0	0	0	0	0
49:	0	0	0	0	0	1	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	1	0	0	0	0	1
89:	0	1	0	0	0	0	0	0
97:	0	1	0	0	0	0	2	0
105:	0	0	0	0	0	0	2	0
113:	0	0	0	0	0	0	0	0
121:	0	1	0	1	1	0	0	0
129:	0	0	0	0	0	0	1	0
137:	0	0	0	1	0	0	0	0
145:	1	0	0	1	0	0	0	0
153:	0	1	0	1	0	1	1	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	2	1	0
177:	0	0	1	0	0	0	1	2
185:	0	0	2	1	0	0	2	2
193:	0	1	2	0	4	5	4	2
201:	5	5	3	4	3	2	6	2
209:	7	5	5	3	2	4	9	6
217:	8	5	12	9	7	9	6	6
225:	10	14	12	8	5	13	11	11
233:	11	7	6	11	4	6	5	6
241:	3	3	3	0	0	0	0	0
249:	0	0	0	0	1	0	0	0
257:	0	0	0	0	1	0	0	0
265:	0	0	2	0	0	0	0	0
273:	1	1	0	0	0	0	0	0
281:	0	1	0	1	0	0	1	0
289:	1	0	2	0	1	3	1	0
297:	3	1	1	0	0	1	1	0
305:	0	0	0	0	1	0	1	0
313:	0	1	0	0	0	0	0	0
321:	0	0	0	0	0	1	0	0
329:	0	0	0	2	0	0	0	0
337:	0	0	2	1	1	1	0	0
345:	0	0	0	2	0	0	1	0
353:	0	0	2	0	2	0	0	1
361:	1	0	0	1	0	0	0	0

369:	0	5	2	2	1	1	3	0

Sample Title: 01

Channel								
377:	3	2	3	1	2	1	4	2
385:	0	2	4	3	3	2	3	0
393:	3	6	4	2	2	4	4	5
401:	3	3	4	8	4	6	3	6
409:	5	10	9	7	3	8	7	7
417:	7	7	10	10	14	15	11	11
425:	11	17	7	9	11	6	10	9
433:	3	8	2	2	1	1	0	1
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	1	0	0
481:	0	1	1	0	0	0	0	0
489:	0	0	1	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	1	1	1	1	0	1	0	0
521:	0	0	0	1	0	0	0	0
529:	0	1	1	0	1	0	0	1
537:	0	1	0	0	0	0	0	0
545:	0	0	1	0	0	0	1	0
553:	0	1	1	1	0	0	1	1
561:	1	2	1	1	1	1	0	1
569:	3	2	1	2	0	1	1	2
577:	0	2	0	2	3	3	2	2
585:	4	4	3	5	6	2	4	5
593:	7	4	9	3	6	5	4	2
601:	3	5	7	7	5	13	4	10
609:	7	14	6	4	6	6	3	5
617:	4	1	0	1	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	1
657:	0	0	1	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	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	1	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	1
737:	2	1	1	0	0	0	0	0
745:	0	1	0	0	0	1	0	0
753:	0	1	0	0	0	0	0	0
761:	1	0	0	0	0	1	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	1	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	1	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	1	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	1	0	0
937:	1	1	0	0	0	0	0	0
945:	1	0	0	0	0	0	0	2
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

KD 8/1/13

Apex-Alpha™

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000647
Batch Identification: 1307098B-UU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_004
Chamber Serial Number:
Detector Serial Number: 4
Env. Background: System Bkgd 63305
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 8/1/2013 7:18:50 AM
Acquisition Date/Time: 8/1/2013 9:15:56 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.611 mL
Effective Efficiency: 0.2097 +/- 0.0114
Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
Chem. Recovery Factor: 1.0806 +/- 0.0621

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.284	412.30	9.68	1.70	0.00E+000	25.0
U-234		4.733	10.13	67.91	1.87	0.00E+000	2.9
U-235		4.367	3.81	117.33	1.19	0.00E+000	5.9
U-238		4.147	6.49	80.40	0.51	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*	5.22E+000 +/- 5.57E-001	9.30E-002 +/- 9.93E-003
U-234	0.994	4761.50*	1.28E-001 +/- 8.82E-002	9.59E-002 +/- 1.02E-002
U-235	0.998	4385.50*	5.95E-002 +/- 7.01E-002	1.03E-001 +/- 1.10E-002
U-238	0.990	4184.40*	8.18E-002 +/- 6.64E-002	6.62E-002 +/- 7.06E-003

KG 8/1/13

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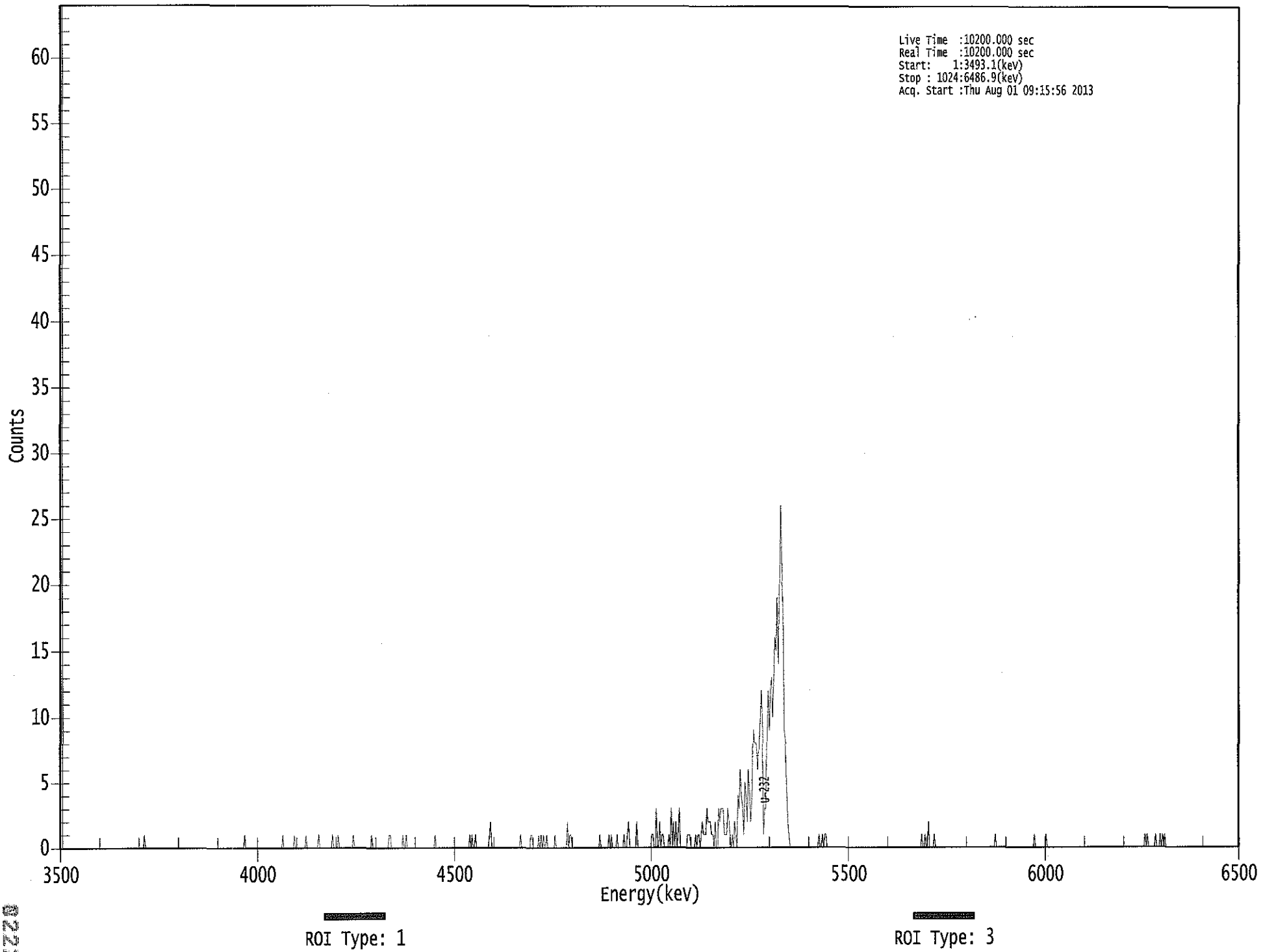

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	1	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	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:	1	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	1	0	0	0	0	0	0
201:	0	0	0	1	0	0	0	0
209:	0	0	0	0	0	1	0	0
217:	0	0	0	0	0	0	0	0
225:	1	0	0	0	0	0	0	0
233:	0	0	0	0	1	0	0	0
241:	0	1	0	0	0	0	0	0
249:	0	0	0	0	0	0	1	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	0
281:	0	0	0	0	0	1	1	0
289:	0	0	0	0	0	0	0	0
297:	0	1	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	1	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	1	0	0
361:	1	0	0	0	0	0	0	0

369:	0	0	0	0	1	2	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	1
401:	0	0	0	0	0	0	0	0
409:	1	1	0	0	0	0	0	1
417:	0	1	0	1	0	0	1	0
425:	0	0	0	0	0	1	0	0
433:	0	0	0	0	0	0	0	0
441:	2	0	1	1	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	1	0	0	0
473:	0	0	0	0	1	0	1	0
481:	0	0	0	1	0	0	0	0
489:	0	1	0	0	1	2	0	0
497:	0	0	0	0	2	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	1	1	0	0	3	0	0
521:	2	0	1	1	0	0	0	0
529:	1	0	3	0	2	0	2	0
537:	1	3	0	0	0	0	0	0
545:	1	1	1	0	0	0	0	1
553:	0	1	1	0	1	2	1	1
561:	1	3	2	2	2	1	1	0
569:	2	0	0	3	2	3	3	3
577:	1	1	1	3	2	1	0	1
585:	0	2	1	0	4	3	6	4
593:	3	1	5	4	2	6	4	2
601:	4	9	8	8	8	6	8	10
609:	12	9	1	3	3	8	12	9
617:	12	13	10	13	16	15	19	14
625:	20	26	21	18	9	8	5	2
633:	1	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	1	0	0	1	0	1
665:	1	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	1	0	0	1	0
753:	0	2	0	0	0	0	1	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	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	1	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	1	0	0
849:	0	0	0	0	0	0	0	1
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	1	0	1
945:	0	0	0	0	0	0	1	0
953:	0	0	1	0	1	0	1	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

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Apex-Alpha™

Sample Description: I-4 TOT-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000647
Batch Identification: 1307098B-UU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_010
Chamber Serial Number:
Detector Serial Number: 10
Env. Background: System Bkgd 63306
Reagent Blank: <not performed>

Sample Size: 5.000E-001 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 7:18:50 AM
Acquisition Date/Time: 8/1/2013 9:15:51 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.602 mL
Effective Efficiency: 0.0711 +/- 0.0063
Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
Chem. Recovery Factor: 0.3614 +/- 0.0327

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	137.81	16.78	1.19	0.00E+000	5.9
U-234		4.713	2.64	152.72	1.36	0.00E+000	2.9
U-235		4.423	2.98	134.37	1.02	0.00E+000	2.9
U-238		4.132	-1.19	180.58	1.19	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	0.996	5302.50*	1.03E+001 +/- 1.79E+000	4.92E-001 +/- 8.56E-002
U-234	0.983	4761.50*	1.97E-001 +/- 3.03E-001	5.12E-001 +/- 8.90E-002
U-235	0.990	4385.50*	2.75E-001 +/- 3.72E-001	5.81E-001 +/- 1.01E-001
U-238	0.980	4184.40*	-8.85E-002 +/- 1.61E-001	4.90E-001 +/- 8.51E-002

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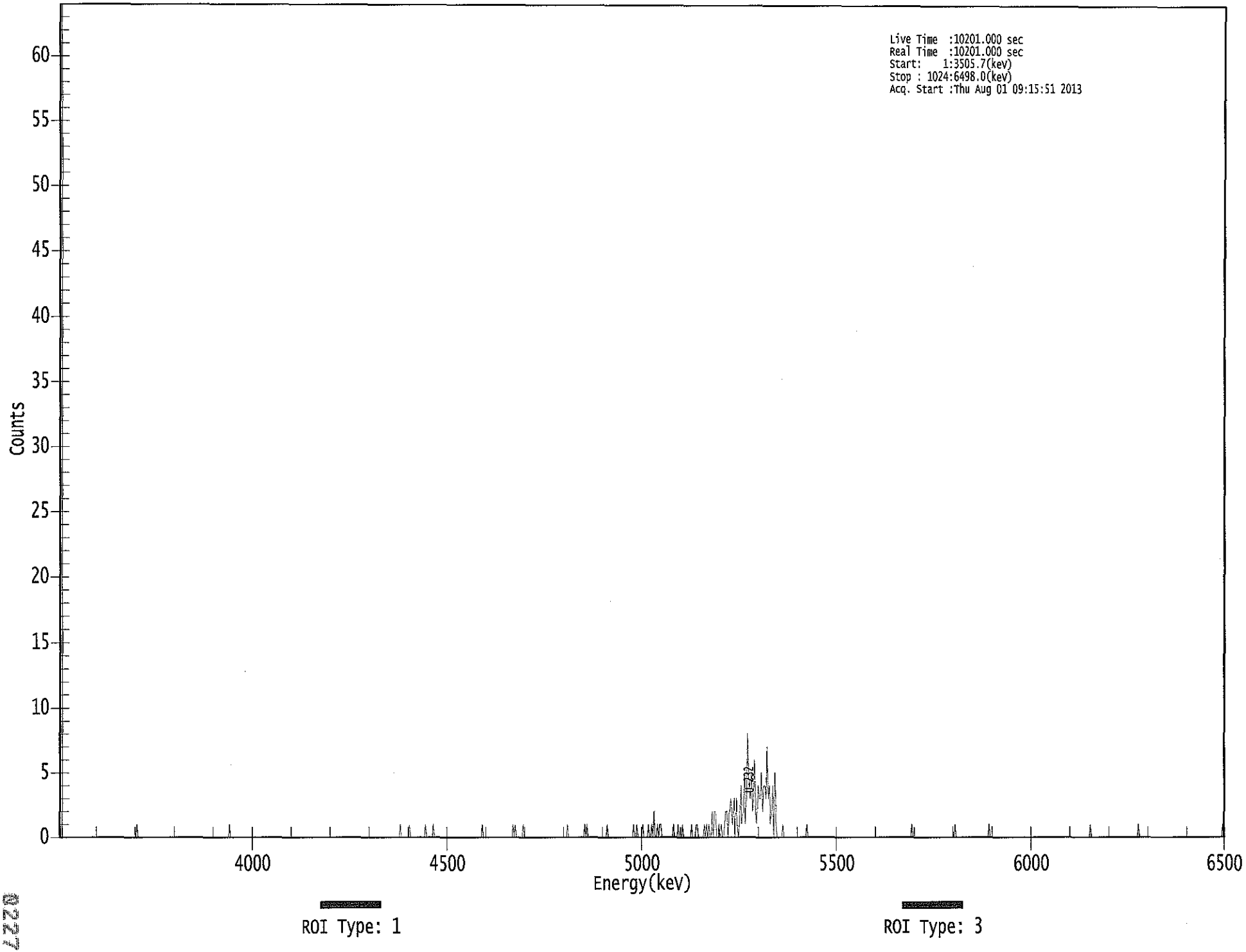
0000064790.CNF



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

Sample Title: 03

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	1	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	1	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	1	0	0	0	0
305:	0	0	0	1	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	1	0	0	0	0	0	0
329:	1	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	1	0	0	0	0

Sample Title: 03

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	1	0
401:	1	0	0	0	0	0	0	1
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	1
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	1	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	1	0	0	1	0	0	0	0
513:	1	0	0	0	0	1	0	0
521:	1	0	2	0	0	1	0	1
529:	1	0	0	0	0	0	0	0
537:	0	0	0	1	0	0	0	1
545:	0	0	0	1	0	0	0	0
553:	0	0	0	1	0	0	0	1
561:	1	0	0	0	0	0	1	0
569:	1	0	1	0	0	2	0	2
577:	2	0	0	1	0	1	0	0
585:	1	2	2	0	2	3	2	1
593:	3	0	3	1	0	1	4	1
601:	2	5	1	4	8	4	3	5
609:	2	3	6	2	1	4	3	3
617:	5	2	4	4	3	7	3	4
625:	1	2	4	0	5	1	0	0
633:	0	0	0	1	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	1	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	1	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	1	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 03

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	1	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	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	1	0	0

KB 8/1/13

Apex-Alpha™

Sample Description: S-5 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
Batch Identification: 1307098B-UU
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_011
Chamber Serial Number:
Detector Serial Number: 11
Env. Background: System Bkgd 63307
Reagent Blank: <not performed>

Sample Size: 5.000E-001 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 7:18:50 AM
Acquisition Date/Time: 8/1/2013 9:15:52 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.585 mL
Effective Efficiency: 0.0321 +/- 0.0042
Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
Chem. Recovery Factor: 0.1567 +/- 0.0207

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.281	60.49	25.32	0.51	0.00E+000	7.8
U-234		4.743	6.66	78.18	0.34	0.00E+000	2.6
U-235		4.323	0.83	239.53	0.17	0.00E+000	2.6
U-238		4.132	-0.34	592.91	0.34	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	0.997	5302.50*	1.00E+001 +/- 2.57E+000	8.68E-001 +/- 2.23E-001
U-234	0.998	4761.50*	1.10E+000 +/- 9.06E-001	7.90E-001 +/- 2.03E-001
U-235	0.972	4385.50*	1.69E-001 +/- 4.08E-001	8.51E-001 +/- 2.19E-001
U-238	0.980	4184.40*	-5.59E-002 +/- 3.32E-001	7.87E-001 +/- 2.02E-001

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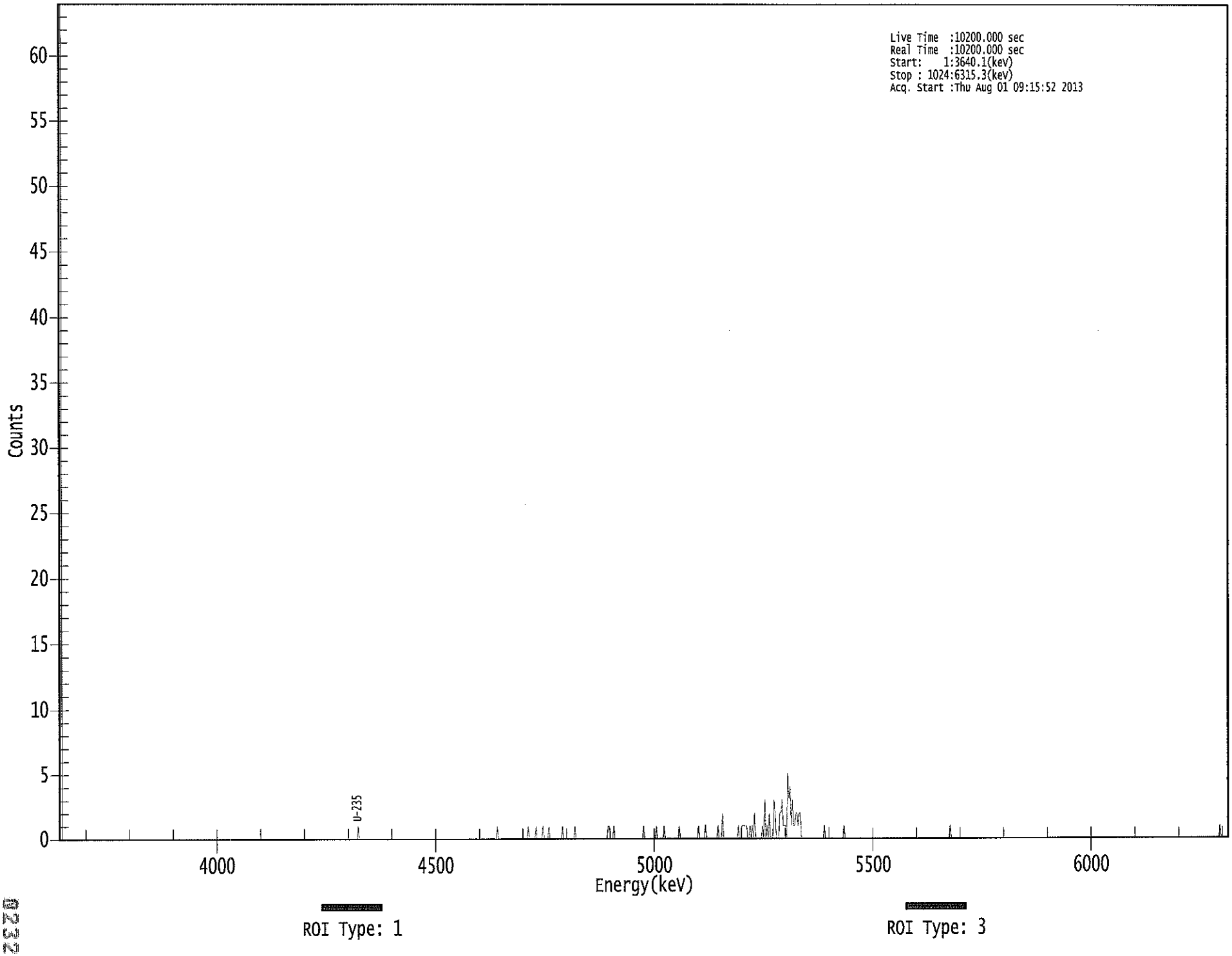
0000064820.CNF



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

369:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
377:	0	0	0	0	0	0	0	1
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	1	0	0	0	0	0
417:	0	1	0	0	0	0	0	1
425:	0	0	0	0	1	0	0	0
433:	0	0	0	0	0	0	0	0
441:	1	0	0	0	0	0	0	0
449:	0	0	0	1	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:	1	1	0	0	0	1	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	1
513:	0	0	0	0	0	0	0	0
521:	0	0	1	0	0	0	0	0
529:	0	1	0	0	0	0	0	0
537:	0	0	0	0	0	0	1	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	1
561:	0	0	0	0	0	1	0	0
569:	0	0	0	0	0	0	0	0
577:	1	0	0	0	2	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	1	0	0	1	1	1
601:	1	1	0	0	1	0	1	0
609:	2	0	0	0	0	0	0	1
617:	0	3	0	1	0	2	0	0
625:	0	3	2	0	0	0	2	2
633:	3	1	1	1	0	5	3	4
641:	1	3	1	1	2	2	1	2
649:	2	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	1	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	1	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 06

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

KB 8/1/13

Apex-Alpha™

Sample Description: I-4 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
Batch Identification: 1307098B-UU
Sample Identification: 11
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_012
Chamber Serial Number:
Detector Serial Number: 12
Env. Background: System Bkgd 63308
Reagent Blank: <not performed>

Sample Size: 5.000E-001 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 7:18:50 AM
Acquisition Date/Time: 8/1/2013 9:15:53 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: 0.0517 +/- 0.0053
Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM
Chem. Recovery Factor: 0.2597 +/- 0.0270

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.265	101.00	19.60	0.00	0.00E+000	6.7
U-234		4.732	5.83	82.55	0.17	0.00E+000	3.0
U-235		4.385	2.49	138.30	0.51	0.00E+000	3.0
U-238		4.186	1.66	169.38	0.34	0.00E+000	3.0

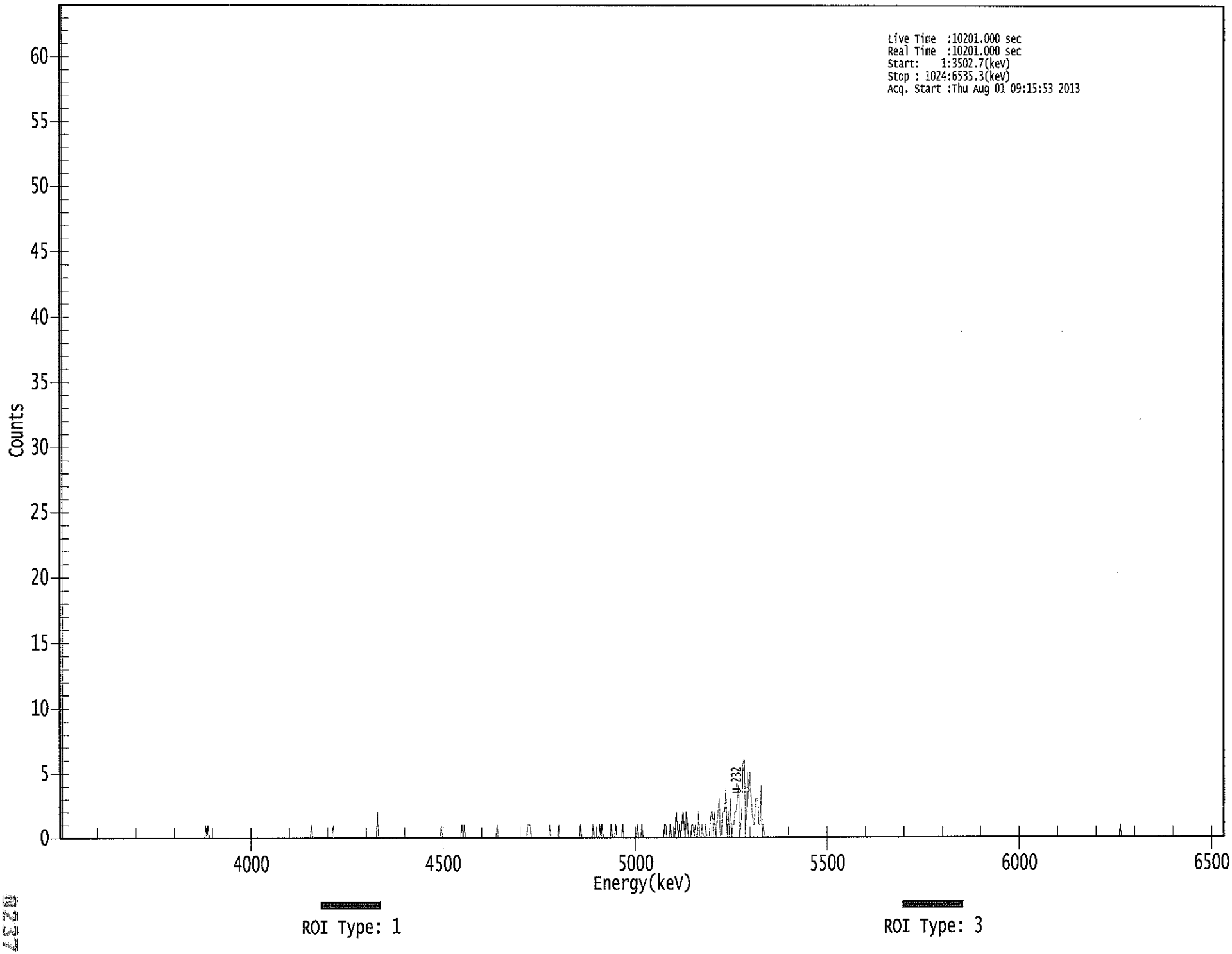
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.990	5302.50*	1.04E+001 +/- 2.09E+000	6.17E-001 +/- 1.24E-001
U-234	0.994	4761.50*	5.99E-001 +/- 5.09E-001	4.29E-001 +/- 8.63E-002
U-235	1.000	4385.50*	3.16E-001 +/- 4.41E-001	6.65E-001 +/- 1.34E-001
U-238	1.000	4184.40*	1.70E-001 +/- 2.90E-001	4.89E-001 +/- 9.84E-002

AG 8/1/13

0000064821.CNF



0237

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

Sample Title: 11

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	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	1	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	1	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	1	0	0	0	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	2
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	1
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	1	0	1	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 11

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

801:	0	0	0	0	0	0	0	0

Sample Title: 11

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	1	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™

ICB 8/1/13

Sample Description: I-4 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
Batch Identification: 1307098B-UU
Sample Identification: 12
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_013
Chamber Serial Number:
Detector Serial Number: 13
Env. Background: System Bkgd 63309
Reagent Blank: <not performed>

Sample Size: 5.000E-001 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 7:18:50 AM
Acquisition Date/Time: 8/1/2013 9:15:54 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: 0.0518 +/- 0.0053
Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
Chem. Recovery Factor: 0.2771 +/- 0.0289

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.279	101.64	19.59	1.36	0.00E+000	4.4
U-234		4.713	14.32	53.21	0.68	0.00E+000	4.9
U-235		4.407	5.32	91.11	0.68	0.00E+000	2.8
U-238		4.117	1.81	193.79	1.19	0.00E+000	2.8

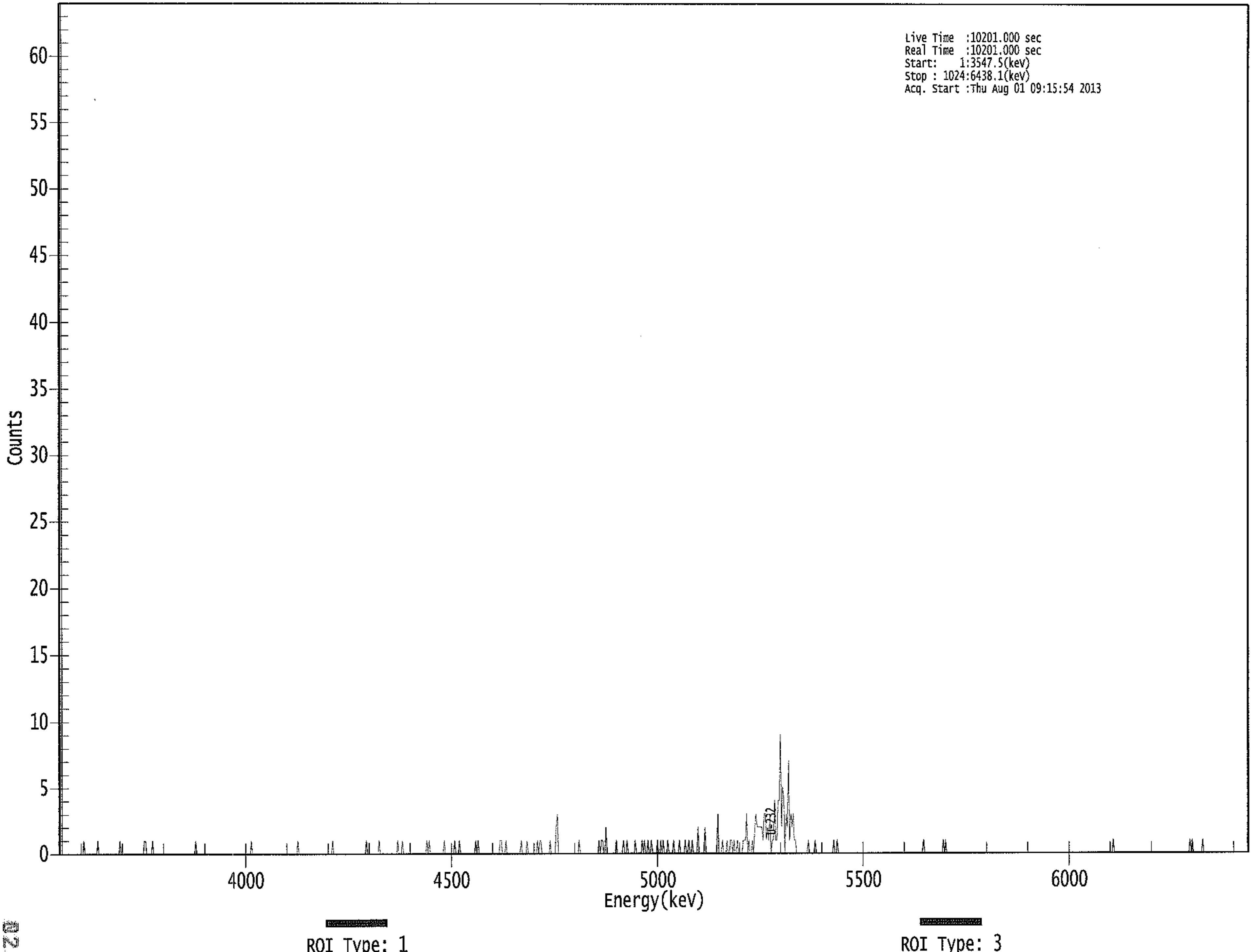
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	1.04E+001 +/- 2.10E+000	7.03E-001 +/- 1.41E-001
U-234	0.983	4761.50*	1.47E+000 +/- 8.35E-001	5.78E-001 +/- 1.16E-001
U-235	0.997	4385.50*	6.73E-001 +/- 6.28E-001	7.13E-001 +/- 1.43E-001
U-238	0.969	4184.40*	1.85E-001 +/- 3.60E-001	6.73E-001 +/- 1.35E-001

AG 8/1/13

0000064822.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: 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	1	0	0
25:	0	0	0	0	0	0	0	0
33:	0	1	0	0	0	0	0	0
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	1	1	0	0	0	0	0
81:	1	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	1	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	1	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	1	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	1	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:	1	0	0	0	0	0	0	0
273:	0	0	0	1	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	1	0	0	0	1
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	1	0	1	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	1	0	0	0	0
337:	0	0	0	0	1	0	0	0
345:	1	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	1	0
361:	1	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 12

Channel								
377:	0	0	0	1	1	0	0	0
385:	1	0	0	0	0	0	0	0
393:	0	0	0	0	0	1	0	0
401:	0	0	1	0	0	0	0	0
409:	0	0	0	1	0	1	1	0
417:	0	0	0	0	0	0	1	0
425:	0	0	0	2	3	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	0	0	0
457:	0	0	0	0	0	0	0	0
465:	1	0	1	1	0	0	2	0
473:	0	0	0	0	0	0	0	1
481:	0	0	0	0	0	1	0	0
489:	1	0	0	0	0	0	0	1
497:	0	0	0	0	0	1	0	1
505:	0	0	1	0	0	1	0	0
513:	0	0	1	0	0	1	0	1
521:	0	0	0	1	0	0	0	0
529:	1	0	0	0	0	1	0	0
537:	0	0	1	0	0	1	0	0
545:	1	0	0	0	0	2	0	0
553:	0	0	0	2	0	0	0	0
561:	0	0	0	0	0	0	3	0
569:	0	0	1	0	0	0	1	0
577:	0	1	1	0	1	0	0	1
585:	0	0	0	0	1	1	1	3
593:	0	1	0	0	1	0	2	3
601:	2	2	2	2	2	1	3	3
609:	1	2	1	3	0	1	1	4
617:	1	1	4	4	9	2	5	4
625:	0	3	2	7	1	3	2	3
633:	1	1	0	0	0	0	0	0
641:	0	0	0	0	1	0	0	0
649:	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	1	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	1
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	1	0	1	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 12

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	1	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	1	0
977:	0	0	0	0	0	0	0	1
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

8/1/2013 5:57:00 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 8/1/2013
Time : 5:57:00 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	8/1/2013 5:25:35 AM
Alpha_004	21f	ALL	Passed	8/1/2013 5:25:35 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	8/1/2013 5:25:36 AM
Alpha_011	21f	ALL	Passed	8/1/2013 5:25:37 AM
Alpha_012	21f	ALL	Passed	8/1/2013 5:25:38 AM
Alpha_013	21f	ALL	Passed	8/1/2013 5:25:39 AM
Alpha_014	21f	ALL	Passed	8/1/2013 5:25:40 AM
Alpha_015	21f	Peak Energy	Action	8/1/2013 5:25:41 AM
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	8/1/2013 5:25:41 AM
Alpha_019	AIM730	ALL	Passed	8/1/2013 5:25:42 AM
Alpha_020	AIM730	ALL	Passed	8/1/2013 5:25:43 AM
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	8/1/2013 5:25:44 AM
Alpha_023	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha_024	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha_025	AIM730	ALL	Passed	8/1/2013 5:25:46 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	8/1/2013 5:25:47 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	8/1/2013 5:25:48 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Passed	8/1/2013 5:25:49 AM
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:50 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:51 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:53 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:55 AM
Alpha_037	Alpha Analyst100DC	ALL	Not Done	
Alpha_038	Alpha Analyst100DC	Peak FWHM	Action	8/1/2013 5:25:57 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:59 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:01 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:02 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:04 AM

Review of QA Results - Pulser Check

8/1/2013 5:57:00 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Not Done	
Alpha_045	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:07 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:09 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:12 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:14 AM

APPROVED BY: C

APPROVAL DATE: 8/1/13

****
***** 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

SECTION IX

ANALYTICAL DATA (ISOTOPIC THORIUM)

13-07098
ThISO
Run 1

Work Order	13-07098
Analysis Code	ThISO
Run	1
Date Received	7/15/2013
Lab Deadline	8/6/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	HASL 300, 4.5.2
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Th-229
Radiometric Sol#	Th-18a
Tracer Act (dpm/g)	22.466
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/16/13 00:00	1.0000E+00
02	MBL	BLANK		07/16/13 00:00	1.0000E+00
03	DUP	I-4 TOT	44	07/09/13 12:25	1.0000E+00
04	TRG	PZ-111-SD TOT	36	07/09/13 10:42	1.0000E+00
05	TRG	PZ-111-SD DIS	36	07/09/13 10:42	1.0000E+00
06	TRG	S-5 TOT	45	07/09/13 10:50	1.0000E+00
07	TRG	S-5 DIS	45	07/09/13 10:50	1.0000E+00
08	TRG	FB @ PZ-110-SS TOT	43	07/09/13 11:40	1.0000E+00
09	TRG	PZ-110-SS TOT	41	07/09/13 12:13	1.0000E+00
10	TRG	PZ-110-SS DIS	41	07/09/13 12:13	1.0000E+00
11	DO	I-4 TOT	44	07/09/13 12:25	1.0000E+00
12	TRG	I-4 DIS	44	07/09/13 12:25	1.0000E+00
13	TRG	PZ-100-SS TOT	46	07/09/13 13:36	1.0000E+00
14	TRG	PZ-100-SS DIS	46	07/09/13 13:36	1.0000E+00
15	TRG	D-3 TOT	43	07/09/13 13:42	1.0000E+00
16	TRG	D-3 DIS	43	07/09/13 13:42	1.0000E+00
17	TRG	PZ-100-SD TOT	39	07/09/13 14:32	1.0000E+00
18	TRG	PZ-100-SD DIS	39	07/09/13 14:32	1.0000E+00
19	TRG	PZ-112-AS TOT	45	07/09/13 14:46	1.0000E+00
20	TRG	PZ-112-AS DIS	45	07/09/13 14:46	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.

13-07098
ThISO
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.4763	10.7		0.00								
02	MBL	0.2385	5.4		0.00								
03	DUP	0.2356	5.3		0.00								
04	TRG	0.2345	5.3		0.00								
05	TRG	0.2345	5.3		0.00								
06	TRG	0.2343	5.3		0.00								
07	TRG	0.2335	5.2		0.00								
08	TRG	0.2338	5.3		0.00								
09	TRG	0.2347	5.3		0.00								
10	TRG	0.2331	5.2		0.00								
11	DO	0.2330	5.2		0.00								
12	TRG	0.2335	5.2		0.00								
13	TRG	0.2335	5.2		0.00								
14	TRG	0.2345	5.3		0.00								
15	TRG	0.2324	5.2		0.00								
16	TRG	0.2322	5.2		0.00								
17	TRG	0.2321	5.2		0.00								
18	TRG	0.2326	5.2		0.00								
19	TRG	0.2320	5.2		0.00								
20	TRG	0.2329	5.2		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.

13-07098
ThISO
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/19/13 08:58	JWOLFE				
02	MBL			07/19/13 08:58	JWOLFE				
03	DUP			07/19/13 08:58	JWOLFE				
04	TRG			07/19/13 08:58	JWOLFE				
05	TRG			07/19/13 08:58	JWOLFE				
06	TRG			07/19/13 08:58	JWOLFE				
07	TRG			07/19/13 08:58	JWOLFE				
08	TRG			07/19/13 08:58	JWOLFE				
09	TRG			07/19/13 08:58	JWOLFE				
10	TRG			07/19/13 08:58	JWOLFE				
11	DO			07/19/13 08:58	JWOLFE				
12	TRG			07/19/13 08:58	JWOLFE				
13	TRG			07/19/13 08:58	JWOLFE				
14	TRG			07/19/13 08:58	JWOLFE				
15	TRG			07/19/13 08:58	JWOLFE				
16	TRG			07/19/13 08:58	JWOLFE				
17	TRG			07/19/13 08:58	JWOLFE				
18	TRG			07/19/13 08:58	JWOLFE				
19	TRG			07/19/13 08:58	JWOLFE				
20	TRG			07/19/13 08:58	JWOLFE				

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

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	13-07098	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	TH-228	LCS	LCS	pCi/l	5.26E+00	8.22E-01	8.54E-02	4.88E+00	107.78	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	7.82E-02	6.58E-02	5.60E-02					OK	OK
03	TH-228	DUP	I-4 TOT	pCi/l	0.00E+00	6.92E-02	1.50E-01				OK	OK	
04	TH-228	TRG	PZ-111-SD TOT	pCi/l	2.14E-02	4.64E-02	9.16E-02					OK	
05	TH-228	TRG	PZ-111-SD DIS	pCi/l	5.83E-03	4.71E-02	1.09E-01					OK	
06	TH-228	TRG	S-5 TOT	pCi/l	1.48E-01	1.34E-01	1.75E-01					OK	
07	TH-228	TRG	S-5 DIS	pCi/l	7.26E-02	9.17E-02	1.45E-01					OK	
08	TH-228	TRG	FB @ PZ-110-SS TOT	pCi/l	-2.55E-03	3.67E-02	9.72E-02					OK	
09	TH-228	TRG	PZ-110-SS TOT	pCi/l	4.99E-02	6.49E-02	8.96E-02					OK	
10	TH-228	TRG	PZ-110-SS DIS	pCi/l	-8.75E-03	4.42E-02	1.13E-01					OK	
11	TH-228	DO	I-4 TOT	pCi/l	1.21E-02	6.58E-02	1.43E-01					OK	
12	TH-228	TRG	I-4 DIS	pCi/l	5.51E-02	6.23E-02	8.72E-02					OK	
13	TH-228	TRG	PZ-100-SS TOT	pCi/l	3.73E-02	5.60E-02	9.08E-02					OK	
14	TH-228	TRG	PZ-100-SS DIS	pCi/l	5.44E-02	6.96E-02	1.03E-01					OK	
15	TH-228	TRG	D-3 TOT	pCi/l	1.54E-01	1.25E-01	1.32E-01					OK	
16	TH-228	TRG	D-3 DIS	pCi/l	1.79E-01	1.06E-01	8.67E-02					OK	
17	TH-228	TRG	PZ-100-SD TOT	pCi/l	2.00E-02	4.31E-02	8.37E-02					OK	
18	TH-228	TRG	PZ-100-SD DIS	pCi/l	2.92E-02	5.69E-02	1.06E-01					OK	
19	TH-228	TRG	PZ-112-AS TOT	pCi/l	6.36E-02	6.62E-02	6.93E-02					OK	
20	TH-228	TRG	PZ-112-AS DIS	pCi/l	7.49E-02	7.49E-02	8.75E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-ThISO-1

Run	1
Analysis Code	ThISO
Eberline Services Work Order	13-07098
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	TH-228	LCS	07/16/13 00:00	1.00E+00	102.45	0.00	0.00			
02	TH-228	MBL	07/16/13 00:00	1.00E+00	110.44	0.00	0.00			
03	TH-228	DUP	07/09/13 12:25	1.00E+00	59.27	0.00	0.00			
04	TH-228	TRG	07/09/13 10:42	1.00E+00	98.80	0.00	0.00			
05	TH-228	TRG	07/09/13 10:42	1.00E+00	119.03	0.00	0.00			
06	TH-228	TRG	07/09/13 10:50	1.00E+00	63.63	0.00	0.00			
07	TH-228	TRG	07/09/13 10:50	1.00E+00	80.73	0.00	0.00			
08	TH-228	TRG	07/09/13 11:40	1.00E+00	108.10	0.00	0.00			
09	TH-228	TRG	07/09/13 12:13	1.00E+00	72.25	0.00	0.00			
10	TH-228	TRG	07/09/13 12:13	1.00E+00	121.98	0.00	0.00			
11	TH-228	DO	07/09/13 12:25	1.00E+00	92.73	0.00	0.00			
12	TH-228	TRG	07/09/13 12:25	1.00E+00	131.81	0.00	0.00			
13	TH-228	TRG	07/09/13 13:36	1.00E+00	90.60	0.00	0.00			
14	TH-228	TRG	07/09/13 13:36	1.00E+00	84.04	0.00	0.00			
15	TH-228	TRG	07/09/13 13:42	1.00E+00	67.26	0.00	0.00			
16	TH-228	TRG	07/09/13 13:42	1.00E+00	102.54	0.00	0.00			
17	TH-228	TRG	07/09/13 14:32	1.00E+00	128.21	0.00	0.00			
18	TH-228	TRG	07/09/13 14:32	1.00E+00	84.87	0.00	0.00			
19	TH-228	TRG	07/09/13 14:46	1.00E+00	85.44	0.00	0.00			
20	TH-228	TRG	07/09/13 14:46	1.00E+00	81.64	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	13-07098	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	07/25/13 13:26		A_Spec	Alpha_045	170	3.88 E+02	6.00 E-03	19.1
02	TH-228	MBL	07/25/13 13:26		A_Spec	Alpha_046	170	5.83 E+00	1.00 E-03	17.9
03	TH-228	DUP	07/25/13 13:26		A_Spec	Alpha_047	170	1.00 E+00	0.00 E+00	18.2
04	TH-228	TRG	07/25/13 13:26		A_Spec	Alpha_048	170	1.32 E+00	4.00 E-03	16.8
05	TH-228	TRG	07/25/13 16:25		A_Spec	Alpha_003	170	4.50 E-01	1.50 E-02	17.5
06	TH-228	TRG	07/25/13 16:25		A_Spec	Alpha_004	170	6.79 E+00	1.30 E-02	19.4
07	TH-228	TRG	07/25/13 16:25		A_Spec	Alpha_010	170	4.28 E+00	1.60 E-02	19.7
08	TH-228	TRG	07/25/13 16:25		A_Spec	Alpha_011	170.02	-2.10 E-01	1.30 E-02	20.5
09	TH-228	TRG	07/25/13 16:25		A_Spec	Alpha_012	170	2.66 E+00	2.00 E-03	19.9
10	TH-228	TRG	07/25/13 16:25		A_Spec	Alpha_013	170.02	-7.40 E-01	2.20 E-02	18.7
11	TH-228	DO	07/25/13 16:25		A_Spec	Alpha_014	170	7.70 E-01	1.90 E-02	18.5
12	TH-228	TRG	07/25/13 16:25		A_Spec	Alpha_015	170.02	3.98 E+00	6.00 E-03	14.8
13	TH-228	TRG	07/25/13 16:27		A_Spec	Alpha_033	170	2.32 E+00	4.00 E-03	18.5
14	TH-228	TRG	07/25/13 16:27		A_Spec	Alpha_034	170	3.15 E+00	5.00 E-03	18.6
15	TH-228	TRG	07/25/13 16:27		A_Spec	Alpha_035	170	7.00 E+00	0.00 E+00	18.3
16	TH-228	TRG	07/25/13 16:27		A_Spec	Alpha_036	170	1.30 E+01	6.00 E-03	19.1
17	TH-228	TRG	07/25/13 16:27		A_Spec	Alpha_038	170	1.64 E+00	8.00 E-03	17.2
18	TH-228	TRG	07/25/13 16:27		A_Spec	Alpha_039	170	1.81 E+00	7.00 E-03	19.7
19	TH-228	TRG	07/25/13 16:27		A_Spec	Alpha_040	170	3.83 E+00	1.00 E-03	19
20	TH-228	TRG	07/25/13 16:27		A_Spec	Alpha_041	170	4.49 E+00	3.00 E-03	19.8

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-ThISO-1

Run	1
Analysis Code	ThISO
Eberline Services Work Order	13-07098
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	TH-230	LCS	LCS	pCi/l	5.12E+00	8.04E-01	8.14E-02	5.47E+00	93.56	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	1.59E-01	9.47E-02	5.61E-02					OK	OK
03	TH-230	DUP	I-4 TOT	pCi/l	7.74E-02	9.94E-02	1.47E-01				NA	OK	
04	TH-230	TRG	PZ-111-SD TOT	pCi/l	6.64E-02	7.20E-02	9.58E-02					OK	
05	TH-230	TRG	PZ-111-SD DIS	pCi/l	1.11E-01	7.73E-02	6.11E-02					OK	
06	TH-230	TRG	S-5 TOT	pCi/l	9.61E-02	1.07E-01	1.53E-01					OK	
07	TH-230	TRG	S-5 DIS	pCi/l	1.07E-02	4.90E-02	1.15E-01					OK	
08	TH-230	TRG	FB @ PZ-110-SS TOT	pCi/l	8.76E-02	6.82E-02	6.75E-02					OK	
09	TH-230	TRG	PZ-110-SS TOT	pCi/l	2.00E-01	1.26E-01	7.71E-02					OK	
10	TH-230	TRG	PZ-110-SS DIS	pCi/l	1.05E-01	7.45E-02	7.33E-02					OK	
11	TH-230	DO	I-4 TOT	pCi/l	5.65E-02	7.02E-02	1.06E-01					OK	
12	TH-230	TRG	I-4 DIS	pCi/l	1.13E-01	8.27E-02	7.69E-02					OK	
13	TH-230	TRG	PZ-100-SS TOT	pCi/l	1.72E-01	1.07E-01	6.62E-02					OK	
14	TH-230	TRG	PZ-100-SS DIS	pCi/l	1.70E-02	4.73E-02	1.02E-01					OK	
15	TH-230	TRG	D-3 TOT	pCi/l	1.51E-01	1.24E-01	1.30E-01					OK	
16	TH-230	TRG	D-3 DIS	pCi/l	9.03E-02	7.21E-02	6.48E-02					OK	
17	TH-230	TRG	PZ-100-SD TOT	pCi/l	1.02E-01	7.27E-02	6.31E-02					OK	
18	TH-230	TRG	PZ-100-SD DIS	pCi/l	9.01E-02	7.83E-02	7.61E-02					OK	
19	TH-230	TRG	PZ-112-AS TOT	pCi/l	1.64E-01	1.10E-01	9.80E-02					OK	
20	TH-230	TRG	PZ-112-AS DIS	pCi/l	1.31E-01	1.00E-01	1.04E-01					OK	

Run: 1
Analysis Code: ThISO
Eberline Services Work Order: 13-07098
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	TH-230	LCS	07/16/13 00:00	1.00E+00	102.45	0.00	0.00			
02	TH-230	MBL	07/16/13 00:00	1.00E+00	110.44	0.00	0.00			
03	TH-230	DUP	07/09/13 12:25	1.00E+00	59.27	0.00	0.00			
04	TH-230	TRG	07/09/13 10:42	1.00E+00	98.80	0.00	0.00			
05	TH-230	TRG	07/09/13 10:42	1.00E+00	119.03	0.00	0.00			
06	TH-230	TRG	07/09/13 10:50	1.00E+00	63.63	0.00	0.00			
07	TH-230	TRG	07/09/13 10:50	1.00E+00	80.73	0.00	0.00			
08	TH-230	TRG	07/09/13 11:40	1.00E+00	108.10	0.00	0.00			
09	TH-230	TRG	07/09/13 12:13	1.00E+00	72.25	0.00	0.00			
10	TH-230	TRG	07/09/13 12:13	1.00E+00	121.98	0.00	0.00			
11	TH-230	DO	07/09/13 12:25	1.00E+00	92.73	0.00	0.00			
12	TH-230	TRG	07/09/13 12:25	1.00E+00	131.81	0.00	0.00			
13	TH-230	TRG	07/09/13 13:36	1.00E+00	90.60	0.00	0.00			
14	TH-230	TRG	07/09/13 13:36	1.00E+00	84.04	0.00	0.00			
15	TH-230	TRG	07/09/13 13:42	1.00E+00	67.26	0.00	0.00			
16	TH-230	TRG	07/09/13 13:42	1.00E+00	102.54	0.00	0.00			
17	TH-230	TRG	07/09/13 14:32	1.00E+00	128.21	0.00	0.00			
18	TH-230	TRG	07/09/13 14:32	1.00E+00	84.87	0.00	0.00			
19	TH-230	TRG	07/09/13 14:46	1.00E+00	85.44	0.00	0.00			
20	TH-230	TRG	07/09/13 14:46	1.00E+00	81.64	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	13-07098	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-230	LCS	07/25/13 13:26		A_Spec	Alpha_045	170	3.77 E+02	0.00 E+00	19.1
02	TH-230	MBL	07/25/13 13:26		A_Spec	Alpha_046	170	1.18 E+01	1.00 E-03	17.9
03	TH-230	DUP	07/25/13 13:26		A_Spec	Alpha_047	170	3.15 E+00	5.00 E-03	18.2
04	TH-230	TRG	07/25/13 13:26		A_Spec	Alpha_048	170	4.15 E+00	5.00 E-03	16.8
05	TH-230	TRG	07/25/13 16:25		A_Spec	Alpha_003	170	8.66 E+00	2.00 E-03	17.5
06	TH-230	TRG	07/25/13 16:25		A_Spec	Alpha_004	170	4.47 E+00	9.00 E-03	19.4
07	TH-230	TRG	07/25/13 16:25		A_Spec	Alpha_010	170	6.40 E-01	8.00 E-03	19.7
08	TH-230	TRG	07/25/13 16:25		A_Spec	Alpha_011	170.02	7.32 E+00	4.00 E-03	20.5
09	TH-230	TRG	07/25/13 16:25		A_Spec	Alpha_012	170	1.08 E+01	1.00 E-03	19.9
10	TH-230	TRG	07/25/13 16:25		A_Spec	Alpha_013	170.02	8.98 E+00	6.00 E-03	18.7
11	TH-230	DO	07/25/13 16:25		A_Spec	Alpha_014	170	3.64 E+00	8.00 E-03	18.5
12	TH-230	TRG	07/25/13 16:25		A_Spec	Alpha_015	170.02	8.32 E+00	4.00 E-03	14.8
13	TH-230	TRG	07/25/13 16:27		A_Spec	Alpha_033	170	1.08 E+01	1.00 E-03	18.5
14	TH-230	TRG	07/25/13 16:27		A_Spec	Alpha_034	170	1.00 E+00	0.00 E+00	18.6
15	TH-230	TRG	07/25/13 16:27		A_Spec	Alpha_035	170	7.00 E+00	0.00 E+00	18.3
16	TH-230	TRG	07/25/13 16:27		A_Spec	Alpha_036	170	6.66 E+00	2.00 E-03	19.1
17	TH-230	TRG	07/25/13 16:27		A_Spec	Alpha_038	170	8.49 E+00	3.00 E-03	17.2
18	TH-230	TRG	07/25/13 16:27		A_Spec	Alpha_039	170	5.66 E+00	2.00 E-03	19.7
19	TH-230	TRG	07/25/13 16:27		A_Spec	Alpha_040	170	1.00 E+01	0.00 E+00	19
20	TH-230	TRG	07/25/13 16:27		A_Spec	Alpha_041	170	7.98 E+00	6.00 E-03	19.8

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-ThISO-1

Run: 1
Analysis Code: ThISO
Eberline Services Work Order: 13-07098
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	TH-232	LCS	LCS	pCi/l	5.35E+00	8.32E-01	5.65E-02	4.88E+00	109.61	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	1.11E-02	2.67E-02	5.60E-02					OK	OK
03	TH-232	DUP	I-4 TOT	pCi/l	3.24E-02	7.03E-02	1.38E-01				NA	OK	
04	TH-232	TRG	PZ-111-SD TOT	pCi/l	2.38E-02	4.54E-02	8.38E-02					OK	
05	TH-232	TRG	PZ-111-SD DIS	pCi/l	-1.08E-02	2.68E-02	7.63E-02					OK	
06	TH-232	TRG	S-5 TOT	pCi/l	1.79E-01	1.32E-01	1.21E-01					OK	
07	TH-232	TRG	S-5 DIS	pCi/l	-6.01E-03	3.63E-02	1.14E-01					OK	
08	TH-232	TRG	FB @ PZ-110-SS TOT	pCi/l	3.18E-02	4.12E-02	5.71E-02					OK	
09	TH-232	TRG	PZ-110-SS TOT	pCi/l	1.84E-02	5.12E-02	1.11E-01					OK	
10	TH-232	TRG	PZ-110-SS DIS	pCi/l	6.18E-02	5.71E-02	6.56E-02					OK	
11	TH-232	DO	I-4 TOT	pCi/l	1.02E-02	3.13E-02	7.40E-02					OK	
12	TH-232	TRG	I-4 DIS	pCi/l	3.85E-02	4.68E-02	5.68E-02					OK	
13	TH-232	TRG	PZ-100-SS TOT	pCi/l	3.16E-02	5.40E-02	9.49E-02					OK	
14	TH-232	TRG	PZ-100-SS DIS	pCi/l	4.81E-02	5.86E-02	7.09E-02					OK	
15	TH-232	TRG	D-3 TOT	pCi/l	-3.67E-03	4.29E-02	9.00E-02					OK	
16	TH-232	TRG	D-3 DIS	pCi/l	3.14E-02	4.71E-02	7.63E-02					OK	
17	TH-232	TRG	PZ-100-SD TOT	pCi/l	9.96E-03	2.39E-02	5.01E-02					OK	
18	TH-232	TRG	PZ-100-SD DIS	pCi/l	2.37E-02	4.52E-02	8.34E-02					OK	
19	TH-232	TRG	PZ-112-AS TOT	pCi/l	1.63E-02	4.53E-02	9.79E-02					OK	
20	TH-232	TRG	PZ-112-AS DIS	pCi/l	-3.97E-02	5.38E-02	1.67E-01					OK	

Run: 1
Analysis Code: ThISO
Eberline Services Work Order: 13-07098
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	TH-232	LCS	07/16/13 00:00	1.00E+00	102.45	0.00	0.00			
02	TH-232	MBL	07/16/13 00:00	1.00E+00	110.44	0.00	0.00			
03	TH-232	DUP	07/09/13 12:25	1.00E+00	59.27	0.00	0.00			
04	TH-232	TRG	07/09/13 10:42	1.00E+00	98.80	0.00	0.00			
05	TH-232	TRG	07/09/13 10:42	1.00E+00	119.03	0.00	0.00			
06	TH-232	TRG	07/09/13 10:50	1.00E+00	63.63	0.00	0.00			
07	TH-232	TRG	07/09/13 10:50	1.00E+00	80.73	0.00	0.00			
08	TH-232	TRG	07/09/13 11:40	1.00E+00	108.10	0.00	0.00			
09	TH-232	TRG	07/09/13 12:13	1.00E+00	72.25	0.00	0.00			
10	TH-232	TRG	07/09/13 12:13	1.00E+00	121.98	0.00	0.00			
11	TH-232	DO	07/09/13 12:25	1.00E+00	92.73	0.00	0.00			
12	TH-232	TRG	07/09/13 12:25	1.00E+00	131.81	0.00	0.00			
13	TH-232	TRG	07/09/13 13:36	1.00E+00	90.60	0.00	0.00			
14	TH-232	TRG	07/09/13 13:36	1.00E+00	84.04	0.00	0.00			
15	TH-232	TRG	07/09/13 13:42	1.00E+00	67.26	0.00	0.00			
16	TH-232	TRG	07/09/13 13:42	1.00E+00	102.54	0.00	0.00			
17	TH-232	TRG	07/09/13 14:32	1.00E+00	128.21	0.00	0.00			
18	TH-232	TRG	07/09/13 14:32	1.00E+00	84.87	0.00	0.00			
19	TH-232	TRG	07/09/13 14:46	1.00E+00	85.44	0.00	0.00			
20	TH-232	TRG	07/09/13 14:46	1.00E+00	81.64	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	13-07098	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	07/25/13 13:26		A_Spec	Alpha_045	170	3.95 E+02	1.00 E-03	19.1
02	TH-232	MBL	07/25/13 13:26		A_Spec	Alpha_046	170	8.30 E-01	1.00 E-03	17.9
03	TH-232	DUP	07/25/13 13:26		A_Spec	Alpha_047	170	1.32 E+00	4.00 E-03	18.2
04	TH-232	TRG	07/25/13 13:26		A_Spec	Alpha_048	170	1.49 E+00	3.00 E-03	16.8
05	TH-232	TRG	07/25/13 16:25		A_Spec	Alpha_003	170	-8.50 E-01	5.00 E-03	17.5
06	TH-232	TRG	07/25/13 16:25		A_Spec	Alpha_004	170	8.32 E+00	4.00 E-03	19.4
07	TH-232	TRG	07/25/13 16:25		A_Spec	Alpha_010	170	-3.60 E-01	8.00 E-03	19.7
08	TH-232	TRG	07/25/13 16:25		A_Spec	Alpha_011	170.02	2.66 E+00	2.00 E-03	20.5
09	TH-232	TRG	07/25/13 16:25		A_Spec	Alpha_012	170	1.00 E+00	0.00 E+00	19.9
10	TH-232	TRG	07/25/13 16:25		A_Spec	Alpha_013	170.02	5.32 E+00	4.00 E-03	18.7
11	TH-232	DO	07/25/13 16:25		A_Spec	Alpha_014	170	6.60 E-01	2.00 E-03	18.5
12	TH-232	TRG	07/25/13 16:25		A_Spec	Alpha_015	170.02	2.83 E+00	1.00 E-03	14.8
13	TH-232	TRG	07/25/13 16:27		A_Spec	Alpha_033	170	2.00 E+00	0.00 E+00	18.5
14	TH-232	TRG	07/25/13 16:27		A_Spec	Alpha_034	170	2.83 E+00	1.00 E-03	18.6
15	TH-232	TRG	07/25/13 16:27		A_Spec	Alpha_035	170	-1.70 E-01	1.00 E-03	18.3
16	TH-232	TRG	07/25/13 16:27		A_Spec	Alpha_036	170	2.32 E+00	4.00 E-03	19.1
17	TH-232	TRG	07/25/13 16:27		A_Spec	Alpha_038	170	8.30 E-01	1.00 E-03	17.2
18	TH-232	TRG	07/25/13 16:27		A_Spec	Alpha_039	170	1.49 E+00	3.00 E-03	19.7
19	TH-232	TRG	07/25/13 16:27		A_Spec	Alpha_040	170	1.00 E+00	0.00 E+00	19
20	TH-232	TRG	07/25/13 16:27		A_Spec	Alpha_041	170	-2.42 E+00	2.60 E-02	19.8

Count Room Report
Client: Engineering Management Su

13-07098-ThISO-1 (pCi/l) in WA
Tracer ID: Th-18a

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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	07/16/13 00:00	1.0000	0.4763	10.7006		0.00		
02	MBL	BLANK	07/16/13 00:00	1.0000	0.2385	5.3581		0.00		
03	DUP	I-4 TOT	07/09/13 12:25	1.0000	0.2356	5.2930		0.00		
04	TRG	PZ-111-SD TOT	07/09/13 10:42	1.0000	0.2345	5.2683		0.00		
05	TRG	PZ-111-SD DIS	07/09/13 10:42	1.0000	0.2345	5.2683		0.00		
06	TRG	S-5 TOT	07/09/13 10:50	1.0000	0.2343	5.2638		0.00		
07	TRG	S-5 DIS	07/09/13 10:50	1.0000	0.2335	5.2458		0.00		
08	TRG	FB @ PZ-110-SS TOT	07/09/13 11:40	1.0000	0.2338	5.2526		0.00		
09	TRG	PZ-110-SS TOT	07/09/13 12:13	1.0000	0.2347	5.2728		0.00		
10	TRG	PZ-110-SS DIS	07/09/13 12:13	1.0000	0.2331	5.2368		0.00		
11	DO	I-4 TOT	07/09/13 12:25	1.0000	0.2330	5.2346		0.00		
12	TRG	I-4 DIS	07/09/13 12:25	1.0000	0.2335	5.2458		0.00		
13	TRG	PZ-100-SS TOT	07/09/13 13:36	1.0000	0.2335	5.2458		0.00		
14	TRG	PZ-100-SS DIS	07/09/13 13:36	1.0000	0.2345	5.2683		0.00		
15	TRG	D-3 TOT	07/09/13 13:42	1.0000	0.2324	5.2211		0.00		
16	TRG	D-3 DIS	07/09/13 13:42	1.0000	0.2322	5.2166		0.00		
17	TRG	PZ-100-SD TOT	07/09/13 14:32	1.0000	0.2321	5.2144		0.00		
18	TRG	PZ-100-SD DIS	07/09/13 14:32	1.0000	0.2326	5.2256		0.00		
19	TRG	PZ-112-AS TOT	07/09/13 14:46	1.0000	0.2320	5.2121		0.00		
20	TRG	PZ-112-AS DIS	07/09/13 14:46	1.0000	0.2329	5.2323		0.00		

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-07098	1	ThISO	7/19/2013 8:57	JWOLFE	JW	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Th-228	Th-8b	103.560	7/19/2013	0.100	0.1046				4.88	0.176	0.00	0.000	0.00	0.000	0.00	0.000
Th-230	Th-1b	23.525	7/19/2013	0.500	0.5160				5.47	0.148	0.00	0.000	0.00	0.000	0.00	0.000
Th-232	Th-8b	103.560	7/19/2013	0.100	0.1046				4.88	0.176	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	Th-229	Th-18a	22.466	7/19/2013	0.4763	0.2200
02	Th-229	Th-18a	22.466	7/19/2013	0.2385	0.2200
03	Th-229	Th-18a	22.466	7/19/2013	0.2356	0.2200
04	Th-229	Th-18a	22.466	7/19/2013	0.2345	0.2200
05	Th-229	Th-18a	22.466	7/19/2013	0.2345	0.2200
06	Th-229	Th-18a	22.466	7/19/2013	0.2343	0.2200
07	Th-229	Th-18a	22.466	7/19/2013	0.2335	0.2200
08	Th-229	Th-18a	22.466	7/19/2013	0.2338	0.2200
09	Th-229	Th-18a	22.466	7/19/2013	0.2347	0.2200
10	Th-229	Th-18a	22.466	7/19/2013	0.2331	0.2200
11	Th-229	Th-18a	22.466	7/19/2013	0.2330	0.2200
12	Th-229	Th-18a	22.466	7/19/2013	0.2335	0.2200
13	Th-229	Th-18a	22.466	7/19/2013	0.2335	0.2200
14	Th-229	Th-18a	22.466	7/19/2013	0.2345	0.2200
15	Th-229	Th-18a	22.466	7/19/2013	0.2324	0.2200
16	Th-229	Th-18a	22.466	7/19/2013	0.2322	0.2200
17	Th-229	Th-18a	22.466	7/19/2013	0.2321	0.2200
18	Th-229	Th-18a	22.466	7/19/2013	0.2326	0.2200
19	Th-229	Th-18a	22.466	7/19/2013	0.2320	0.2200
20	Th-229	Th-18a	22.466	7/19/2013	0.2329	0.2200

Balance Printer Tapes

Tracer

0.4763 g
0.2385 g
-0.2356 g
-0.2345 g
-0.2345 g
-0.2345 g
-0.2335 g
-0.2338 g
-0.2347 g
-0.2331 g
-0.2330 g
-0.2335 g
-0.2335 g
-0.2345 g
-0.2324 g
-0.2322 g
-0.2321 g
.2326
-0.2320 g
-0.2329 g

LCS

0.5160 g
0.1046 g

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 7/19/2013 8:49 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07098	1	ThISO	liters	8/6/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	I-4 TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-111-SD TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-111-SD DIS	TRG					1.0000E+00	1.0000E+00				
06	S-5 TOT	TRG					1.0000E+00	1.0000E+00				
07	S-5 DIS	TRG					1.0000E+00	1.0000E+00				
08	FB @ PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
10	PZ-110-SS DIS	TRG					1.0000E+00	1.0000E+00				
11	I-4 TOT	DO					1.0000E+00	1.0000E+00				
12	I-4 DIS	TRG					1.0000E+00	1.0000E+00				
13	PZ-100-SS TOT	TRG					1.0000E+00	1.0000E+00				
14	PZ-100-SS DIS	TRG					1.0000E+00	1.0000E+00				
15	D-3 TOT	TRG					1.0000E+00	1.0000E+00				
16	D-3 DIS	TRG					1.0000E+00	1.0000E+00				
17	PZ-100-SD TOT	TRG					1.0000E+00	1.0000E+00				
18	PZ-100-SD DIS	TRG					1.0000E+00	1.0000E+00				
19	PZ-112-AS TOT	TRG					1.0000E+00	1.0000E+00				
20	PZ-112-AS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: JWolfe Date: 7/19/13

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-TH
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_045
Chamber Serial Number: 04026482A
Detector Serial Number: 91131
Env. Background: System Bkgd 62775
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/25/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 1:26:17 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.476 mL
Effective Efficiency: 0.1956 +/- 0.0120
Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
Chem. Recovery Factor: 1.0245 +/- 0.0654

Control Certificate Name: NatTh_Th-8
Chem. Recov. of Control: TH-232 1.096062 +/- 0.093049
Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.805	6.66	78.18	0.34	0.00E+000	3.0
TH-228		5.368	387.98	9.97	1.02	0.00E+000	27.4
TH-229	T	4.866	355.83	10.39	0.17	0.00E+000	12.7
TH-230		4.634	377.00	10.11	0.00	0.00E+000	23.1
TH-232		3.963	394.83	9.87	0.17	0.00E+000	8.8

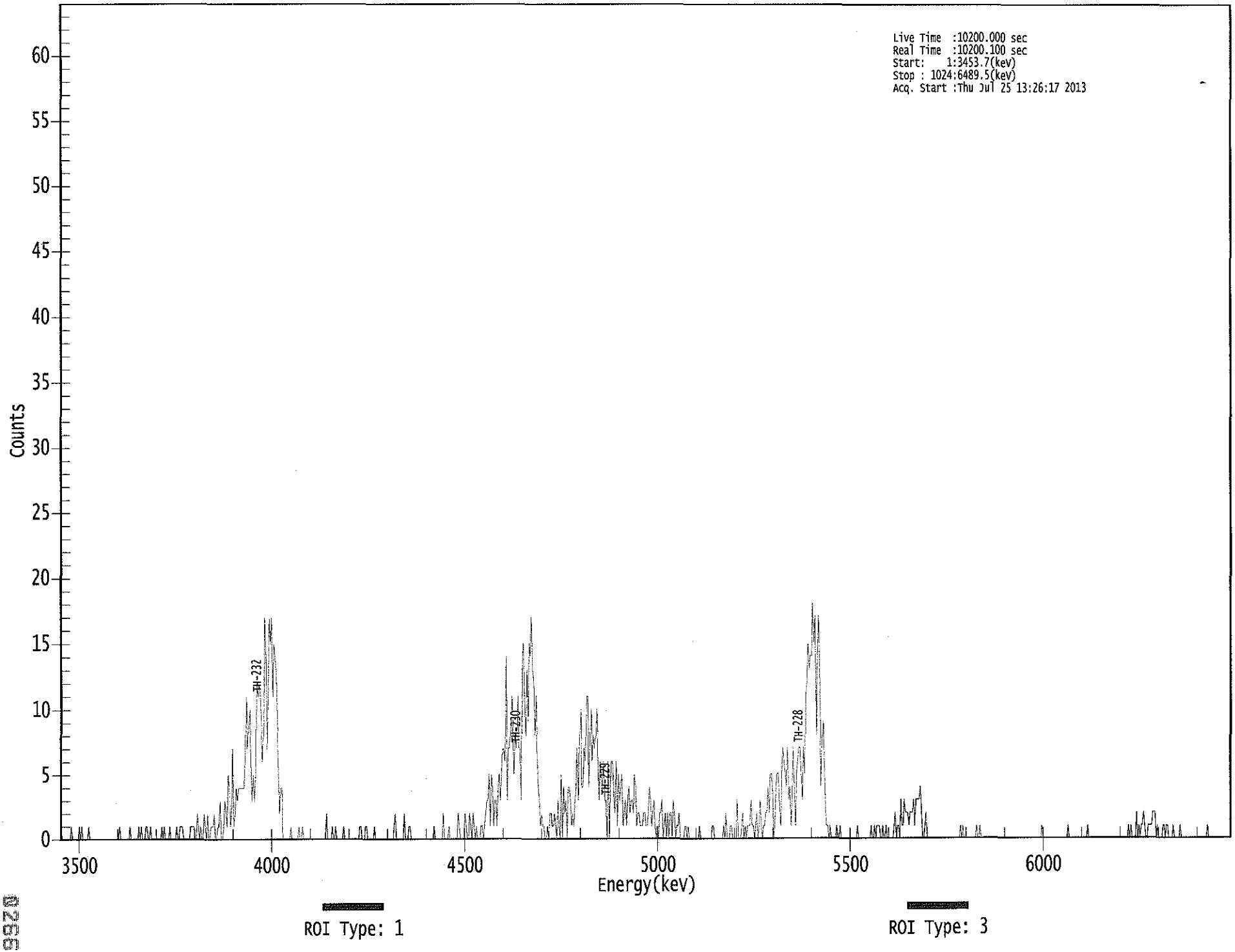
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.989	5850.00*	9.25E-002 +/- 7.32E-002	6.64E-002 +/- 8.00E-003
TH-228	0.995	5400.00*	5.26E+000 +/- 8.22E-001	8.54E-002 +/- 1.03E-002
TH-229	1.000	4872.00*	4.84E+000 +/- 5.83E-001	5.68E-002 +/- 6.84E-003
TH-230	0.993	4672.00*	5.12E+000 +/- 8.04E-001	8.14E-002 +/- 9.80E-003
TH-232	0.994	3997.00*	5.35E+000 +/- 8.32E-001	5.65E-002 +/- 6.81E-003

AG
7/26/13

0000063962.CNF



9926

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

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10200

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

369:	1	0	1	2	3	3	5	1

Sample Title: 01

Channel								
377:	5	4	1	3	3	1	4	5
385:	3	5	7	7	6	14	3	7
393:	7	9	11	8	5	8	7	11
401:	7	7	3	14	15	10	8	13
409:	9	15	14	17	13	12	8	11
417:	7	4	3	1	2	1	1	0
425:	0	1	0	2	2	1	1	2
433:	1	0	3	1	0	5	0	4
441:	2	3	0	4	4	3	1	2
449:	1	3	4	7	3	7	10	4
457:	4	7	6	11	11	4	7	10
465:	6	8	7	8	10	6	3	6
473:	5	4	6	3	3	0	6	0
481:	4	6	6	3	2	6	1	5
489:	3	4	5	1	2	3	1	3
497:	4	2	3	3	2	5	4	1
505:	2	2	1	1	1	2	2	1
513:	1	2	4	3	1	2	3	1
521:	0	1	0	2	2	3	0	1
529:	2	0	2	0	2	2	0	3
537:	2	0	1	1	2	0	0	0
545:	0	1	1	0	1	0	0	0
553:	0	0	0	0	0	0	1	0
561:	0	0	0	0	0	0	0	0
569:	0	1	1	0	0	0	0	0
577:	0	0	0	1	0	2	0	0
585:	0	1	1	0	0	0	0	3
593:	0	0	0	1	2	0	1	0
601:	1	1	1	3	1	1	0	1
609:	2	0	1	3	1	0	1	1
617:	2	2	4	2	5	5	4	0
625:	1	4	5	5	3	1	5	7
633:	6	5	4	7	3	4	1	3
641:	7	4	1	5	6	7	7	5
649:	3	7	5	11	12	15	13	14
657:	14	18	15	17	8	14	17	13
665:	4	7	9	7	3	1	1	0
673:	1	0	0	0	0	0	1	0
681:	0	1	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	1	0	0	1
713:	0	1	1	1	0	0	1	0
721:	0	1	0	0	0	0	0	0
729:	1	2	0	1	1	0	3	1
737:	1	3	2	2	2	1	2	2
745:	2	3	1	3	3	3	3	4
753:	2	0	0	1	2	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	1	0	1	0	0	0
793:	0	0	0	0	0	0	0	0

801:	1	0	0	1	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	1	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	1	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	1	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	1	0	1
937:	0	0	0	0	2	0	1	0
945:	1	1	2	1	0	0	1	1
953:	1	1	2	2	2	0	1	0
961:	0	0	0	1	1	0	1	1
969:	0	0	0	0	1	0	0	0
977:	0	0	1	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	1	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: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_046
Chamber Serial Number: 04026482B
Detector Serial Number: 58762
Env. Background: System Bkgd 62776
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/25/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 1:26:19 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.238 mL
Effective Efficiency: 0.1976 +/- 0.0160
Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
Chem. Recovery Factor: 1.1044 +/- 0.0914

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.855	6.00	86.43	0.00	0.00E+000	3.0
TH-228		5.272	5.83	82.55	0.17	0.00E+000	6.0
TH-229	T	4.822	180.00	14.65	0.00	0.00E+000	3.6
TH-230		4.556	11.83	57.46	0.17	0.00E+000	3.0
TH-232		4.076	0.83	239.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	8.25E-002 +/- 7.25E-002	8.25E-002 +/- 1.31E-002
TH-228	0.918	5400.00*	7.82E-002 +/- 6.58E-002	5.60E-002 +/- 8.88E-003
TH-229	0.987	4872.00*	2.43E+000 +/- 3.85E-001	8.08E-002 +/- 1.28E-002
TH-230	0.932	4672.00*	1.59E-001 +/- 9.47E-002	5.61E-002 +/- 8.89E-003
TH-232	0.968	3997.00*	1.11E-002 +/- 2.67E-002	5.60E-002 +/- 8.87E-003

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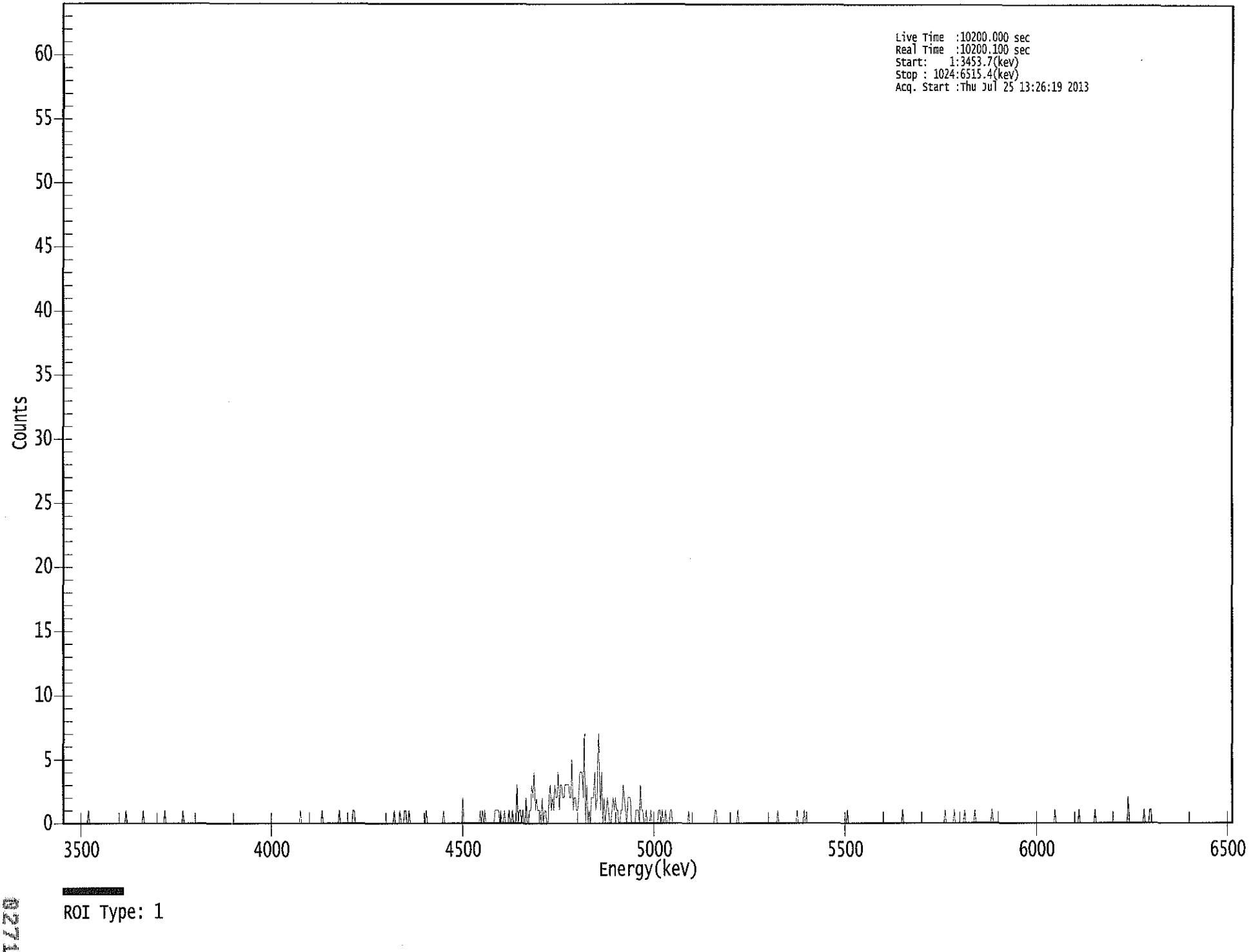
7/26/13

0000064056.CNF



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

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	1	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	1
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	1	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	1	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	1	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	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:	1	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	1	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	1	0	0	0	0	0
249:	0	0	0	0	0	0	1	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	1	0	0	0	0	1
297:	0	0	0	1	1	0	0	1
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	1	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	2	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	1	0	1

369:	0	1	0	0	0	0	0	0

Sample Title: 02

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

801:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
809:	0	0	0	0	1	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	1	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	1	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	1	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	2	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	1	0	0	0	0	1	1
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™

Sample Description: I-4 TOT DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-TH
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_047
Chamber Serial Number: 02030596A
Detector Serial Number: 91086
Env. Background: System Bkgd 62777
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 1:26:13 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.236 mL
Effective Efficiency: 0.1080 +/- 0.0115
Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
Chem. Recovery Factor: 0.5927 +/- 0.0640

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.794	2.83	120.53	0.17	0.00E+000	2.9
TH-228		5.300	0.00	1960.0	0.00	0.00E+000	0.0
TH-229	T	4.874	97.15	19.99	0.85	0.00E+000	9.3
TH-230		4.678	3.15	126.67	0.85	0.00E+000	2.9
TH-232		3.983	1.32	215.97	0.68	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)
TH-227	0.984	5850.00*	7.13E-002 +/- 8.73E-002	1.05E-001 +/- 2.20E-002
TH-228	0.949	5400.00*	0.00E+000 +/- 6.92E-002	1.50E-001 +/- 3.13E-002
TH-229	1.000	4872.00*	2.40E+000 +/- 5.00E-001	1.48E-001 +/- 3.08E-002
TH-230	1.000	4672.00*	7.74E-002 +/- 9.94E-002	1.47E-001 +/- 3.07E-002
TH-232	0.999	3997.00*	3.24E-002 +/- 7.03E-002	1.38E-001 +/- 2.89E-002

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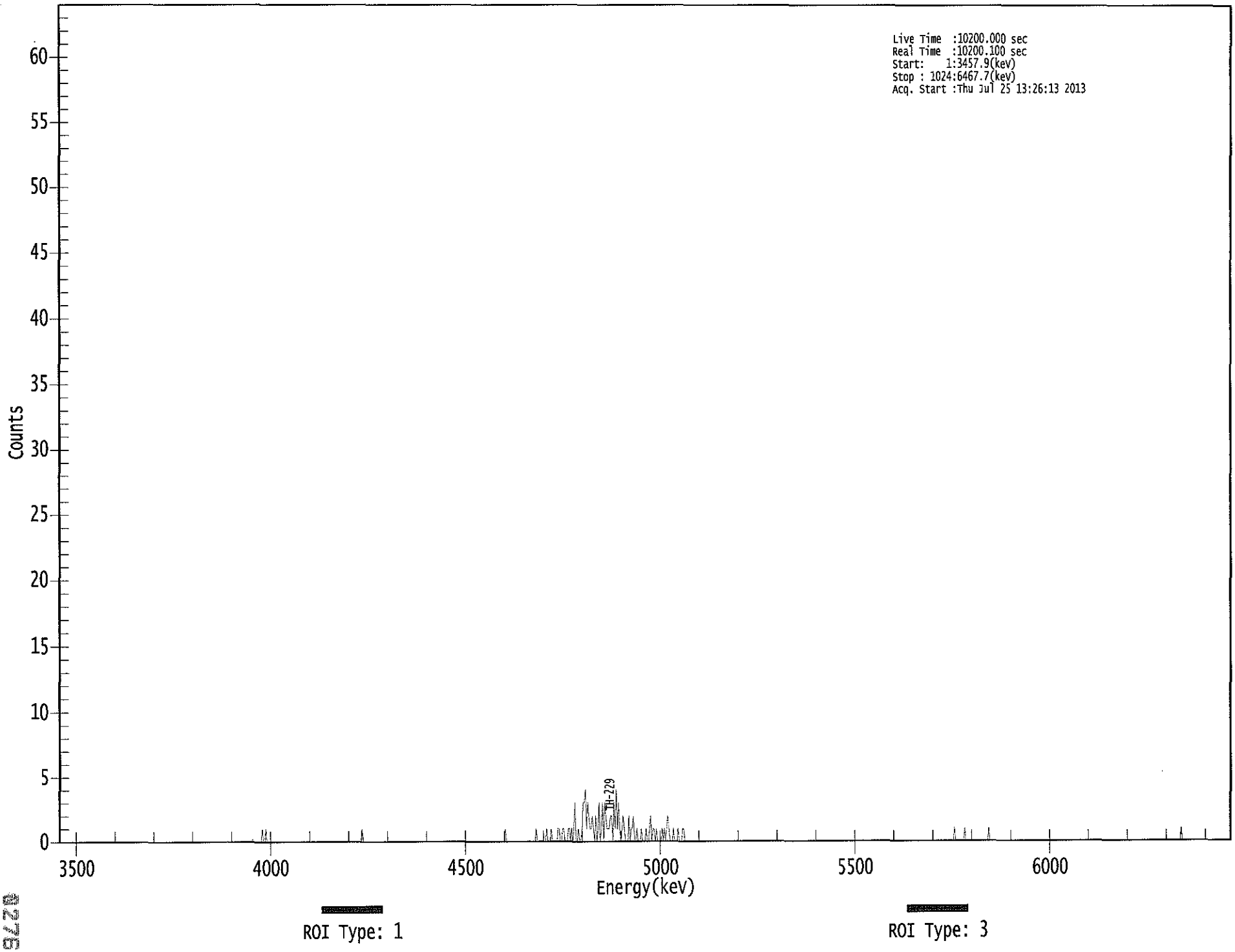
0000063972.CNF



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

Sample Title: 03

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	1	0	0	1	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:	1	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
425:	0	1	0	0	0	1	0	0
433:	0	0	0	1	1	0	0	1
441:	1	0	0	0	1	1	0	1
449:	0	1	3	0	0	1	0	0
457:	1	3	3	4	1	3	2	1
465:	1	2	1	0	2	0	1	3
473:	0	1	3	0	3	2	1	1
481:	1	2	2	0	3	1	4	1
489:	3	1	0	1	2	1	0	0
497:	0	2	0	1	1	2	0	0
505:	1	0	0	0	1	0	0	0
513:	1	0	0	1	2	0	1	1
521:	0	1	0	0	0	0	1	0
529:	1	0	1	2	1	0	0	0
537:	1	0	0	0	1	0	0	0
545:	1	1	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	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	1	0	0
785:	0	0	0	0	0	0	1	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
809:	0	0	0	1	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	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	1	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: PZ-111-SD TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-TH
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_048
Chamber Serial Number: 02030596B
Detector Serial Number: 83111
Env. Background: System Bkgd 62778
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 1:26:15 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.236 mL
Effective Efficiency: 0.1660 +/- 0.0146
Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
Chem. Recovery Factor: 0.9880 +/- 0.0884

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.842	7.00	79.20	0.00	0.00E+000	3.0
TH-228		5.295	1.32	215.97	0.68	0.00E+000	3.0
TH-229	T	4.879	149.32	16.08	0.68	0.00E+000	5.2
TH-230		4.656	4.15	107.12	0.85	0.00E+000	3.0
TH-232		3.915	1.49	190.02	0.51	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	1.15E-001 +/- 9.30E-002	9.83E-002 +/- 1.69E-002
TH-228	0.944	5400.00*	2.14E-002 +/- 4.64E-002	9.16E-002 +/- 1.57E-002
TH-229	1.000	4872.00*	2.40E+000 +/- 4.12E-001	9.05E-002 +/- 1.56E-002
TH-230	0.999	4672.00*	6.64E-002 +/- 7.20E-002	9.58E-002 +/- 1.65E-002
TH-232	0.965	3997.00*	2.38E-002 +/- 4.54E-002	8.38E-002 +/- 1.44E-002

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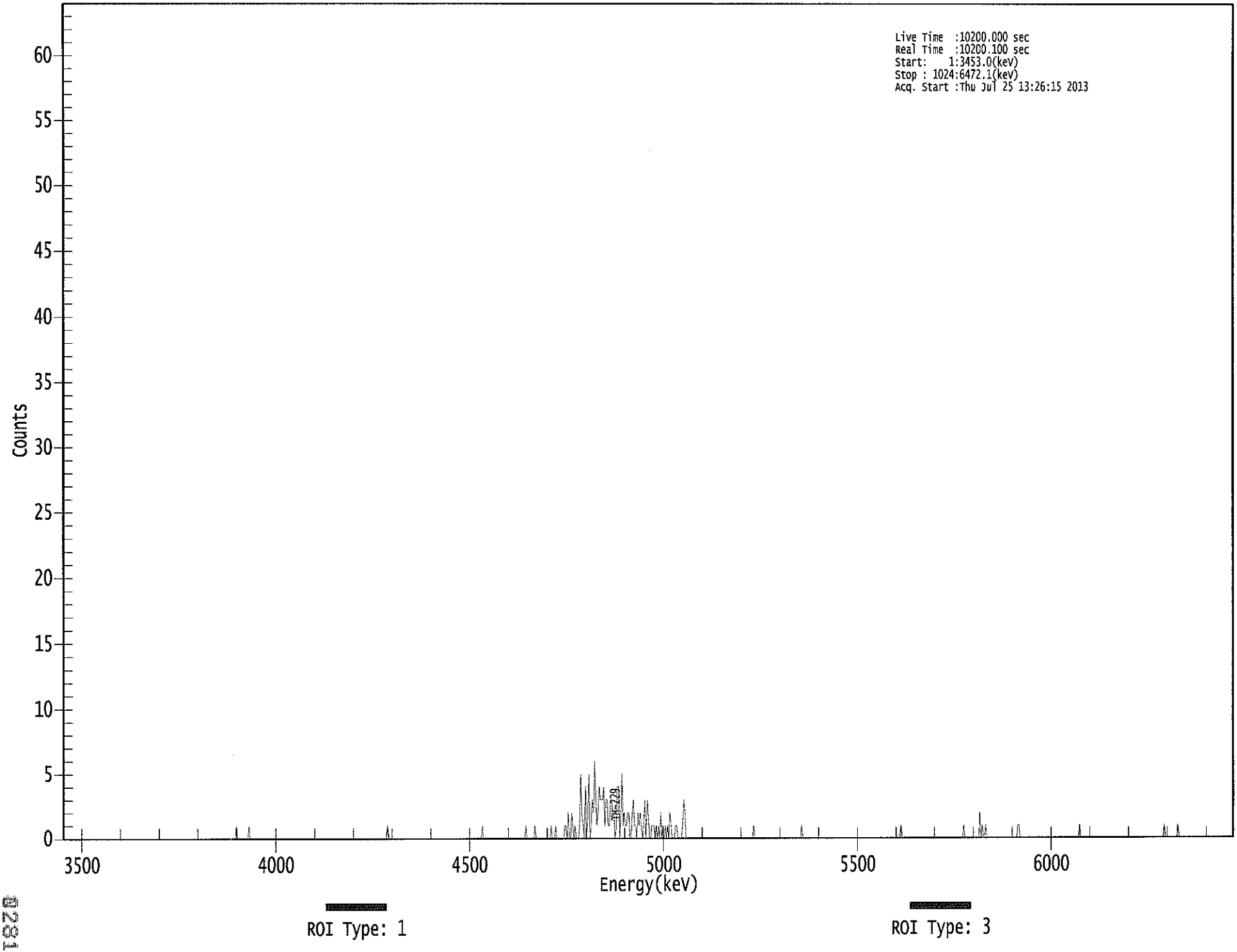
7/26/13

0000063971.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:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	1
153:	0	0	0	0	0	0	0	0
161:	0	0	1	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	1	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	1	0

369:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	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	1	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	1	0	0	0	1	0
433:	0	0	0	0	0	0	1	1
441:	0	2	0	0	2	1	0	1
449:	0	0	0	1	5	2	1	0
457:	4	0	2	5	0	1	3	2
465:	6	3	1	2	4	3	3	3
473:	4	1	3	3	1	1	3	3
481:	2	2	0	1	4	4	0	2
489:	5	1	2	1	1	2	2	0
497:	0	2	3	1	1	0	2	1
505:	2	1	0	1	3	0	3	2
513:	0	0	1	1	1	0	1	0
521:	1	0	2	0	1	0	1	0
529:	1	0	2	1	0	0	0	1
537:	1	0	0	0	0	1	3	2
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	1	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	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	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	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	1	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	2	0	1	0	0	1	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	1	1	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:	1	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	1	0	0	0	0	0
969:	0	0	0	0	0	0	1	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description: PZ-111-SD DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_003
Chamber Serial Number:
Detector Serial Number: 3
Env. Background: System Bkgd 62747
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:25:50 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.235 mL
Effective Efficiency: 0.2079 +/- 0.0166
Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
Chem. Recovery Factor: 1.1903 +/- 0.0975

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.806	2.60	193.34	3.40	0.00E+000	3.0
TH-228		5.411	0.45	807.07	2.55	0.00E+000	3.0
TH-229	T	4.826	186.15	14.40	0.85	0.00E+000	5.4
TH-230		4.537	8.66	68.12	0.34	0.00E+000	3.0
TH-232		3.949	-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)
TH-227	0.990	5850.00*	3.40E-002 +/- 6.60E-002	1.21E-001 +/- 1.90E-002
TH-228	0.999	5400.00*	5.83E-003 +/- 4.71E-002	1.09E-001 +/- 1.70E-002
TH-229	0.989	4872.00*	2.38E+000 +/- 3.73E-001	7.67E-002 +/- 1.20E-002
TH-230	0.909	4672.00*	1.11E-001 +/- 7.73E-002	6.11E-002 +/- 9.55E-003
TH-232	0.988	3997.00*	-1.08E-002 +/- 2.68E-002	7.63E-002 +/- 1.19E-002

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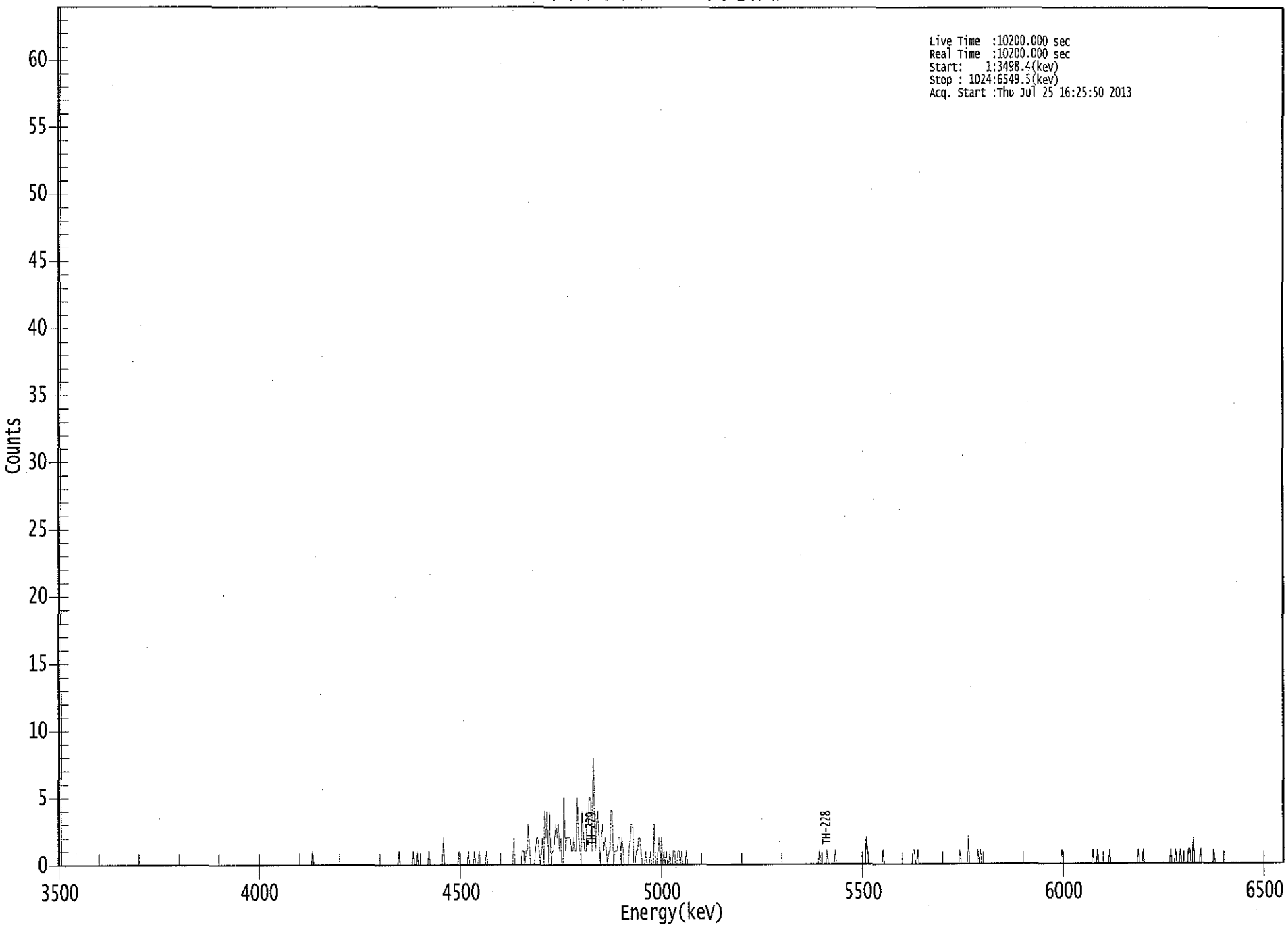
0000064057.CNF



****
***** 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	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	1	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	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:	1	0	0	1	0	0	0	0
305:	0	0	0	0	0	1	0	0
313:	0	0	0	0	0	0	0	0
321:	0	2	0	0	0	0	0	0
329:	0	0	0	0	0	0	1	0
337:	0	0	0	0	0	0	1	0
345:	0	0	0	1	0	0	0	1
353:	0	0	0	0	0	1	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
377:	0	0	0	0	2	0	0	0
385:	0	0	0	1	1	0	1	1
393:	3	1	0	0	0	0	1	2
401:	2	1	0	1	2	0	4	2
409:	4	0	4	0	1	1	2	3
417:	2	3	1	2	0	0	5	1
425:	2	2	2	2	1	1	2	1
433:	1	5	2	1	1	4	2	1
441:	1	4	3	5	5	1	8	5
449:	1	3	4	2	0	2	3	1
457:	2	1	0	1	1	4	4	0
465:	1	1	1	2	2	1	2	1
473:	0	0	0	0	1	2	3	3
481:	0	0	1	1	2	2	1	0
489:	0	0	1	0	0	0	1	0
497:	0	3	0	0	1	2	0	2
505:	0	1	0	1	0	0	1	0
513:	0	1	1	0	0	1	1	0
521:	1	0	0	0	1	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	1	0	0	0	0
641:	0	1	0	0	0	0	0	0
649:	1	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	2	1	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	1	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	1	1	0	0	1	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	1	0	0	0	0	0	0	2
761:	0	0	0	0	0	0	0	1
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: 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	1	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	1	0	0	0	0
873:	0	0	0	0	0	1	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	1	0	0
905:	0	1	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	1	0	0	0	1	0	0	0
937:	1	0	0	0	0	0	0	1
945:	1	0	0	2	0	0	0	0
953:	0	1	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: S-5 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_004
Chamber Serial Number:
Detector Serial Number: 4
Env. Background: System Bkgd 62748
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:25:51 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.234 mL
Effective Efficiency: 0.1235 +/- 0.0124
Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
Chem. Recovery Factor: 0.6363 +/- 0.0652

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.747	4.47	109.71	1.53	0.00E+000	2.9
TH-228		5.310	6.79	88.39	2.21	0.00E+000	5.9
TH-229	T	4.866	110.47	18.80	1.53	0.00E+000	4.9
TH-230		4.604	4.47	109.71	1.53	0.00E+000	2.9
TH-232		3.937	8.32	71.13	0.68	0.00E+000	2.9

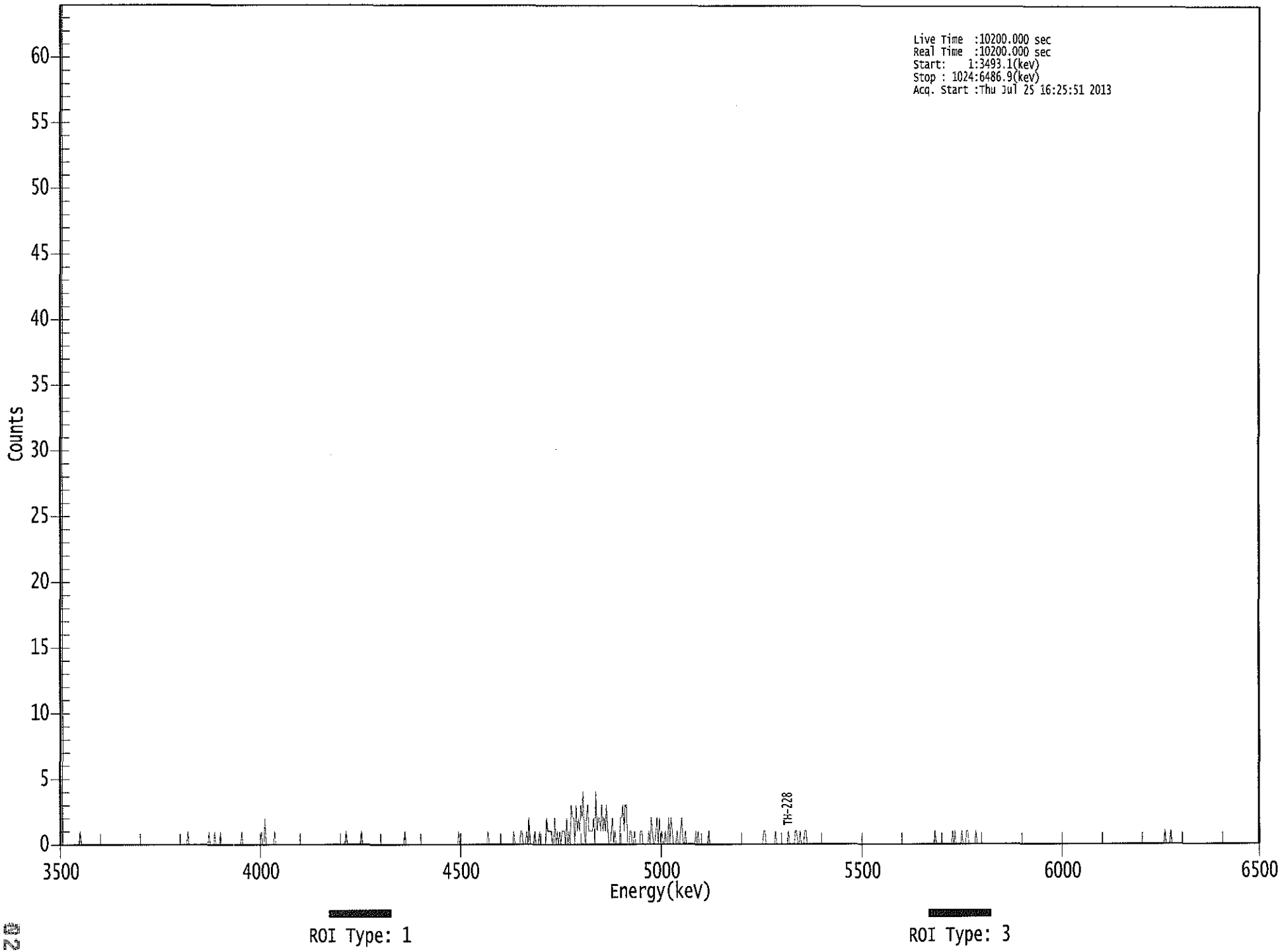
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.946	5850.00*	9.85E-002 +/- 1.10E-001	1.57E-001 +/- 3.10E-002
TH-228	0.959	5400.00*	1.48E-001 +/- 1.34E-001	1.75E-001 +/- 3.45E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 4.71E-001	1.53E-001 +/- 3.03E-002
TH-230	0.976	4672.00*	9.61E-002 +/- 1.07E-001	1.53E-001 +/- 3.02E-002
TH-232	0.981	3997.00*	1.79E-001 +/- 1.32E-001	1.21E-001 +/- 2.39E-002

AG
7/26/13

0000064058.CNF



1628

****
***** 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	1	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	1	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	1
129:	0	0	0	0	1	0	0	0
137:	0	1	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	1	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	1	0	0	2
177:	0	0	0	0	0	0	0	1
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	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	1	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	1	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	1	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	1	0	0	0	0
393:	0	1	1	0	0	0	1	0
401:	2	0	0	0	0	1	0	0
409:	0	1	0	0	0	0	0	2
417:	1	1	1	1	0	0	2	0
425:	1	0	1	0	1	1	1	0
433:	2	0	1	0	3	2	2	0
441:	3	1	2	1	3	2	4	1
449:	0	2	3	1	1	1	1	2
457:	0	4	1	2	2	1	3	1
465:	2	1	3	1	0	0	1	2
473:	0	1	0	0	0	0	2	2
481:	3	1	3	3	0	0	1	1
489:	0	0	1	0	0	0	0	1
497:	1	0	0	0	0	0	1	0
505:	2	1	0	0	1	2	0	2
513:	0	1	0	0	1	0	0	2
521:	0	2	1	0	0	0	1	0
529:	0	1	2	0	0	1	0	0
537:	0	0	0	0	0	0	1	0
545:	1	0	0	0	0	0	0	0
553:	0	1	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	1	1	0	0	0	0	0	0
609:	0	0	1	0	0	0	0	0
617:	0	0	0	0	0	1	0	0
625:	0	0	0	1	1	0	0	1
633:	0	0	0	1	1	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	1	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	1	0	1	0	0	0	0
769:	0	1	0	0	0	1	1	0
777:	0	0	0	0	0	1	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	1	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

Apex-Alpha™

C 7/26

Sample Description: S-5 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-TH
Sample Identification: 07
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_010
Chamber Serial Number:
Detector Serial Number: 10
Env. Background: System Bkgd 62749
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:25:44 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.234 mL
Effective Efficiency: 0.1588 +/- 0.0143
Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
Chem. Recovery Factor: 0.8073 +/- 0.0744

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.865	1.79	229.04	2.21	0.00E+000	2.9
TH-228		5.383	4.28	125.10	2.72	0.00E+000	2.9
TH-229	T	4.879	141.62	16.63	2.38	0.00E+000	4.3
TH-230		4.644	0.64	457.43	1.36	0.00E+000	2.9
TH-232		3.868	-0.36	604.15	1.36	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)
TH-227	0.999	5850.00*	3.07E-002 +/- 7.05E-002	1.37E-001 +/- 2.43E-002
TH-228	0.998	5400.00*	7.26E-002 +/- 9.17E-002	1.45E-001 +/- 2.58E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 4.20E-001	1.37E-001 +/- 2.43E-002
TH-230	0.996	4672.00*	1.07E-002 +/- 4.90E-002	1.15E-001 +/- 2.03E-002
TH-232	0.917	3997.00*	-6.01E-003 +/- 3.63E-002	1.14E-001 +/- 2.03E-002

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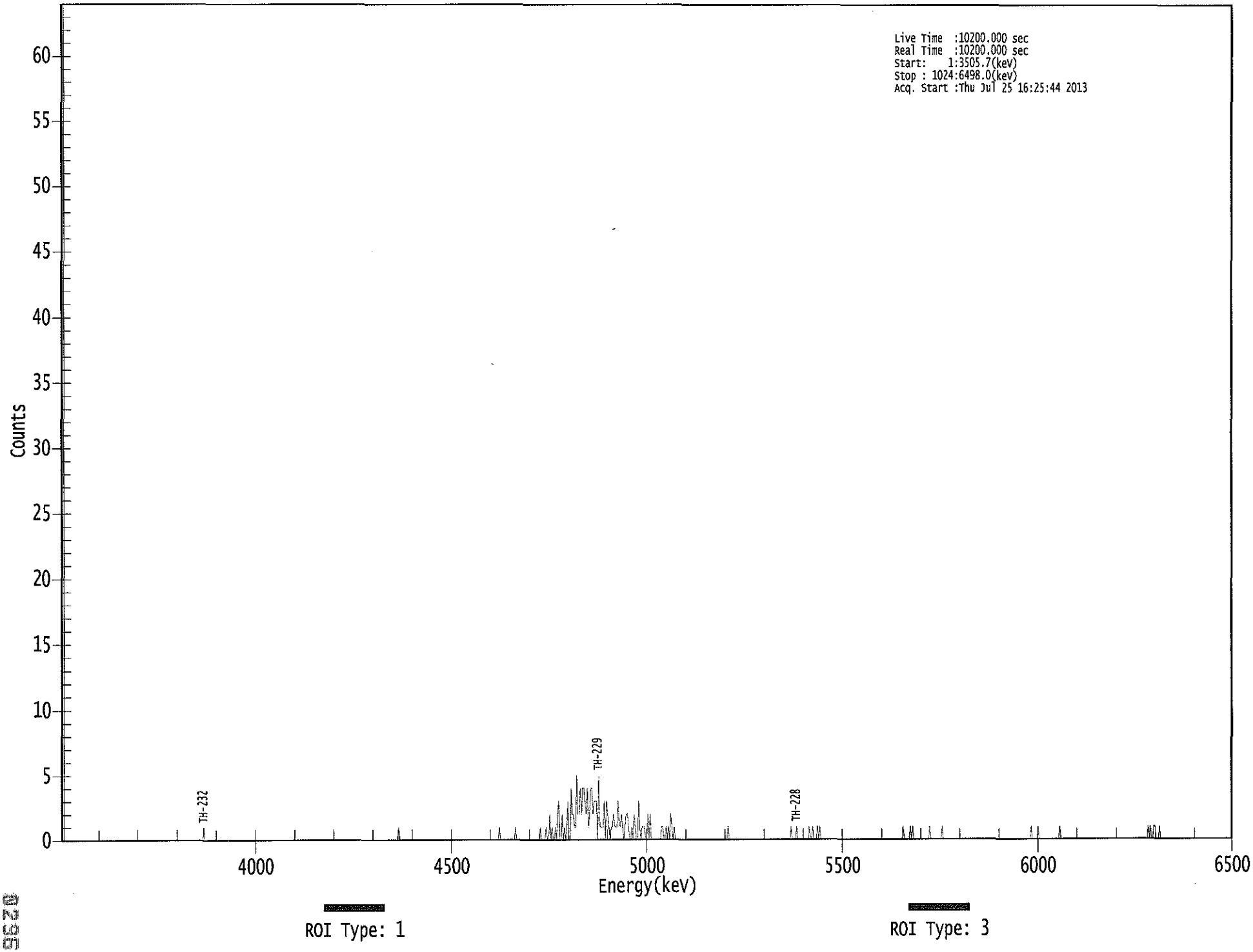
7/26/13

0000063994.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: 10200

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

369:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
377:	0	0	0	0	0	0	1	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	1	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	1	0	0	0	0	1
425:	0	0	2	0	1	0	0	1
433:	0	2	3	0	0	2	0	1
441:	0	1	3	0	0	4	2	2
449:	1	1	5	2	2	4	2	4
457:	4	3	2	4	1	2	4	4
465:	2	3	3	3	0	5	1	1
473:	1	1	3	0	3	2	1	0
481:	1	1	2	1	1	1	3	1
489:	1	2	1	0	1	2	2	1
497:	0	0	1	0	2	1	0	0
505:	3	1	0	1	1	1	0	0
513:	2	0	2	0	0	0	0	0
521:	0	0	0	0	1	1	0	0
529:	1	0	1	0	2	1	0	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	1	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	1	0	0
641:	0	0	1	0	0	0	0	0
649:	0	0	0	0	0	1	0	0
657:	1	0	0	0	1	0	1	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	1
737:	0	0	0	0	0	1	0	1
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	1	0
761:	0	0	0	0	0	0	0	0
769:	0	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: 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	1
849:	0	0	0	0	0	1	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	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	0	0	0	0	0	0
945:	0	0	0	0	0	1	0	1
953:	0	0	1	1	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™

Sample Description: FB@PZ-110-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 08
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_011
Chamber Serial Number:
Detector Serial Number: 11
Env. Background: System Bkgd 62750
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:25:45 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.234 mL
Effective Efficiency: 0.2217 +/- 0.0172
Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
Chem. Recovery Factor: 1.0810 +/- 0.0861

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.807	1.64	214.85	1.36	0.00E+000	2.6
TH-228		5.404	-0.21	1437.1	2.21	0.00E+000	2.6
TH-229	T	4.874	197.98	13.97	1.02	0.00E+000	5.6
TH-230		4.552	7.32	76.28	0.68	0.00E+000	2.6
TH-232		4.008	2.66	128.85	0.34	0.00E+000	5.2

T = Tracer Peak used for Effective Efficiency

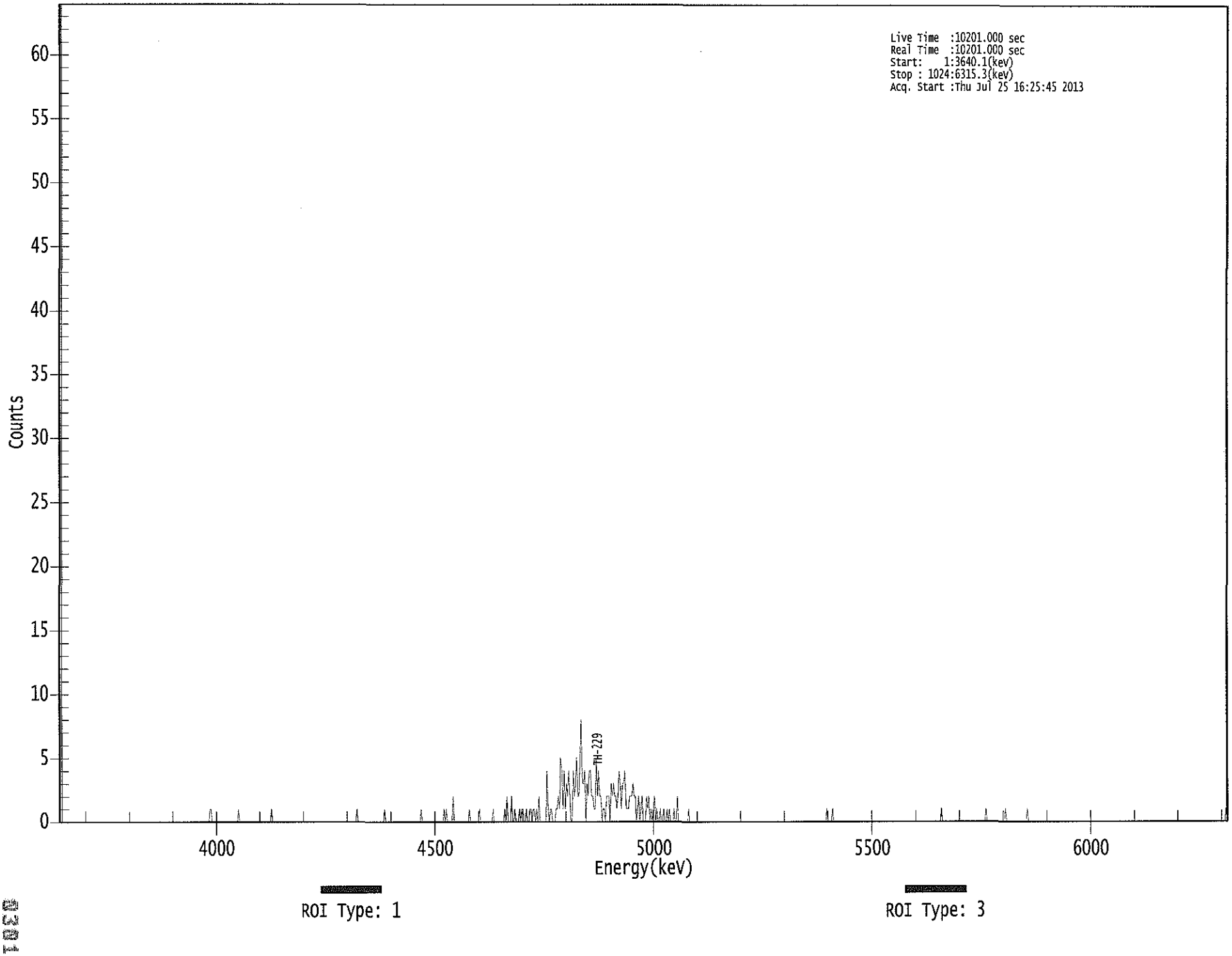
NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.990	5850.00*	2.01E-002 +/- 4.34E-002	8.42E-002 +/- 1.28E-002
TH-228	1.000	5400.00*	-2.55E-003 +/- 3.67E-002	9.72E-002 +/- 1.48E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 3.62E-001	7.57E-002 +/- 1.15E-002
TH-230	0.928	4672.00*	8.76E-002 +/- 6.82E-002	6.75E-002 +/- 1.03E-002
TH-232	0.999	3997.00*	3.18E-002 +/- 4.12E-002	5.71E-002 +/- 8.71E-003

AC
7/26/13

0300

0000064059.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: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	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	1	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	1	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	1	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	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	1	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	1	0	1	0	0	0	0
345:	0	2	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	1
361:	0	0	0	0	0	0	0	0

369:	1	0	0	0	0	0	0	0

Sample Title: 08

Channel								
377:	0	0	0	0	1	0	0	0
385:	0	0	0	0	0	0	1	0
393:	2	0	0	0	2	0	0	1
401:	0	0	0	1	0	1	1	0
409:	0	1	0	0	1	1	0	1
417:	1	0	1	0	2	0	0	0
425:	0	0	0	4	1	0	1	1
433:	0	0	0	1	1	2	1	5
441:	4	1	4	1	3	2	4	2
449:	0	0	4	2	3	5	2	2
457:	5	8	3	3	4	0	3	2
465:	4	4	2	2	1	1	5	2
473:	4	2	2	0	1	1	0	2
481:	2	2	0	3	2	3	2	2
489:	1	2	4	3	1	3	3	4
497:	1	1	1	2	2	2	3	2
505:	2	0	1	2	0	1	2	0
513:	0	0	2	1	2	0	1	0
521:	1	2	0	1	0	0	1	0
529:	0	1	0	0	1	0	1	0
537:	0	0	1	0	0	2	0	0
545:	0	0	0	0	0	0	0	1
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	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:	1	0	0	0	0	1	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	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	1	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 08

Channel								
809:	0	0	0	1	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	1	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
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	1	0	0

Apex-Alpha™

Sample Description: PZ-110-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-TH
Sample Identification: 09
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_012
Chamber Serial Number:
Detector Serial Number: 12
Env. Background: System Bkgd 62751
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:25:46 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.235 mL
Effective Efficiency: 0.1437 +/- 0.0134
Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM
Chem. Recovery Factor: 0.7225 +/- 0.0687

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.766	2.66	128.85	0.34	0.00E+000	3.0
TH-228		5.321	2.66	128.85	0.34	0.00E+000	3.0
TH-229	T	4.854	128.83	17.28	0.17	0.00E+000	3.6
TH-230		4.601	10.83	60.10	0.17	0.00E+000	3.0
TH-232		3.989	1.00	277.19	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)
TH-227	0.963	5850.00*	5.04E-002 +/- 6.55E-002	9.05E-002 +/- 1.66E-002
TH-228	0.968	5400.00*	4.99E-002 +/- 6.49E-002	8.96E-002 +/- 1.64E-002
TH-229	0.998	4872.00*	2.39E+000 +/- 4.37E-001	7.73E-002 +/- 1.42E-002
TH-230	0.974	4672.00*	2.00E-001 +/- 1.26E-001	7.71E-002 +/- 1.41E-002
TH-232	1.000	3997.00*	1.84E-002 +/- 5.12E-002	1.11E-001 +/- 2.02E-002

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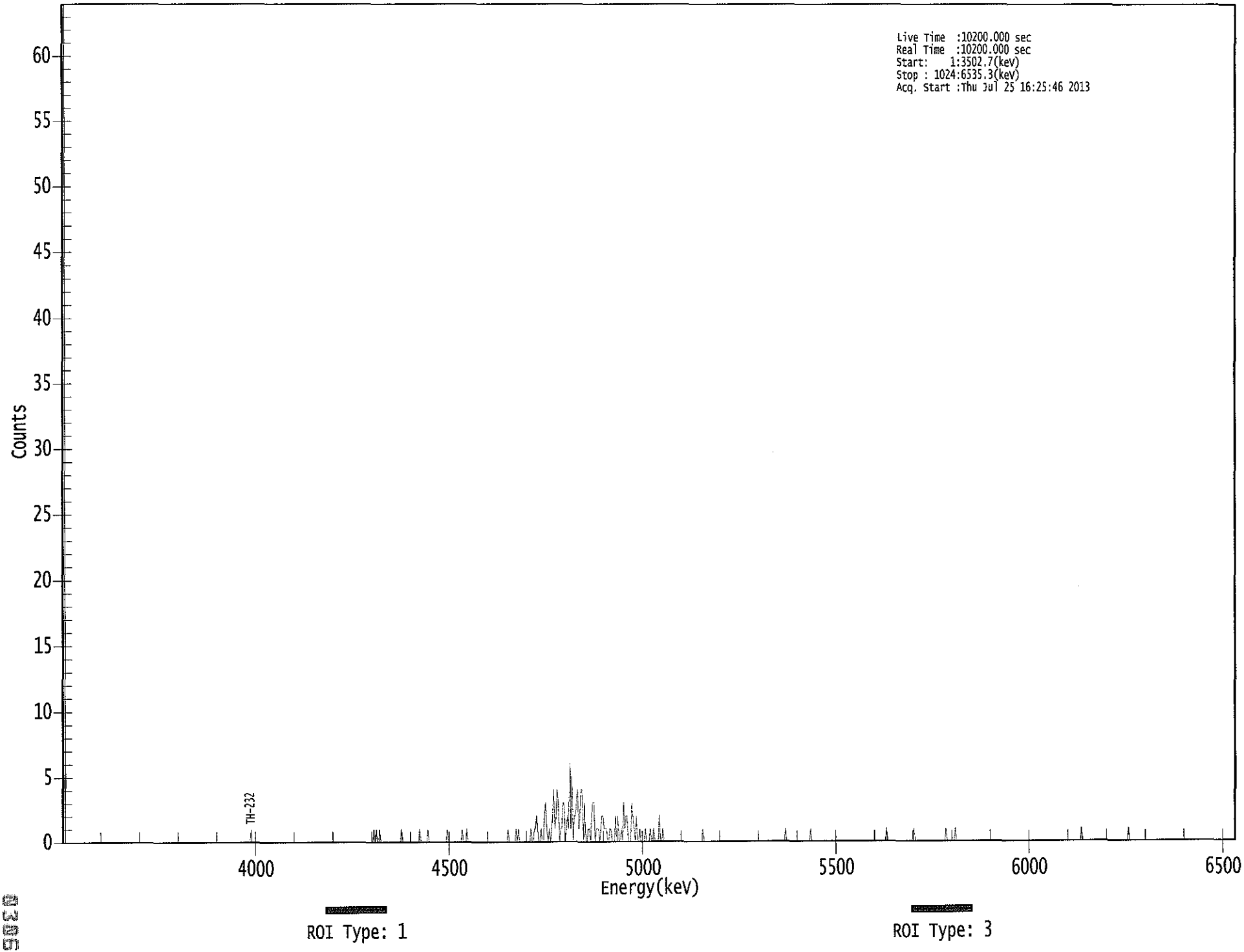
0000063993.CNF



****
***** 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: 10200

Channel								
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	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	1	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	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	1
273:	0	1	0	0	1	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	1
313:	0	0	0	0	0	0	1	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	1
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	1	0	0	0
353:	1	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: 09

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	1	0	0	0
393:	0	0	0	1	0	1	0	0
401:	0	0	0	0	0	0	0	0
409:	1	0	0	1	1	2	1	0
417:	0	1	0	0	2	3	1	0
425:	1	0	1	2	4	1	2	4
433:	3	0	1	1	3	3	0	1
441:	2	1	6	1	5	0	2	2
449:	3	4	1	2	4	4	0	3
457:	0	0	1	1	0	2	3	3
465:	0	1	1	1	0	1	2	2
473:	1	1	1	0	0	1	1	0
481:	0	0	2	0	2	0	0	1
489:	0	3	1	2	2	0	0	0
497:	3	2	1	0	2	0	0	1
505:	0	0	0	0	1	0	0	0
513:	1	0	0	1	0	0	0	0
521:	2	0	0	1	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	1	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	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	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	1	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	1	0	0	0	0	0
777:	0	0	1	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 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:	1	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	1	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™

Sample Description: PZ-110-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-TH
Sample Identification: 10
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_013
Chamber Serial Number:
Detector Serial Number: 13
Env. Background: System Bkgd 62752
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:25:47 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.233 mL
Effective Efficiency: 0.2280 +/- 0.0175
Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
Chem. Recovery Factor: 1.2198 +/- 0.0965

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.823	1.43	324.62	3.57	0.00E+000	2.8
TH-228		5.394	-0.74	504.84	3.74	0.00E+000	2.8
TH-229	T	4.846	202.98	13.80	1.02	0.00E+000	5.1
TH-230		4.666	8.98	69.62	1.02	0.00E+000	2.8
TH-232		3.967	5.32	91.11	0.68	0.00E+000	2.8

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.996	5850.00*	1.71E-002 +/- 5.55E-002	1.13E-001 +/- 1.70E-002
TH-228	1.000	5400.00*	-8.75E-003 +/- 4.42E-002	1.13E-001 +/- 1.71E-002
TH-229	0.996	4872.00*	2.37E+000 +/- 3.57E-001	7.36E-002 +/- 1.11E-002
TH-230	1.000	4672.00*	1.05E-001 +/- 7.45E-002	7.33E-002 +/- 1.11E-002
TH-232	0.995	3997.00*	6.18E-002 +/- 5.71E-002	6.56E-002 +/- 9.88E-003

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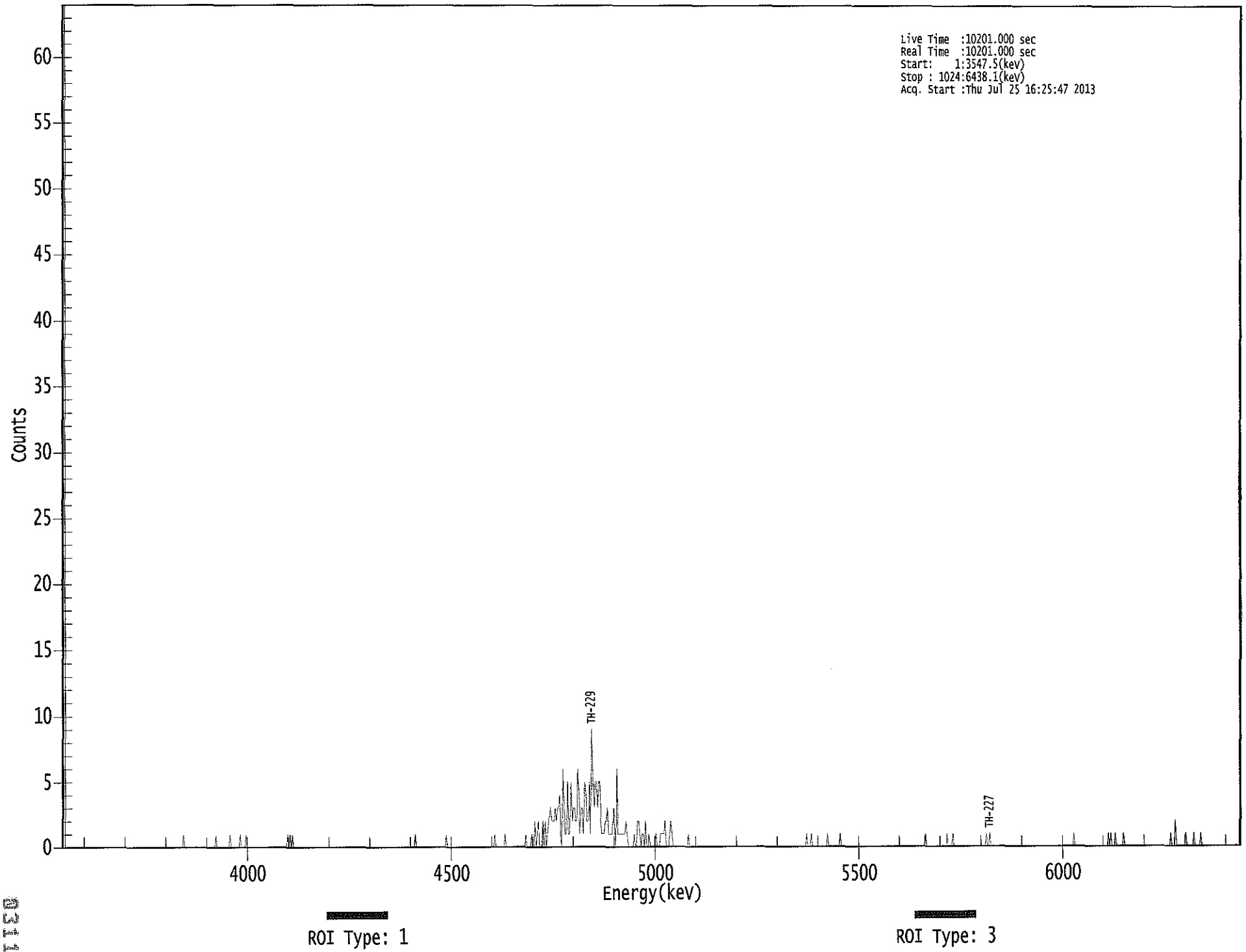
0000063996.CNF



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

Sample Title: 10

Elapsed Live time: 10201
Elapsed Real Time: 10201

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

Sample Title: 10

Channel								
377:	0	0	0	0	0	0	0	0
385:	1	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	1	0	0	0	0	1
409:	0	0	2	0	1	2	0	0
417:	0	2	0	2	0	1	2	3
425:	2	2	2	3	2	3	3	4
433:	1	0	6	3	1	1	5	1
441:	1	5	2	3	3	2	2	6
449:	4	1	3	3	1	5	4	2
457:	2	5	1	9	5	3	5	5
465:	3	5	5	2	1	1	1	2
473:	2	3	1	1	1	1	3	2
481:	0	6	1	1	1	1	1	1
489:	1	2	1	0	0	0	0	0
497:	1	0	0	2	2	1	0	1
505:	1	0	2	0	0	1	0	0
513:	0	0	0	1	0	0	0	1
521:	1	1	1	2	0	0	0	1
529:	2	1	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	1
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	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	1	0
649:	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	1	0	0	0	0	0	0	0
673:	0	0	0	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:	0	0	0	0	0	1	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	1	0	0	0	0	1	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	1	0	0	1	0	0

Sample Title: 10

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	1	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	1	0	1	0
913:	0	0	1	0	0	0	0	0
921:	0	1	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	1	0	0	0	2	0
969:	0	0	0	0	0	0	0	1
977:	0	0	0	0	0	0	1	0
985:	0	0	0	0	1	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: I-4 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 11
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_014
Chamber Serial Number:
Detector Serial Number: 14
Env. Background: System Bkgd 62753
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:25:48 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.233 mL
Effective Efficiency: 0.1712 +/- 0.0149
Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
Chem. Recovery Factor: 0.9273 +/- 0.0827

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.833	4.28	125.10	2.72	0.00E+000	4.4
TH-228		5.355	0.77	542.91	3.23	0.00E+000	2.9
TH-229	T	4.860	152.30	15.99	1.70	0.00E+000	4.7
TH-230		4.530	3.64	123.16	1.36	0.00E+000	2.9
TH-232		3.943	0.66	305.43	0.34	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)
TH-227	0.998	5850.00*	6.81E-002 +/- 8.59E-002	1.36E-001 +/- 2.33E-002
TH-228	0.990	5400.00*	1.21E-002 +/- 6.58E-002	1.43E-001 +/- 2.45E-002
TH-229	0.999	4872.00*	2.37E+000 +/- 4.05E-001	1.14E-001 +/- 1.95E-002
TH-230	0.900	4672.00*	5.65E-002 +/- 7.02E-002	1.06E-001 +/- 1.82E-002
TH-232	0.985	3997.00*	1.02E-002 +/- 3.13E-002	7.40E-002 +/- 1.27E-002

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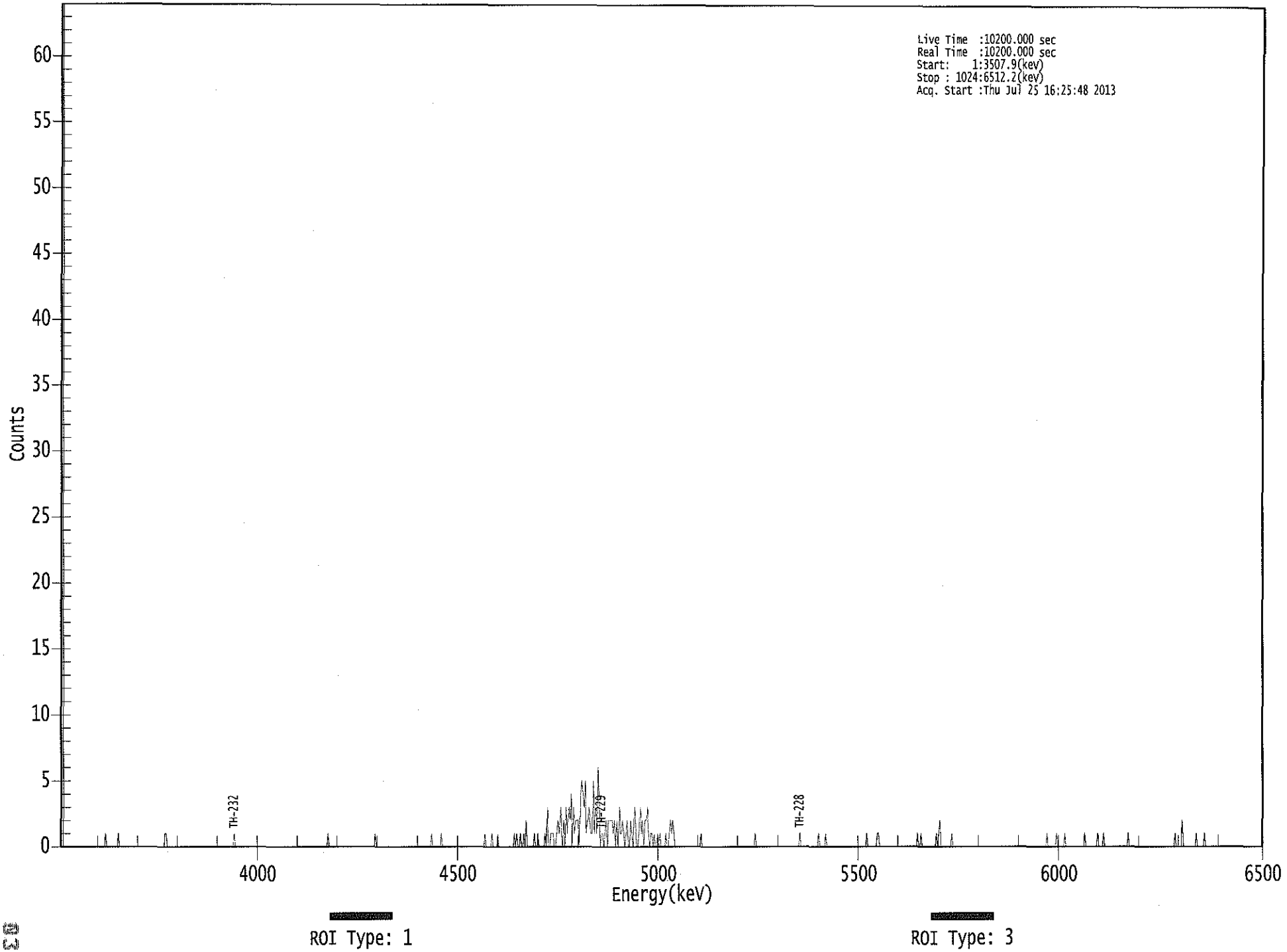
0000064060.CNF



****
***** 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: 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	1	0
41:	0	0	0	0	0	0	0	0
49:	0	1	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	1	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	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	1	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	1	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	1	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	1	0	0	0
321:	0	0	0	0	1	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	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	1	0	0	0	0	0	1

369:	0	0	0	0	1	0	0	0

Sample Title: 11

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	1	0	1	0	0	1
393:	0	0	1	0	2	0	0	0
401:	0	0	0	1	0	0	1	0
409:	0	0	0	0	1	0	3	0
417:	0	1	1	1	0	0	1	2
425:	1	3	1	0	2	0	3	1
433:	3	2	4	0	3	1	2	2
441:	2	0	4	5	4	3	5	1
449:	2	3	2	1	1	5	1	3
457:	1	6	3	0	1	1	0	1
465:	2	0	2	2	2	2	1	2
473:	0	2	0	3	1	1	2	1
481:	0	1	2	0	0	2	1	0
489:	3	2	0	0	1	3	1	2
497:	0	2	2	3	1	0	1	1
505:	0	1	0	0	1	0	1	0
513:	0	0	0	1	0	0	1	2
521:	1	2	1	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	1	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	1
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	1	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	1	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	1	0
689:	0	0	0	0	0	0	0	1
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	0	0	0	0
729:	0	1	0	0	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	1	0	1	2	0	0	0
753:	0	0	0	0	0	0	1	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	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	1
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	0	0	1	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	1
873:	0	0	0	0	0	0	0	0
881:	0	0	1	0	0	0	0	1
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:	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	1	0	0	0
953:	0	0	2	0	0	0	0	0
961:	0	0	0	0	0	0	1	0
969:	0	0	0	0	0	1	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description: I-4 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
Batch Identification: 1307098A-TH
Sample Identification: 12
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_015
Chamber Serial Number:
Detector Serial Number: 15
Env. Background: System Bkgd 62754
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:25:49 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.234 mL
Effective Efficiency: 0.1947 +/- 0.0160
Counting Efficiency: 0.1477 +/- 0.0027 on 7/20/2013 6:27:27 PM
Chem. Recovery Factor: 1.3181 +/- 0.1107

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.802	3.00	130.67	0.00	0.00E+000	3.0
TH-228		5.336	3.98	112.01	1.02	0.00E+000	4.5
TH-229	T	4.869	173.66	14.89	0.34	0.00E+000	12.5
TH-230		4.695	8.32	71.13	0.68	0.00E+000	4.5
TH-232		3.883	2.83	120.54	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.988	5850.00*	4.19E-002 +/- 5.52E-002	8.38E-002 +/- 1.35E-002
TH-228	0.979	5400.00*	5.51E-002 +/- 6.23E-002	8.72E-002 +/- 1.40E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 3.82E-001	6.54E-002 +/- 1.05E-002
TH-230	0.997	4672.00*	1.13E-001 +/- 8.27E-002	7.69E-002 +/- 1.24E-002
TH-232	0.934	3997.00*	3.85E-002 +/- 4.68E-002	5.68E-002 +/- 9.13E-003

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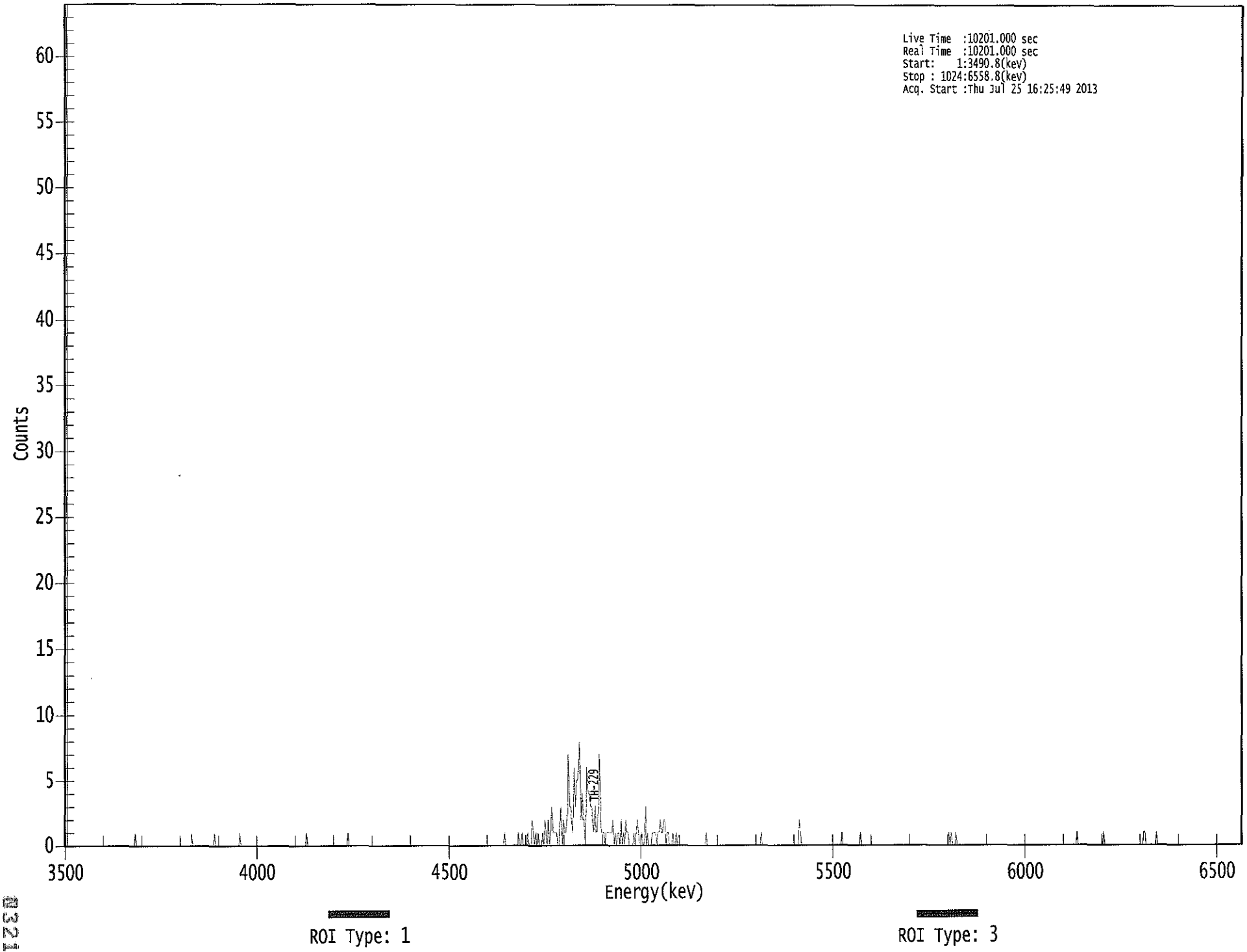
0000063998.CNF



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

Sample Title: 12

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	1	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	1	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	1	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	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	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	1	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 12

Channel								
377:	0	0	0	0	0	0	1	0
385:	0	0	0	0	0	0	0	0
393:	0	0	1	0	0	1	0	0
401:	0	0	1	0	0	0	2	1
409:	0	1	0	1	0	0	0	1
417:	0	2	1	0	2	0	1	3
425:	1	1	1	1	0	0	3	2
433:	0	2	1	1	2	7	3	3
441:	2	1	6	3	5	5	6	8
449:	2	4	2	2	0	6	4	4
457:	3	3	2	1	3	1	1	3
465:	7	2	1	1	1	0	1	1
473:	1	1	1	1	2	0	1	0
481:	1	1	0	2	0	1	0	2
489:	1	1	0	0	0	0	1	0
497:	1	2	1	0	0	1	0	0
505:	3	0	1	0	0	0	1	1
513:	1	1	0	1	1	2	1	1
521:	2	2	0	1	1	0	0	0
529:	1	0	0	1	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	1	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	1	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	2	1
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	1	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	1	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:	1	0	1	0	0	0	1	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	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	1
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	1	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	1	1	0	0	0	0	0
945:	0	0	0	0	1	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™

Sample Description: PZ-100-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 13
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_033
Chamber Serial Number: 04026479A
Detector Serial Number: 91132
Env. Background: System Bkgd 62765
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:27:29 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.234 mL
Effective Efficiency: 0.1674 +/- 0.0147
Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM
Chem. Recovery Factor: 0.9060 +/- 0.0810

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.874	-0.51	400.63	0.51	0.00E+000	0.0
TH-228		5.307	2.32	149.12	0.68	0.00E+000	3.0
TH-229	T	4.866	149.32	16.08	0.68	0.00E+000	3.3
TH-230		4.537	10.83	60.10	0.17	0.00E+000	3.0
TH-232		3.990	2.00	169.74	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)
TH-227	0.997	5850.00*	-8.29E-003 +/- 3.32E-002	8.53E-002 +/- 1.47E-002
TH-228	0.956	5400.00*	3.73E-002 +/- 5.60E-002	9.08E-002 +/- 1.56E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 4.08E-001	8.97E-002 +/- 1.54E-002
TH-230	0.909	4672.00*	1.72E-001 +/- 1.07E-001	6.62E-002 +/- 1.14E-002
TH-232	1.000	3997.00*	3.16E-002 +/- 5.40E-002	9.49E-002 +/- 1.63E-002

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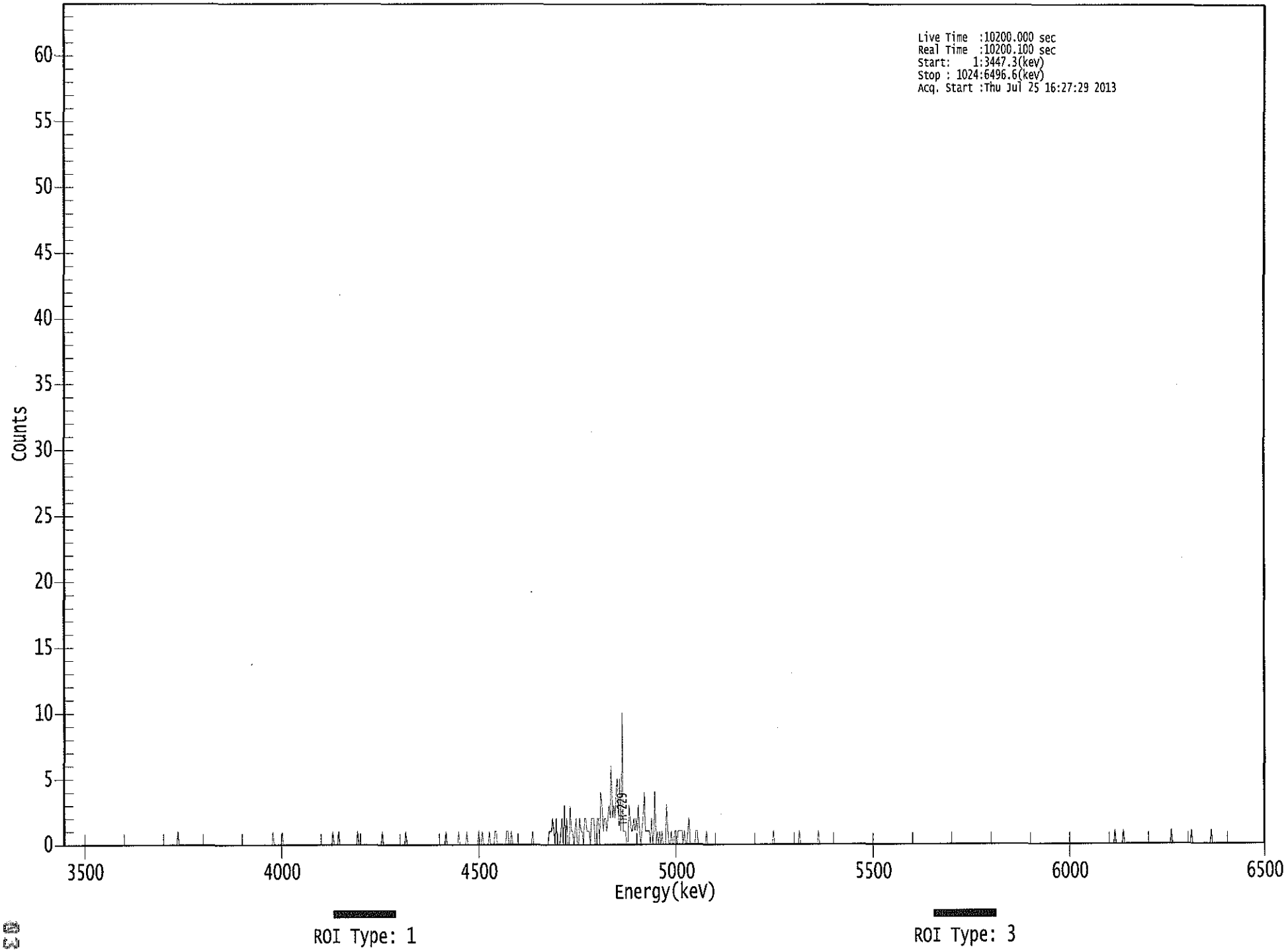
0000064061.CNF



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

Sample Title: 13

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	1	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	1	0	0	0	0	0	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	1	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	1	0	0
233:	0	0	1	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	1	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	1
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	1	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	1	0	0
329:	0	0	0	0	0	0	0	0
337:	1	0	0	0	0	0	0	1
345:	0	0	0	0	0	0	0	0
353:	0	1	0	0	1	0	0	0
361:	0	0	1	0	0	0	0	1

369:	1	0	0	0	0	0	0	0

Sample Title: 13

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

801:	0	0	0	0	0	0	0	0

Sample Title: 13

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	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	1
897:	0	0	0	0	0	0	1	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	1
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	1	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	1	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: PZ-100-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 14
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_034
Chamber Serial Number: 04026479B
Detector Serial Number: 91136
Env. Background: System Bkgd 62766
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:27:31 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.235 mL
Effective Efficiency: 0.1559 +/- 0.0141
Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
Chem. Recovery Factor: 0.8404 +/- 0.0772

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.859	0.83	239.53	0.17	0.00E+000	3.0
TH-228		5.357	3.15	126.67	0.85	0.00E+000	3.0
TH-229	T	4.858	139.66	16.61	0.34	0.00E+000	7.1
TH-230		4.560	1.00	277.19	0.00	0.00E+000	3.0
TH-232		3.994	2.83	120.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	1.45E-002 +/- 3.48E-002	7.28E-002 +/- 1.29E-002
TH-228	0.990	5400.00*	5.44E-002 +/- 6.96E-002	1.03E-001 +/- 1.83E-002
TH-229	0.999	4872.00*	2.38E+000 +/- 4.22E-001	8.16E-002 +/- 1.44E-002
TH-230	0.936	4672.00*	1.70E-002 +/- 4.73E-002	1.02E-001 +/- 1.81E-002
TH-232	1.000	3997.00*	4.81E-002 +/- 5.86E-002	7.09E-002 +/- 1.25E-002

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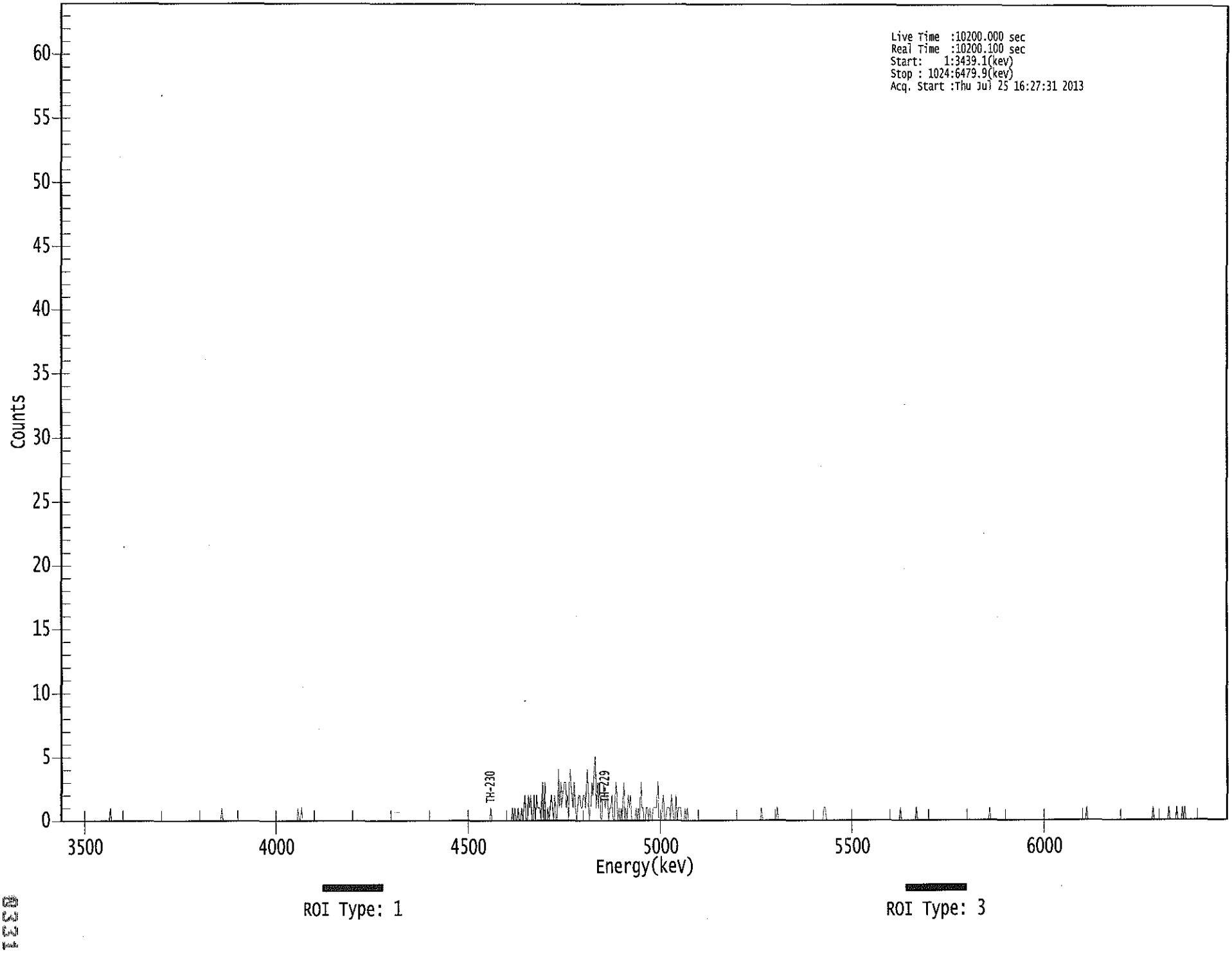
0000064062.CNF



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

Sample Title: 14

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	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	1	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	1	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:	1	0	0	1	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 14

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

801:	0	0	0	0	0	0	0	0

Sample Title: 14

Channel								
809:	0	0	0	0	0	0	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	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	1	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	1	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	1	0	0	0	0
977:	0	0	1	0	0	0	0	1
985:	0	1	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: D-3 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 15
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_035
Chamber Serial Number: 04026477A
Detector Serial Number: 58771
Env. Background: System Bkgd 62767
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:27:24 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.232 mL
Effective Efficiency: 0.1228 +/- 0.0124
Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
Chem. Recovery Factor: 0.6726 +/- 0.0690

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.742	2.00	169.74	0.00	0.00E+000	5.9
TH-228		5.344	7.00	79.20	0.00	0.00E+000	2.9
TH-229	T	4.882	109.00	18.86	0.00	0.00E+000	3.7
TH-230		4.671	7.00	79.20	0.00	0.00E+000	2.9
TH-232		3.949	-0.17	1169.4	0.17	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)
TH-227	0.941	5850.00*	4.43E-002 +/- 7.57E-002	1.33E-001 +/- 2.63E-002
TH-228	0.984	5400.00*	1.54E-001 +/- 1.25E-001	1.32E-001 +/- 2.61E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 4.68E-001	1.30E-001 +/- 2.58E-002
TH-230	1.000	4672.00*	1.51E-001 +/- 1.24E-001	1.30E-001 +/- 2.57E-002
TH-232	0.988	3997.00*	-3.67E-003 +/- 4.29E-002	9.00E-002 +/- 1.78E-002

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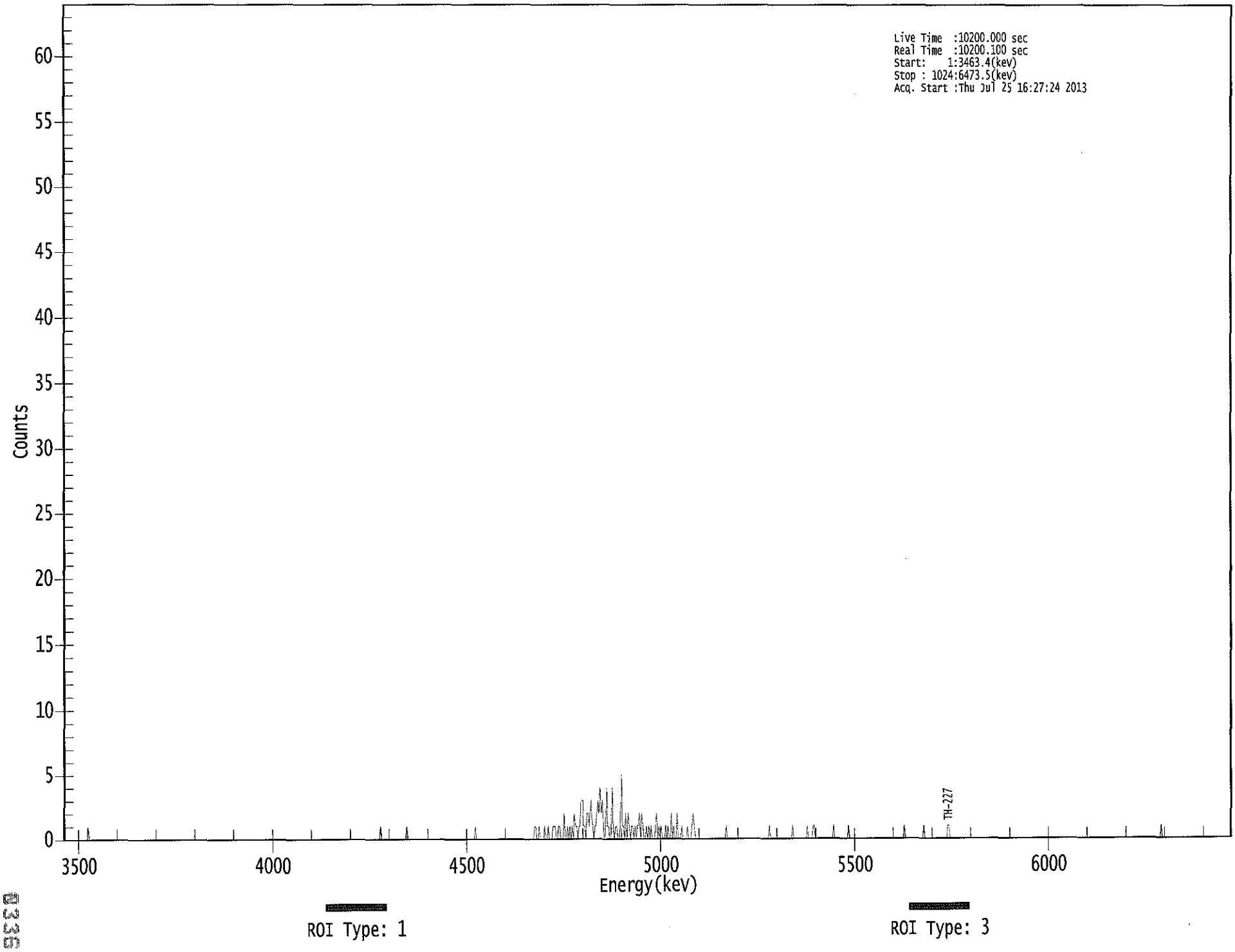
0000064003.CNF



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

Sample Title: 15

Elapsed Live time: 10200
Elapsed Real Time: 10200

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

369:	0	0	0	0	0	0	0	0

Sample Title: 15

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	1	1	0	0
417:	1	0	0	0	0	1	0	0
425:	1	0	0	0	1	1	1	0
433:	0	1	1	0	0	0	2	0
441:	0	1	0	1	0	1	0	2
449:	1	1	0	1	1	3	3	1
457:	1	0	2	2	1	3	2	1
465:	0	1	1	3	2	4	2	3
473:	2	0	0	4	1	1	0	0
481:	4	1	0	1	1	0	0	1
489:	5	1	1	0	2	0	2	1
497:	0	1	1	0	1	0	1	1
505:	2	0	2	1	0	0	1	0
513:	1	0	1	0	0	0	1	2
521:	0	1	0	1	0	0	0	1
529:	0	1	0	0	2	0	1	0
537:	0	2	0	0	0	1	0	0
545:	0	0	1	0	0	0	1	2
553:	1	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	1	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	1	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	1	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	1	0	0	0	0
657:	1	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	1	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:	1	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	1	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	1	1
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:	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	1	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description: D-3 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 16
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_036
Chamber Serial Number: 04026477B
Detector Serial Number: 84167
Env. Background: System Bkgd 62768
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:27:26 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.232 mL
Effective Efficiency: 0.1958 +/- 0.0161
Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
Chem. Recovery Factor: 1.0254 +/- 0.0860

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.738	3.32	119.77	0.68	0.00E+000	3.0
TH-228		5.317	12.98	56.85	1.02	0.00E+000	3.0
TH-229	T	4.862	173.66	14.89	0.34	0.00E+000	4.1
TH-230		4.547	6.66	78.18	0.34	0.00E+000	3.0
TH-232		3.951	2.32	149.12	0.68	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.937	5850.00*	4.61E-002 +/- 5.58E-002	7.84E-002 +/- 1.26E-002
TH-228	0.965	5400.00*	1.79E-001 +/- 1.06E-001	8.67E-002 +/- 1.39E-002
TH-229	0.999	4872.00*	2.36E+000 +/- 3.80E-001	6.50E-002 +/- 1.05E-002
TH-230	0.922	4672.00*	9.03E-002 +/- 7.21E-002	6.48E-002 +/- 1.04E-002
TH-232	0.989	3997.00*	3.14E-002 +/- 4.71E-002	7.63E-002 +/- 1.23E-002

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US EPA ARCHIVE DOCUMENT

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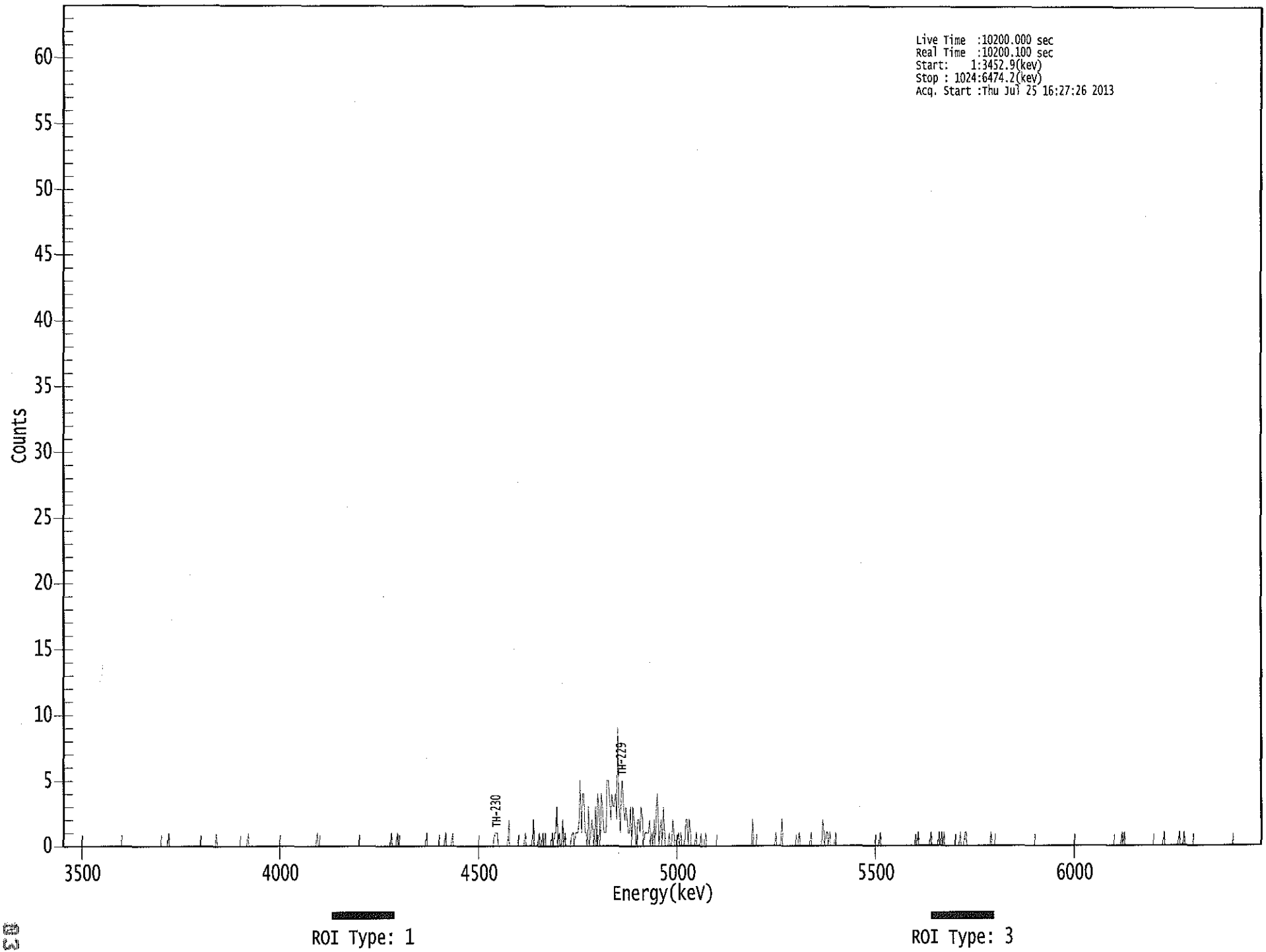


****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 16

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	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	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	1	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	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	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	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:	1	0	0	0	0	1	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	1	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	1	0
329:	0	0	0	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	0	0	0	0

369:	1	1	1	0	0	0	0	0

Sample Title: 16

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

801:	0	0	0	0	0	0	0	0

Sample Title: 16

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	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	1
905:	0	1	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	1	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	1	0	0	0	1	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description:	PZ-100-SD TOT
Spectrum File:	\\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification:	1307098A-TH
Sample Identification:	17
Sample Geometry:	Shelf 2
Procedure Description:	Th iso
Detector Name:	Alpha_038
Chamber Serial Number:	04026478B
Detector Serial Number:	91134
Env. Background:	System Bkgd 62770
Reagent Blank:	<not performed>
Sample Size:	1.000E+000 +/- 0.000E+000 liter
Sample Date/Time:	7/9/2013 10:21:48 AM
Acquisition Date/Time:	7/25/2013 4:27:27 PM
Acquisition Live Time:	170.0 minutes
Acquisition Real Time:	170.0 minutes
Tracer Certificate:	Th229_TH-18A
Tracer Quantity:	0.232 mL
Effective Efficiency:	0.2207 +/- 0.0172
Counting Efficiency:	0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
Chem. Recovery Factor:	1.2821 +/- 0.1025
Peak Match Tolerance:	0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.852	3.32	119.77	0.68	0.00E+000	3.0
TH-228		5.290	1.64	214.83	1.36	0.00E+000	3.0
TH-229	T	4.890	195.66	14.03	0.34	0.00E+000	4.7
TH-230		4.634	8.49	69.59	0.51	0.00E+000	3.0
TH-232		3.958	0.83	239.53	0.17	0.00E+000	3.0

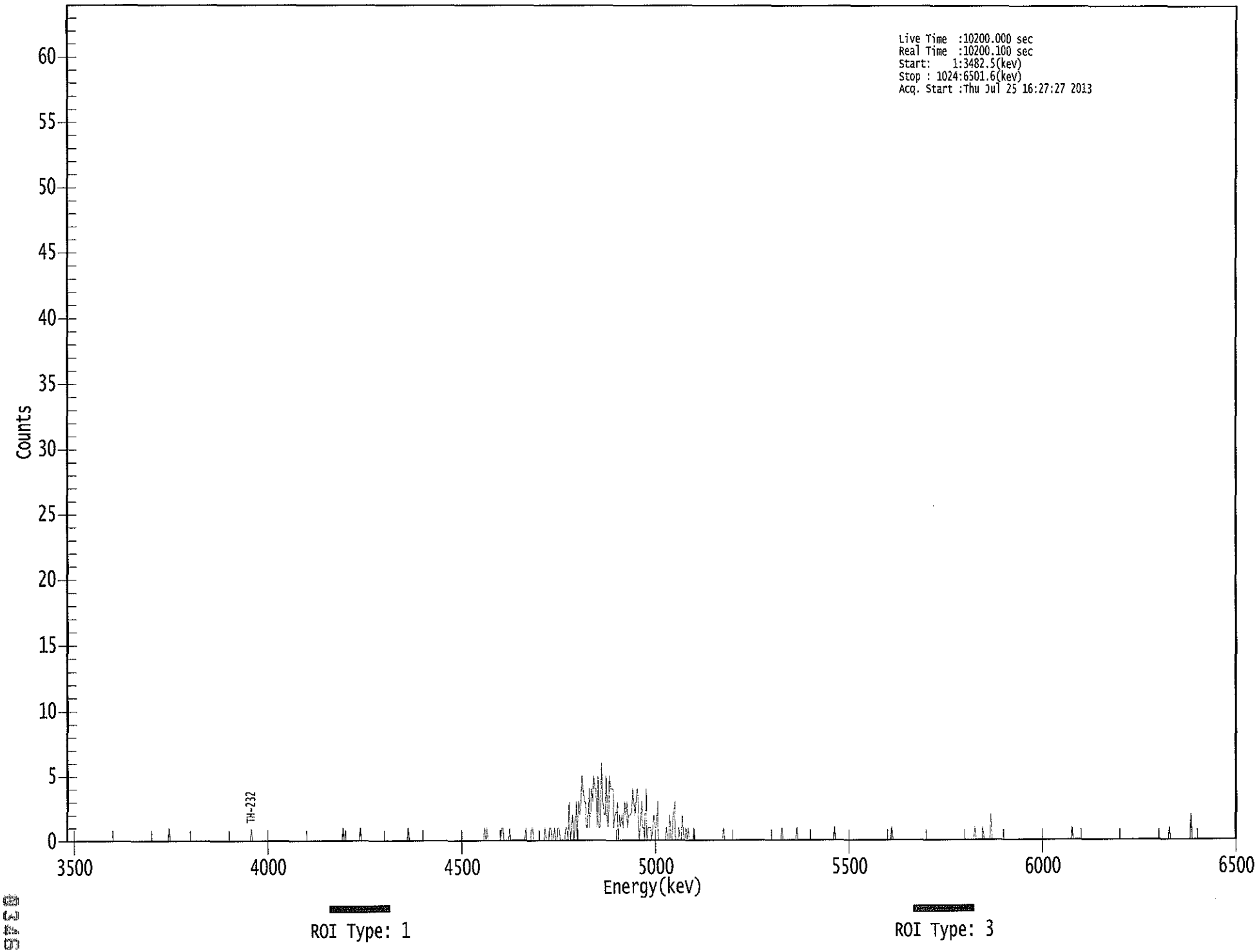
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	4.09E-002 +/- 4.94E-002	6.95E-002 +/- 1.06E-002
TH-228	0.938	5400.00*	2.00E-002 +/- 4.31E-002	8.37E-002 +/- 1.28E-002
TH-229	0.998	4872.00*	2.36E+000 +/- 3.61E-001	5.77E-002 +/- 8.82E-003
TH-230	0.993	4672.00*	1.02E-001 +/- 7.27E-002	6.31E-002 +/- 9.65E-003
TH-232	0.992	3997.00*	9.96E-003 +/- 2.39E-002	5.01E-002 +/- 7.66E-003

AG 7/26/13

0000064001.CNF



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

Sample Title: 17

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	1	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	1	0	0	0	0	0	0
169:	0	0	0	0	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	1	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	1	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	1	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	1	0	1

369:	0	0	0	0	0	0	0	0

Sample Title: 17

Channel								
377:	0	0	0	0	1	1	0	0
385:	0	0	0	1	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	1	0	0	0	0	1	1
409:	0	0	0	0	0	0	0	0
417:	0	0	1	0	0	0	1	1
425:	0	0	1	0	0	1	1	0
433:	0	0	0	0	1	1	0	3
441:	0	1	2	0	1	3	0	3
449:	2	3	5	4	3	3	1	1
457:	4	1	4	3	5	4	4	1
465:	5	1	1	6	3	2	2	5
473:	2	1	5	4	4	4	1	2
481:	2	3	0	2	1	2	1	3
489:	2	3	1	2	2	2	4	3
497:	2	3	4	3	0	1	3	1
505:	1	0	4	0	1	1	1	0
513:	1	2	1	1	3	0	0	0
521:	0	0	0	0	1	0	0	2
529:	0	0	2	3	0	0	0	1
537:	0	0	2	0	0	1	0	1
545:	0	0	0	0	1	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	1	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	1	0	0	0	0	0	0
633:	0	0	0	0	0	0	1	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	1
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	1	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	1	0	0	0	0	0

801:	0	1	0	0	0	0	0	0

Sample Title: 17

Channel							
809:	2	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	1
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	1	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	2
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: PZ-100-SD DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 18
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_039
Chamber Serial Number: 06027396A
Detector Serial Number: 83109
Env. Background: System Bkgd 62771
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:27:34 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.233 mL
Effective Efficiency: 0.1668 +/- 0.0147
Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
Chem. Recovery Factor: 0.8487 +/- 0.0762

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.757	3.00	130.67	0.00	0.00E+000	3.0
TH-228		5.282	1.81	193.78	1.19	0.00E+000	3.0
TH-229	T	4.875	148.15	16.16	0.85	0.00E+000	14.1
TH-230		4.498	5.66	85.23	0.34	0.00E+000	3.0
TH-232		4.042	1.49	190.02	0.51	0.00E+000	3.0

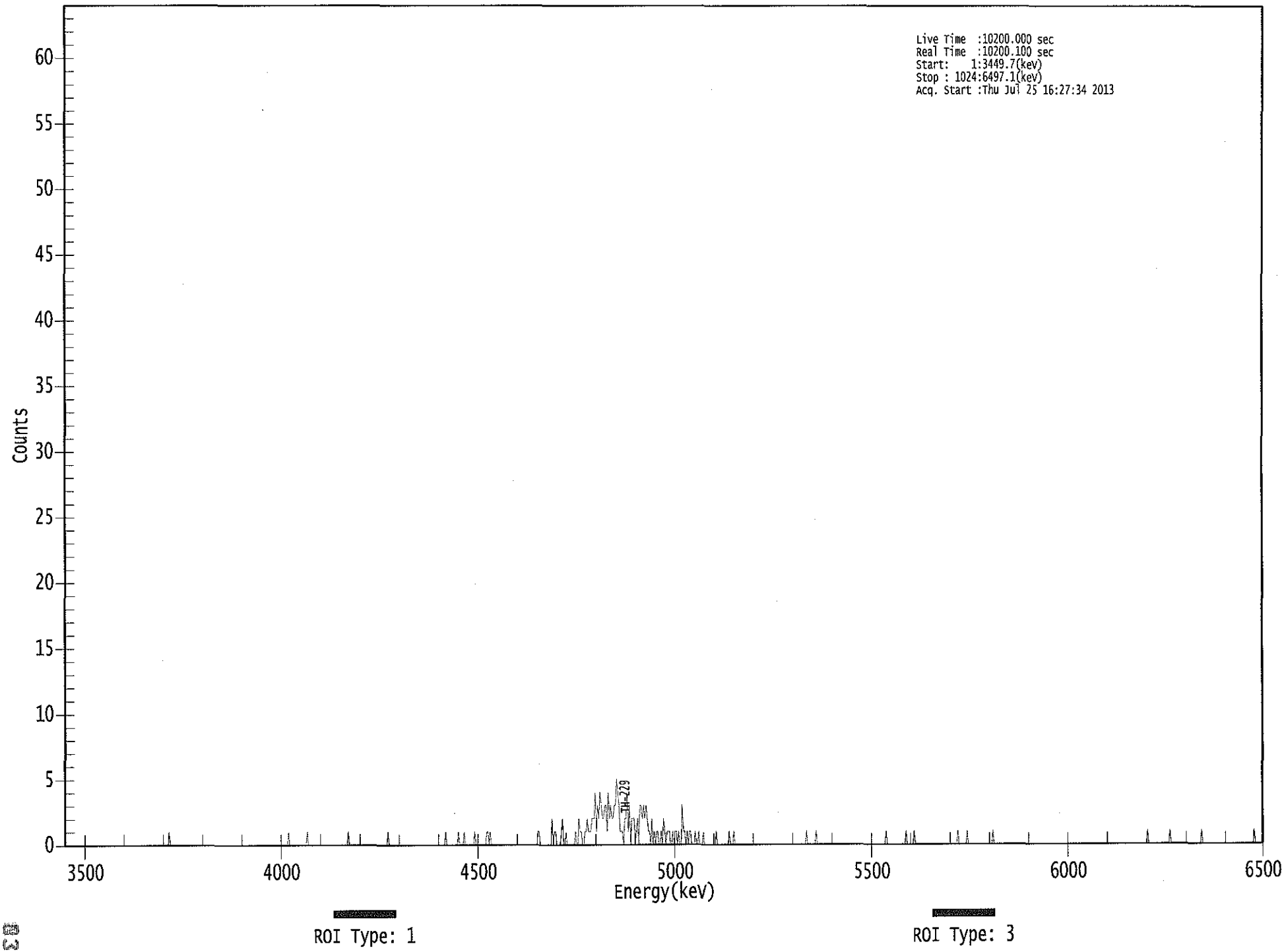
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.956	5850.00*	4.90E-002 +/- 6.45E-002	9.78E-002 +/- 1.69E-002
TH-228	0.929	5400.00*	2.92E-002 +/- 5.69E-002	1.06E-001 +/- 1.84E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 4.08E-001	9.56E-002 +/- 1.65E-002
TH-230	0.853	4672.00*	9.01E-002 +/- 7.83E-002	7.61E-002 +/- 1.31E-002
TH-232	0.989	3997.00*	2.37E-002 +/- 4.52E-002	8.34E-002 +/- 1.44E-002

AG
7/26/13

0000064064.CNF



B53

****
***** 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:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	1	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	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	1
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	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	1	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	1	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	1	0	0
329:	0	0	0	0	0	0	0	0
337:	1	0	0	0	0	1	0	0
345:	0	0	0	0	0	0	1	0
353:	0	0	0	0	0	0	0	0
361:	1	1	0	1	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 18

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	1	0	0
409:	0	0	0	0	0	0	0	0
417:	2	0	1	1	0	0	0	0
425:	1	2	0	0	1	0	0	0
433:	0	0	0	0	1	0	0	2
441:	1	1	0	0	1	1	2	1
449:	1	1	2	2	2	4	1	3
457:	2	4	3	2	2	3	3	1
465:	4	2	3	2	2	3	3	5
473:	4	3	1	1	1	0	2	2
481:	4	1	3	0	2	2	2	0
489:	1	2	0	3	3	2	3	2
497:	3	2	1	1	0	2	0	1
505:	0	1	1	0	0	1	0	2
513:	1	0	1	1	1	0	0	1
521:	0	1	1	0	1	0	0	3
529:	1	1	0	1	0	1	1	0
537:	0	0	1	0	0	1	0	0
545:	0	1	0	0	0	0	0	0
553:	0	0	0	0	1	0	0	0
561:	0	0	0	0	0	0	0	1
569:	0	0	0	1	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	1	0	0	0	0	0	0
641:	0	1	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	1	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	1	0
721:	0	0	0	0	0	1	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	1	0	0	0	0	0
769:	0	0	1	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	1	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 18

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

Apex-Alpha™

Sample Description: PZ-112-AS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 19
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 62772
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:27:36 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.232 mL
Effective Efficiency: 0.1623 +/- 0.0144
Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
Chem. Recovery Factor: 0.8544 +/- 0.0775

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.860	3.49	113.53	0.51	0.00E+000	3.0
TH-228		5.263	3.83	102.72	0.17	0.00E+000	3.0
TH-229	T	4.890	143.83	16.35	0.17	0.00E+000	7.4
TH-230		4.503	10.00	65.01	0.00	0.00E+000	3.0
TH-232		3.910	1.00	277.19	0.00	0.00E+000	3.0

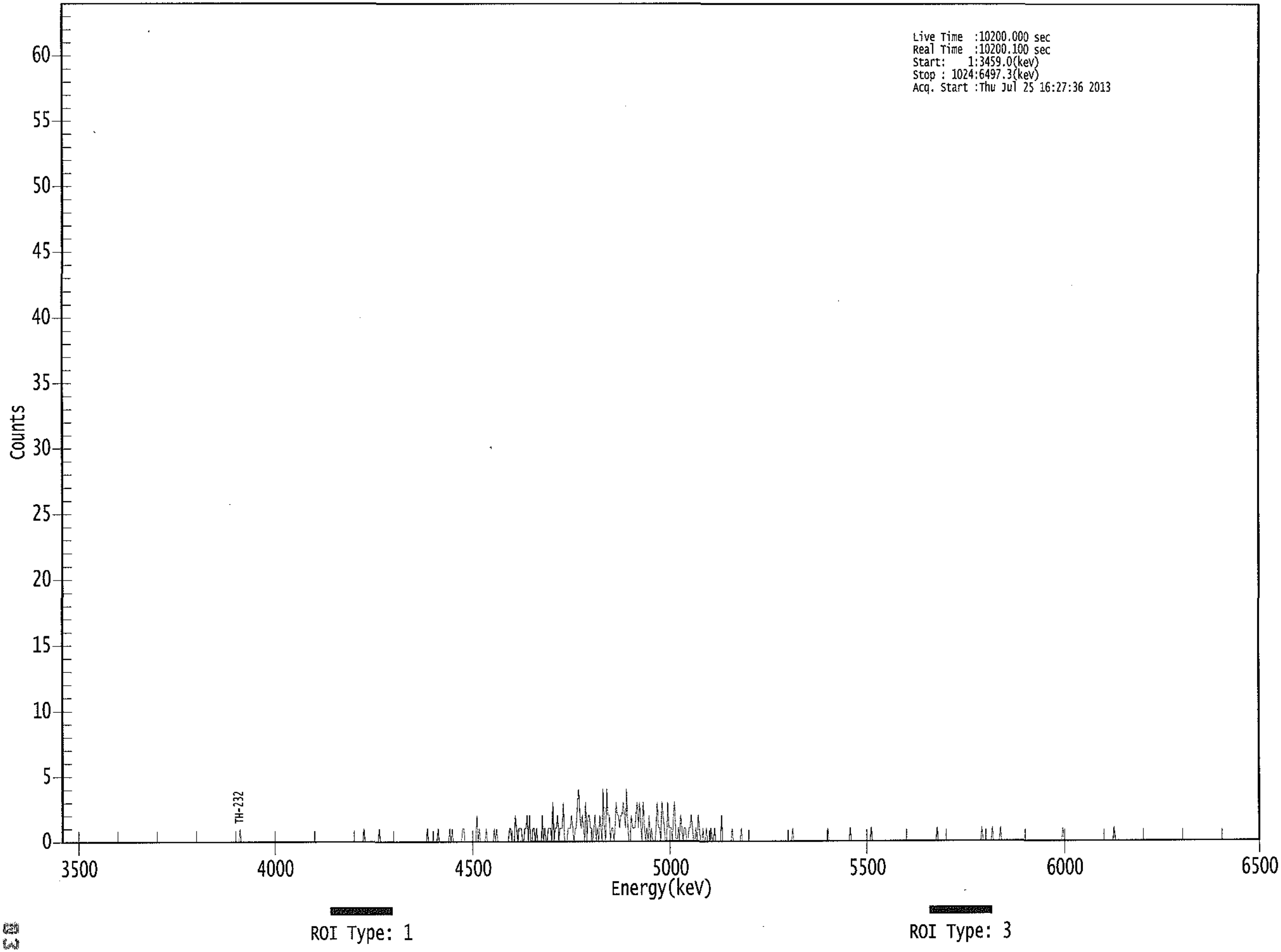
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	5.85E-002 +/- 6.72E-002	8.80E-002 +/- 1.53E-002
TH-228	0.907	5400.00*	6.36E-002 +/- 6.62E-002	6.93E-002 +/- 1.21E-002
TH-229	0.998	4872.00*	2.36E+000 +/- 4.12E-001	6.84E-002 +/- 1.19E-002
TH-230	0.861	4672.00*	1.64E-001 +/- 1.10E-001	9.80E-002 +/- 1.71E-002
TH-232	0.962	3997.00*	1.63E-002 +/- 4.53E-002	9.79E-002 +/- 1.71E-002

AC
7/26/13

0000064065.CNF



8356

****
***** 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:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	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	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	1	0	0	0	0	0
265:	0	0	0	0	0	0	0	1
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	1	0	0	0	0	0	0	0
321:	0	1	0	0	0	0	0	0
329:	0	0	0	1	0	1	0	0
337:	0	0	0	0	0	0	1	1
345:	0	0	0	0	0	0	0	0
353:	0	0	2	0	1	0	0	0
361:	0	0	1	0	0	0	0	0

369:	0	1	0	1	0	0	0	0

Sample Title: 19

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

801:	0	1	0	0	0	0	0	0

Sample Title: 19

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	1	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	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	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™

Sample Description: PZ-112-AS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000640
Batch Identification: 1307098A-TH
Sample Identification: 20
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 62773
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 7/9/2013 10:21:48 AM
Acquisition Date/Time: 7/25/2013 4:27:32 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.233 mL
Effective Efficiency: 0.1615 +/- 0.0144
Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
Chem. Recovery Factor: 0.8164 +/- 0.0741

Peak Match Tolerance: 0.175 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227		5.849	2.15	161.66	0.85	0.00E+000	3.0
TH-228		5.303	4.49	98.45	0.51	0.00E+000	3.0
TH-229	T	4.855	143.66	16.38	0.34	0.00E+000	4.0
TH-230		4.551	7.98	74.39	1.02	0.00E+000	4.5
TH-232		3.996	-2.42	134.34	4.42	0.00E+000	3.0

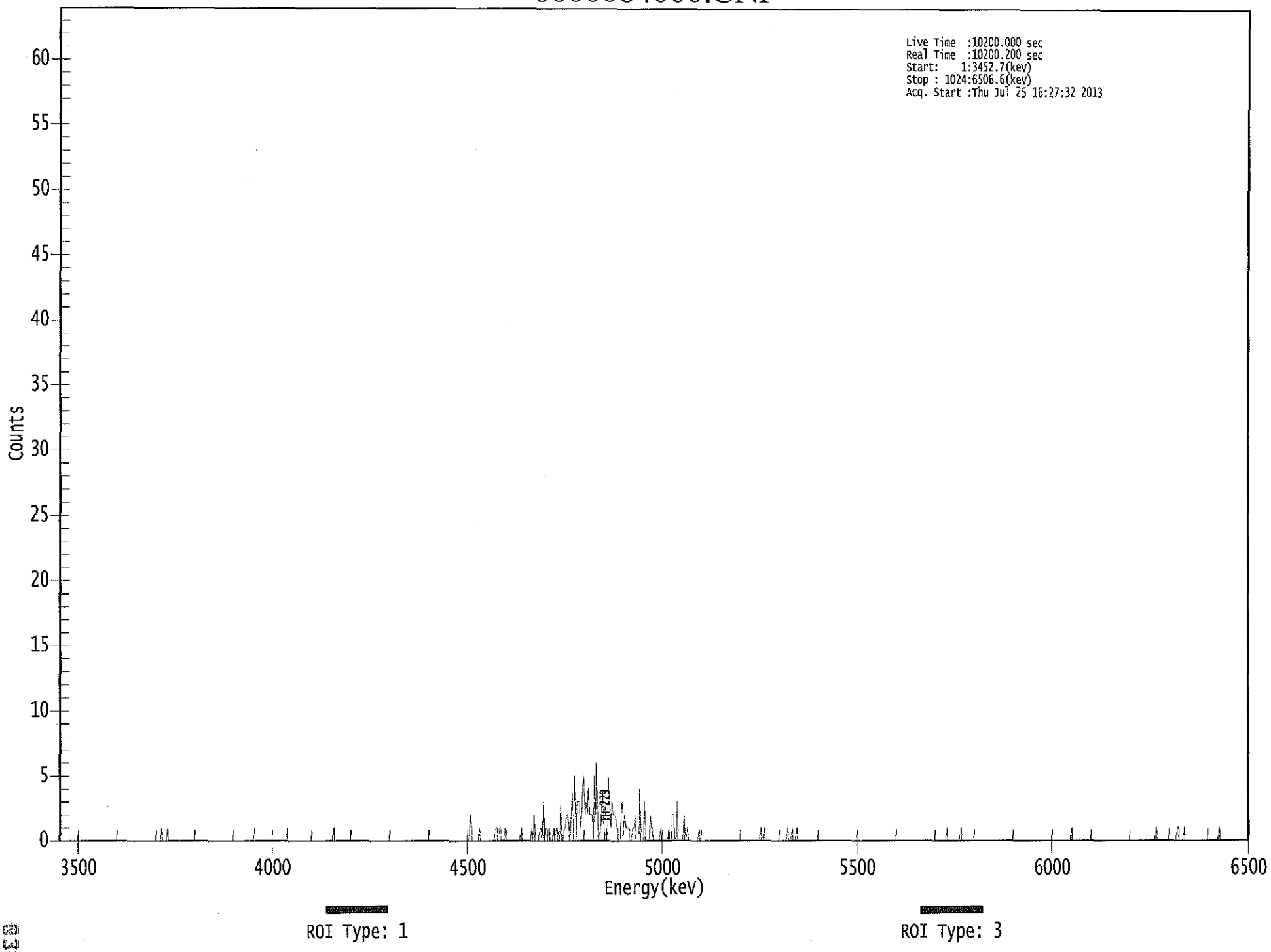
T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	3.62E-002 +/- 5.89E-002	1.01E-001 +/- 1.76E-002
TH-228	0.952	5400.00*	7.49E-002 +/- 7.49E-002	8.75E-002 +/- 1.53E-002
TH-229	0.998	4872.00*	2.37E+000 +/- 4.14E-001	7.88E-002 +/- 1.38E-002
TH-230	0.927	4672.00*	1.31E-001 +/- 1.00E-001	1.04E-001 +/- 1.81E-002
TH-232	1.000	3997.00*	-3.97E-002 +/- 5.38E-002	1.67E-001 +/- 2.92E-002

AG
7/26/13

0000064066.CNF



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

Sample Title: 20

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel							
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	1	0	0	0	0	1	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:	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	1	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	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:	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	2	1	0	0	0	0	0
361:	0	1	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	1

Sample Title: 20

Channel								
377:	1	0	1	1	0	0	0	1
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	1	0	0
401:	0	0	0	0	0	0	1	0
409:	2	0	0	0	0	1	1	0
417:	3	0	1	1	0	1	0	0
425:	0	1	0	1	1	0	0	3
433:	0	0	1	1	2	2	1	0
441:	2	4	0	5	0	3	3	3
449:	1	2	4	5	2	3	2	4
457:	2	2	2	0	5	2	6	1
465:	0	1	2	4	1	0	1	0
473:	5	3	1	3	2	2	2	1
481:	1	0	0	2	3	1	2	1
489:	1	1	1	0	0	1	1	2
497:	0	0	0	4	0	0	0	3
505:	0	0	0	0	2	1	1	0
513:	0	0	0	0	0	1	0	0
521:	0	0	0	0	1	0	0	2
529:	2	0	0	3	0	0	0	0
537:	0	2	0	0	1	0	0	0
545:	0	0	0	0	0	0	1	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	1	0	0	1	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	1	0	0	0	1	0
633:	0	0	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	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	1	0	0	0	0
769:	0	0	0	0	0	0	0	1
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: 20

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	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	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	1
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	1	1	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	1	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

7/25/2013 5:32:50 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 7/25/2013
Time : 5:32:50 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	7/25/2013 5:16:27 AM
Alpha_004	21f	ALL	Passed	7/25/2013 5:16:28 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	7/25/2013 5:16:29 AM
Alpha_011	21f	ALL	Passed	7/25/2013 5:16:29 AM
Alpha_012	21f	ALL	Passed	7/25/2013 5:16:30 AM
Alpha_013	21f	ALL	Passed	7/25/2013 5:16:31 AM
Alpha_014	21f	ALL	Passed	7/25/2013 5:16:32 AM
Alpha_015	21f	ALL	Passed	7/25/2013 5:16:33 AM
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	7/25/2013 5:16:34 AM
Alpha_019	AIM730	ALL	Passed	7/25/2013 5:16:34 AM
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	7/25/2013 5:16:35 AM
Alpha_023	AIM730	ALL	Passed	7/25/2013 5:16:36 AM
Alpha_024	AIM730	ALL	Passed	7/25/2013 5:16:37 AM
Alpha_025	AIM730	ALL	Passed	7/25/2013 5:16:38 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	7/25/2013 5:16:38 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	7/25/2013 5:16:39 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Passed	7/25/2013 5:16:40 AM
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:41 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:42 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:44 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:45 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:46 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:48 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:49 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:51 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:52 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:54 AM

Review of QA Results - Pulser Check

7/25/2013 5:32:50 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Not Done	
Alpha_045	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:56 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:57 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:59 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:17:00 AM

APPROVED BY: _____

APPROVAL DATE: 7/25/13

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

Nuclide Library Title: Thorium

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

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

* = key line

TOTALS: 5 Nuclides 5 Energy Lines

SECTION X

ANALYTICAL DATA (RADIUM-226)

Work Order	13-07098
Analysis Code	Ra226
Run	1
Date Received	7/15/2013
Lab Deadline	8/6/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	E903.0
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	993.635
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/16/13 00:00	1.0000E+00
02	MBL	BLANK		07/16/13 00:00	1.0000E+00
03	DUP	I-4 TOT	44	07/09/13 12:25	1.0000E+00
04	TRG	PZ-111-SD TOT	36	07/09/13 10:42	1.0000E+00
05	TRG	PZ-111-SD DIS	36	07/09/13 10:42	1.0000E+00
06	TRG	S-5 TOT	45	07/09/13 10:50	1.0000E+00
07	TRG	S-5 DIS	45	07/09/13 10:50	1.0000E+00
08	TRG	FB @ PZ-110-SS TOT	43	07/09/13 11:40	1.0000E+00
09	TRG	PZ-110-SS TOT	41	07/09/13 12:13	1.0000E+00
10	TRG	PZ-110-SS DIS	41	07/09/13 12:13	1.0000E+00
11	DO	I-4 TOT	44	07/09/13 12:25	1.0000E+00
12	TRG	I-4 DIS	44	07/09/13 12:25	1.0000E+00
13	TRG	PZ-100-SS TOT	46	07/09/13 13:36	1.0000E+00
14	TRG	PZ-100-SS DIS	46	07/09/13 13:36	1.0000E+00
15	TRG	D-3 TOT	43	07/09/13 13:42	1.0000E+00
16	TRG	D-3 DIS	43	07/09/13 13:42	1.0000E+00
17	TRG	PZ-100-SD TOT	39	07/09/13 14:32	1.0000E+00
18	TRG	PZ-100-SD DIS	39	07/09/13 14:32	1.0000E+00
19	TRG	PZ-112-AS TOT	45	07/09/13 14:46	1.0000E+00
20	TRG	PZ-112-AS DIS	45	07/09/13 14:46	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	0.9214	915.5	397.0	96.26		0.0226	0.0293	0.0067		96.26	2.40	1.00
02	MBL	0.9118	906.0	351.3	86.08		0.0224	0.0287	0.0063		86.08	2.27	1.00
03	DUP	0.9114	905.6	383.9	94.11		0.0224	0.0296	0.0072		94.11	2.55	1.00
04	TRG	0.9096	903.8	385.9	94.79		0.0225	0.0291	0.0066		94.79	2.37	1.00
05	TRG	0.9105	904.7	386.0	94.72		0.0227	0.0295	0.0068		94.72	2.44	1.00
06	TRG	0.9085	902.7	227.5	55.95		0.0224	0.0331	0.0107		55.95	3.50	1.00
07	TRG	0.9086	902.8	280.0	68.85		0.0227	0.0375	0.0148		68.85	6.24	1.00
08	TRG	0.8957	890.0	339.1	84.58		0.0225	0.0283	0.0058		84.58	2.08	1.00
09	TRG	0.9078	902.0	360.2	88.65		0.0224	0.0290	0.0066		88.65	2.37	1.00
10	TRG	0.9090	903.2	391.6	96.25		0.0227	0.0293	0.0066		96.25	2.37	1.00
11	DO	0.9076	901.8	410.0	100.93		0.0224	0.0334	0.0110		100.93	3.61	1.00
12	TRG	0.9114	905.6	354.2	86.83		0.0224	0.0339	0.0115		86.83	3.82	1.00
13	TRG	0.9086	902.8	362.2	89.06		0.0225	0.0289	0.0064		89.06	2.31	1.00
14	TRG	0.9057	899.9	385.1	95.00		0.0225	0.0288	0.0063		95.00	2.27	1.00
15	TRG	0.9055	899.7	356.1	87.86		0.0225	0.0363	0.0138		87.86	5.26	1.00
16	TRG	0.9046	898.8	332.7	82.17		0.0226	0.0373	0.0147		82.17	6.13	1.00
17	TRG	0.9066	900.8	395.5	97.47		0.0225	0.0291	0.0066		97.47	2.37	1.00
18	TRG	0.9067	900.9	399.2	98.37		0.0226	0.0285	0.0059		98.37	2.12	1.00
19	TRG	0.9063	900.5	389.6	96.04		0.0225	0.0361	0.0136		96.04	5.10	1.00
20	TRG	0.9059	900.1	364.2	89.82		0.0225	0.0329	0.0104		89.82	3.40	1.00

* 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			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
02	MBL			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
03	DUP			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
04	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
05	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
06	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
07	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
08	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
09	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
10	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
11	DO			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
12	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
13	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
14	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
15	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
16	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
17	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
18	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
19	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		
20	TRG			07/19/13 08:55	JWOLFE	07/23/13 12:55	LWALKER		

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

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-Ra226-1

Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07098
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	RA-226	LCS	LCS	pCi/l	1.07E+01	1.25E+00	2.72E-01	1.03E+01	103.42	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	1.29E-01	1.76E-01	2.91E-01					OK	OK
03	RA-226	DUP	I-4 TOT	pCi/l	1.08E+00	3.91E-01	2.31E-01				NA	OK	
04	RA-226	TRG	PZ-111-SD TOT	pCi/l	1.05E+00	3.71E-01	1.59E-01					OK	
05	RA-226	TRG	PZ-111-SD DIS	pCi/l	1.53E+00	4.74E-01	2.41E-01					OK	
06	RA-226	TRG	S-5 TOT	pCi/l	9.83E-01	6.72E-01	8.02E-01					OK	
07	RA-226	TRG	S-5 DIS	pCi/l	8.31E-01	6.19E-01	6.56E-01					OK	
08	RA-226	TRG	FB @ PZ-110-SS TOT	pCi/l	3.46E-02	1.02E-01	2.22E-01					OK	
09	RA-226	TRG	PZ-110-SS TOT	pCi/l	4.12E+00	7.94E-01	2.29E-01					OK	
10	RA-226	TRG	PZ-110-SS DIS	pCi/l	3.43E+00	7.00E-01	2.14E-01					OK	
11	RA-226	DO	I-4 TOT	pCi/l	1.37E+00	5.23E-01	2.83E-01					OK	
12	RA-226	TRG	I-4 DIS	pCi/l	9.59E-01	4.99E-01	3.13E-01					OK	
13	RA-226	TRG	PZ-100-SS TOT	pCi/l	4.04E+00	8.03E-01	2.25E-01					OK	
14	RA-226	TRG	PZ-100-SS DIS	pCi/l	3.19E+00	6.41E-01	2.03E-01					OK	
15	RA-226	TRG	D-3 TOT	pCi/l	3.53E+00	9.39E-01	3.04E-01					OK	
16	RA-226	TRG	D-3 DIS	pCi/l	3.72E+00	9.92E-01	4.94E-01					OK	
17	RA-226	TRG	PZ-100-SD TOT	pCi/l	1.87E+00	5.07E-01	1.83E-01					OK	
18	RA-226	TRG	PZ-100-SD DIS	pCi/l	1.85E+00	4.66E-01	1.25E-01					OK	
19	RA-226	TRG	PZ-112-AS TOT	pCi/l	2.27E+00	7.40E-01	2.57E-01					OK	
20	RA-226	TRG	PZ-112-AS DIS	pCi/l	1.19E+00	5.22E-01	3.77E-01					OK	

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Run	Analysis Code	Eberline Services Work Order	Client
1	Ra226	13-07098	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	RA-226	LCS	07/16/13 00:00	1.00E+00	96.26	0.00	96.26		7/23/2013 12:55	
02	RA-226	MBL	07/16/13 00:00	1.00E+00	86.08	0.00	86.08		7/23/2013 12:55	
03	RA-226	DUP	07/09/13 12:25	1.00E+00	94.11	0.00	94.11		7/23/2013 12:55	
04	RA-226	TRG	07/09/13 10:42	1.00E+00	94.79	0.00	94.79		7/23/2013 12:55	
05	RA-226	TRG	07/09/13 10:42	1.00E+00	94.72	0.00	94.72		7/23/2013 12:55	
06	RA-226	TRG	07/09/13 10:50	1.00E+00	55.95	0.00	55.95		7/23/2013 12:55	
07	RA-226	TRG	07/09/13 10:50	1.00E+00	68.85	0.00	68.85		7/23/2013 12:55	
08	RA-226	TRG	07/09/13 11:40	1.00E+00	84.58	0.00	84.58		7/23/2013 12:55	
09	RA-226	TRG	07/09/13 12:13	1.00E+00	88.65	0.00	88.65		7/23/2013 12:55	
10	RA-226	TRG	07/09/13 12:13	1.00E+00	96.25	0.00	96.25		7/23/2013 12:55	
11	RA-226	DO	07/09/13 12:25	1.00E+00	100.00	0.00	100.93		7/23/2013 12:55	
12	RA-226	TRG	07/09/13 12:25	1.00E+00	86.83	0.00	86.83		7/23/2013 12:55	
13	RA-226	TRG	07/09/13 13:36	1.00E+00	89.06	0.00	89.06		7/23/2013 12:55	
14	RA-226	TRG	07/09/13 13:36	1.00E+00	95.00	0.00	95.00		7/23/2013 12:55	
15	RA-226	TRG	07/09/13 13:42	1.00E+00	87.86	0.00	87.86		7/23/2013 12:55	
16	RA-226	TRG	07/09/13 13:42	1.00E+00	82.17	0.00	82.17		7/23/2013 12:55	
17	RA-226	TRG	07/09/13 14:32	1.00E+00	97.47	0.00	97.47		7/23/2013 12:55	
18	RA-226	TRG	07/09/13 14:32	1.00E+00	98.37	0.00	98.37		7/23/2013 12:55	
19	RA-226	TRG	07/09/13 14:46	1.00E+00	96.04	0.00	96.04		7/23/2013 12:55	
20	RA-226	TRG	07/09/13 14:46	1.00E+00	89.82	0.00	89.82		7/23/2013 12:55	

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Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-Ra226-1

Run	Analysis Code	Eberline Services Work Order	Client
1	Ra226	13-07098	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-226	LCS	07/24/13 12:43		A_Spec	Alpha_004	170	3.13 E+02	1.30 E-02	19.4
02	RA-226	MBL	07/24/13 12:43		A_Spec	Alpha_010	170	3.62 E+00	1.40 E-02	19.7
03	RA-226	DUP	07/24/13 12:43		A_Spec	Alpha_011	170	3.08 E+01	7.00 E-03	20.5
04	RA-226	TRG	07/24/13 12:43		A_Spec	Alpha_012	170	3.17 E+01	2.00 E-03	19.9
05	RA-226	TRG	07/24/13 12:43		A_Spec	Alpha_013	170	4.18 E+01	7.00 E-03	18.7
06	RA-226	TRG	07/24/13 12:43		A_Spec	Alpha_014	170	1.09 E+01	1.80 E-02	18.5
07	RA-226	TRG	07/24/13 12:43		A_Spec	Alpha_015	170.02	7.98 E+00	6.00 E-03	14.8
08	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_033	170	9.80 E-01	6.00 E-03	18.5
09	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_034	170	1.08 E+02	0.00 E+00	18.6
10	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_035	170	9.60 E+01	0.00 E+00	18.3
11	RA-226	DO	07/24/13 12:44		A_Spec	Alpha_036	170	2.73 E+01	4.00 E-03	19.1
12	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_037	170	1.47 E+01	2.00 E-03	17.8
13	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_038	170	1.01 E+02	4.00 E-03	17.2
14	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_039	170	9.90 E+01	6.00 E-03	19.7
15	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_040	170	5.57 E+01	2.00 E-03	19
16	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_041	170	5.71 E+01	1.10 E-02	19.8
17	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_042	170	5.35 E+01	3.00 E-03	18.5
18	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_045	170	6.18 E+01	1.00 E-03	19.1
19	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_046	170	3.68 E+01	1.00 E-03	17.9
20	RA-226	TRG	07/24/13 12:44		A_Spec	Alpha_047	170	2.16 E+01	8.00 E-03	18.2

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	07/16/13 00:00	1.0000	0.9214	915.5353	397.0000	96.26	2.40	1.00
02	MBL	BLANK	07/16/13 00:00	1.0000	0.9118	905.9964	351.3000	86.08	2.27	1.00
03	DUP	I-4 TOT	07/09/13 12:25	1.0000	0.9114	905.5989	383.9000	94.11	2.55	1.00
04	TRG	PZ-111-SD TOT	07/09/13 10:42	1.0000	0.9096	903.8104	385.9000	94.79	2.37	1.00
05	TRG	PZ-111-SD DIS	07/09/13 10:42	1.0000	0.9105	904.7047	386.0000	94.72	2.44	1.00
06	TRG	S-5 TOT	07/09/13 10:50	1.0000	0.9085	902.7174	227.5000	55.95	3.50	1.00
07	TRG	S-5 DIS	07/09/13 10:50	1.0000	0.9086	902.8168	280.0000	68.85	6.24	1.00
08	TRG	FB @ PZ-110-SS TOT	07/09/13 11:40	1.0000	0.8957	889.9989	339.1000	84.58	2.08	1.00
09	TRG	PZ-110-SS TOT	07/09/13 12:13	1.0000	0.9078	902.0219	360.2000	88.65	2.37	1.00
10	TRG	PZ-110-SS DIS	07/09/13 12:13	1.0000	0.9090	903.2142	391.6000	96.25	2.37	1.00
11	DO	I-4 TOT	07/09/13 12:25	1.0000	0.9076	901.8231	410.0000	100.93	3.61	1.00
12	TRG	I-4 DIS	07/09/13 12:25	1.0000	0.9114	905.5989	354.2000	86.83	3.82	1.00
13	TRG	PZ-100-SS TOT	07/09/13 13:36	1.0000	0.9086	902.8168	362.2000	89.06	2.31	1.00
14	TRG	PZ-100-SS DIS	07/09/13 13:36	1.0000	0.9057	899.9352	385.1000	95.00	2.27	1.00
15	TRG	D-3 TOT	07/09/13 13:42	1.0000	0.9055	899.7365	356.1000	87.86	5.26	1.00
16	TRG	D-3 DIS	07/09/13 13:42	1.0000	0.9046	898.8422	332.7000	82.17	6.13	1.00
17	TRG	PZ-100-SD TOT	07/09/13 14:32	1.0000	0.9066	900.8295	395.5000	97.47	2.37	1.00
18	TRG	PZ-100-SD DIS	07/09/13 14:32	1.0000	0.9067	900.9289	399.2000	98.37	2.12	1.00
19	TRG	PZ-112-AS TOT	07/09/13 14:46	1.0000	0.9063	900.5314	389.6000	96.04	5.10	1.00
20	TRG	PZ-112-AS DIS	07/09/13 14:46	1.0000	0.9059	900.1339	364.2000	89.82	3.40	1.00

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-07098	1	Ra226	7/19/2013 8:54	JWOLFE	JW	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Ra-226	Ra-5b	44.067	7/19/2013	0.500	0.5188				10.30	0.474	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	Ba-133	Ba-6a	993.635	7/19/2013	0.9214	1.0200
02	Ba-133	Ba-6a	993.635	7/19/2013	0.9118	1.0200
03	Ba-133	Ba-6a	993.635	7/19/2013	0.9114	1.0200
04	Ba-133	Ba-6a	993.635	7/19/2013	0.9096	1.0200
05	Ba-133	Ba-6a	993.635	7/19/2013	0.9105	1.0200
06	Ba-133	Ba-6a	993.635	7/19/2013	0.9085	1.0200
07	Ba-133	Ba-6a	993.635	7/19/2013	0.9086	1.0200
08	Ba-133	Ba-6a	993.635	7/19/2013	0.8957	1.0200
09	Ba-133	Ba-6a	993.635	7/19/2013	0.9078	1.0200
10	Ba-133	Ba-6a	993.635	7/19/2013	0.9090	1.0200
11	Ba-133	Ba-6a	993.635	7/19/2013	0.9076	1.0200
12	Ba-133	Ba-6a	993.635	7/19/2013	0.9114	1.0200
13	Ba-133	Ba-6a	993.635	7/19/2013	0.9086	1.0200
14	Ba-133	Ba-6a	993.635	7/19/2013	0.9057	1.0200
15	Ba-133	Ba-6a	993.635	7/19/2013	0.9055	1.0200
16	Ba-133	Ba-6a	993.635	7/19/2013	0.9046	1.0200
17	Ba-133	Ba-6a	993.635	7/19/2013	0.9066	1.0200
18	Ba-133	Ba-6a	993.635	7/19/2013	0.9067	1.0200
19	Ba-133	Ba-6a	993.635	7/19/2013	0.9063	1.0200
20	Ba-133	Ba-6a	993.635	7/19/2013	0.9059	1.0200

Balance Printer Tapes

Tracer

0.9214 g
0.9118 g
-0.9114 g
-0.9096 g
-0.9105 g
-0.9085 g
-0.9086 g
-0.8957 g
-0.9078 g
-0.9090 g
-0.9076 g
-0.9114 g
-0.9086 g
-0.9057 g
-0.9055 g
-0.9046 g
-0.9066 g
-0.9067 g
-0.9063 g
-0.9059 g

LCS

0.5188 g
0.5184 g

Matrix Spike

US EPA ARCHIVE DOCUMENT

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07098	1	Ra226	liters	8/6/2013	JWOLFE

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	I-4 TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-111-SD TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-111-SD DIS	TRG					1.0000E+00	1.0000E+00				
06	S-5 TOT	TRG					1.0000E+00	1.0000E+00				
07	S-5 DIS	TRG					1.0000E+00	1.0000E+00				
08	FB @ PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
10	PZ-110-SS DIS	TRG					1.0000E+00	1.0000E+00				
11	I-4 TOT	DO					1.0000E+00	1.0000E+00				
12	I-4 DIS	TRG					1.0000E+00	1.0000E+00				
13	PZ-100-SS TOT	TRG					1.0000E+00	1.0000E+00				
14	PZ-100-SS DIS	TRG					1.0000E+00	1.0000E+00				
15	D-3 TOT	TRG					1.0000E+00	1.0000E+00				
16	D-3 DIS	TRG					1.0000E+00	1.0000E+00				
17	PZ-100-SD TOT	TRG					1.0000E+00	1.0000E+00				
18	PZ-100-SD DIS	TRG					1.0000E+00	1.0000E+00				
19	PZ-112-AS TOT	TRG					1.0000E+00	1.0000E+00				
20	PZ-112-AS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: JWolfe Date: 7/19/13

Eberline Services - Oak Ridge
Version 1.0 9/1999

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07098	1	Ra226			LWALKER

TRetec	Engineering Management Support, Inc.	Sample	Carrier Data	Filter Data			Gravimetric
Fraction	Client ID	Type	Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS		0.0226	0.0293	0.0067	
02	BLANK	MBL		0.0224	0.0287	0.0063	
03	DUP	DUP		0.0224	0.0296	0.0072	
04	PZ-111-SD TOT	TRG		0.0225	0.0291	0.0066	
05	PZ-111-SD DIS	TRG		0.0227	0.0295	0.0068	
06	S-5 TOT	TRG		0.0224	0.0331	0.0107	
07	S-5 DIS	TRG		0.0227	0.0375	0.0148	
08	FB @ PZ-110-SS TOT	TRG		0.0225	0.0283	0.0058	
09	PZ-110-SS TOT	TRG		0.0224	0.0290	0.0066	
10	PZ-110-SS DIS	TRG		0.0227	0.0293	0.0066	
11	I-4 TOT	DO		0.0224	0.0334	0.0110	
12	I-4 DIS	TRG		0.0224	0.0339	0.0115	
13	PZ-100-SS TOT	TRG		0.0225	0.0289	0.0064	
14	PZ-100-SS DIS	TRG		0.0225	0.0288	0.0063	
15	D-3 TOT	TRG		0.0225	0.0363	0.0138	
16	D-3 DIS	TRG		0.0226	0.0373	0.0147	
17	PZ-100-SD TOT	TRG		0.0225	0.0291	0.0066	
18	PZ-100-SD DIS	TRG		0.0226	0.0285	0.0059	
19	PZ-112-AS TOT	TRG		0.0225	0.0361	0.0136	
20	PZ-112-AS DIS	TRG		0.0225	0.0329	0.0104	

Technician: J. Walker Date: 7/23/13

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_004
Chamber Serial Number:
Detector Serial Number: 4
Env. Background: System Bkgd 62748
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.400E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/24/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:43:34 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9626 +/- 0.0000
Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
Effective Efficiency: 0.1868 +/- 0.0034

Control Certificate Name: Ra226_Ra-5b
Chem. Recov. of Control: RA-226 0.430887 +/- 0.028779
Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.530	554.07	8.37	4.93	0.00E+000	11.0
RA-226	4.689	312.79	11.13	2.21	0.00E+000	4.9

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	1.98E+001 +/- 4.32E+001	3.79E-001 +/- 8.26E-001
RA-226	0.988	4785.00*	1.07E+001 +/- 1.25E+000	2.72E-001 +/- 9.80E-003

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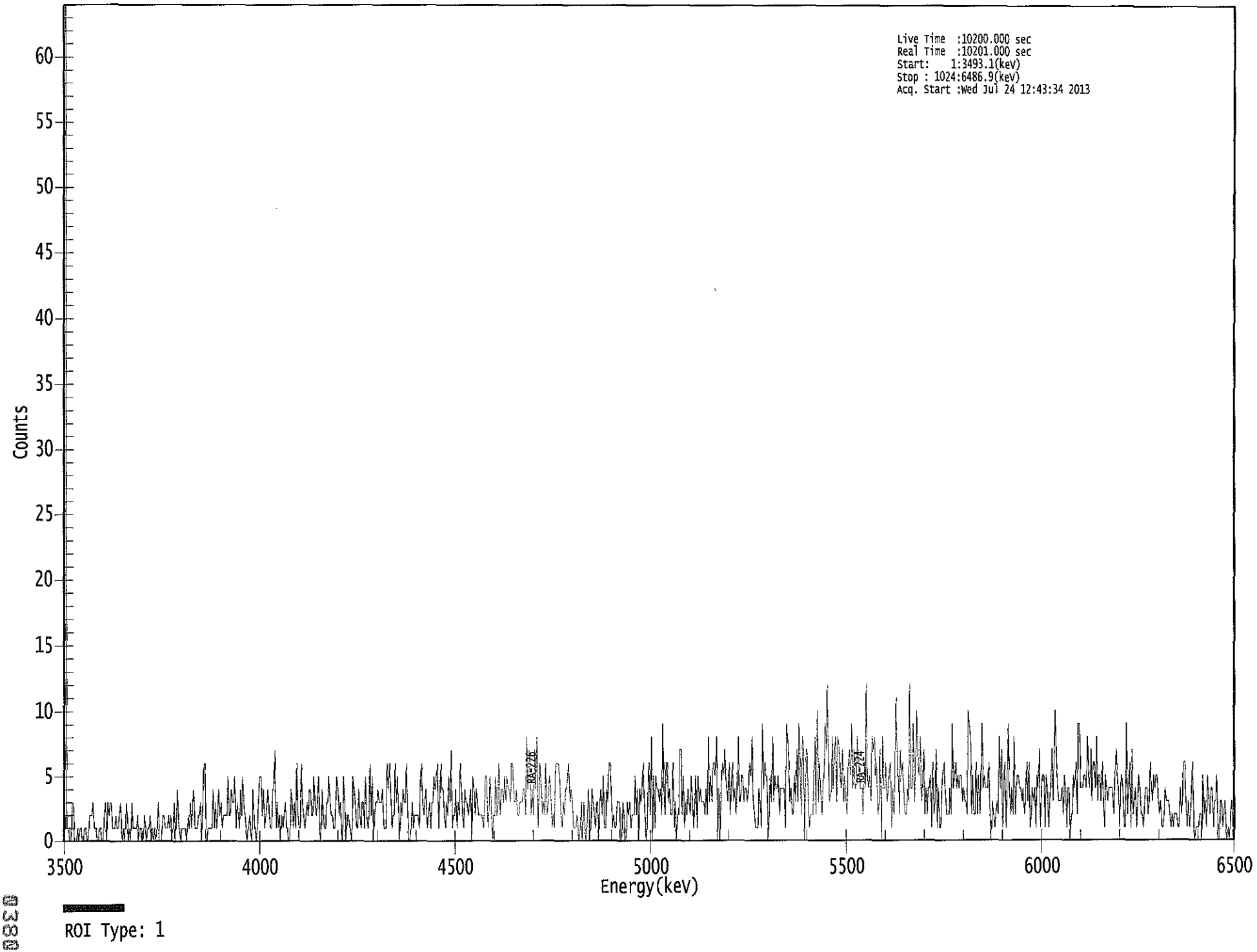
US EPA ARCHIVE DOCUMENT

0000063869.CNF



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

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10201

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

369:	5	5	1	2	5	3	0	2

Sample Title: 01

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

801:	2	4	9	4	5	4	4	4

Sample Title: 01

Channel								
809:	6	2	0	3	2	1	2	3
817:	2	8	4	7	1	4	6	1
825:	4	9	4	2	4	2	8	2
833:	4	5	5	4	4	3	4	2
841:	3	6	3	6	1	2	4	3
849:	4	1	5	4	7	1	4	5
857:	5	1	5	4	1	3	4	7
865:	3	7	10	6	4	3	3	3
873:	4	2	5	4	1	4	4	0
881:	2	2	5	4	6	2	9	9
889:	4	4	4	5	5	4	8	5
897:	4	7	3	6	6	4	8	3
905:	5	5	3	6	3	1	5	4
913:	3	4	4	4	4	2	5	7
921:	5	4	1	4	5	4	1	1
929:	9	2	4	6	1	7	2	3
937:	4	1	3	5	4	2	2	1
945:	3	4	4	2	3	6	4	3
953:	5	4	5	5	3	2	3	1
961:	1	2	4	3	3	3	2	1
969:	2	1	2	2	2	1	1	4
977:	2	3	6	6	3	1	3	1
985:	2	4	6	1	0	1	1	1
993:	2	2	0	5	2	3	1	5
1001:	3	2	4	4	1	3	3	5
1009:	0	0	3	3	1	2	3	1
1017:	0	1	0	2	3	1	2	4

Apex-Alpha™

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_010
Chamber Serial Number:
Detector Serial Number: 10
Env. Background: System Bkgd 62749
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.270E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/24/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:43:29 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8608 +/- 0.0000
Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
Effective Efficiency: 0.1693 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.526	3.26	166.13	3.74	0.00E+000	2.9
RA-226	4.526	3.62	137.02	2.38	0.00E+000	2.9

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.967	5685.50*	1.22E-001 +/- 3.34E-001	3.58E-001 +/- 7.84E-001
RA-226	0.916	4785.00*	1.29E-001 +/- 1.76E-001	2.91E-001 +/- 1.04E-002

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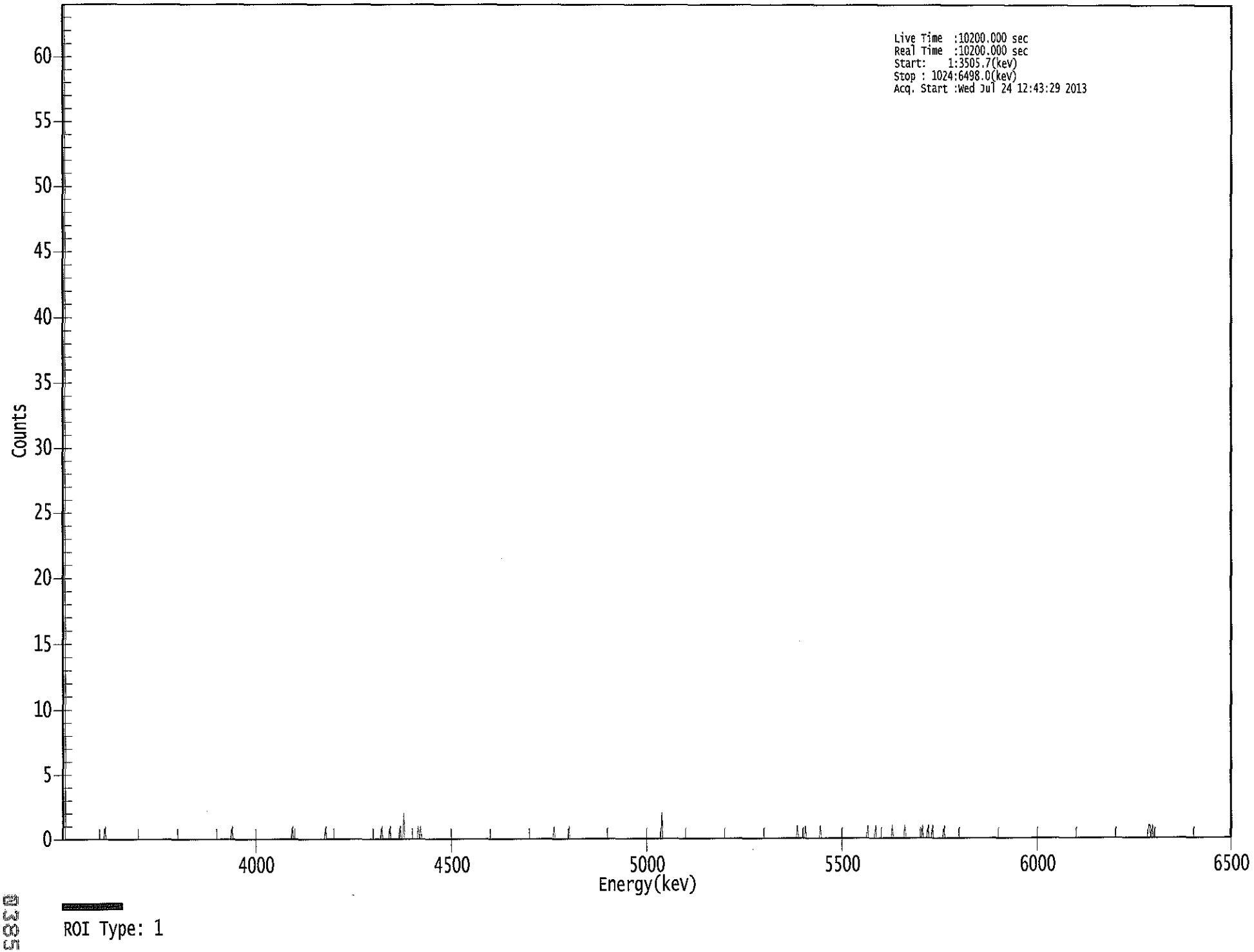

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 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	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	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	1	0	0	0
153:	0	0	0	0	0	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	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	1	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	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	1
281:	0	0	0	0	0	0	1	0
289:	0	0	0	0	0	0	0	1
297:	0	0	2	0	0	0	0	0
305:	0	0	0	0	0	0	0	1
313:	0	1	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	1	0
433:	0	0	0	0	0	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	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	0	0	2	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	1	0	0	0	0
649:	0	0	1	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:	1	0	0	0	0	0	0	1
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	1	0
729:	0	0	0	0	0	0	0	0
737:	0	1	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	1	0	0	0	0	1	0	0
761:	0	1	0	0	0	0	0	0
769:	0	0	0	1	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	1	1
953:	0	1	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™

Sample Description: I-4 TOT-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_011
Chamber Serial Number:
Detector Serial Number: 11
Env. Background: System Bkgd 62750
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.550E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:43:30 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9411 +/- 0.0000
Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
Effective Efficiency: 0.1930 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.479	8.11	81.93	2.89	0.00E+000	2.6
RA-226	4.599	30.81	36.10	1.19	0.00E+000	2.6

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.945	5685.50*	3.60E-001 +/- 9.26E+001	3.89E-001 +/- 1.00E+002
RA-226	0.956	4785.00*	1.08E+000 +/- 3.91E-001	2.31E-001 +/- 7.80E-003

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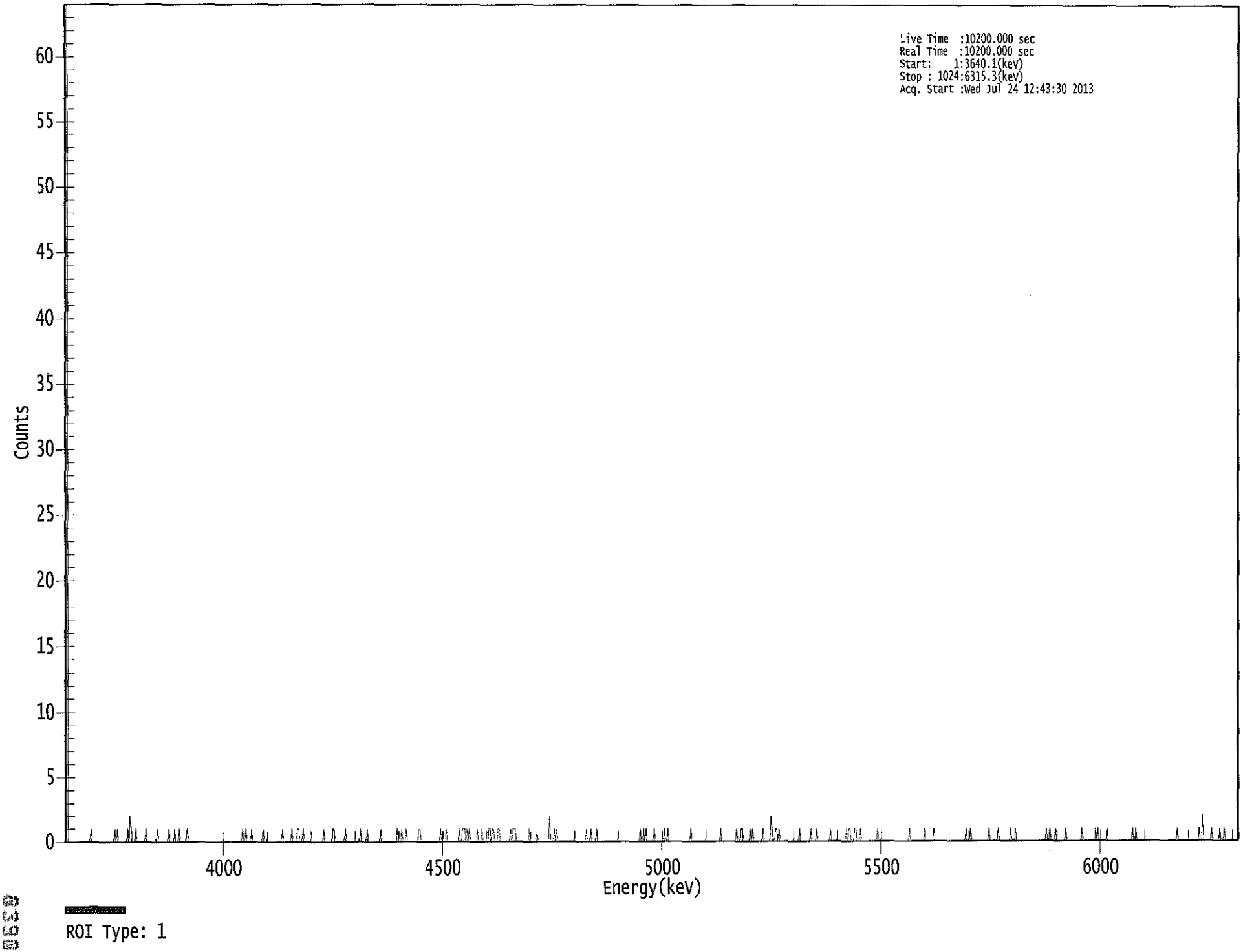


****
***** S P E C T R A L D A T A R E P O R T *****
****

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

369:	0	1	1	0	1	1	0	0

Sample Title: 03

Channel								
377:	0	1	1	0	0	0	0	0
385:	0	0	0	0	1	0	1	1
393:	1	0	0	0	0	0	0	0
401:	0	0	0	0	1	0	0	0
409:	0	0	0	1	0	0	0	0
417:	0	0	0	0	0	0	2	0
425:	0	0	1	0	1	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	1	0
457:	0	0	1	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	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	1	0	0
505:	1	0	1	0	0	0	0	0
513:	0	1	0	0	0	0	0	0
521:	0	0	1	0	0	1	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	1	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	1	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	1	0	0	0	1	1	0
593:	0	0	0	0	0	1	0	1
601:	0	0	0	0	0	0	0	0
609:	1	0	0	0	0	0	0	2
617:	1	0	0	1	1	0	1	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	1	0	0	0	0	1
657:	0	0	0	0	0	0	0	0
665:	0	0	0	1	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	1	0	1	1	0	0	0
689:	1	1	0	0	0	1	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	1	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	1	0	0	0	0	0	0	0
745:	0	0	0	0	0	1	0	0
753:	0	0	0	0	0	1	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	1	0	0	0	1	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	1	0	0

Sample Title: 03

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

Apex-Alpha™

Sample Description: PZ-111-SD TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_012
Chamber Serial Number:
Detector Serial Number: 12
Env. Background: System Bkgd 62751
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.370E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:43:31 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9479 +/- 0.0000
Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM
Effective Efficiency: 0.1886 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

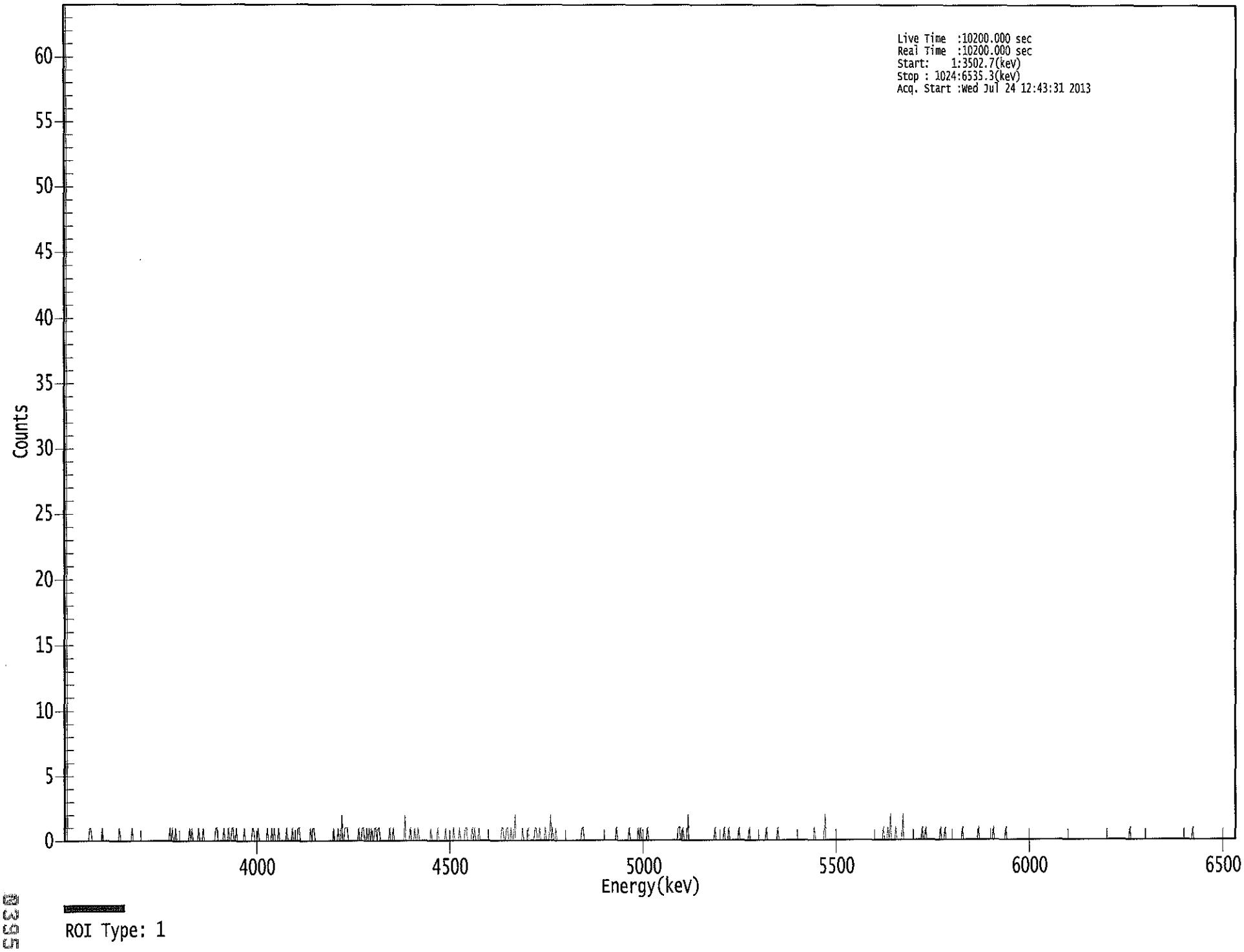
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.592	9.83	63.14	0.17	0.00E+000	3.0
RA-226	4.599	31.66	35.05	0.34	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.988	5685.50*	4.15E-001 +/- 1.07E+002	1.76E-001 +/- 4.53E+001
RA-226	0.956	4785.00*	1.05E+000 +/- 3.71E-001	1.59E-001 +/- 5.41E-003

AC
7/25/13

0000063852.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	1	1
25:	0	0	0	0	0	0	0	0
33:	0	1	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	1	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	1	0	1	0
97:	0	1	0	0	0	0	0	0
105:	0	0	0	0	0	1	0	1
113:	0	0	0	0	0	1	0	0
121:	0	1	0	0	0	0	0	0
129:	0	0	0	0	1	1	0	0
137:	0	0	0	1	0	0	0	1
145:	0	0	1	1	0	0	1	0
153:	0	0	0	0	0	1	0	0
161:	0	0	0	0	1	1	0	0
169:	0	1	0	0	0	0	0	0
177:	0	1	0	0	0	1	0	1
185:	0	0	0	1	0	0	0	0
193:	0	0	1	0	0	0	0	1
201:	0	0	0	0	1	1	0	0
209:	0	0	0	0	0	0	0	1
217:	0	1	1	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	1	0	0	0	1
241:	0	0	2	0	0	1	1	1
249:	0	0	0	0	0	0	0	0
257:	0	1	0	0	1	1	0	0
265:	1	0	1	0	1	0	0	1
273:	1	0	1	1	0	0	0	0
281:	0	0	0	0	1	0	0	1
289:	0	0	0	0	0	0	0	0
297:	0	2	0	0	0	0	1	0
305:	0	0	1	0	0	1	0	0
313:	0	0	0	0	0	0	0	0
321:	1	0	0	0	0	0	1	0
329:	0	0	0	0	0	1	0	0
337:	0	0	0	0	1	0	0	0
345:	0	1	0	0	0	0	1	1
353:	0	0	0	0	1	0	1	0
361:	0	0	1	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
377:	0	0	0	0	0	0	1	1
385:	0	0	1	1	0	0	1	0
393:	0	2	0	0	0	0	0	0
401:	1	0	0	0	0	1	0	0
409:	0	0	0	1	1	0	0	1
417:	0	0	0	0	1	0	0	0
425:	2	0	1	0	0	1	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	1	1	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	1	0	0	0	0	0
489:	0	0	0	0	0	1	0	0
497:	0	0	0	0	0	1	0	1
505:	0	0	0	0	0	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:	1	1	0	0	1	0	0	0
545:	2	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	1	0	0	0	0	0	0	0
577:	1	0	0	0	1	0	0	0
585:	0	0	0	0	0	1	0	0
593:	0	0	0	0	0	0	1	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	1	0	0
617:	0	0	0	0	0	0	0	1
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	1
657:	0	0	0	0	0	0	0	0
665:	2	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	1	0	0	0	1
721:	0	2	0	0	0	0	1	0
729:	0	0	0	0	2	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	1	0	0
753:	1	0	0	0	0	0	0	0
761:	0	0	0	0	0	1	0	0
769:	0	1	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	1	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	1	0

801:	0	0	0	0	0	0	0	0

Sample Title: 04

Channel								
809:	0	0	0	1	0	0	0	0
817:	0	0	0	0	0	0	1	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	1	0	0	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	1	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: PZ-111-SD DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_013
Chamber Serial Number:
Detector Serial Number: 13
Env. Background: System Bkgd 62752
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.440E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:43:32 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9472 +/- 0.0000
Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
Effective Efficiency: 0.1770 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

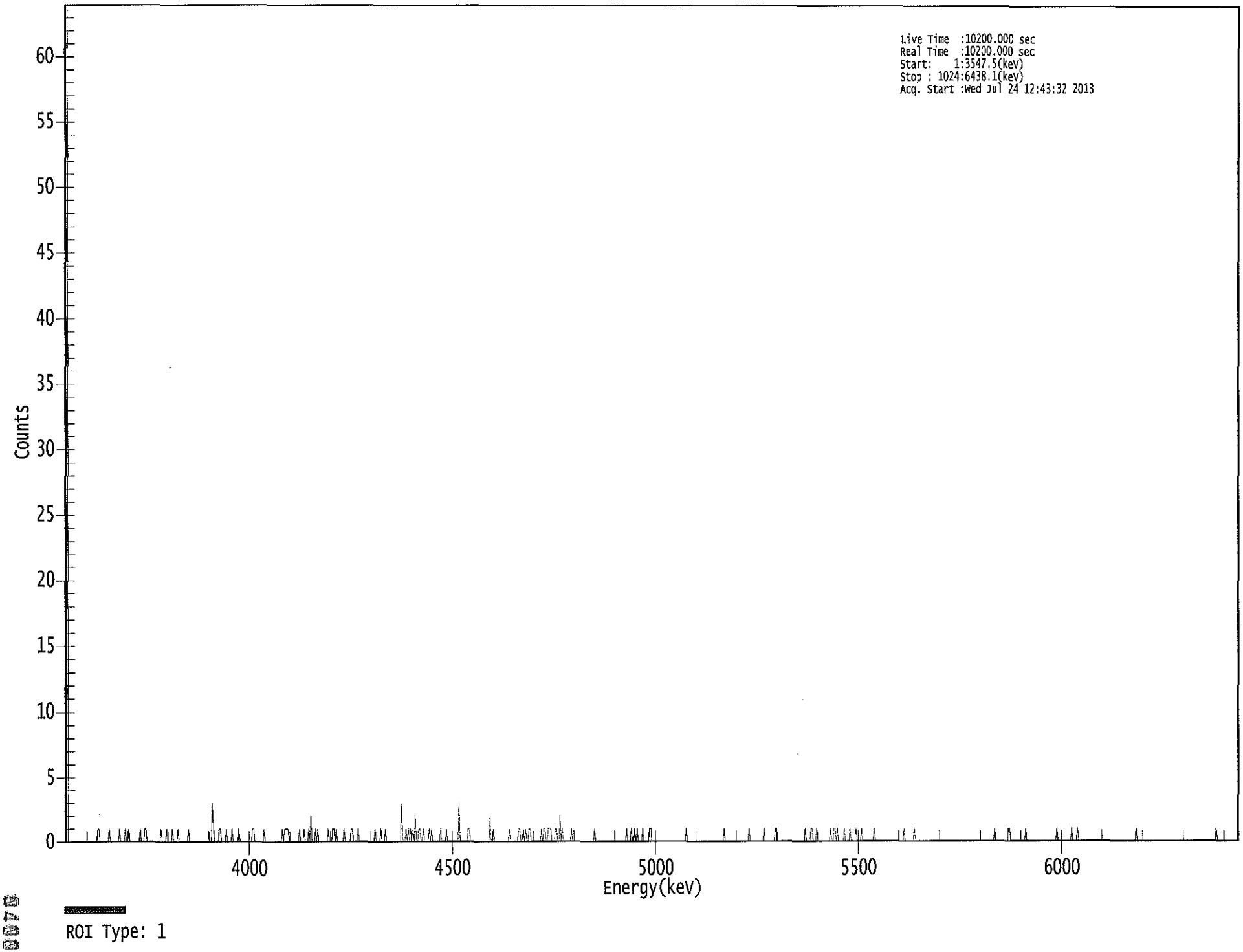
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.477	10.77	69.42	3.23	0.00E+000	5.7
RA-226	4.576	41.81	30.81	1.19	0.00E+000	2.8

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.944	5685.50*	4.99E-001 +/- 1.28E+002	4.22E-001 +/- 1.08E+002
RA-226	0.945	4785.00*	1.53E+000 +/- 4.74E-001	2.41E-001 +/- 8.72E-003

AC
7/25/13

0000063851.CNF



00076

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

369:	0	0	2	0	0	1	0	0

Sample Title: 05

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	1	0	0	0	0
393:	0	0	0	1	1	0	0	1
401:	0	1	0	0	1	1	0	0
409:	0	0	0	0	0	0	0	1
417:	0	1	1	0	0	1	1	1
425:	0	0	0	1	1	0	0	2
433:	0	1	0	0	0	0	0	0
441:	0	1	0	0	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	0	0	0	0	0
489:	0	1	0	0	0	1	0	0
497:	1	0	1	0	0	0	0	1
505:	0	0	0	0	0	1	1	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	1	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	1	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	1	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	1	0	0	0	0	0	0
617:	0	0	0	1	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	1	0	0
649:	0	0	1	1	0	0	0	1
657:	0	0	0	0	0	0	0	0
665:	0	0	0	1	0	0	1	1
673:	0	1	0	0	0	0	0	1
681:	0	0	0	0	1	0	0	0
689:	0	1	0	0	0	0	1	0
697:	0	0	0	0	0	0	0	0
705:	0	1	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	1	0	0	0	0
737:	0	0	0	0	1	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	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	1	0	0	0	0	0
817:	0	0	0	0	0	0	1	1
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
873:	0	0	0	0	0	1	0	0
881:	0	0	1	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	1	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	1	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: S-5 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_014
Chamber Serial Number:
Detector Serial Number: 14
Env. Background: System Bkgd 62753
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.500E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:43:32 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.5595 +/- 0.0000
Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
Effective Efficiency: 0.1033 +/- 0.0019

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.511	-0.59	726.33	4.59	0.00E+000	5.9
RA-226	4.587	10.94	68.27	3.06	0.00E+000	2.9

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.961	5685.50*	-6.72E-002 +/- 1.73E+001	1.18E+000 +/- 3.03E+002
RA-226	0.950	4785.00*	9.83E-001 +/- 6.72E-001	8.02E-001 +/- 2.92E-002

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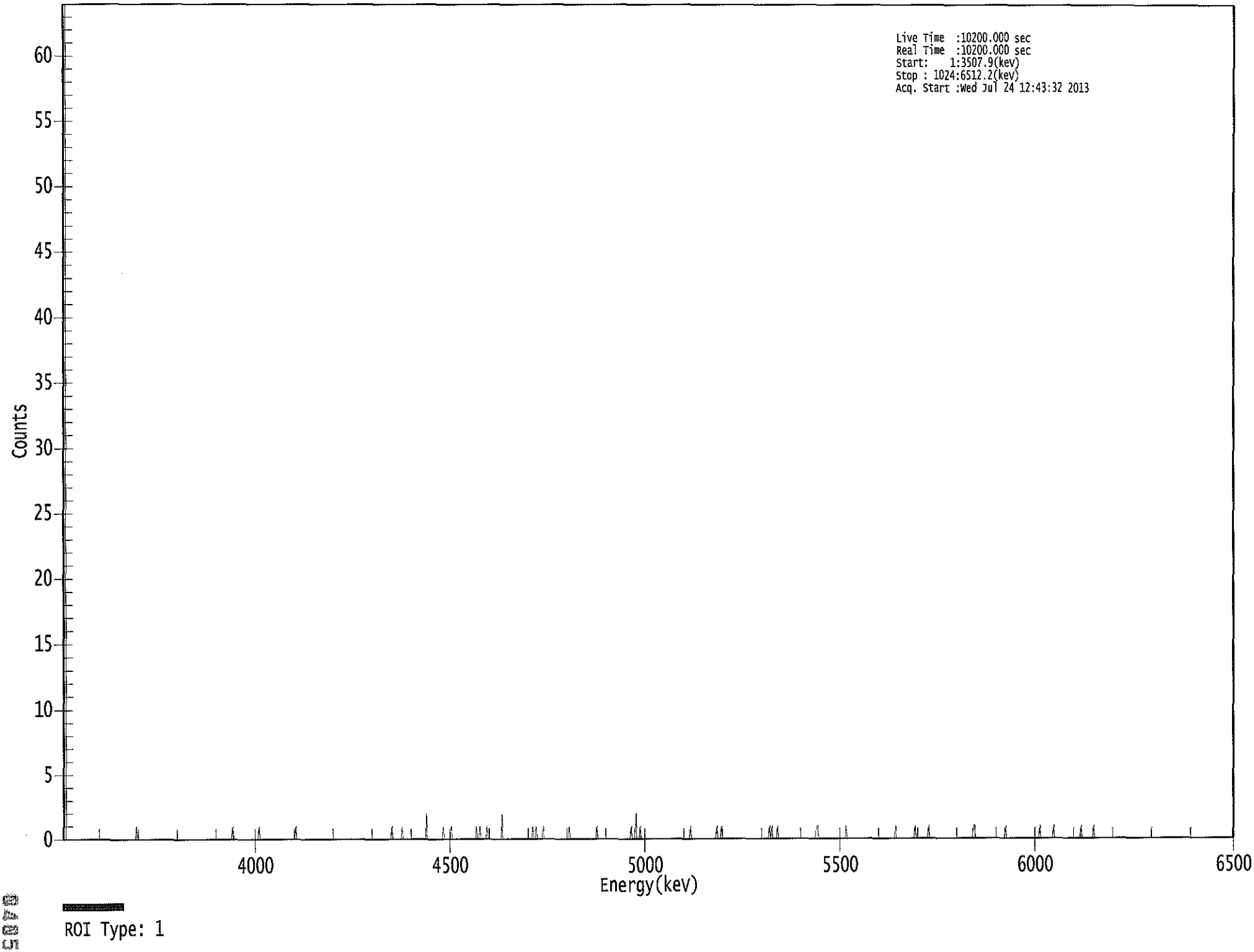
US EPA ARCHIVE DOCUMENT

0000063855.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	0	0
57:	0	0	0	0	0	0	0	0
65:	1	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	1	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	1	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	1	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	1
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	2	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	1	0	0	0
337:	0	0	0	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	1	0	0	1	0	0	0

369:	0	0	1	0	0	0	0	0

Sample Title: 06

Channel								
377:	0	0	0	0	0	0	0	2
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	1	0	0	1	0	0
417:	0	0	0	1	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	1	0	0	0	0	0
449:	0	0	0	0	0	0	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:	1	0	0	0	2	0	0	0
505:	1	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	1	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	1	0	0	0	1
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	1	0	1	0	0	0	0
625:	1	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	1	1	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	1	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	1
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	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	1	1	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	1
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	1	0	0
857:	0	0	0	0	0	0	0	0
865:	0	1	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	1	0	0	0	0	0	0
897:	0	0	0	0	1	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	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: S-5 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 07
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_015
Chamber Serial Number:
Detector Serial Number: 15
Env. Background: System Bkgd 62754
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 4.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:43:33 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.6885 +/- 0.0000
Counting Efficiency: 0.1477 +/- 0.0027 on 7/20/2013 6:27:27 PM
Effective Efficiency: 0.1017 +/- 0.0018

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.518	5.49	88.08	0.51	0.00E+000	3.0
RA-226	4.598	7.98	74.39	1.02	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.964	5685.50*	7.26E-001 +/- 1.87E+002	6.94E-001 +/- 1.78E+002
RA-226	0.955	4785.00*	8.31E-001 +/- 6.19E-001	6.56E-001 +/- 2.32E-002

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US EPA ARCHIVE DOCUMENT

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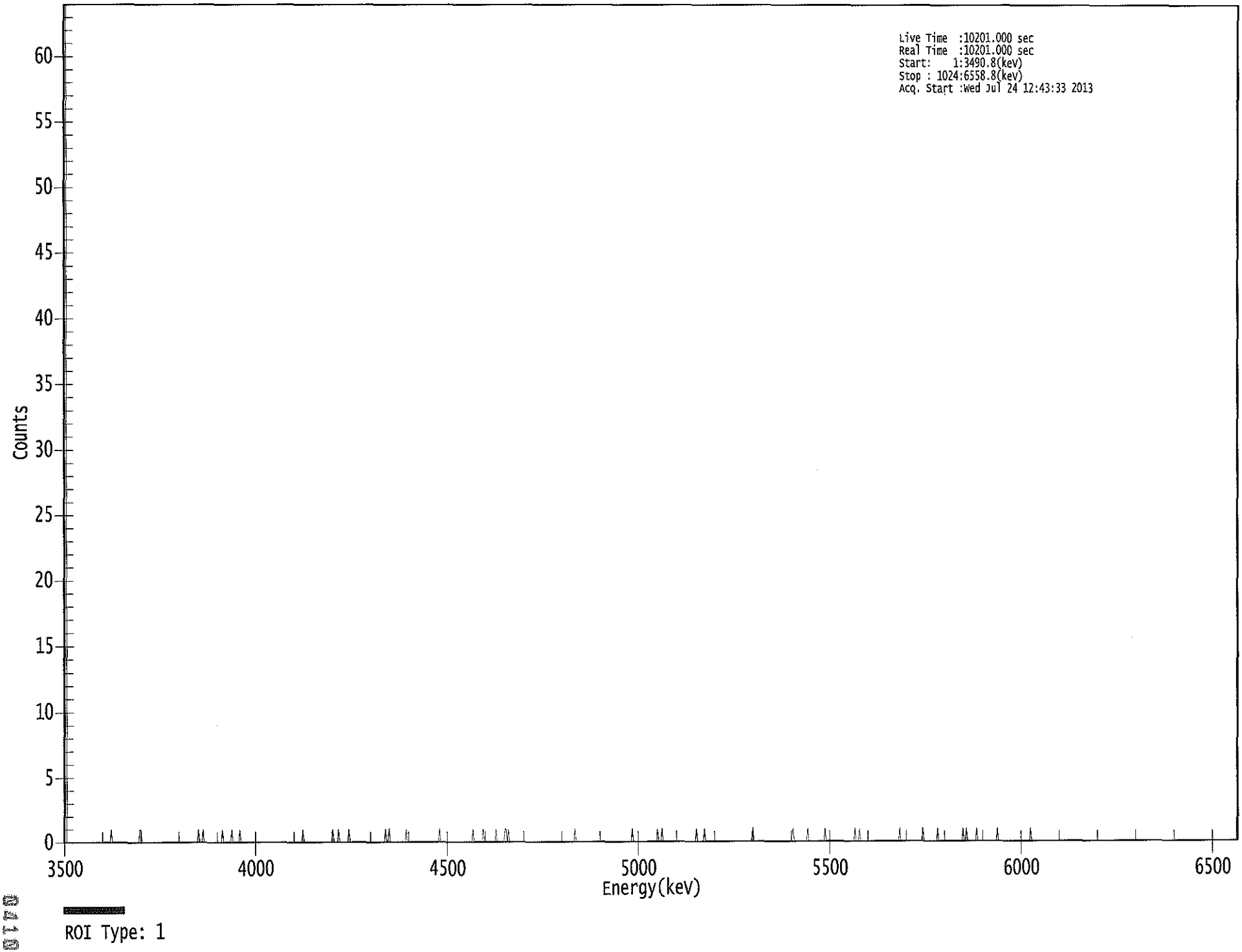

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 07

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	1	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	1	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	1	0	0
121:	0	1	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	1	0	0	0	0	0
145:	0	0	1	0	0	0	0	0
153:	0	1	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	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:	1	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	1	0	0	0	0	1
241:	0	0	0	0	0	0	0	0
249:	1	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	1	0	0	1	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	1	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	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	0
353:	0	0	0	0	1	0	0	0
361:	0	0	0	0	0	1	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
377:	1	0	0	0	0	0	0	0
385:	1	1	0	1	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	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	0	0	0	0	0	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	0	0	0	0	0	0
513:	0	0	0	0	0	1	0	0
521:	0	1	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	1
553:	0	0	0	0	0	0	1	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	1	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	1	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	1	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	1	0	0	0	1	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	1	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	1	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	1	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	1
785:	0	0	1	0	0	0	0	0
793:	0	0	0	1	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
809:	0	0	0	0	0	1	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	1	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	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 @ PZ-110-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 08
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_033
Chamber Serial Number: 04026479A
Detector Serial Number: 91132
Env. Background: System Bkgd 62765
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.080E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:02 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8458 +/- 0.0000
Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM
Effective Efficiency: 0.1563 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.462	0.49	416.98	0.51	0.00E+000	3.0
RA-226	4.675	0.98	294.85	1.02	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.937	5685.50*	2.19E-002 +/- 5.64E+000	2.35E-001 +/- 6.04E+001
RA-226	0.984	4785.00*	3.46E-002 +/- 1.02E-001	2.22E-001 +/- 7.63E-003

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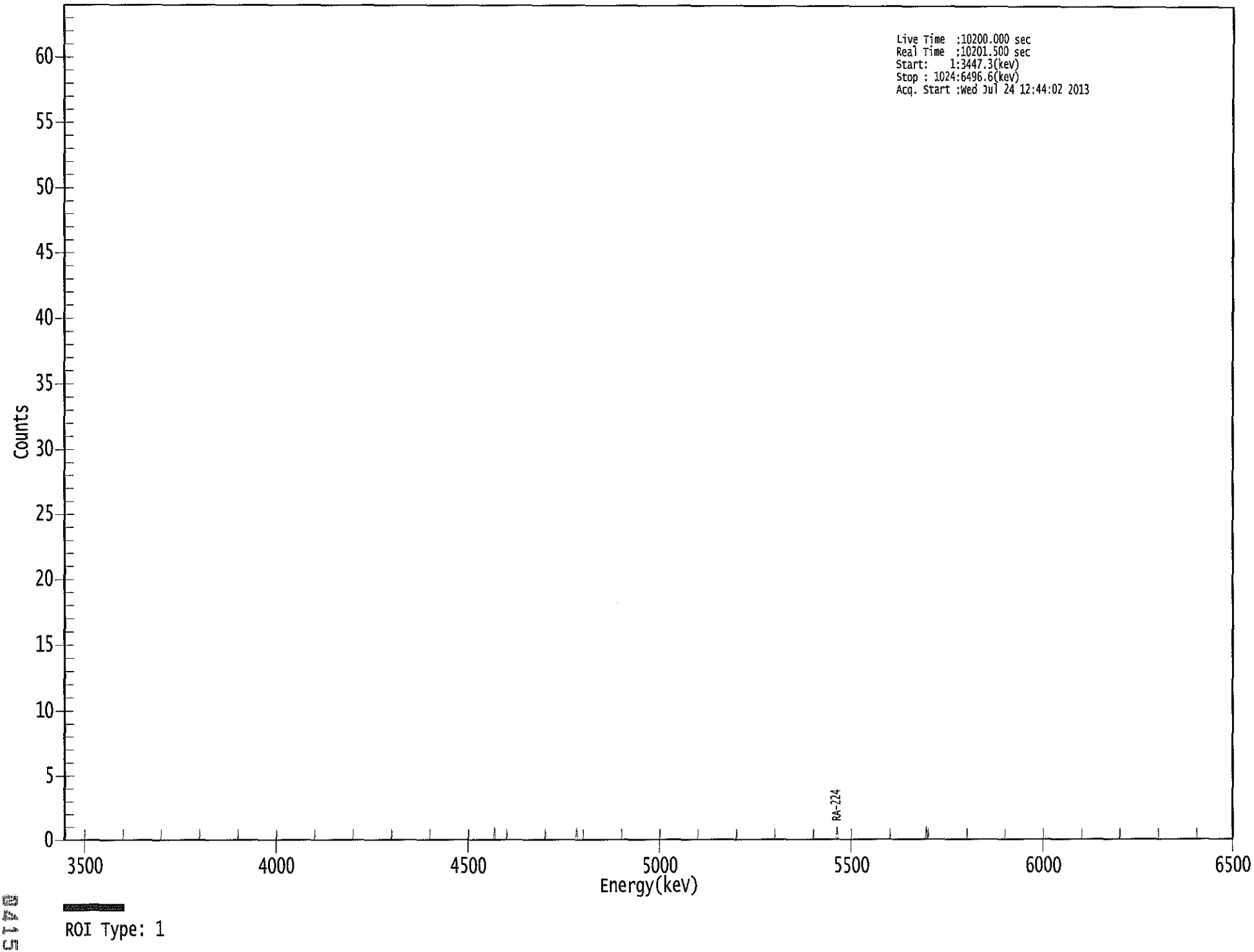

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 08

Elapsed Live time: 10200
Elapsed Real Time: 10202

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

369:	0	0	0	0	0	0	0	0

Sample Title: 08

Channel								
377:	1	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	1	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	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	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	1	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 08

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

Sample Description: PZ-110-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 09
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_034
Chamber Serial Number: 04026479B
Detector Serial Number: 91136
Env. Background: System Bkgd 62766
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.370E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:03 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8865 +/- 0.0000
Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
Effective Efficiency: 0.1645 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.506	35.32	33.35	0.68	0.00E+000	3.7
RA-226	4.586	108.00	18.95	0.00	0.00E+000	4.5

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.959	5685.50*	1.71E+000 +/- 4.40E+002	2.73E-001 +/- 7.03E+001
RA-226	0.950	4785.00*	4.12E+000 +/- 7.94E-001	2.29E-001 +/- 7.81E-003

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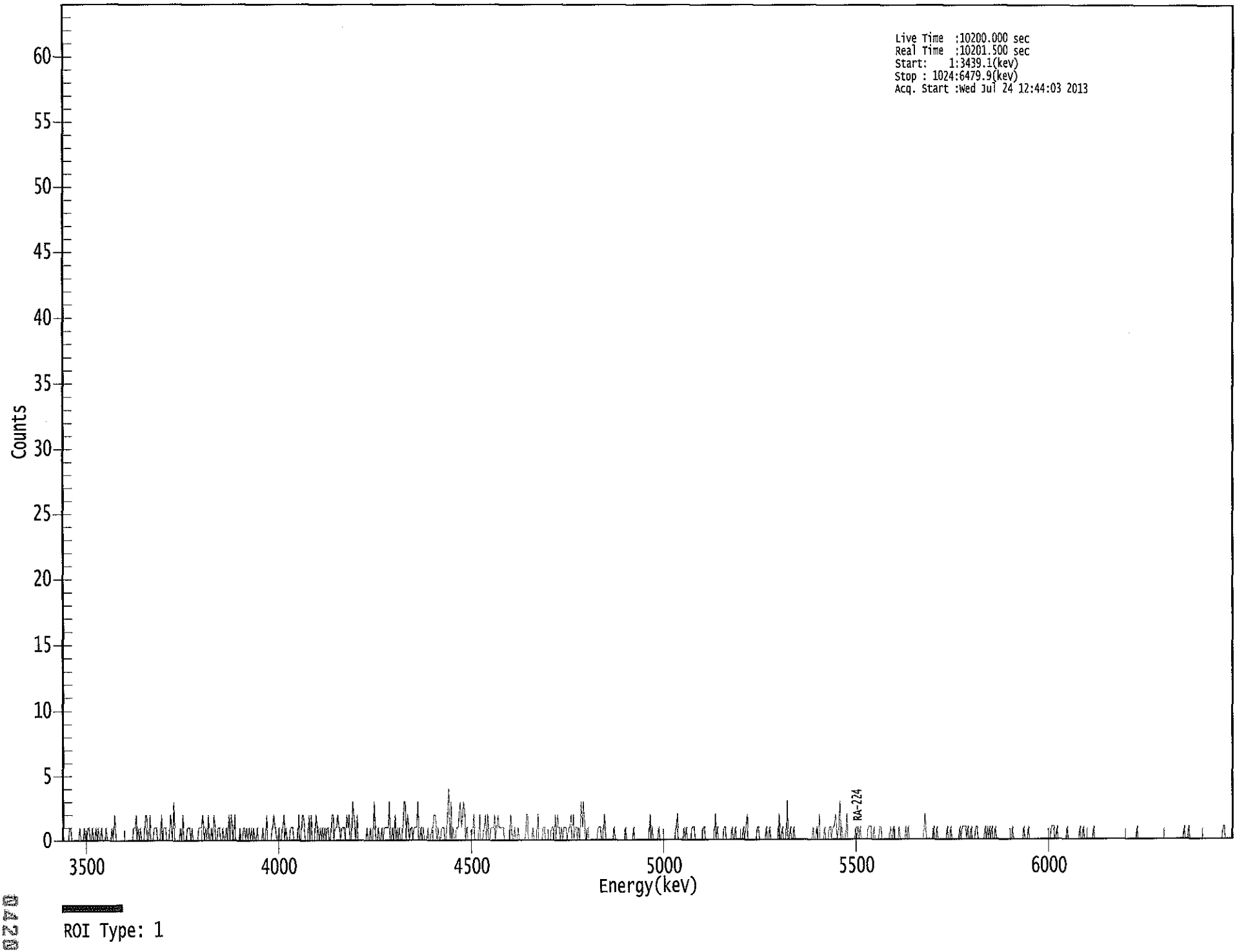
US EPA ARCHIVE DOCUMENT

0000063860.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: 10202

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

369:	1	2	0	2	0	0	1	1

Sample Title: 09

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

801:	0	0	0	0	0	0	1	0

Sample Title: 09

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

Apex-Alpha™

Sample Description: PZ-110-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 10
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_035
Chamber Serial Number: 04026477A
Detector Serial Number: 58771
Env. Background: System Bkgd 62767
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.370E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:05 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9625 +/- 0.0000
Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
Effective Efficiency: 0.1757 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.514	20.00	44.91	0.00	0.00E+000	2.9
RA-226	4.591	96.00	20.11	0.00	0.00E+000	3.7

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.962	5685.50*	9.07E-001 +/- 2.33E+002	2.72E-001 +/- 6.99E+001
RA-226	0.952	4785.00*	3.43E+000 +/- 7.00E-001	2.14E-001 +/- 7.34E-003

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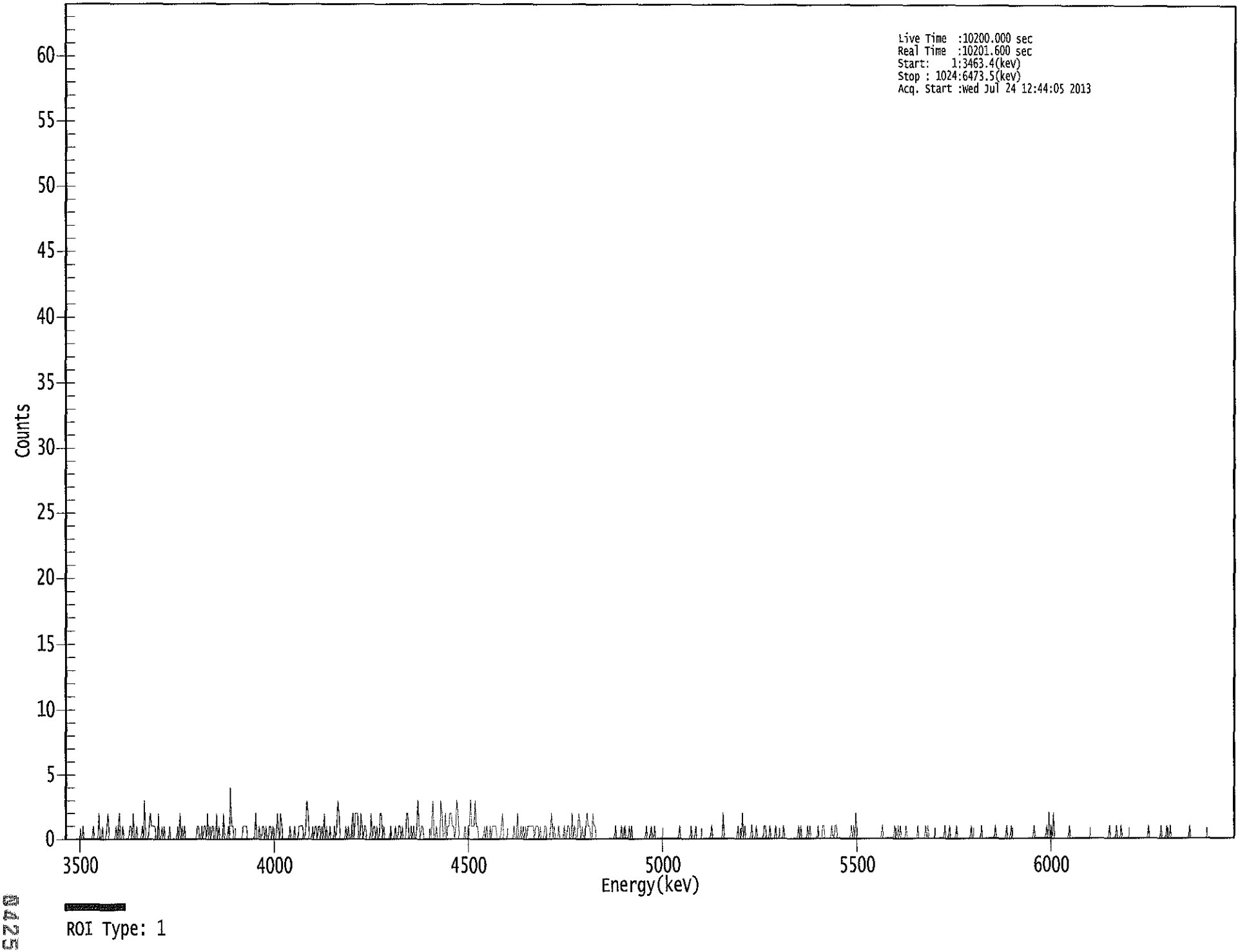

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 10

Elapsed Live time: 10200
Elapsed Real Time: 10202

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

369:	1	0	0	1	0	1	1	1

Sample Title: 10

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

801:	0	1	0	0	0	0	0	0

Sample Title: 10

Channel								
809:	0	0	0	0	0	1	0	0
817:	0	0	0	0	0	0	0	1
825:	0	0	0	1	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	0	0	0	0
857:	0	0	1	0	2	0	1	0
865:	2	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	1	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	1	0	0	0	0	0	1
921:	0	0	0	1	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	1	0
961:	0	0	0	1	0	0	1	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	1
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: I-4 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 11
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_036
Chamber Serial Number: 04026477B
Detector Serial Number: 84167
Env. Background: System Bkgd 62768
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.610E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:06 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
Effective Efficiency: 0.1910 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.537	13.32	55.28	0.68	0.00E+000	3.0
RA-226	4.637	27.32	38.04	0.68	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	8.47E-001 +/- 2.18E+002	3.58E-001 +/- 9.22E+001
RA-226	0.972	4785.00*	1.37E+000 +/- 5.23E-001	2.83E-001 +/- 9.63E-003

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US EPA ARCHIVE DOCUMENT

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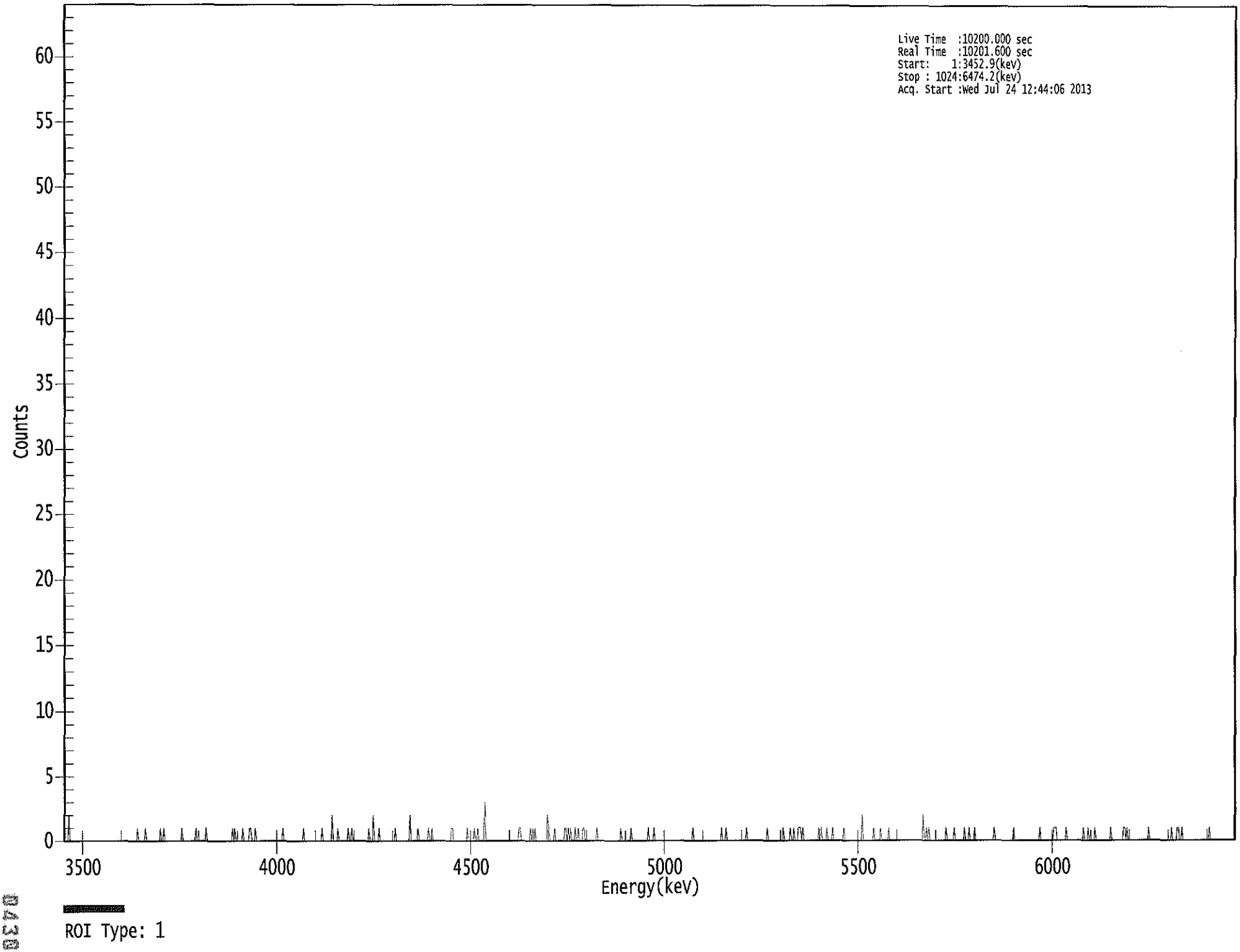

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 11

Elapsed Live time: 10200
Elapsed Real Time: 10202

Channel								
1:	0	0	0	0	2	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:	1	0	0	0	0	0	0	1
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	1	0	0	1
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	1
105:	0	0	0	0	0	0	0	0
113:	0	0	0	1	0	0	0	0
121:	0	0	0	0	1	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	1	0	1	0	0
153:	0	0	0	0	1	0	0	0
161:	0	0	1	1	0	0	0	1
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	1
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	1	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	0	0	0	0	0
233:	0	0	2	0	0	0	0	1
241:	0	0	0	0	0	0	0	0
249:	1	0	0	1	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	0	0	2	0
273:	0	0	0	1	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	1	0	0	0	0	0	0
297:	0	0	0	0	0	0	2	0
305:	0	0	0	0	0	1	0	0
313:	0	0	0	0	0	0	1	0
321:	0	1	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	1	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	1	0	0	0	0	0	1	0
361:	0	1	0	0	0	0	0	3

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	1	1	0
401:	0	0	0	0	0	0	0	1
409:	0	1	0	1	0	0	0	0
417:	0	0	0	0	0	0	2	1
425:	0	0	0	0	1	0	0	0
433:	0	0	0	0	0	1	1	0
441:	1	0	1	0	0	0	1	0
449:	0	1	0	0	0	1	1	0
457:	0	0	0	0	0	0	0	0
465:	0	1	0	0	0	0	0	0
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	1
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	1	0
513:	0	0	0	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	1	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	1	0
577:	0	0	1	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	1	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	1	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	1	0	0	0
633:	0	0	1	0	0	1	0	0
641:	0	1	1	1	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	1	0	1	0	0
665:	0	0	1	0	0	0	0	1
673:	0	0	0	0	0	0	0	0
681:	0	1	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	2	0	0	0	0	0	0
705:	0	0	0	1	0	0	0	0
713:	0	1	0	0	0	0	0	0
721:	1	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	2	0
753:	0	1	0	1	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	1	0	0	0	0	0
777:	0	1	0	0	0	0	0	0
785:	0	0	1	0	0	0	1	0
793:	0	0	0	1	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 11

Channel								
809:	0	0	0	0	1	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	1	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	1	0	0	0
857:	0	0	0	0	0	0	0	0
865:	1	1	1	0	0	0	0	0
873:	0	0	0	1	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	1	0	0	0	1	0
897:	0	0	0	0	1	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	1	0	0	0	0	0
921:	0	0	0	0	0	1	1	0
929:	1	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	1
969:	0	0	0	0	1	1	0	0
977:	1	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	1	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: I-4 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 12
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_037
Chamber Serial Number: 04026478A
Detector Serial Number: 91133
Env. Background: System Bkgd 62769
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.820E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:08 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8683 +/- 0.0000
Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
Effective Efficiency: 0.1548 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.501	5.83	82.55	0.17	0.00E+000	2.9
RA-226	4.644	14.66	51.88	0.34	0.00E+000	2.9

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.956	5685.50*	4.84E-001 +/- 1.24E+002	3.46E-001 +/- 8.91E+001
RA-226	0.974	4785.00*	9.59E-001 +/- 4.99E-001	3.13E-001 +/- 1.14E-002

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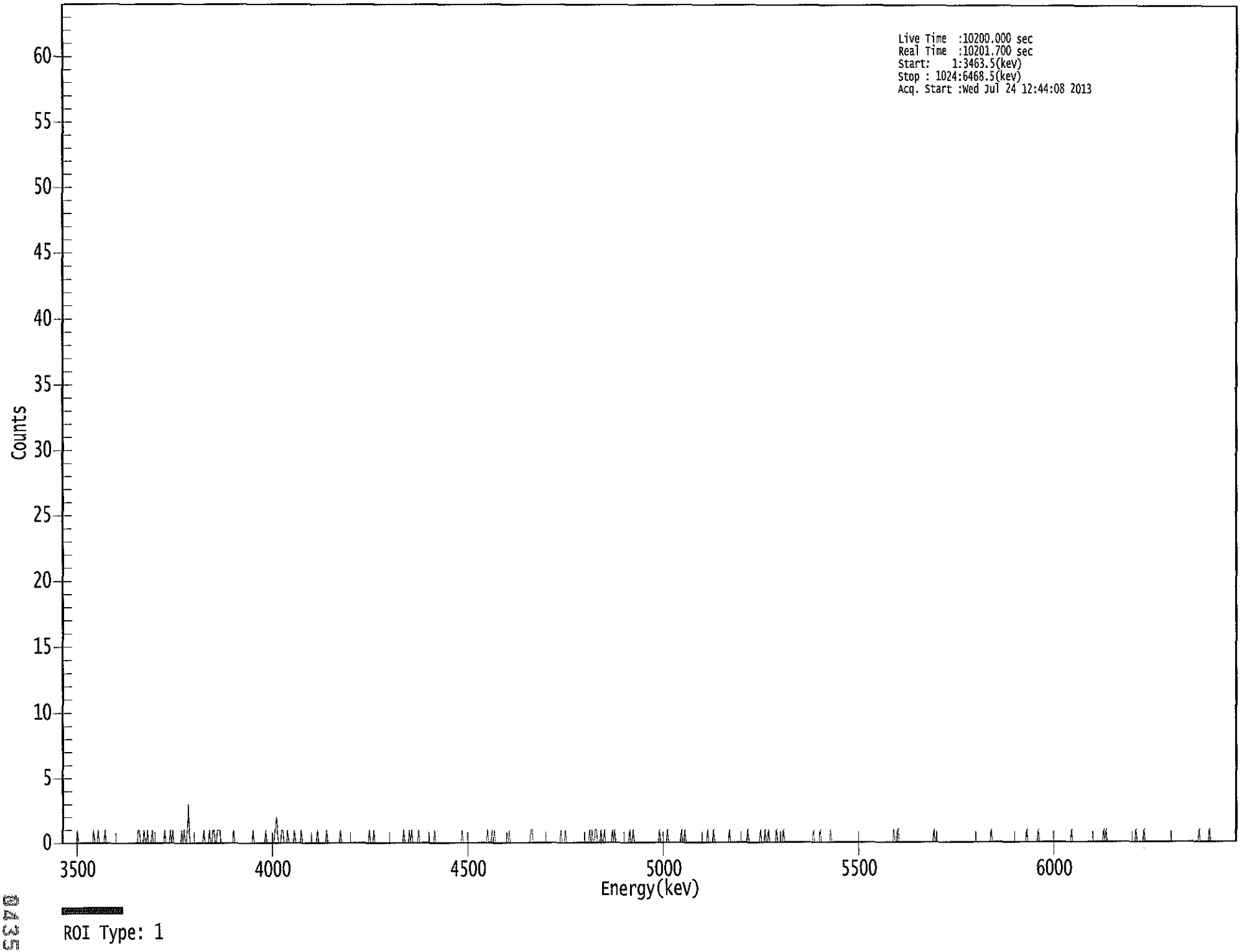

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 12

Elapsed Live time: 10200
Elapsed Real Time: 10202

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	1	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	1	0	0	0	1
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	1	1	0	0	0	1
73:	0	0	1	0	0	0	1	0
81:	0	0	0	0	0	0	0	0
89:	0	1	0	0	0	0	1	0
97:	1	0	0	0	0	0	0	0
105:	1	0	1	0	0	3	1	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	1	0	0	0	0
129:	1	0	0	1	1	0	0	1
137:	1	1	0	0	0	0	0	0
145:	0	0	0	0	0	1	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	1	0	0	0	0	0	0
185:	0	1	2	1	0	0	0	1
193:	1	0	0	0	1	0	0	0
201:	0	0	1	0	0	0	0	0
209:	1	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	1	0
225:	0	0	0	0	0	0	1	0
233:	0	0	0	0	0	0	0	0
241:	0	0	1	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	1	0	0	0	1
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	1	0	0	0	0	1	0
305:	1	0	0	0	0	0	1	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	1	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	1	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	0	1	0

Sample Title: 12

Channel								
377:	1	0	0	0	0	0	0	0
385:	0	0	0	0	0	1	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	1	1	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	1	0	0	0	1	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	1	0	1	0	0
465:	1	1	0	0	0	1	0	0
473:	1	0	0	0	0	0	0	1
481:	0	1	0	0	0	0	0	0
489:	0	0	0	0	0	0	1	0
497:	0	1	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	1	0	0	0	0	0	0	1
529:	0	0	0	0	0	0	0	0
537:	0	0	0	1	0	0	1	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	1	0	0	0	0	1
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	1	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	1	0	0
601:	0	0	0	0	0	0	0	0
609:	1	0	0	0	1	0	0	1
617:	0	0	0	0	0	0	1	0
625:	0	0	0	0	1	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	1	0
657:	0	0	0	0	1	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	1	0	0	1
729:	1	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	1
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 12

Channel								
809:	0	1	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	1	0	0	0	0	0	0	0
849:	0	0	1	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	1
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	1	0	1	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	1	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	1	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

Apex-Alpha™

Sample Description: PZ-100-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 13
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_038
Chamber Serial Number: 04026478B
Detector Serial Number: 91134
Env. Background: System Bkgd 62770
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.310E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:09 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8906 +/- 0.0000
Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
Effective Efficiency: 0.1533 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.495	11.32	60.27	0.68	0.00E+000	3.0
RA-226	4.599	101.32	19.55	0.68	0.00E+000	3.4

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.953	5685.50*	5.73E-001 +/- 1.47E+002	2.86E-001 +/- 7.35E+001
RA-226	0.956	4785.00*	4.04E+000 +/- 8.03E-001	2.25E-001 +/- 7.75E-003

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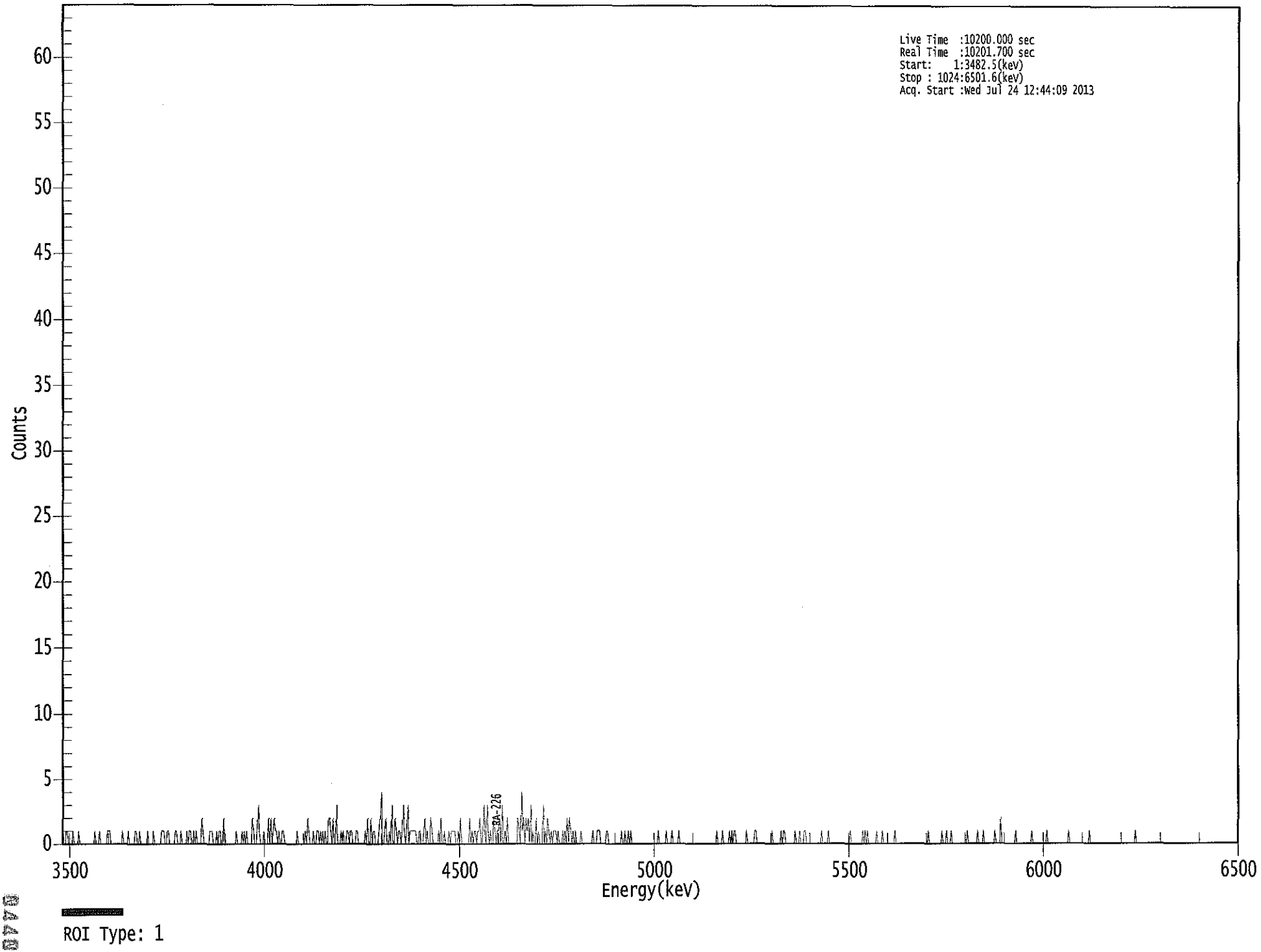

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***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 13

Elapsed Live time: 10200
Elapsed Real Time: 10202

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

369:	0	3	1	0	1	0	0	2

Sample Title: 13

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

801:	0	1	0	0	0	0	0	0

Sample Title: 13

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

Apex-Alpha™

Sample Description: PZ-100-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 14
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_039
Chamber Serial Number: 06027396A
Detector Serial Number: 83109
Env. Background: System Bkgd 62771
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.270E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:11 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9500 +/- 0.0000
Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
Effective Efficiency: 0.1867 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.493	7.81	76.13	1.19	0.00E+000	3.0
RA-226	4.588	98.98	19.82	1.02	0.00E+000	7.4

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.952	5685.50*	3.19E-001 +/- 8.21E+001	2.69E-001 +/- 6.93E+001
RA-226	0.950	4785.00*	3.19E+000 +/- 6.41E-001	2.03E-001 +/- 6.89E-003

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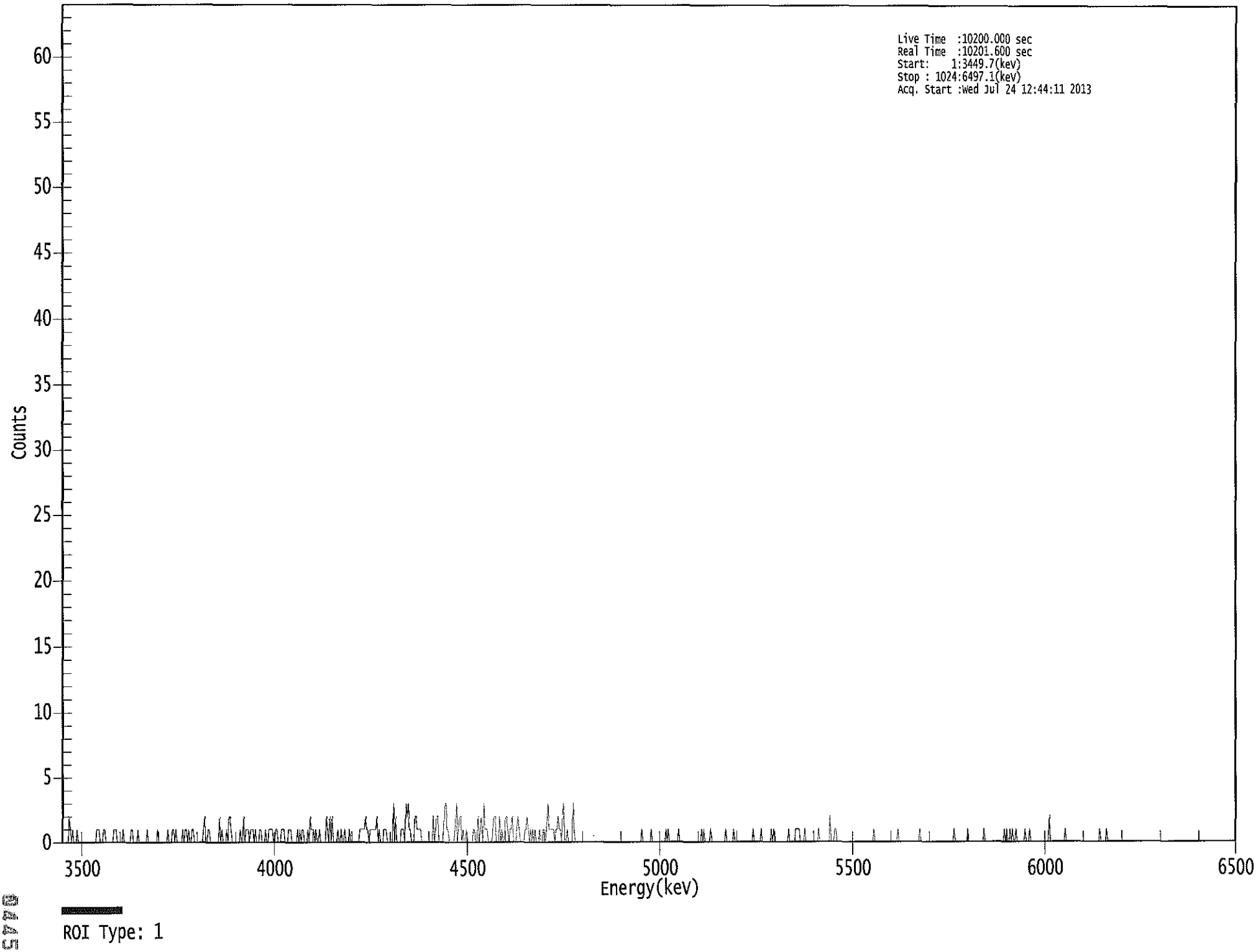
7/25/13

0000063865.CNF



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

Sample Title: 14

Elapsed Live time: 10200
Elapsed Real Time: 10202

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

369:	1	1	1	0	0	0	0	1

Sample Title: 14

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

801:	0	0	0	1	0	0	0	0

Sample Title: 14

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	1	0	1
825:	0	0	1	0	1	0	0	1
833:	0	0	0	0	0	0	0	1
841:	0	0	0	1	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	2	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	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	1	0	0	0	0	0	1	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™

Sample Description: D-3 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 15
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 62772
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 4.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:13 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8786 +/- 0.0000
Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
Effective Efficiency: 0.1669 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.515	24.49	40.09	0.51	0.00E+000	3.7
RA-226	4.636	55.66	26.37	0.34	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.962	5685.50*	1.97E+000 +/- 5.08E+002	4.23E-001 +/- 1.09E+002
RA-226	0.971	4785.00*	3.53E+000 +/- 9.39E-001	3.04E-001 +/- 1.03E-002

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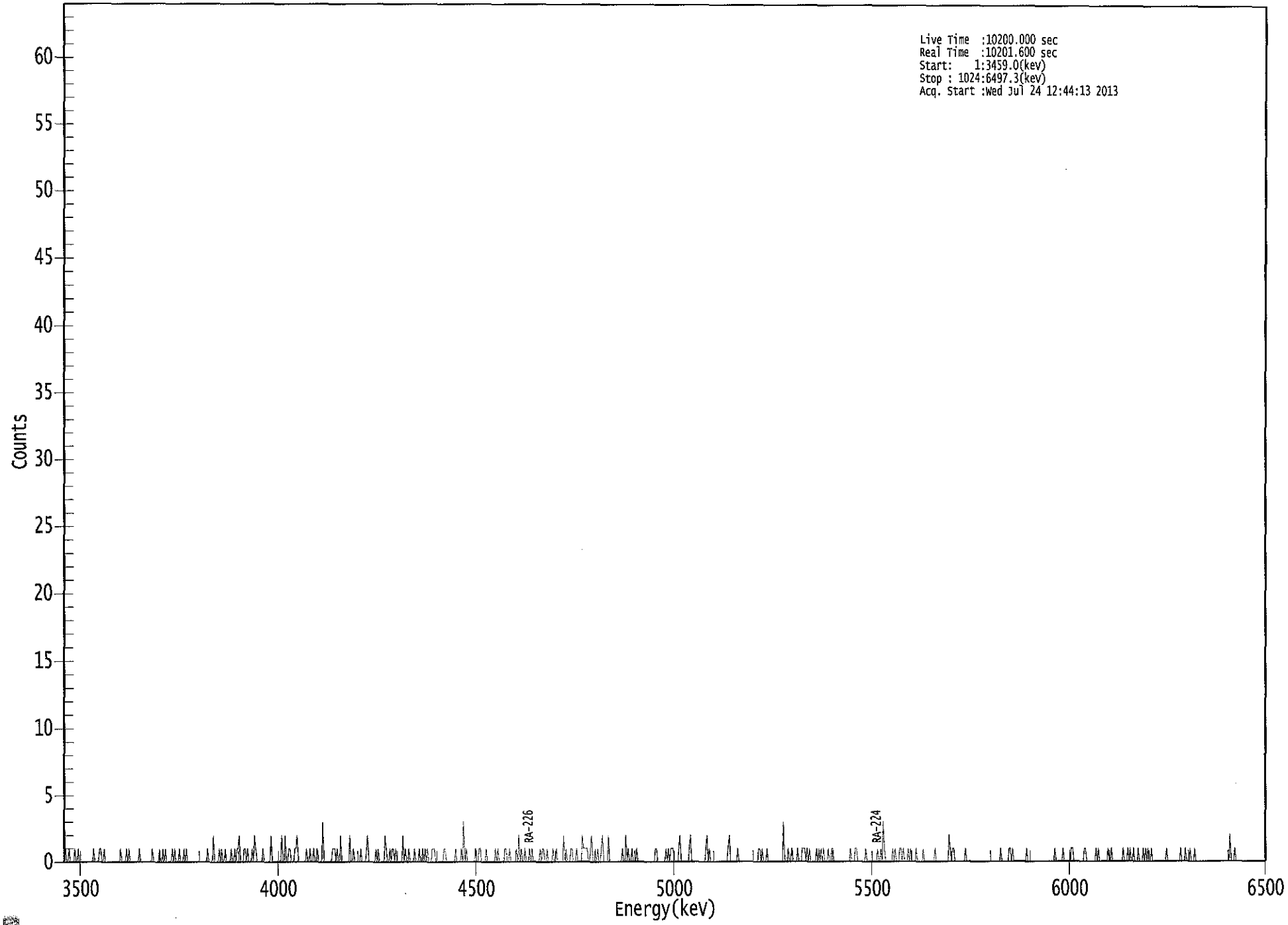
7/25/13

0000063864.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: 10202

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

369:	0	1	0	0	0	0	0	1

Sample Title: 15

Channel								
377:	1	0	0	1	0	0	0	0
385:	0	1	0	2	0	1	0	0
393:	1	0	0	0	1	0	1	0
401:	0	0	0	0	0	1	0	1
409:	1	0	0	1	0	0	0	0
417:	1	0	0	1	0	0	0	0
425:	0	2	0	1	0	0	0	1
433:	1	0	0	0	1	0	0	0
441:	0	2	1	1	1	1	0	0
449:	1	2	0	0	1	0	1	0
457:	0	1	2	0	0	0	0	2
465:	0	0	0	0	0	0	0	0
473:	0	0	0	1	0	0	2	0
481:	1	0	0	1	0	0	0	1
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	1
505:	1	0	0	0	0	0	0	0
513:	1	0	1	0	1	1	1	0
521:	0	0	0	1	2	0	0	0
529:	0	0	0	0	1	2	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	1	2	0	1	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	1	2	0
569:	0	0	0	0	0	1	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	1
593:	1	0	1	0	0	0	1	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	3	0	0	0
617:	1	0	0	1	0	0	0	0
625:	1	0	0	0	1	1	1	0
633:	1	0	1	0	0	0	0	0
641:	1	0	1	0	1	0	1	0
649:	0	0	1	0	0	1	1	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	1	0	0
673:	0	1	1	0	0	0	0	0
681:	0	0	1	0	0	0	0	0
689:	0	0	0	0	1	0	0	1
697:	0	3	1	0	0	0	0	0
705:	0	1	0	1	0	0	0	1
713:	1	0	1	0	0	0	1	0
721:	1	0	0	0	0	1	0	0
729:	0	0	0	1	0	0	0	0
737:	0	0	0	0	0	1	0	0
745:	0	0	0	0	0	0	0	0
753:	0	2	1	0	1	1	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	1	0	0

801:	0	0	0	0	1	1	0	1

Sample Title: 15

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	1	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	1	0	0	0	0
849:	0	0	1	0	0	0	0	0
857:	0	1	1	0	0	0	0	0
865:	0	0	0	0	1	1	0	0
873:	0	0	0	0	0	0	1	0
881:	1	0	0	0	0	0	0	0
889:	1	0	0	1	0	0	0	0
897:	0	0	0	0	0	1	0	0
905:	0	1	0	1	0	0	1	0
913:	0	0	1	0	0	0	1	0
921:	1	0	1	0	0	1	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	1	0
953:	0	0	1	0	0	0	1	0
961:	0	0	1	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	2	0	0	0	1	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: D-3 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 16
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 62773
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 4.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:15 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8217 +/- 0.0000
Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
Effective Efficiency: 0.1626 +/- 0.0028

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.532	25.98	39.33	1.02	0.00E+000	3.7
RA-226	4.595	57.13	26.42	1.87	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.970	5685.50*	2.15E+000 +/- 5.53E+002	5.21E-001 +/- 1.34E+002
RA-226	0.954	4785.00*	3.72E+000 +/- 9.92E-001	4.94E-001 +/- 1.67E-002

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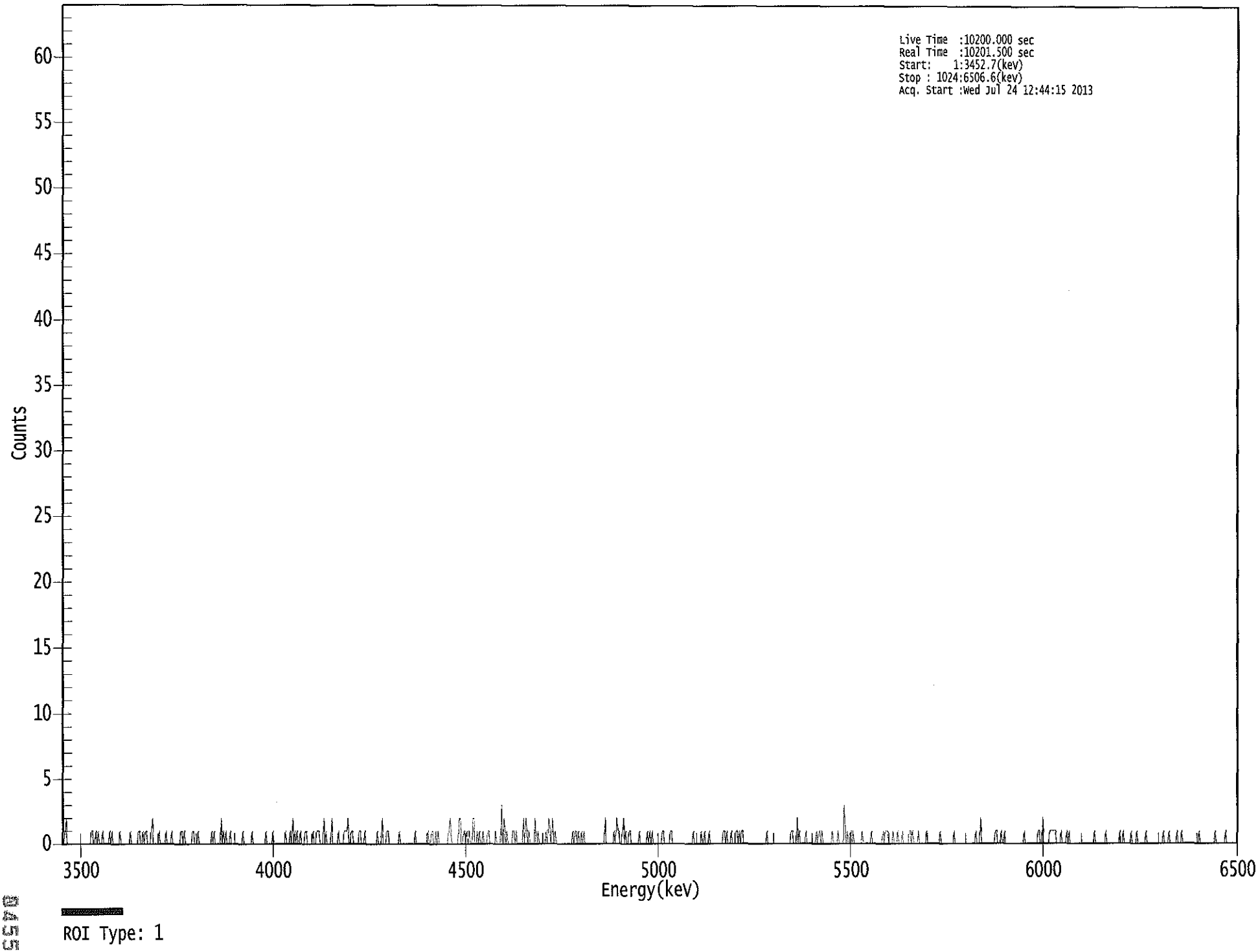

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 16

Elapsed Live time: 10200
Elapsed Real Time: 10202

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

369:	0	0	1	1	0	0	0	0

Sample Title: 16

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

801:	0	0	0	0	0	0	0	0

Sample Title: 16

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

Apex-Alpha™

Sample Description: PZ-100-SD TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 17
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_042
Chamber Serial Number: 05026930B
Detector Serial Number: 84185
Env. Background: System Bkgd 62774
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.370E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:17 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9747 +/- 0.0000
Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
Effective Efficiency: 0.1799 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.497	7.98	74.39	1.02	0.00E+000	4.5
RA-226	4.571	53.49	26.95	0.51	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.954	5685.50*	3.53E-001 +/- 9.09E+001	2.79E-001 +/- 7.18E+001
RA-226	0.942	4785.00*	1.87E+000 +/- 5.07E-001	1.83E-001 +/- 6.24E-003

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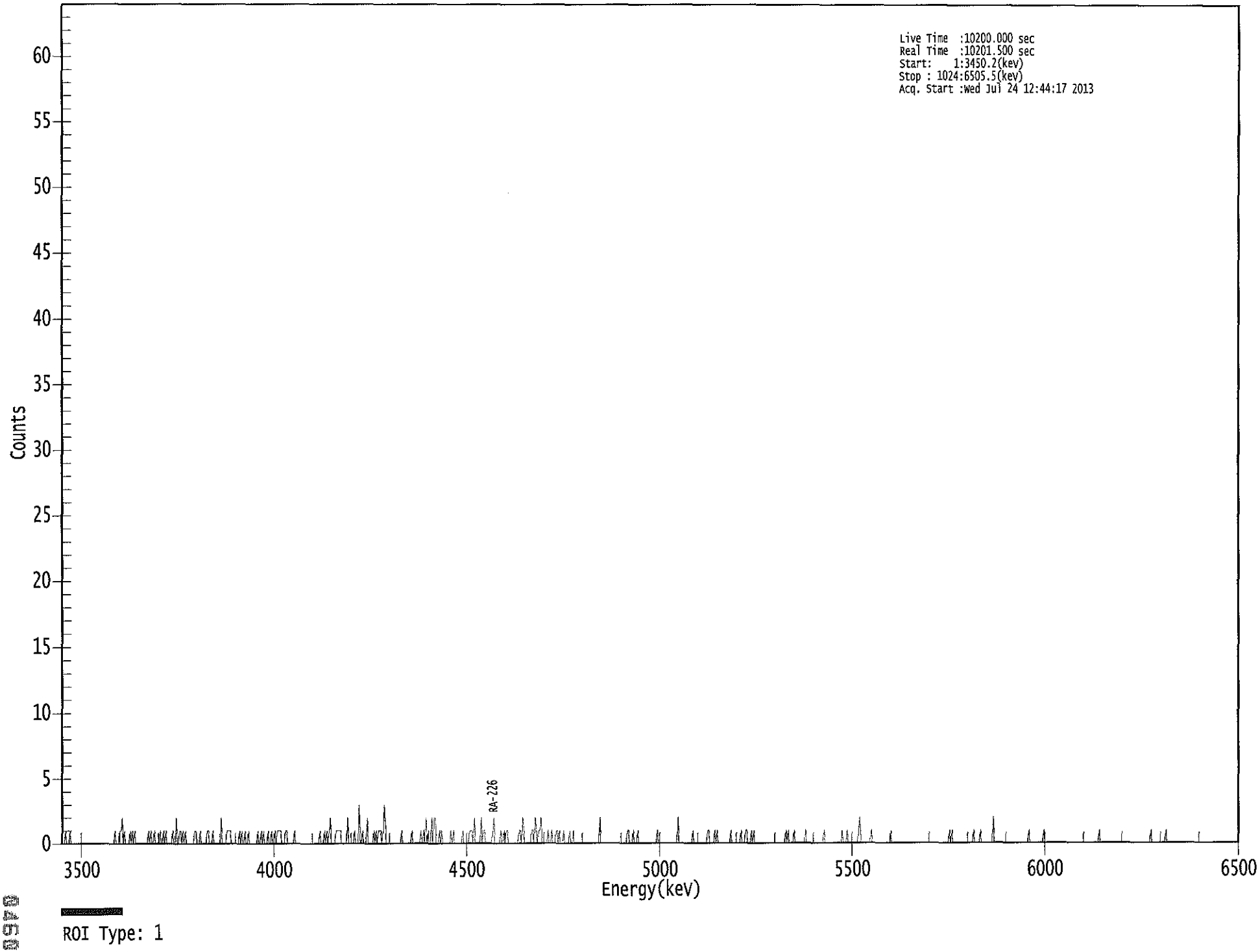
0000063867.CNF



****
***** 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: 10202

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

369:	0	0	0	0	0	0	1	2

Sample Title: 17

Channel								
377:	0	0	0	0	0	1	0	0
385:	1	0	1	1	0	0	0	0
393:	0	0	0	0	0	1	1	0
401:	2	1	0	0	0	0	0	0
409:	1	1	0	2	1	0	1	1
417:	2	0	0	0	0	0	1	0
425:	0	1	0	0	0	1	1	0
433:	1	0	0	0	1	0	0	0
441:	0	1	0	0	1	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	2	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	1	1	0	0	0
497:	1	0	0	0	1	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	1	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	2
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	1	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	1	1	0	0	0	0	1
569:	0	1	0	0	0	0	0	0
577:	0	0	0	0	0	1	0	0
585:	0	0	0	0	0	0	1	0
593:	0	0	1	1	0	0	0	1
601:	0	1	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	1	0	1
633:	0	0	0	0	1	0	0	0
641:	0	0	0	0	0	0	1	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	1	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	1	0
681:	0	0	1	0	0	0	0	0
689:	0	0	0	0	1	2	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:	1	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	1	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	1	0	0	0	0	0	1	0

801:	0	0	0	0	0	0	0	0

Sample Title: 17

Channel								
809:	0	2	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	1	0	0	0	0	0	0	0
849:	0	0	0	0	0	1	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	1	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	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™

Sample Description: PZ-100-SD DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 18
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_045
Chamber Serial Number: 04026482A
Detector Serial Number: 91131
Env. Background: System Bkgd 62775
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.120E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:19 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9837 +/- 0.0000
Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
Effective Efficiency: 0.1878 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

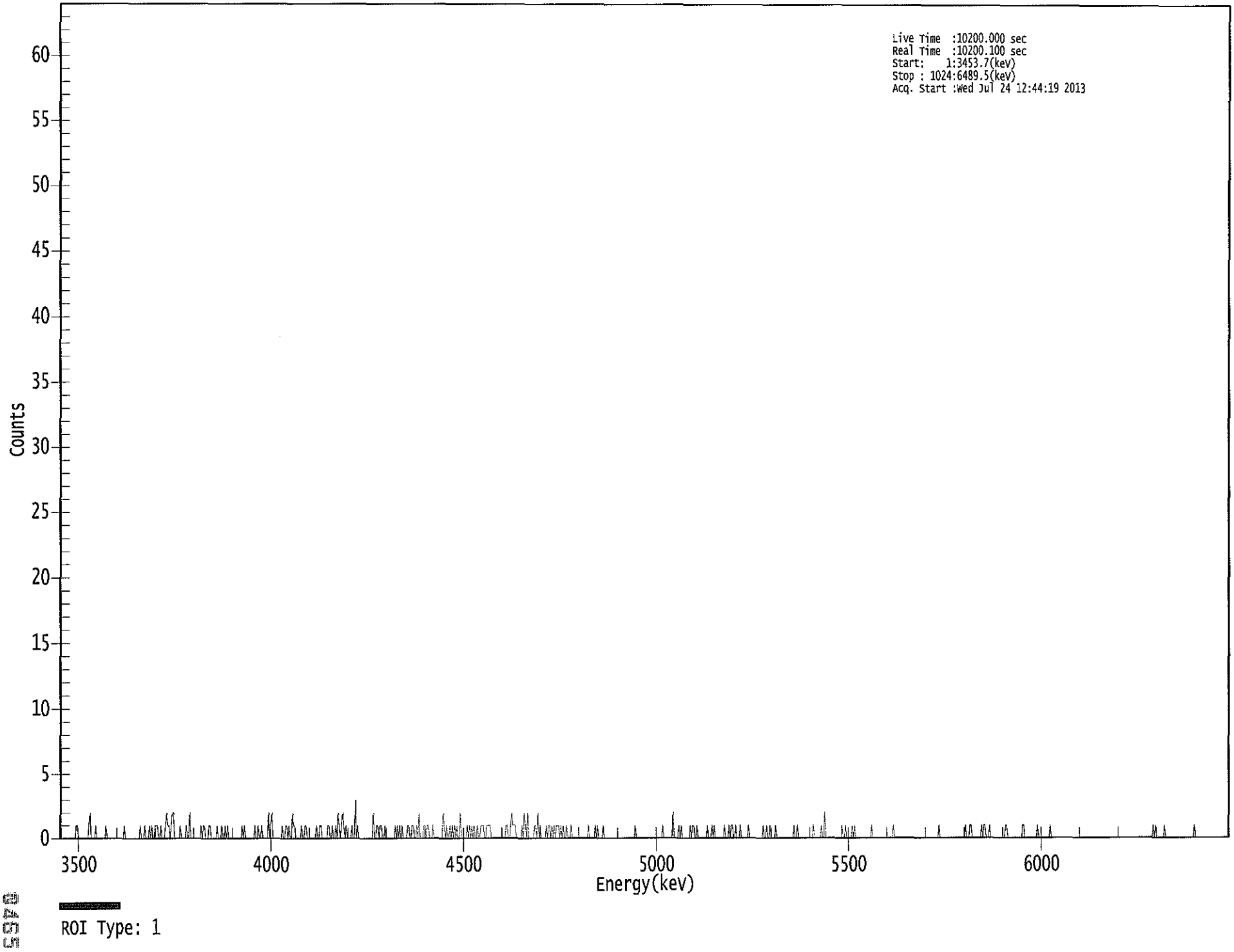
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.490	9.15	68.23	0.85	0.00E+000	3.0
RA-226	4.590	61.83	24.97	0.17	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.951	5685.50*	3.47E-001 +/- 8.93E+001	2.27E-001 +/- 5.84E+001
RA-226	0.951	4785.00*	1.85E+000 +/- 4.66E-001	1.25E-001 +/- 4.26E-003

AG
7/25/13

0000063856.CNF



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

Sample Title: 18

Elapsed Live time: 10200
Elapsed Real Time: 10200

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

369:	1	1	1	0	0	1	1	1

Sample Title: 18

Channel								
377:	1	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	1	1
393:	0	0	1	2	1	1	1	0
401:	0	0	0	0	1	0	2	1
409:	0	2	0	0	0	0	0	1
417:	1	0	2	0	1	0	0	0
425:	0	1	0	1	1	0	1	0
433:	1	0	1	1	1	0	1	0
441:	1	0	0	1	0	0	0	1
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	1	0
465:	0	0	0	0	1	0	1	0
473:	0	0	0	1	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	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	1
529:	0	0	0	0	0	0	0	0
537:	2	0	0	0	0	1	0	1
545:	0	0	0	0	0	0	0	1
553:	0	1	1	0	0	1	0	0
561:	0	0	0	0	0	0	1	0
569:	0	0	1	0	1	0	0	0
577:	0	0	0	0	0	1	0	0
585:	0	1	0	1	1	0	0	1
593:	0	0	0	1	0	0	0	0
601:	0	0	1	0	0	0	0	0
609:	0	0	0	0	0	0	0	1
617:	0	0	1	0	0	1	0	0
625:	0	0	1	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	1	0	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	1	0	0	0	0
665:	0	0	1	0	0	2	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	1	0	0	1
689:	0	0	0	0	0	1	0	1
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	1	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	1	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	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:	1	0	0	0	1	1	0	0

801:	0	0	0	0	0	0	1	0

Sample Title: 18

Channel								
809:	1	1	0	0	0	1	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	1	1	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	1	1	0	0	0	0
849:	0	0	0	0	0	0	0	1
857:	0	0	0	0	0	0	0	0
865:	0	0	1	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	1	0	1	0
961:	0	0	0	0	0	0	1	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:	1	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: PZ-112-AS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 19
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_046
Chamber Serial Number: 04026482B
Detector Serial Number: 58762
Env. Background: System Bkgd 62776
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 4.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:21 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9604 +/- 0.0000
Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
Effective Efficiency: 0.1718 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

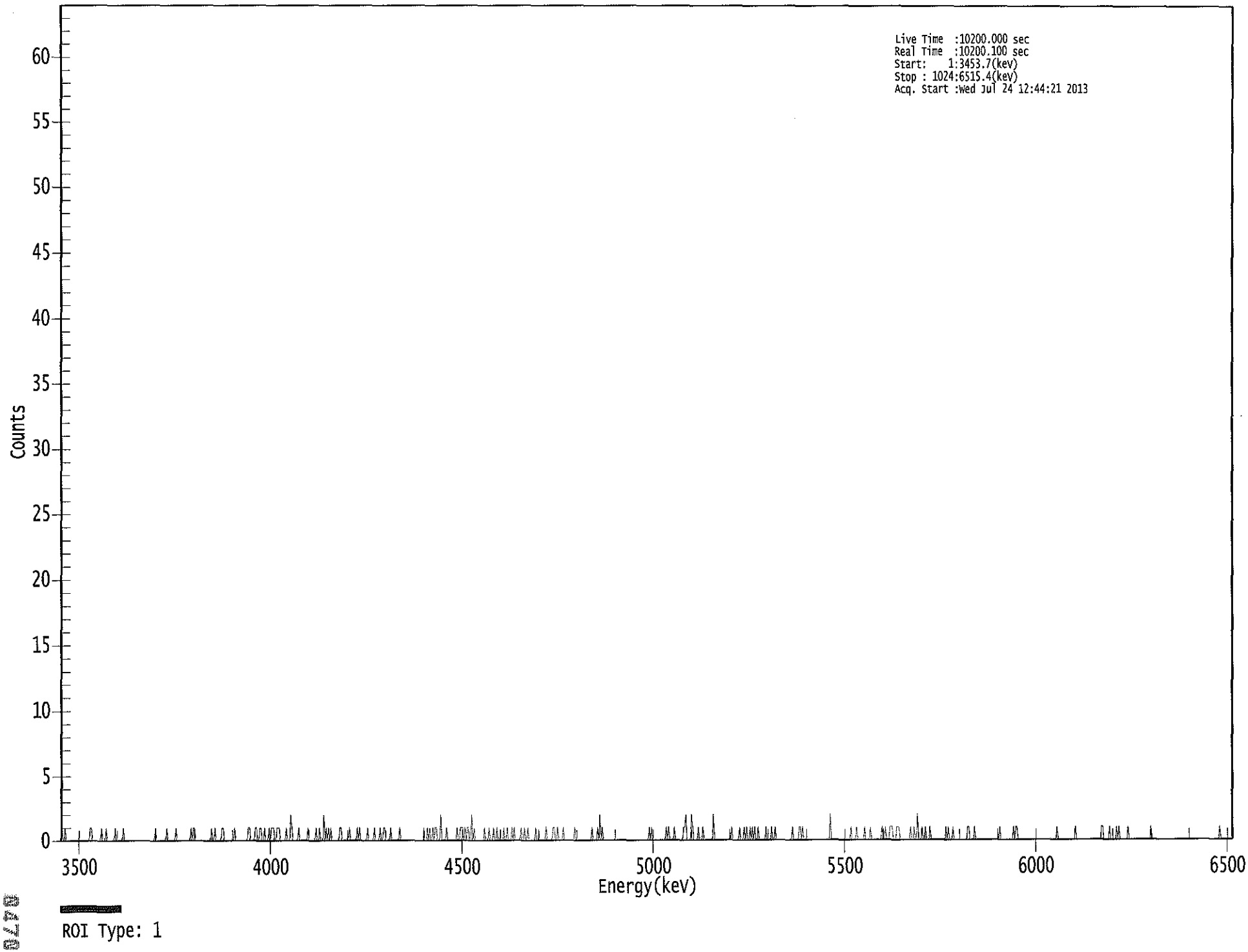
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.569	20.83	43.15	0.17	0.00E+000	3.0
RA-226	4.566	36.83	32.38	0.17	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.982	5685.50*	1.63E+000 +/- 4.19E+002	3.27E-001 +/- 8.40E+001
RA-226	0.939	4785.00*	2.27E+000 +/- 7.40E-001	2.57E-001 +/- 8.86E-003

AG
7/25/13

0000063857.CNF



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

Sample Title: 19

Elapsed Live time: 10200
Elapsed Real Time: 10200

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

369:	0	1	0	0	0	1	0	0

Sample Title: 19

Channel								
377:	0	1	0	0	1	0	0	0
385:	0	0	1	0	0	1	0	0
393:	0	1	0	1	0	0	0	0
401:	0	1	0	0	1	0	0	1
409:	0	0	0	0	0	0	1	0
417:	0	0	0	0	0	0	0	1
425:	0	0	0	0	0	1	1	0
433:	0	1	0	0	0	0	1	0
441:	0	0	0	0	0	0	0	0
449:	1	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	1
465:	0	0	0	0	1	0	2	0
473:	1	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	1	0	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	1	0	1	0	0	0	0	1
537:	0	0	0	0	0	0	0	1
545:	1	2	0	0	0	0	2	1
553:	0	0	0	0	1	0	0	0
561:	1	0	0	0	0	0	0	0
569:	0	2	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	1	0	0	0	0	0	0
593:	1	0	0	0	1	0	1	0
601:	0	1	0	1	0	1	0	0
609:	1	0	0	0	0	0	0	1
617:	0	0	0	0	1	0	0	1
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	1	0
641:	0	0	0	0	1	1	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	2
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	1	0	0	0	0	1	0
697:	0	0	0	0	0	1	0	0
705:	0	0	1	0	0	0	0	0
713:	0	0	0	0	1	0	0	1
721:	0	0	0	1	1	1	0	0
729:	0	1	1	1	0	0	0	0
737:	0	0	0	0	0	1	0	0
745:	1	0	0	2	0	0	0	1
753:	0	0	1	0	0	0	1	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	1	0	1	0
777:	0	0	1	0	0	0	0	0
785:	0	0	0	0	0	0	0	1
793:	1	0	0	0	0	1	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	1	0	0	0	0
825:	0	0	0	0	0	0	0	1
833:	0	1	1	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	1	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	1	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	1	0	0
913:	0	0	0	1	0	0	0	0
921:	0	1	0	1	0	0	0	0
929:	0	0	0	1	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	1
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	1	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description: PZ-112-AS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000638
Batch Identification: 1307098A-RA
Sample Identification: 20
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_047
Chamber Serial Number: 02030596A
Detector Serial Number: 91086
Env. Background: System Bkgd 62777
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.400E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/23/2013 12:55:40 PM
Acquisition Date/Time: 7/24/2013 12:44:24 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8982 +/- 0.0000
Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
Effective Efficiency: 0.1636 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

PEAK AREA REPORT

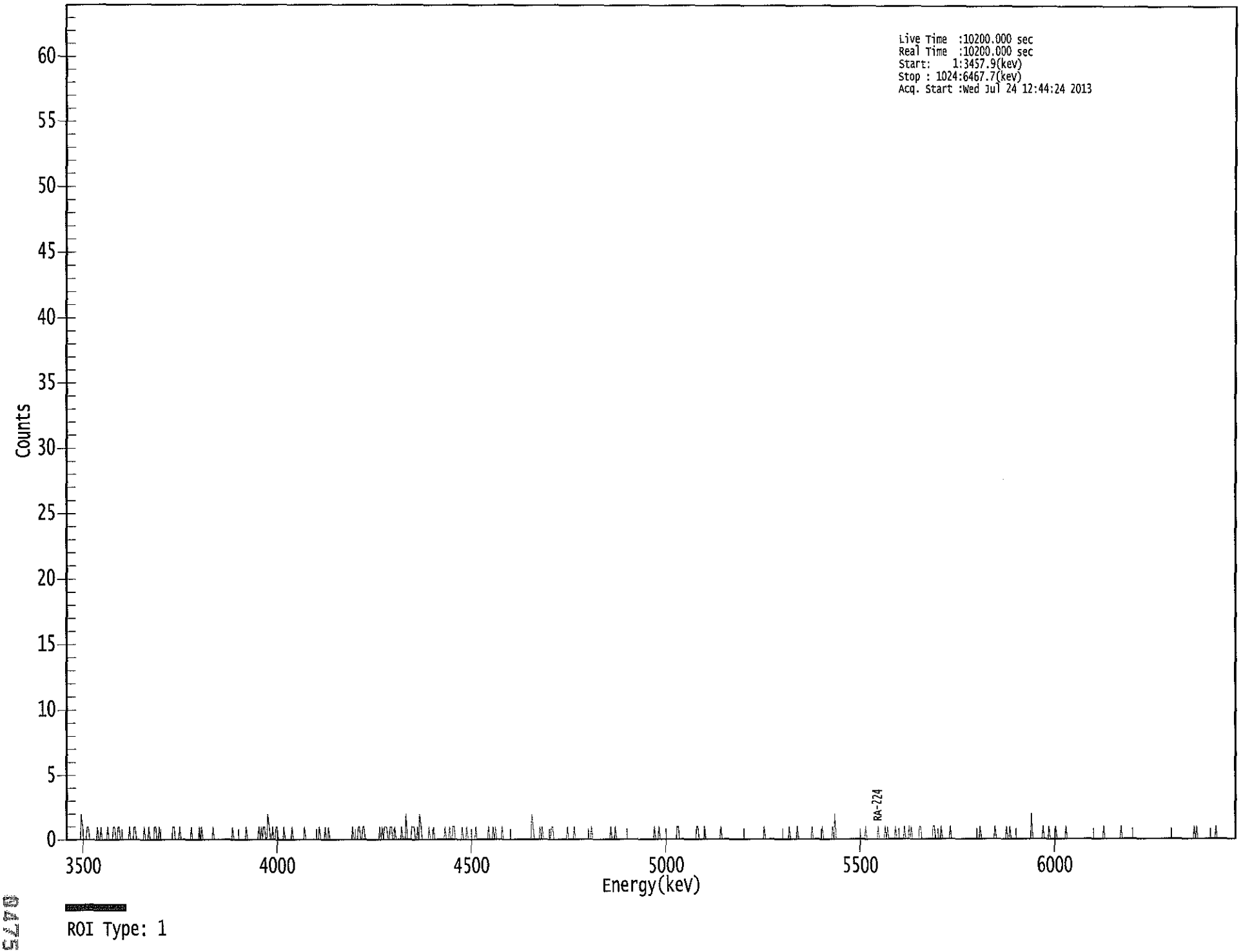
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.546	15.66	50.15	0.34	0.00E+000	2.9
RA-226	4.580	21.64	43.66	1.36	0.00E+000	4.4

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.974	5685.50*	1.09E+000 +/- 2.81E+002	3.34E-001 +/- 8.59E+001
RA-226	0.947	4785.00*	1.19E+000 +/- 5.22E-001	3.77E-001 +/- 1.30E-002

AG
7/25/13

0000063866.CNF



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

Sample Title: 20

Elapsed Live time: 10200
Elapsed Real Time: 10200

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

369:	0	1	0	0	0	1	0	1

Sample Title: 20

Channel								
377:	0	0	0	0	0	1	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	2
409:	1	0	0	0	0	0	1	0
417:	1	0	0	0	0	0	0	0
425:	1	1	0	0	0	0	0	0
433:	0	0	0	0	0	0	1	0
441:	0	0	0	0	1	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	1	0	0	0
481:	1	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	1	0	0	0	1	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	1	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	1
553:	1	0	0	0	0	0	1	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	1	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	1	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	1	0	0	0	0	0	0	1
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	1	0	0	0
657:	0	0	0	0	0	1	0	0
665:	0	0	0	0	0	0	1	0
673:	2	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	1	0	0	0	0
705:	0	0	0	0	0	0	1	0
713:	0	0	0	0	1	0	1	0
721:	0	0	0	0	0	1	0	0
729:	0	0	0	0	0	1	0	0
737:	0	1	0	1	0	0	0	0
745:	0	0	1	1	0	0	0	0
753:	0	0	0	0	0	0	1	1
761:	0	0	0	0	0	1	0	0
769:	0	0	0	0	0	1	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: 20

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

7/24/2013 5:43:41 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 7/24/2013
Time : 5:43:41 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	7/24/2013 5:25:26 AM
Alpha_004	21f	ALL	Passed	7/24/2013 5:25:27 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	7/24/2013 5:25:28 AM
Alpha_011	21f	ALL	Passed	7/24/2013 5:25:29 AM
Alpha_012	21f	ALL	Passed	7/24/2013 5:25:29 AM
Alpha_013	21f	ALL	Passed	7/24/2013 5:25:30 AM
Alpha_014	21f	ALL	Passed	7/24/2013 5:25:31 AM
Alpha_015	21f	ALL	Passed	7/24/2013 5:25:32 AM
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	7/24/2013 5:25:33 AM
Alpha_019	AIM730	ALL	Passed	7/24/2013 5:25:34 AM
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	7/24/2013 5:25:34 AM
Alpha_023	AIM730	ALL	Passed	7/24/2013 5:25:35 AM
Alpha_024	AIM730	ALL	Passed	7/24/2013 5:25:36 AM
Alpha_025	AIM730	ALL	Passed	7/24/2013 5:25:37 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	7/24/2013 5:25:38 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	7/24/2013 5:25:38 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Passed	7/24/2013 5:25:39 AM
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:40 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:42 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:43 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:45 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:46 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:48 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:50 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:52 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:54 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:56 AM

Review of QA Results - Pulser Check

7/24/2013 5:43:41 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Not Done	
Alpha_045	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:25:58 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:26:00 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:26:02 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	7/24/2013 5:26:05 AM

APPROVED BY: _____

APPROVAL DATE: 7/24/13

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

Nuclide Library Title: Radium

Nuclide Library Description: Ra-226, Po-218, Rn-222

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert.(Abs.+-)
PO-218	5.049E+010	6003.000*	0.000	99.9800	0.0000
RN-222	5.049E+010	5490.000*	0.000	99.9200	0.0000
RA-226	5.049E+010	4785.000*	0.000	100.0000	0.0000

* = key line

TOTALS: 3 Nuclides 3 Energy Lines

SECTION XI

ANALYTICAL DATA (RADIUM-228)

Work Order	13-07098
Analysis Code	Ra228
Run	1
Date Received	7/15/2013
Lab Deadline	8/6/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	E904.0
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	993.635
Carrier	Yttirum
Carrier Conc (mg/ml)	34

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/16/13 00:00	1.0000E+00
02	MBL	BLANK		07/16/13 00:00	1.0000E+00
03	DUP	I-4 TOT	44	07/09/13 12:25	1.0000E+00
04	TRG	PZ-111-SD TOT	36	07/09/13 10:42	1.0000E+00
05	TRG	PZ-111-SD DIS	36	07/09/13 10:42	1.0000E+00
06	TRG	S-5 TOT	45	07/09/13 10:50	1.0000E+00
07	TRG	S-5 DIS	45	07/09/13 10:50	1.0000E+00
08	TRG	FB @ PZ-110-SS TOT	43	07/09/13 11:40	1.0000E+00
09	TRG	PZ-110-SS TOT	41	07/09/13 12:13	1.0000E+00
10	TRG	PZ-110-SS DIS	41	07/09/13 12:13	1.0000E+00
11	DO	I-4 TOT	44	07/09/13 12:25	1.0000E+00
12	TRG	I-4 DIS	44	07/09/13 12:25	1.0000E+00
13	TRG	PZ-100-SS TOT	46	07/09/13 13:36	1.0000E+00
14	TRG	PZ-100-SS DIS	46	07/09/13 13:36	1.0000E+00
15	TRG	D-3 TOT	43	07/09/13 13:42	1.0000E+00
16	TRG	D-3 DIS	43	07/09/13 13:42	1.0000E+00
17	TRG	PZ-100-SD TOT	39	07/09/13 14:32	1.0000E+00
18	TRG	PZ-100-SD DIS	39	07/09/13 14:32	1.0000E+00
19	TRG	PZ-112-AS TOT	45	07/09/13 14:46	1.0000E+00
20	TRG	PZ-112-AS DIS	45	07/09/13 14:46	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.

13-07098
Ra228
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.9214	915.5	397.0	96.26	2.000	0.0954	0.1537	0.0583	85.74	82.53	1.00	1.00
02	MBL	0.9118	906.0	351.3	86.08	2.000	0.0962	0.1542	0.0580	85.29	73.42	1.00	1.00
03	DUP	0.9114	905.6	383.9	94.11	2.000	0.0957	0.1546	0.0589	86.62	81.52	1.00	1.00
04	TRG	0.9096	903.8	385.9	94.79	2.000	0.0957	0.1518	0.0561	82.50	78.20	1.00	1.00
05	TRG	0.9105	904.7	386.0	94.72	2.000	0.0958	0.1511	0.0553	81.32	77.03	1.00	1.00
06	TRG	0.9085	902.7	227.5	55.95	2.000	0.0964	0.1542	0.0578	85.00	47.56	1.00	1.00
07	TRG	0.9086	902.8	280.0	68.85	2.000	0.0958	0.1522	0.0564	82.94	57.11	1.00	1.00
08	TRG	0.8957	890.0	339.1	84.58	2.000	0.0962	0.1526	0.0564	82.94	70.16	1.00	1.00
09	TRG	0.9078	902.0	360.2	88.65	2.000	0.0964	0.1515	0.0551	81.03	71.83	1.00	1.00
10	TRG	0.9090	903.2	391.6	96.25	2.000	0.0957	0.1509	0.0552	81.18	78.13	1.00	1.00
11	DO	0.9076	901.8	410.0	100.93	2.000	0.0963	0.1517	0.0554	81.47	82.23	1.00	1.00
12	TRG	0.9114	905.6	354.2	86.83	2.000	0.0960	0.1507	0.0547	80.44	69.85	1.00	1.00
13	TRG	0.9086	902.8	362.2	89.06	2.000	0.0960	0.1509	0.0549	80.74	71.91	1.00	1.00
14	TRG	0.9057	899.9	385.1	95.00	2.000	0.0960	0.1521	0.0561	82.50	78.37	1.00	1.00
15	TRG	0.9055	899.7	356.1	87.86	2.000	0.0964	0.1540	0.0576	84.71	74.43	1.00	1.00
16	TRG	0.9046	898.8	332.7	82.17	2.000	0.0924	0.1480	0.0556	81.76	67.19	1.00	1.00
17	TRG	0.9066	900.8	395.5	97.47	2.000	0.0928	0.1500	0.0572	84.12	81.99	1.00	1.00
18	TRG	0.9067	900.9	399.2	98.37	2.000	0.0929	0.1509	0.0580	85.29	83.90	1.00	1.00
19	TRG	0.9063	900.5	389.6	96.04	2.000	0.0927	0.1509	0.0582	85.59	82.20	1.00	1.00
20	TRG	0.9059	900.1	364.2	89.82	2.000	0.0927	0.1514	0.0587	86.32	77.54	1.00	1.00

* 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.

13-07098
Ra228
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
02	MBL			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
03	DUP			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
04	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
05	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
06	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
07	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
08	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
09	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
10	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
11	DO			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
12	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
13	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
14	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
15	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
16	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
17	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
18	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
19	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH
20	TRG			07/19/13 08:57	JWOLFE	07/23/13 12:55	LWALKER	07/31/13 04:18	TSMITH

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

Preliminary Data Report & Analytical Calculations

Work Order: 13-07098-Ra228-1

Run: 1
Analysis Code: Ra228
Eberline Services Work Order: 13-07098
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	RA-228	LCS	LCS	pCi/l	1.06E+01	8.26E-01	9.69E-02	8.84E+00	119.50	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	2.43E+00	4.24E-01	1.07E-01					OK	OK
03	RA-228	DUP	I-4 TOT	pCi/l	3.00E+00	4.42E-01	1.02E-01				NA	OK	
04	RA-228	TRG	PZ-111-SD TOT	pCi/l	3.72E+00	5.06E-01	1.08E-01					OK	
05	RA-228	TRG	PZ-111-SD DIS	pCi/l	4.77E+00	5.76E-01	1.07E-01					OK	
06	RA-228	TRG	S-5 TOT	pCi/l	5.52E+00	7.98E-01	1.75E-01					OK	
07	RA-228	TRG	S-5 DIS	pCi/l	4.01E+00	6.16E-01	1.46E-01					OK	
08	RA-228	TRG	FB @ PZ-110-SS TOT	pCi/l	2.86E+00	4.67E-01	1.20E-01					OK	
09	RA-228	TRG	PZ-110-SS TOT	pCi/l	4.11E+00	5.57E-01	1.20E-01					OK	
10	RA-228	TRG	PZ-110-SS DIS	pCi/l	5.20E+00	6.02E-01	1.14E-01					OK	
11	RA-228	DO	I-4 TOT	pCi/l	5.20E+00	5.91E-01	1.07E-01					OK	
12	RA-228	TRG	I-4 DIS	pCi/l	5.89E+00	6.75E-01	1.27E-01					OK	
13	RA-228	TRG	PZ-100-SS TOT	pCi/l	1.99E+00	8.43E-01	1.60E+00					OK	
14	RA-228	TRG	PZ-100-SS DIS	pCi/l	7.37E-01	6.58E-01	1.33E+00					OK	
15	RA-228	TRG	D-3 TOT	pCi/l	4.81E+00	9.62E-01	1.60E+00					OK	
16	RA-228	TRG	D-3 DIS	pCi/l	6.18E+00	1.03E+00	1.60E+00					OK	
17	RA-228	TRG	PZ-100-SD TOT	pCi/l	1.35E+00	6.65E-01	1.27E+00					OK	
18	RA-228	TRG	PZ-100-SD DIS	pCi/l	6.71E-01	6.21E-01	1.25E+00					OK	
19	RA-228	TRG	PZ-112-AS TOT	pCi/l	3.39E+00	6.92E-01	1.09E+00					OK	
20	RA-228	TRG	PZ-112-AS DIS	pCi/l	1.96E+00	7.51E-01	1.40E+00					OK	

Run	Analysis Code	Eberline Services Work Order	Client
1	Ra228	13-07098	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	RA-228	LCS	07/16/13 00:00	1.00E+00	96.26	86.74	82.53	1.00	7/23/2013 12:55	7/31/2013 4:18
02	RA-228	MBL	07/16/13 00:00	1.00E+00	86.08	85.29	73.42	1.00	7/23/2013 12:55	7/31/2013 4:18
03	RA-228	DUP	07/09/13 12:25	1.00E+00	94.11	86.62	81.52	1.00	7/23/2013 12:55	7/31/2013 4:18
04	RA-228	TRG	07/09/13 10:42	1.00E+00	94.79	82.50	78.20	1.00	7/23/2013 12:55	7/31/2013 4:18
05	RA-228	TRG	07/09/13 10:42	1.00E+00	94.72	81.32	77.03	1.00	7/23/2013 12:55	7/31/2013 4:18
06	RA-228	TRG	07/09/13 10:50	1.00E+00	55.95	85.00	47.56	1.00	7/23/2013 12:55	7/31/2013 4:18
07	RA-228	TRG	07/09/13 10:50	1.00E+00	68.85	82.94	57.11	1.00	7/23/2013 12:55	7/31/2013 4:18
08	RA-228	TRG	07/09/13 11:40	1.00E+00	84.58	82.94	70.16	1.00	7/23/2013 12:55	7/31/2013 4:18
09	RA-228	TRG	07/09/13 12:13	1.00E+00	88.65	81.03	71.83	1.00	7/23/2013 12:55	7/31/2013 4:18
10	RA-228	TRG	07/09/13 12:13	1.00E+00	96.25	81.18	78.13	1.00	7/23/2013 12:55	7/31/2013 4:18
11	RA-228	DO	07/09/13 12:25	1.00E+00	100.93	81.47	82.23	1.00	7/23/2013 12:55	7/31/2013 4:18
12	RA-228	TRG	07/09/13 12:25	1.00E+00	86.83	80.44	69.85	1.00	7/23/2013 12:55	7/31/2013 4:18
13	RA-228	TRG	07/09/13 13:36	1.00E+00	89.06	80.74	71.91	1.00	7/23/2013 12:55	7/31/2013 4:18
14	RA-228	TRG	07/09/13 13:36	1.00E+00	95.00	82.50	78.37	1.00	7/23/2013 12:55	7/31/2013 4:18
15	RA-228	TRG	07/09/13 13:42	1.00E+00	87.86	84.71	74.43	1.00	7/23/2013 12:55	7/31/2013 4:18
16	RA-228	TRG	07/09/13 13:42	1.00E+00	82.17	81.76	67.19	1.00	7/23/2013 12:55	7/31/2013 4:18
17	RA-228	TRG	07/09/13 14:32	1.00E+00	97.47	84.12	81.99	1.00	7/23/2013 12:55	7/31/2013 4:18
18	RA-228	TRG	07/09/13 14:32	1.00E+00	98.37	85.29	83.90	1.00	7/23/2013 12:55	7/31/2013 4:18
19	RA-228	TRG	07/09/13 14:46	1.00E+00	96.04	85.59	82.20	1.00	7/23/2013 12:55	7/31/2013 4:18
20	RA-228	TRG	07/09/13 14:46	1.00E+00	89.82	86.32	77.54	1.00	7/23/2013 12:55	7/31/2013 4:18

Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-07098
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	07/31/13 08:18		LB4110R	A1	120	629	0.00196688	0.4776
02	RA-228	MBL	07/31/13 08:18		LB4110R	A2	120	127	0.001681312	0.4699
03	RA-228	DUP	07/31/13 08:18		LB4110R	A3	120	178	0.00237914	0.4809
04	RA-228	TRG	07/31/13 08:18		LB4110R	A4	120	208	0.002347269	0.4732
05	RA-228	TRG	07/31/13 08:18		LB4110R	B1	120	264	0.002208604	0.4754
06	RA-228	TRG	07/31/13 08:18		LB4110R	B2	120	185	0.002084176	0.4658
07	RA-228	TRG	07/31/13 08:18		LB4110R	B3	120	163	0.002208398	0.4713
08	RA-228	TRG	07/31/13 08:18		LB4110R	B4	120	145	0.002425977	0.4773
09	RA-228	TRG	07/31/13 08:18		LB4110R	C1	120	210	0.002480706	0.4705
10	RA-228	TRG	07/31/13 08:18		LB4110R	C2	120	287	0.002817592	0.4676
11	RA-228	DO	07/31/13 08:18		LB4110R	C3	120	298	0.002511178	0.4614
12	RA-228	TRG	07/31/13 08:18		LB4110R	C4	120	293	0.002817505	0.4714
13	RA-228	TRG	07/31/13 08:17		LB4110A	B1	120	284	1.533333333	0.4626
14	RA-228	TRG	07/31/13 08:17		LB4110A	B2	120	195	1.283333333	0.4691
15	RA-228	TRG	07/31/13 08:17		LB4110A	B3	120	429	1.55	0.449
16	RA-228	TRG	07/31/13 08:17		LB4110A	B4	120	450	1.333333333	0.4619
17	RA-228	TRG	07/31/13 08:17		LB4110A	C1	120	232	1.283333333	0.4667
18	RA-228	TRG	07/31/13 08:17		LB4110A	C2	120	189	1.25	0.4578
19	RA-228	TRG	07/31/13 08:17		LB4110A	C3	120	312	0.95	0.4699
20	RA-228	TRG	07/31/13 08:17		LB4110A	C4	120	276	1.4	0.4692

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	07/16/13 00:00	1.0000	0.9214	915.5353	397.0000	96.26	1.00	1.00
02	MBL	BLANK	07/16/13 00:00	1.0000	0.9118	905.9964	351.3000	86.08	1.00	1.00
03	DUP	I-4 TOT	07/09/13 12:25	1.0000	0.9114	905.5989	383.9000	94.11	1.00	1.00
04	TRG	PZ-111-SD TOT	07/09/13 10:42	1.0000	0.9096	903.8104	385.9000	94.79	1.00	1.00
05	TRG	PZ-111-SD DIS	07/09/13 10:42	1.0000	0.9105	904.7047	386.0000	94.72	1.00	1.00
06	TRG	S-5 TOT	07/09/13 10:50	1.0000	0.9085	902.7174	227.5000	55.95	1.00	1.00
07	TRG	S-5 DIS	07/09/13 10:50	1.0000	0.9086	902.8168	280.0000	68.85	1.00	1.00
08	TRG	FB @ PZ-110-SS TOT	07/09/13 11:40	1.0000	0.8957	889.9989	339.1000	84.58	1.00	1.00
09	TRG	PZ-110-SS TOT	07/09/13 12:13	1.0000	0.9078	902.0219	360.2000	88.65	1.00	1.00
10	TRG	PZ-110-SS DIS	07/09/13 12:13	1.0000	0.9090	903.2142	391.6000	96.25	1.00	1.00
11	DO	I-4 TOT	07/09/13 12:25	1.0000	0.9076	901.8231	410.0000	100.93	1.00	1.00
12	TRG	I-4 DIS	07/09/13 12:25	1.0000	0.9114	905.5989	354.2000	86.83	1.00	1.00
13	TRG	PZ-100-SS TOT	07/09/13 13:36	1.0000	0.9086	902.8168	362.2000	89.06	1.00	1.00
14	TRG	PZ-100-SS DIS	07/09/13 13:36	1.0000	0.9057	899.9352	385.1000	95.00	1.00	1.00
15	TRG	D-3 TOT	07/09/13 13:42	1.0000	0.9055	899.7365	356.1000	87.86	1.00	1.00
16	TRG	D-3 DIS	07/09/13 13:42	1.0000	0.9046	898.8422	332.7000	82.17	1.00	1.00
17	TRG	PZ-100-SD TOT	07/09/13 14:32	1.0000	0.9066	900.8295	395.5000	97.47	1.00	1.00
18	TRG	PZ-100-SD DIS	07/09/13 14:32	1.0000	0.9067	900.9289	399.2000	98.37	1.00	1.00
19	TRG	PZ-112-AS TOT	07/09/13 14:46	1.0000	0.9063	900.5314	389.6000	96.04	1.00	1.00
20	TRG	PZ-112-AS DIS	07/09/13 14:46	1.0000	0.9059	900.1339	364.2000	89.82	1.00	1.00

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-07098	1	Ra228	7/19/2013 8:56	JWOLFE		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	*Sol #*	*Activity dpm/g*	*Solution Date*	*Approx Addition*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Volume Used (g)*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*	*Known pCi*	*Error Estimate*	*Added pCi*	*Error Estimate*
Ra-228	Ra-11	37.864	7/19/2013	0.530	0.5184				8.84	0.451	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	Ba-133	Ba-6a	993.635	7/19/2013	0.9214	1.0200
02	Ba-133	Ba-6a	993.635	7/19/2013	0.9118	1.0200
03	Ba-133	Ba-6a	993.635	7/19/2013	0.9114	1.0200
04	Ba-133	Ba-6a	993.635	7/19/2013	0.9096	1.0200
05	Ba-133	Ba-6a	993.635	7/19/2013	0.9105	1.0200
06	Ba-133	Ba-6a	993.635	7/19/2013	0.9085	1.0200
07	Ba-133	Ba-6a	993.635	7/19/2013	0.9086	1.0200
08	Ba-133	Ba-6a	993.635	7/19/2013	0.8957	1.0200
09	Ba-133	Ba-6a	993.635	7/19/2013	0.9078	1.0200
10	Ba-133	Ba-6a	993.635	7/19/2013	0.9090	1.0200
11	Ba-133	Ba-6a	993.635	7/19/2013	0.9076	1.0200
12	Ba-133	Ba-6a	993.635	7/19/2013	0.9114	1.0200
13	Ba-133	Ba-6a	993.635	7/19/2013	0.9086	1.0200
14	Ba-133	Ba-6a	993.635	7/19/2013	0.9057	1.0200
15	Ba-133	Ba-6a	993.635	7/19/2013	0.9055	1.0200
16	Ba-133	Ba-6a	993.635	7/19/2013	0.9046	1.0200
17	Ba-133	Ba-6a	993.635	7/19/2013	0.9066	1.0200
18	Ba-133	Ba-6a	993.635	7/19/2013	0.9067	1.0200
19	Ba-133	Ba-6a	993.635	7/19/2013	0.9063	1.0200
20	Ba-133	Ba-6a	993.635	7/19/2013	0.9059	1.0200

Balance Printer Tapes

Tracer	LCS

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07098	1	Ra228	liters	8/6/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	I-4 TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-111-SD TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-111-SD DIS	TRG					1.0000E+00	1.0000E+00				
06	S-5 TOT	TRG					1.0000E+00	1.0000E+00				
07	S-5 DIS	TRG					1.0000E+00	1.0000E+00				
08	FB @ PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
10	PZ-110-SS DIS	TRG					1.0000E+00	1.0000E+00				
11	I-4 TOT	DO					1.0000E+00	1.0000E+00				
12	I-4 DIS	TRG					1.0000E+00	1.0000E+00				
13	PZ-100-SS TOT	TRG					1.0000E+00	1.0000E+00				
14	PZ-100-SS DIS	TRG					1.0000E+00	1.0000E+00				
15	D-3 TOT	TRG					1.0000E+00	1.0000E+00				
16	D-3 DIS	TRG					1.0000E+00	1.0000E+00				
17	PZ-100-SD TOT	TRG					1.0000E+00	1.0000E+00				
18	PZ-100-SD DIS	TRG					1.0000E+00	1.0000E+00				
19	PZ-112-AS TOT	TRG					1.0000E+00	1.0000E+00				
20	PZ-112-AS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: JWolfe Date: 7/19/13

Eberline Services - Oak Ridge
Version 1.0 9/1999

Gravimetric Worksheet

Printed: 7/31/2013 7:35 AM

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07098	1	Ra228	Yttirum	34.0000	TSMITH

TRetec	Engineering Management Support, Inc.	Sample	Carrier Data	Filter Data			Gravimetric
Fraction	Client ID	Type	Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS	2.0000	0.0954	0.1537	0.0583	85.74
02	BLANK	MBL	2.0000	0.0962	0.1542	0.0580	85.29
03	DUP	DUP	2.0000	0.0957	0.1546	0.0589	86.62
04	PZ-111-SD TOT	TRG	2.0000	0.0957	0.1518	0.0561	82.50
05	PZ-111-SD DIS	TRG	2.0000	0.0958	0.1511	0.0553	81.32
06	S-5 TOT	TRG	2.0000	0.0964	0.1542	0.0578	85.00
07	S-5 DIS	TRG	2.0000	0.0958	0.1522	0.0564	82.94
08	FB @ PZ-110-SS TOT	TRG	2.0000	0.0962	0.1526	0.0564	82.94
09	PZ-110-SS TOT	TRG	2.0000	0.0964	0.1515	0.0551	81.03
10	PZ-110-SS DIS	TRG	2.0000	0.0957	0.1509	0.0552	81.18
11	I-4 TOT	DO	2.0000	0.0963	0.1517	0.0554	81.47
12	I-4 DIS	TRG	2.0000	0.0960	0.1507	0.0547	80.44
13	PZ-100-SS TOT	TRG	2.0000	0.0960	0.1509	0.0549	80.74
14	PZ-100-SS DIS	TRG	2.0000	0.0960	0.1521	0.0561	82.50
15	D-3 TOT	TRG	2.0000	0.0964	0.1540	0.0576	84.71
16	D-3 DIS	TRG	2.0000	0.0924	0.1480	0.0556	81.76
17	PZ-100-SD TOT	TRG	2.0000	0.0928	0.1500	0.0572	84.12
18	PZ-100-SD DIS	TRG	2.0000	0.0929	0.1509	0.0580	85.29
19	PZ-112-AS TOT	TRG	2.0000	0.0927	0.1509	0.0582	85.59
20	PZ-112-AS DIS	TRG	2.0000	0.0927	0.1514	0.0587	86.32

0491A

Technician: _____ Date: 7/31/13

7/31/17

(1)

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1307098-09	8	210	120	1400	7/31/13 10:18
C2	1307098-10	13	287	120	1400	7/31/13 10:18
C3	1307098-11	22	298	120	1400	7/31/13 10:18
C4	1307098-12	10	293	120	1400	7/31/13 10:18
A1	1307098-01	10	629	120	1400	7/31/13 10:18
A2	1307098-02	7	127	120	1400	7/31/13 10:18
A3	1307098-03	9	178	120	1400	7/31/13 10:18
A4	1307098-04	11	208	120	1400	7/31/13 10:18
B1	1307098-05	6	264	120	1400	7/31/13 10:18
B2	1307098-06	12	185	120	1400	7/31/13 10:18
B3	1307098-07	13	163	120	1400	7/31/13 10:18
B4	1307098-08	9	145	120	1400	7/31/13 10:18

C
7/31/13
A

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
B1	1307098-13	17	284	120	1400	7/31/13 10:17
B2	1307098-14	15	195	120	1400	7/31/13 10:17
B3	1307098-15	10	429	120	1400	7/31/13 10:17
B4	1307098-16	14	450	120	1400	7/31/13 10:17
C1	1307098-17	13	232	120	1400	7/31/13 10:17
C2	1307098-18	12	189	120	1400	7/31/13 10:17
C3	1307098-19	12	312	120	1400	7/31/13 10:17
C4	1307098-20	10	276	120	1400	7/31/13 10:17

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Backgrounds)

C
7/31/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	7/31/2013	5.00E-02	P	-2.14E+01	2.84E-01	2.19E+01
LB4110A - A2	Alpha	11/18/2007	7/31/2013	1.50E-01	P	-1.82E+01	2.55E-01	1.87E+01
LB4110A - A3	Alpha	11/18/2007	7/31/2013	8.33E-02	P	-1.77E+01	2.17E-01	1.81E+01
LB4110A - A4	Alpha	11/18/2007	7/31/2013	6.67E-02	P	-1.88E+01	2.37E-01	1.92E+01
LB4110A - B1	Alpha	11/18/2007	7/31/2013	8.33E-02	P	-9.70E-02	7.51E-02	2.47E-01
LB4110A - B2	Alpha	11/18/2007	7/31/2013	1.50E-01	P	-7.82E-02	7.23E-02	2.23E-01
LB4110A - B3	Alpha	11/18/2007	7/31/2013	1.17E-01	P	-6.31E-02	5.35E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	7/31/2013	5.00E-02	P	-1.41E-01	7.88E-02	2.98E-01
LB4110A - C1	Alpha	11/18/2007	7/31/2013	6.67E-02	P	-1.49E-01	8.88E-02	3.27E-01
LB4110A - C2	Alpha	11/18/2007	7/31/2013	5.00E-02	P	-1.77E-01	8.69E-02	3.51E-01
LB4110A - C3	Alpha	11/18/2007	7/31/2013	1.83E-01	P	-1.72E-01	1.01E-01	3.73E-01
LB4110A - C4	Alpha	11/18/2007	7/31/2013	8.33E-02	P	-6.27E-02	6.84E-02	1.99E-01
LB4110A - D1	Alpha	11/18/2007	7/31/2013	5.00E-02	P	-5.36E-02	8.35E-02	2.21E-01
LB4110A - D2	Alpha	11/18/2007	7/31/2013	6.67E-02	P	-7.01E-02	6.07E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	7/31/2013	3.33E-02	P	-4.83E-02	7.09E-02	1.90E-01
LB4110A - D4	Alpha	11/18/2007	7/31/2013	5.00E-02	P	-5.73E-02	7.04E-02	1.98E-01
LB4110R - A1	Alpha	11/24/2006	7/31/2013	1.90E-04	P	-9.84E-02	1.01E-01	3.01E-01
LB4110R - A2	Alpha	11/24/2006	7/31/2013	9.52E-05	P	-8.92E-02	7.65E-02	2.42E-01
LB4110R - A3	Alpha	11/24/2006	7/31/2013	1.27E-04	P	-7.34E-02	7.72E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	7/31/2013	6.34E-05	P	-5.27E-02	7.10E-02	1.95E-01
LB4110R - B1	Alpha	11/24/2006	7/31/2013	1.24E-04	P	-9.44E-02	6.15E-02	2.17E-01
LB4110R - B2	Alpha	11/24/2006	7/31/2013	1.24E-04	P	-6.94E-02	6.34E-02	1.96E-01
LB4110R - B3	Alpha	11/24/2006	7/31/2013	1.56E-04	P	-6.48E-02	6.99E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	7/31/2013	9.33E-05	P	-6.41E-02	7.02E-02	2.05E-01
LB4110R - C1	Alpha	11/24/2006	7/31/2013	1.23E-04	P	-7.69E-02	7.36E-02	2.24E-01
LB4110R - C2	Alpha	11/24/2006	7/31/2013	9.19E-05	P	-7.56E-02	7.11E-02	2.18E-01
LB4110R - C3	Alpha	11/24/2006	7/31/2013	1.53E-04	P	-8.80E-02	8.44E-02	2.57E-01
LB4110R - C4	Alpha	11/24/2006	7/31/2013	3.06E-05	P	-6.20E-02	8.13E-02	2.25E-01
LB4110R - D1	Alpha	11/24/2006	7/31/2013	0.00E+00	P	-1.02E-01	7.05E-02	2.43E-01
LB4110R - D2	Alpha	11/24/2006	7/31/2013	0.00E+00	P	-7.73E-02	7.00E-02	2.17E-01
LB4110R - D3	Alpha	11/24/2006	7/31/2013	0.00E+00	P	-8.24E-02	6.97E-02	2.22E-01
LB4110R - D4	Alpha	11/24/2006	7/31/2013	0.00E+00	P	-7.46E-02	7.45E-02	2.24E-01
LB5100 - 1	Alpha	7/10/2006	10/26/2007	5.00E-02	P	-1.56E-02	9.58E-02	2.07E-01

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Backgrounds)

7/17/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	7/31/2013	6.80E+00	P	-2.90E+02	7.63E+00	3.05E+02
LB4110A - A2	Beta	11/18/2007	7/31/2013	3.93E+00	P	-3.04E+01	2.59E+00	3.56E+01
LB4110A - A3	Beta	11/18/2007	7/31/2013	1.70E+00	P	-5.03E+01	2.63E+00	5.56E+01
LB4110A - A4	Beta	11/18/2007	7/31/2013	7.18E+00	P	-3.25E+01	3.19E+00	3.89E+01
LB4110A - B1	Beta	11/18/2007	7/31/2013	1.53E+00	P	-1.04E+01	3.24E+00	1.69E+01
LB4110A - B2	Beta	11/18/2007	7/31/2013	1.28E+00	P	-7.65E+00	2.00E+00	1.16E+01
LB4110A - B3	Beta	11/18/2007	7/31/2013	1.55E+00	P	1.14E-01	1.36E+00	2.61E+00
LB4110A - B4	Beta	11/18/2007	7/31/2013	1.33E+00	P	-7.64E+00	1.98E+00	1.16E+01
LB4110A - C1	Beta	11/18/2007	7/31/2013	1.28E+00	P	-5.40E+00	2.12E+00	9.64E+00
LB4110A - C2	Beta	11/18/2007	7/31/2013	1.25E+00	P	3.82E-01	1.27E+00	2.15E+00
LB4110A - C3	Beta	11/18/2007	7/31/2013	9.50E-01	P	4.71E-01	1.46E+00	2.45E+00
LB4110A - C4	Beta	11/18/2007	7/31/2013	1.40E+00	P	-1.76E+00	2.10E+00	5.97E+00
LB4110A - D1	Beta	11/18/2007	7/31/2013	1.58E+00	P	-2.32E+00	2.57E+00	7.45E+00
LB4110A - D2	Beta	11/18/2007	7/31/2013	1.75E+00	P	-6.45E-01	1.56E+00	3.77E+00
LB4110A - D3	Beta	11/18/2007	7/31/2013	4.27E+00	P	1.28E+00	4.48E+00	7.67E+00
LB4110A - D4	Beta	11/18/2007	7/31/2013	1.28E+00	P	-4.27E-01	1.37E+00	3.17E+00
LB4110R - A1	Beta	11/24/2006	7/31/2013	1.97E-03	P	-6.10E+01	3.68E+00	6.83E+01
LB4110R - A2	Beta	11/24/2006	7/31/2013	1.68E-03	P	-4.84E+01	2.02E+00	5.24E+01
LB4110R - A3	Beta	11/24/2006	7/31/2013	2.38E-03	P	-4.48E+01	2.74E+00	5.03E+01
LB4110R - A4	Beta	11/24/2006	7/31/2013	2.35E-03	P	-4.47E+01	1.99E+00	4.87E+01
LB4110R - B1	Beta	11/24/2006	7/31/2013	2.21E-03	P	-4.70E+01	2.02E+00	5.11E+01
LB4110R - B2	Beta	11/24/2006	7/31/2013	2.08E-03	P	-4.70E+01	2.05E+00	5.11E+01
LB4110R - B3	Beta	11/24/2006	7/31/2013	2.21E-03	P	-4.68E+01	2.66E+00	5.21E+01
LB4110R - B4	Beta	11/24/2006	7/31/2013	2.43E-03	P	-4.71E+01	1.92E+00	5.10E+01
LB4110R - C1	Beta	11/24/2006	7/31/2013	2.48E-03	P	-4.69E+01	2.97E+00	5.29E+01
LB4110R - C2	Beta	11/24/2006	7/31/2013	2.82E-03	P	-4.69E+01	2.72E+00	5.23E+01
LB4110R - C3	Beta	11/24/2006	7/31/2013	2.51E-03	P	-4.74E+01	2.52E+00	5.24E+01
LB4110R - C4	Beta	11/24/2006	7/31/2013	2.82E-03	P	-5.35E+01	2.95E+00	5.94E+01
LB4110R - D1	Beta	11/24/2006	7/31/2013	0.00E+00	P	-4.45E+01	5.58E+00	5.57E+01
LB4110R - D2	Beta	11/24/2006	7/31/2013	0.00E+00	P	-4.79E+01	1.88E+00	5.16E+01
LB4110R - D3	Beta	11/24/2006	7/31/2013	0.00E+00	P	-5.12E+01	5.56E+00	6.23E+01
LB4110R - D4	Beta	11/24/2006	7/31/2013	0.00E+00	P	-4.76E+01	2.24E+00	5.20E+01
LB5100 - 1	Beta	7/10/2006	10/26/2007	4.52E+00	F	-3.19E-01	1.58E+00	3.48E+00

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	7/31/2013	0.2408	P	-0.0136	0.2157	0.4451
LB4110A - A2	Alpha	11/18/2007	7/31/2013	0.2061	P	-0.0511	0.1739	0.3990
LB4110A - A3	Alpha	11/18/2007	7/31/2013	0.2079	P	-0.0745	0.1631	0.4007
LB4110A - A4	Alpha	11/18/2007	7/31/2013	0.2207	P	-0.0529	0.1818	0.4166
LB4110A - B1	Alpha	11/18/2007	7/31/2013	0.2182	P	0.1944	0.2244	0.2544
LB4110A - B2	Alpha	11/18/2007	7/31/2013	0.2120	P	0.1924	0.2214	0.2503
LB4110A - B3	Alpha	11/18/2007	7/31/2013	0.2293	P	0.1276	0.2323	0.3370
LB4110A - B4	Alpha	11/18/2007	7/31/2013	0.2222	P	0.2089	0.2364	0.2639
LB4110A - C1	Alpha	11/18/2007	7/31/2013	0.2209	P	0.1976	0.2208	0.2439
LB4110A - C2	Alpha	11/18/2007	7/31/2013	0.2241	P	0.1971	0.2252	0.2533
LB4110A - C3	Alpha	11/18/2007	7/31/2013	0.2538	P	0.2233	0.2494	0.2756
LB4110A - C4	Alpha	11/18/2007	7/31/2013	0.2255	P	0.1969	0.2257	0.2544
LB4110A - D1	Alpha	11/18/2007	7/31/2013	0.2230	P	0.2030	0.2329	0.2629
LB4110A - D2	Alpha	11/18/2007	7/31/2013	0.2446	P	0.2277	0.2581	0.2885
LB4110A - D3	Alpha	11/18/2007	7/31/2013	0.2429	P	0.2311	0.2635	0.2959
LB4110A - D4	Alpha	11/18/2007	7/31/2013	0.1824	P	0.1643	0.1993	0.2343
LB4110R - A1	Alpha	11/24/2006	7/31/2013	0.2363	P	0.2005	0.2387	0.2769
LB4110R - A2	Alpha	11/24/2006	7/31/2013	0.2167	P	0.1869	0.2203	0.2537
LB4110R - A3	Alpha	11/24/2006	7/31/2013	0.2149	P	0.1929	0.2245	0.2560
LB4110R - A4	Alpha	11/24/2006	7/31/2013	0.2387	P	0.2125	0.2455	0.2785
LB4110R - B1	Alpha	11/24/2006	7/31/2013	0.2163	P	0.1831	0.2257	0.2683
LB4110R - B2	Alpha	11/24/2006	7/31/2013	0.2061	P	0.1754	0.2170	0.2586
LB4110R - B3	Alpha	11/24/2006	7/31/2013	0.2421	P	0.2014	0.2438	0.2862
LB4110R - B4	Alpha	11/24/2006	7/31/2013	0.2150	P	0.1883	0.2313	0.2744
LB4110R - C1	Alpha	11/24/2006	7/31/2013	0.2072	P	0.1833	0.2150	0.2467
LB4110R - C2	Alpha	11/24/2006	7/31/2013	0.2204	P	0.1931	0.2245	0.2559
LB4110R - C3	Alpha	11/24/2006	7/31/2013	0.2328	P	0.2033	0.2394	0.2755
LB4110R - C4	Alpha	11/24/2006	7/31/2013	0.2084	P	0.1827	0.2223	0.2619
LB4110R - D1	Alpha	11/24/2006	7/31/2013	0.0000	F	0.0080	0.2003	0.3927
LB4110R - D2	Alpha	11/24/2006	7/31/2013	0.0000	F	0.0097	0.2278	0.4459
LB4110R - D3	Alpha	11/24/2006	7/31/2013	0.0000	F	0.0096	0.2238	0.4380
LB4110R - D4	Alpha	11/24/2006	7/31/2013	0.0000	F	0.0063	0.1804	0.3544
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

7/31/13

GPC Detector Report
(ALL Efficiencies)

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7/7/17

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	7/31/2013	0.5560	P	0.2101	0.5625	0.9150
LB4110A - A2	Beta	11/18/2007	7/31/2013	0.4944	P	0.1610	0.4647	0.7683
LB4110A - A3	Beta	11/18/2007	7/31/2013	0.4648	P	0.0889	0.4572	0.8255
LB4110A - A4	Beta	11/18/2007	7/31/2013	0.5225	P	0.1416	0.4890	0.8364
LB4110A - B1	Beta	11/18/2007	7/31/2013	0.5103	P	0.4635	0.5299	0.5962
LB4110A - B2	Beta	11/18/2007	7/31/2013	0.5081	P	0.4632	0.5269	0.5906
LB4110A - B3	Beta	11/18/2007	7/31/2013	0.5265	P	0.3162	0.5314	0.7466
LB4110A - B4	Beta	11/18/2007	7/31/2013	0.5284	P	0.4919	0.5540	0.6160
LB4110A - C1	Beta	11/18/2007	7/31/2013	0.5085	P	0.4510	0.5026	0.5543
LB4110A - C2	Beta	11/18/2007	7/31/2013	0.5056	P	0.4291	0.5010	0.5730
LB4110A - C3	Beta	11/18/2007	7/31/2013	0.6061	P	0.5289	0.5906	0.6523
LB4110A - C4	Beta	11/18/2007	7/31/2013	0.5215	P	0.4577	0.5248	0.5920
LB4110A - D1	Beta	11/18/2007	7/31/2013	0.5212	P	0.4787	0.5532	0.6277
LB4110A - D2	Beta	11/18/2007	7/31/2013	0.5414	P	0.4890	0.5873	0.6857
LB4110A - D3	Beta	11/18/2007	7/31/2013	0.5931	P	0.5373	0.6150	0.6927
LB4110A - D4	Beta	11/18/2007	7/31/2013	0.4372	P	0.3849	0.4721	0.5594
LB4110R - A1	Beta	11/24/2006	7/31/2013	0.5611	P	0.4754	0.5675	0.6595
LB4110R - A2	Beta	11/24/2006	7/31/2013	0.5163	P	0.4166	0.5087	0.6009
LB4110R - A3	Beta	11/24/2006	7/31/2013	0.5268	P	0.4506	0.5386	0.6265
LB4110R - A4	Beta	11/24/2006	7/31/2013	0.5969	P	0.5033	0.5915	0.6798
LB4110R - B1	Beta	11/24/2006	7/31/2013	0.5342	P	0.4461	0.5422	0.6383
LB4110R - B2	Beta	11/24/2006	7/31/2013	0.5046	P	0.4245	0.5196	0.6147
LB4110R - B3	Beta	11/24/2006	7/31/2013	0.5985	P	0.4936	0.5916	0.6896
LB4110R - B4	Beta	11/24/2006	7/31/2013	0.5184	P	0.4540	0.5490	0.6440
LB4110R - C1	Beta	11/24/2006	7/31/2013	0.4613	P	0.4162	0.5017	0.5873
LB4110R - C2	Beta	11/24/2006	7/31/2013	0.5125	P	0.4439	0.5284	0.6129
LB4110R - C3	Beta	11/24/2006	7/31/2013	0.5626	P	0.4753	0.5706	0.6659
LB4110R - C4	Beta	11/24/2006	7/31/2013	0.4959	P	0.4259	0.5251	0.6243
LB4110R - D1	Beta	11/24/2006	7/31/2013	0.0000	F	0.0183	0.4790	0.9398
LB4110R - D2	Beta	11/24/2006	7/31/2013	0.0000	F	0.0212	0.5383	1.0554
LB4110R - D3	Beta	11/24/2006	7/31/2013	0.0000	F	0.0205	0.5228	1.0251
LB4110R - D4	Beta	11/24/2006	7/31/2013	0.0000	F	0.0139	0.4303	0.8467
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

SECTION XII

BARIUM-133 ANALYTICAL TRACER DATA

VAX/VMS Peak Search Report Generated 24-JUL-2013 08:02:55.98

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709801_GE3_BAFIL_193577.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : SPIKE
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 07:47:36
Sample ID : 1307098-01 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.05 0.6%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.78	2111	102	1.41	31.10	26	14	2.35E+00	2.3	8.10E+00
2	4	35.00	500	90	1.73	35.32	26	14	5.55E-01	5.5	
3	0	52.34	64	134	1.67	52.66	49	8	7.09E-02	33.8	
4	1	61.56	253	82	1.51	61.88	57	17	2.81E-01	8.3	2.33E+00
5	1	65.82	141	80	1.52	66.14	57	17	1.57E-01	12.7	
6	0	80.90	828	116	1.68	81.22	77	7	9.20E-01	4.1	
7	0	111.62	222	89	1.46	111.93	108	7	2.47E-01	9.7	
8	0	116.21	72	47	1.94	116.53	115	5	8.04E-02	18.8	
9	0	160.31	32	76	1.61	160.63	158	7	3.55E-02	48.5	
10	0	206.25	55	58	5.67	206.56	202	10	6.06E-02	29.7	
11	1	276.55	62	14	1.78	276.86	272	15	6.84E-02	16.0	2.59E+00
12	1	282.69	13	13	1.62	283.00	272	15	1.42E-02	56.9	
13	2	302.79	145	18	1.50	303.09	298	19	1.61E-01	9.3	2.33E+00
14	2	307.04	36	18	1.99	307.34	298	19	4.00E-02	31.0	
15	2	310.69	9	13	1.64	311.00	298	19	1.04E-02	76.0	
16	1	333.53	93	16	1.83	333.83	330	11	1.03E-01	12.1	1.33E+00
17	1	337.72	36	12	1.83	338.02	330	11	4.05E-02	23.7	
18	0	355.98	544	35	1.48	356.29	352	9	6.04E-01	4.7	
19	0	365.81	10	30	1.70	366.11	362	7	1.09E-02	96.3	
20	1	383.67	116	23	1.87	383.98	381	9	1.29E-01	12.9	1.44E+01
21	1	386.78	198	27	1.73	387.08	381	9	2.20E-01	9.4	
22	0	391.16	54	19	1.96	391.47	390	6	5.96E-02	19.9	
23	1	414.53	45	19	1.89	414.83	410	18	4.98E-02	22.1	2.26E+00
24	1	417.87	36	20	1.90	418.17	410	18	3.95E-02	29.6	
25	0	436.72	121	1	1.50	437.02	433	7	1.34E-01	9.3	
26	0	468.04	23	10	1.44	468.34	464	7	2.56E-02	31.1	
27	0	472.88	11	11	1.85	473.17	470	6	1.27E-02	55.2	
28	0	510.98	18	0	3.94	511.28	508	7	2.00E-02	23.6	
29	0	583.52	11	0	2.58	583.82	581	7	1.22E-02	30.2	

Sample ID : 1307098-01 Acquisition date : 24-JUL-2013 07:47:36

Total number of lines in spectrum	29	
Number of unidentified lines	24	
Number of lines tentatively identified by NID	5	17.24%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.970E+02	3.970E+02	0.706E+02	17.79	
	Total Activity :		3.970E+02	3.970E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
PA-231	3.28E+04Y	1.00	3.036E+03	3.036E+03	0.785E+03	25.87	
TH-234	4.47E+09Y	1.00	7.549E+02	7.549E+02	1.355E+02	17.95	
	Total Activity :		3.791E+03	3.791E+03			
	Grand Total Activity :		4.188E+03	4.188E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.970E+02	3.970E+02	17.79	OK
	302.84	17.80	6.222E+00	3.923E+02	3.924E+02	27.78	OK
	356.01	60.00	5.860E+00	4.645E+02	4.645E+02	16.60	OK

Final Mean for 3 Valid Peaks = 3.970E+02+/- 7.061E+01 (17.79%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
PA-231	9.28	42.00*	1.000E+02	----- Line Out Of Range ----			Absent
	10.11	20.20	1.000E+02	----- Line Out Of Range ----			Absent
	283.67	1.60	6.406E+00	3.756E+02	3.756E+02	115.18	OK
	302.67	2.30	6.224E+00	3.036E+03	3.036E+03	25.87	OK

Final Mean for 2 Valid Peaks = 3.036E+03+/- 7.854E+02 (25.87%)

TH-234	63.29	3.80*	2.648E+01	7.549E+02	7.549E+02	17.95	OK

Final Mean for 1 Valid Peaks = 7.549E+02+/- 1.355E+02 (17.95%)

Flag: "*" = Keyline

Sample ID : 1307098-01 Acquisition date : 24-JUL-2013 07:47:36

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.970E+02	7.061E+01	2.212E+01	3.383E+00	17.946
PA-231	3.036E+03	7.854E+02	3.194E+00	4.542E-02	950.530
TH-234	7.549E+02	1.355E+02	1.361E+02	7.311E+00	5.546

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-9.261E-01		6.040E+00	9.550E+00	1.091E+00	-0.097
CD-109	-4.044E+00		1.129E+02	1.951E+02	1.609E+01	-0.021
PA-234	3.408E+00		1.558E+00	2.886E+00	4.104E-02	1.181
NP-237	9.576E-01		3.490E+01	5.610E+01	4.535E+00	0.017
AM-241	3.389E+01		1.053E+01	1.989E+01	9.779E-01	1.704

VAX/VMS Peak Search Report Generated 24-JUL-2013 08:18:40.01

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709802_GE3_BAFIL_193578.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : BLANK
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 08:03:19
Sample ID : 1307098-02 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.49 0.5%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.74	1953	87	1.43	31.06	26	19	2.17E+00	2.3	1.05E+01
2	2	34.95	560	75	1.55	35.27	26	19	6.22E-01	4.9	
3	0	52.87	90	111	2.30	53.19	49	9	1.00E-01	23.7	
4	1	58.82	19	34	1.50	59.14	58	12	2.12E-02	49.2	1.10E+01
5	1	61.82	231	65	1.51	62.14	58	12	2.57E-01	8.9	
6	1	65.54	101	74	1.52	65.86	58	12	1.12E-01	16.5	
7	1	80.82	733	40	1.54	81.14	76	11	8.14E-01	4.1	1.19E+01
8	1	83.68	28	25	1.41	84.00	76	11	3.13E-02	67.1	
9	0	93.07	33	76	1.22	93.38	89	7	3.65E-02	47.5	
10	1	111.60	196	49	1.59	111.91	107	18	2.18E-01	9.2	2.79E+00
11	1	115.54	53	49	1.60	115.85	107	18	5.89E-02	28.0	
12	0	160.53	26	77	1.16	160.85	157	6	2.92E-02	56.1	
13	0	276.96	49	44	1.54	277.27	274	9	5.46E-02	28.4	
14	0	303.15	121	52	1.16	303.46	300	7	1.35E-01	13.3	
15	0	322.33	20	15	4.98	322.63	318	10	2.18E-02	43.4	
16	1	333.54	72	14	1.83	333.84	328	14	8.04E-02	14.3	2.12E+00
17	1	337.59	20	20	1.83	337.90	328	14	2.27E-02	38.9	
18	2	351.77	16	0	1.84	352.08	351	12	1.75E-02	20.0	1.11E+00
19	2	355.90	508	6	1.55	356.20	351	12	5.64E-01	4.5	
20	5	383.53	84	20	2.09	383.84	381	9	9.30E-02	16.6	6.13E+00
21	5	386.74	185	25	1.49	387.04	381	9	2.06E-01	8.4	
22	0	414.43	31	19	1.96	414.73	412	7	3.45E-02	28.9	
23	0	436.85	88	11	1.22	437.15	434	7	9.79E-02	12.3	
24	4	467.49	24	2	2.57	467.79	462	14	2.68E-02	24.9	7.00E-01
25	4	472.29	8	3	2.58	472.59	462	14	8.42E-03	49.8	
26	0	510.52	19	4	1.69	510.82	506	10	2.08E-02	31.9	

Sample ID : 1307098-02 Acquisition date : 24-JUL-2013 08:03:19

Total number of lines in spectrum	26	
Number of unidentified lines	21	
Number of lines tentatively identified by NID	5	19.23%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.512E+02	3.513E+02	0.627E+02	17.85	
	Total Activity :		3.512E+02	3.513E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	6.899E+02	6.899E+02	1.317E+02	19.09	
AM-241	432.20Y	1.00	5.505E+00	5.505E+00	5.431E+00	98.65	
	Total Activity :		6.954E+02	6.954E+02			
	Grand Total Activity :		1.047E+03	1.047E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.512E+02	3.513E+02	17.85	OK
	302.84	17.80	6.222E+00	3.291E+02	3.291E+02	33.57	OK
	356.01	60.00	5.860E+00	4.336E+02	4.336E+02	16.34	OK

Final Mean for 3 Valid Peaks = 3.513E+02+/- 6.269E+01 (17.85%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	6.899E+02	6.899E+02	19.09	OK

Final Mean for 1 Valid Peaks = 6.899E+02+/- 1.317E+02 (19.09%)

AM-241	59.54	35.90*	2.893E+01	5.505E+00	5.505E+00	98.65	OK

Final Mean for 1 Valid Peaks = 5.505E+00+/- 5.431E+00 (98.65%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.513E+02	6.269E+01	1.762E+01	2.695E+00	19.934
TH-234	6.899E+02	1.317E+02	1.135E+02	6.094E+00	6.080
AM-241	5.505E+00	5.431E+00	1.097E+01	5.393E-01	0.502

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	3.561E-01		6.460E+00	1.044E+01	1.193E+00	0.034
CD-109	-8.040E+00		1.132E+02	1.598E+02	1.318E+01	-0.050
PA-231	3.394E+00		1.814E+00	3.614E+00	5.140E-02	0.939
PA-234	2.800E+00		1.536E+00	2.795E+00	3.976E-02	1.002
NP-237	-7.195E+00		3.224E+01	4.440E+01	3.589E+00	-0.162

VAX/VMS Peak Search Report Generated 24-JUL-2013 08:37:03.37

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709803_GE3_BAFIL_193580.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-4 TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 08:21:41
Sample ID : 1307098-03 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.05 0.6%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	27.81	51	41	1.43	28.13	27	14	5.63E-02	18.5	1.86E+01
2	3	30.78	1896	76	1.42	31.10	27	14	2.11E+00	2.4	
3	3	34.85	510	85	1.75	35.17	27	14	5.67E-01	5.2	
4	0	45.77	18	70	1.21	46.09	44	6	1.98E-02	78.2	
5	0	52.91	55	103	4.37	53.23	50	8	6.08E-02	34.8	
6	0	61.50	235	144	1.29	61.82	58	7	2.61E-01	10.7	
7	0	65.90	88	109	1.42	66.22	65	5	9.77E-02	21.1	
8	0	80.92	801	117	1.57	81.24	76	10	8.90E-01	4.3	
9	0	94.30	51	98	1.97	94.61	90	10	5.70E-02	38.7	
10	1	108.78	14	49	1.59	109.10	107	17	1.54E-02	83.0	2.91E+00
11	1	111.83	188	46	1.59	112.14	107	17	2.09E-01	9.4	
12	1	115.54	47	43	1.60	115.85	107	17	5.20E-02	31.5	
13	0	161.61	23	70	1.13	161.93	160	5	2.55E-02	59.1	
14	0	204.58	17	62	2.45	204.89	201	7	1.93E-02	78.4	
15	0	276.21	49	27	1.88	276.51	273	7	5.49E-02	22.3	
16	1	302.85	123	21	1.62	303.16	299	15	1.37E-01	10.4	7.09E-01
17	1	307.53	35	12	1.81	307.84	299	15	3.84E-02	25.7	
18	1	310.86	11	9	1.81	311.16	299	15	1.23E-02	74.9	
19	3	330.86	11	10	1.83	331.17	328	14	1.17E-02	56.8	2.52E+00
20	3	333.73	81	12	2.21	334.04	328	14	9.00E-02	14.2	
21	3	337.91	20	11	2.22	338.22	328	14	2.21E-02	41.9	
22	0	355.91	471	39	1.41	356.21	352	9	5.24E-01	5.2	
23	2	383.55	134	20	1.85	383.86	381	16	1.49E-01	10.1	9.48E+00
24	2	386.76	208	10	1.82	387.06	381	16	2.31E-01	8.5	
25	2	390.75	54	2	1.87	391.06	381	16	5.96E-02	20.0	
26	2	414.72	56	4	2.08	415.02	409	20	6.25E-02	13.7	5.46E+00
27	2	417.95	25	2	2.09	418.25	409	20	2.73E-02	34.7	
28	2	421.06	12	1	2.09	421.36	409	20	1.36E-02	54.5	
29	0	436.92	86	9	1.49	437.22	433	9	9.61E-02	12.4	
30	0	458.62	12	0	1.10	458.92	456	6	1.33E-02	28.9	
31	1	467.54	20	8	1.93	467.84	464	11	2.22E-02	30.2	1.14E+00
32	1	471.82	7	6	1.94	472.12	464	11	8.12E-03	67.4	
33	0	510.45	18	4	2.18	510.74	507	7	1.94E-02	29.8	
34	0	608.08	9	2	3.40	608.37	605	7	1.02E-02	41.0	

Sample ID : 1307098-03 Acquisition date : 24-JUL-2013 08:21:41

Total number of lines in spectrum	34	
Number of unidentified lines	30	
Number of lines tentatively identified by NID	4	11.76%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.839E+02	3.839E+02	0.693E+02	18.04	
	Total Activity :		3.839E+02	3.839E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	7.006E+02	7.006E+02	1.577E+02	22.51	
AM-241	432.20Y	1.00	6.788E+01	6.788E+01	1.521E+01	22.41	
	Total Activity :		7.685E+02	7.685E+02			
	Grand Total Activity :		1.152E+03	1.152E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.839E+02	3.839E+02	18.04	OK
	302.84	17.80	6.222E+00	3.338E+02	3.338E+02	29.29	OK
	356.01	60.00	5.860E+00	4.025E+02	4.025E+02	17.13	OK

Final Mean for 3 Valid Peaks = 3.839E+02+/- 6.925E+01 (18.04%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.006E+02	7.006E+02	22.51	OK

Final Mean for 1 Valid Peaks = 7.006E+02+/- 1.577E+02 (22.51%)

AM-241	59.54	35.90*	2.893E+01	6.788E+01	6.788E+01	22.41	OK

Final Mean for 1 Valid Peaks = 6.788E+01+/- 1.521E+01 (22.41%)

Flag: "*" = Keyline

Sample ID : 1307098-03 Acquisition date : 24-JUL-2013 08:21:41

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.839E+02	6.925E+01	1.646E+01	2.517E+00	23.324
TH-234	7.006E+02	1.577E+02	1.571E+02	8.439E+00	4.459
AM-241	6.788E+01	1.521E+01	1.296E+01	6.371E-01	5.239

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Iided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.354E+00		5.952E+00	9.904E+00	1.131E+00	0.137
CD-109	-9.226E+01		1.217E+02	1.512E+02	1.246E+01	-0.610
PA-231	2.664E+00		1.635E+00	3.266E+00	4.646E-02	0.815
PA-234	2.794E+00		1.425E+00	2.758E+00	3.922E-02	1.013
NP-237	1.450E+01		3.023E+01	4.695E+01	3.795E+00	0.309

VAX/VMS Peak Search Report Generated 24-JUL-2013 08:53:29.34

C 7/24/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709804_GE3_BAFIL_193581.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-111-SD TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 08:38:08
Sample ID : 1307098-04 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.57 0.5%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.77	1939	90	1.39	31.09	27	14	2.15E+00	2.4	5.91E+00
2	3	34.91	504	78	1.59	35.23	27	14	5.60E-01	5.3	
3	0	46.16	39	87	1.77	46.48	43	7	4.32E-02	43.0	
4	0	52.23	64	74	1.52	52.55	50	6	7.14E-02	24.5	
5	1	58.82	24	38	1.50	59.14	58	11	2.67E-02	39.7	8.56E+00
6	1	61.80	241	63	1.51	62.12	58	11	2.68E-01	8.4	
7	1	65.54	100	63	1.52	65.86	58	11	1.12E-01	16.3	
8	0	80.93	805	94	1.76	81.25	77	7	8.95E-01	4.0	
9	1	108.83	21	24	1.59	109.14	108	18	2.37E-02	37.5	4.59E+00
10	1	111.82	206	40	1.59	112.14	108	18	2.29E-01	8.6	
11	1	115.83	37	40	1.60	116.15	108	18	4.16E-02	33.5	
12	0	260.25	10	27	2.51	260.56	257	7	1.06E-02	100.5	
13	0	277.04	44	38	1.93	277.35	272	9	4.93E-02	29.2	
14	0	302.37	98	57	1.25	302.68	299	8	1.08E-01	16.9	
15	0	333.62	75	38	1.48	333.92	329	8	8.35E-02	18.3	
16	0	355.99	492	22	1.70	356.30	352	9	5.47E-01	4.8	
17	0	376.17	14	19	6.53	376.47	371	9	1.58E-02	62.3	
18	1	383.53	151	7	1.87	383.83	380	19	1.68E-01	9.3	4.37E+00
19	1	386.77	215	8	1.77	387.07	380	19	2.39E-01	8.4	
20	1	390.80	45	11	1.88	391.10	380	19	4.99E-02	23.3	
21	3	414.81	51	8	2.29	415.11	411	15	5.67E-02	19.8	3.16E+00
22	3	418.15	36	9	2.22	418.45	411	15	4.01E-02	29.1	
23	3	422.27	13	10	2.30	422.57	411	15	1.49E-02	56.6	
24	0	436.71	111	5	1.75	437.01	432	9	1.23E-01	10.1	
25	0	469.60	7	14	1.81	469.90	464	8	8.10E-03	96.1	
26	0	510.90	25	2	2.59	511.19	507	8	2.79E-02	22.2	
27	0	524.60	5	2	0.96	524.89	522	6	5.87E-03	57.5	
28	0	608.86	9	1	1.06	609.15	606	7	9.56E-03	42.0	

Sample ID : 1307098-04 Acquisition date : 24-JUL-2013 08:38:08

Total number of lines in spectrum	28	
Number of unidentified lines	23	
Number of lines tentatively identified by NID	5	17.86%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.858E+02	3.859E+02	0.685E+02	17.75	
	Total Activity :		3.858E+02	3.859E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	7.190E+02	7.190E+02	1.301E+02	18.10	
AM-241	432.20Y	1.00	6.951E+00	6.951E+00	5.538E+00	79.68	
	Total Activity :		7.259E+02	7.259E+02			
	Grand Total Activity :		1.112E+03	1.112E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.858E+02	3.859E+02	17.75	OK
	302.84	17.80	6.222E+00	2.647E+02	2.647E+02	39.52	OK
	356.01	60.00	5.860E+00	4.205E+02	4.205E+02	16.71	OK

Final Mean for 3 Valid Peaks = 3.859E+02+/- 6.851E+01 (17.75%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.190E+02	7.190E+02	18.10	OK

Final Mean for 1 Valid Peaks = 7.190E+02+/- 1.301E+02 (18.10%)

AM-241	59.54	35.90*	2.893E+01	6.951E+00	6.951E+00	79.68	OK

Final Mean for 1 Valid Peaks = 6.951E+00+/- 5.538E+00 (79.68%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.859E+02	6.851E+01	1.871E+01	2.861E+00	20.629
TH-234	7.190E+02	1.301E+02	1.251E+02	6.717E+00	5.749
AM-241	6.951E+00	5.538E+00	1.209E+01	5.944E-01	0.575

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.215E-01		6.552E+00	1.129E+01	1.289E+00	-0.020
CD-109	-8.017E+01		9.710E+01	1.555E+02	1.282E+01	-0.515
PA-231	3.204E+00		1.672E+00	3.384E+00	4.812E-02	0.947
PA-234	4.204E+00		1.421E+00	2.871E+00	4.084E-02	1.464
NP-237	-1.975E+00		2.956E+01	4.755E+01	3.844E+00	-0.042

VAX/VMS Peak Search Report Generated 24-JUL-2013 09:10:26.47

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709805_GE3_BAFIL_193583.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-111-SD DIS
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 08:55:00
Sample ID : 1307098-05 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.08 0.6%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.80	2067	86	1.36	31.12	26	16	2.30E+00	2.3	3.89E+00
2	2	34.96	439	71	1.59	35.28	26	16	4.88E-01	6.0	
3	0	52.37	67	124	1.60	52.69	48	8	7.44E-02	31.3	
4	1	61.75	264	76	1.51	62.07	57	16	2.93E-01	7.9	3.01E+00
5	1	65.66	115	58	1.52	65.98	57	16	1.28E-01	14.8	
6	1	69.54	21	50	1.52	69.86	57	16	2.28E-02	64.1	
7	1	80.82	805	60	1.54	81.14	76	11	8.95E-01	3.9	9.59E+00
8	1	83.68	18	43	1.41	84.00	76	11	2.06E-02	104.8	
9	0	92.16	22	61	1.99	92.48	91	6	2.40E-02	60.8	
10	1	107.83	18	30	1.59	108.14	107	14	1.99E-02	46.6	3.52E+00
11	1	111.72	186	55	1.59	112.04	107	14	2.07E-01	9.5	
12	1	115.66	31	58	1.60	115.98	107	14	3.44E-02	42.2	
13	0	161.00	37	59	1.39	161.31	158	7	4.12E-02	38.2	
14	0	275.91	66	35	1.82	276.22	271	9	7.29E-02	20.6	
15	0	303.07	84	44	1.29	303.38	300	7	9.29E-02	17.0	
16	0	307.62	21	28	1.61	307.92	306	5	2.31E-02	43.9	
17	3	333.66	103	9	1.68	333.97	328	21	1.14E-01	11.0	1.29E+00
18	3	338.25	25	16	2.22	338.55	328	21	2.81E-02	37.3	
19	0	355.99	497	28	1.51	356.29	352	9	5.52E-01	4.9	
20	0	364.29	21	9	1.85	364.60	362	7	2.31E-02	32.4	
21	0	376.57	19	16	2.20	376.87	374	7	2.14E-02	40.1	
22	3	383.76	105	33	1.53	384.06	382	8	1.17E-01	13.2	2.08E+01
23	3	386.65	187	51	1.46	386.96	382	8	2.08E-01	8.8	
24	0	391.24	45	12	1.42	391.54	390	6	4.95E-02	20.9	
25	1	414.53	40	12	1.89	414.83	411	15	4.39E-02	22.4	1.83E+00
26	1	417.87	26	15	1.90	418.17	411	15	2.90E-02	36.3	
27	1	421.84	9	17	1.90	422.14	411	15	1.03E-02	77.5	
28	0	436.89	114	11	1.50	437.19	433	9	1.26E-01	10.8	
29	0	467.93	25	18	1.62	468.23	463	10	2.81E-02	36.8	
30	0	511.52	14	6	3.63	511.82	507	9	1.57E-02	41.9	

Sample ID : 1307098-05 Acquisition date : 24-JUL-2013 08:55:00

Total number of lines in spectrum	30	
Number of unidentified lines	26	
Number of lines tentatively identified by NID	4	13.33%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.860E+02	3.860E+02	0.680E+02	17.62	
	Total Activity :		3.860E+02	3.860E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	7.865E+02	7.865E+02	1.352E+02	17.19	
	Total Activity :		7.865E+02	7.865E+02			
	Grand Total Activity :		1.172E+03	1.173E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : 1307098-05 Acquisition date : 24-JUL-2013 08:55:00

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.860E+02	3.860E+02	17.62	OK
	302.84	17.80	6.222E+00	2.268E+02	2.268E+02	39.70	OK
	356.01	60.00	5.860E+00	4.246E+02	4.246E+02	16.79	OK

Final Mean for 3 Valid Peaks = 3.860E+02+/- 6.803E+01 (17.62%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.865E+02	7.865E+02	17.19	OK

Final Mean for 1 Valid Peaks = 7.865E+02+/- 1.352E+02 (17.19%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.860E+02	6.803E+01	1.697E+01	2.595E+00	22.751
TH-234	7.865E+02	1.352E+02	1.135E+02	6.094E+00	6.932

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.017E+00		6.831E+00	1.033E+01	1.180E+00	-0.292
CD-109	3.831E+01		1.092E+02	1.654E+02	1.364E+01	0.232
PA-231	2.486E+00		1.550E+00	3.118E+00	4.435E-02	0.797
PA-234	2.590E+00		1.531E+00	2.767E+00	3.935E-02	0.936
NP-237	9.054E+00		3.285E+01	4.897E+01	3.959E+00	0.185
AM-241	3.810E+01		9.764E+00	1.928E+01	9.477E-01	1.977

VAX/VMS Peak Search Report Generated 24-JUL-2013 09:27:07.69

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709806_GE3_BAFIL_193584.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : S-5 TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 09:11:45
Sample ID : 1307098-06 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.69 0.5%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	27.81	18	32	1.43	28.13	27	17	2.00E-02	39.8	8.08E+00
2	4	30.83	1155	52	1.41	31.15	27	17	1.28E+00	3.0	
3	4	34.95	304	56	1.93	35.27	27	17	3.38E-01	8.8	
4	0	61.28	107	91	1.23	61.60	58	6	1.19E-01	17.1	
5	0	66.25	43	59	1.27	66.57	65	5	4.78E-02	31.5	
6	3	78.05	15	30	1.86	78.37	77	12	1.68E-02	67.3	4.03E+00
7	3	80.96	475	38	1.56	81.28	77	12	5.27E-01	4.9	
8	2	111.78	118	43	1.75	112.10	108	13	1.31E-01	12.2	6.94E-01
9	2	115.74	24	34	1.76	116.05	108	13	2.71E-02	49.7	
10	0	186.36	17	69	3.23	186.67	179	11	1.93E-02	95.7	
11	0	276.58	24	13	1.77	276.89	275	6	2.66E-02	31.6	
12	3	302.72	95	17	1.66	303.03	299	20	1.05E-01	12.1	1.26E+00
13	3	307.10	14	20	2.19	307.41	299	20	1.52E-02	71.4	
14	0	333.76	20	20	1.13	334.06	330	6	2.27E-02	40.7	
15	0	355.95	288	25	1.50	356.25	352	9	3.20E-01	6.7	
16	1	383.64	85	4	1.78	383.94	382	13	9.41E-02	10.1	6.61E+00
17	1	386.87	115	4	1.87	387.17	382	13	1.28E-01	11.7	
18	1	390.87	34	1	1.88	391.17	382	13	3.75E-02	26.6	
19	0	416.62	61	4	4.19	416.92	411	15	6.73E-02	14.7	
20	0	436.91	44	9	1.49	437.21	434	7	4.85E-02	19.3	
21	0	468.21	11	10	1.08	468.51	465	8	1.17E-02	60.6	
22	0	510.78	15	2	1.14	511.08	508	7	1.67E-02	29.8	

Sample ID : 1307098-06 Acquisition date : 24-JUL-2013 09:11:45

Total number of lines in spectrum	22
Number of unidentified lines	18
Number of lines tentatively identified by NID	4 18.18%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	2.275E+02	2.275E+02	0.424E+02	18.62	
	Total Activity :		2.275E+02	2.275E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
AM-241	432.20Y	1.00	3.108E+01	3.108E+01	1.084E+01	34.88	
	Total Activity :		3.108E+01	3.108E+01			
	Grand Total Activity :		2.586E+02	2.586E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	2.275E+02	2.275E+02	18.62	OK
	302.84	17.80	6.222E+00	2.568E+02	2.569E+02	31.77	OK
	356.01	60.00	5.860E+00	2.463E+02	2.463E+02	19.07	OK

Final Mean for 3 Valid Peaks = 2.275E+02+/- 4.236E+01 (18.62%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
AM-241	59.54	35.90*	2.893E+01	3.108E+01	3.108E+01	34.88	OK

Final Mean for 1 Valid Peaks = 3.108E+01+/- 1.084E+01 (34.88%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	2.275E+02	4.236E+01	1.575E+01	2.409E+00	14.441
AM-241	3.108E+01	1.084E+01	9.674E+00	4.757E-01	3.213

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.365E+00		4.971E+00	7.803E+00	8.914E-01	-0.175
CD-109	-5.401E+01		9.009E+01	1.348E+02	1.111E+01	-0.401
PA-231	2.067E+00		1.509E+00	3.005E+00	4.274E-02	0.688
PA-234	1.276E+00		1.106E+00	2.122E+00	3.019E-02	0.601
TH-234	2.539E+02		1.047E+02	1.809E+02	9.716E+00	1.403
NP-237	-9.462E+00		2.563E+01	3.984E+01	3.221E+00	-0.237

VAX/VMS Peak Search Report Generated 24-JUL-2013 09:47:22.48

C Finn

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709807_GE3_BAFIL_193585.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : S-5 DIS
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 09:32:05
Sample ID : 1307098-07 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.63 0.5%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	30.74	1458	62	1.44	31.06	26	16	1.62E+00	2.7	6.62E+00
2	1	34.81	316	51	1.45	35.13	26	16	3.51E-01	6.8	
3	0	52.77	81	72	3.52	53.09	49	9	9.00E-02	21.9	
4	1	61.78	150	40	1.51	62.10	58	11	1.66E-01	11.2	5.87E+00
5	1	65.54	76	40	1.52	65.86	58	11	8.47E-02	17.8	
6	0	80.93	584	125	1.60	81.25	76	10	6.49E-01	5.5	
7	0	92.67	43	64	1.85	92.99	89	9	4.75E-02	36.9	
8	3	111.81	194	33	1.65	112.12	107	17	2.15E-01	8.4	1.34E+00
9	3	116.16	25	33	1.93	116.48	107	17	2.73E-02	45.9	
10	0	167.32	30	41	2.25	167.63	164	7	3.37E-02	40.1	
11	0	276.69	31	33	1.54	277.00	275	7	3.45E-02	34.7	
12	1	302.79	117	8	1.80	303.09	299	15	1.30E-01	9.6	2.30E+00
13	1	307.82	17	10	1.81	308.13	299	15	1.93E-02	38.2	
14	0	334.20	25	40	1.30	334.51	332	6	2.76E-02	44.7	
15	0	338.51	17	19	1.36	338.82	337	6	1.86E-02	47.5	
16	0	355.91	387	20	1.57	356.22	351	10	4.30E-01	5.5	
17	0	365.06	11	6	2.74	365.36	362	6	1.22E-02	46.4	
18	2	383.66	79	17	2.06	383.97	381	9	8.82E-02	15.0	2.57E+00
19	2	386.80	161	15	1.38	387.11	381	9	1.79E-01	8.8	
20	0	391.05	34	9	1.25	391.35	390	5	3.74E-02	23.0	
21	1	414.53	31	12	1.89	414.83	411	13	3.41E-02	24.1	6.90E+00
22	1	417.87	25	12	1.90	418.17	411	13	2.81E-02	32.6	
23	0	437.17	51	9	1.48	437.47	434	6	5.64E-02	16.9	
24	0	448.98	9	2	1.24	449.28	446	7	1.01E-02	41.3	
25	6	462.89	6	0	3.11	463.19	462	11	6.38E-03	37.2	1.37E+00
26	6	467.06	17	2	3.11	467.35	462	11	1.85E-02	34.6	
27	0	512.00	27	0	6.85	512.30	507	11	3.00E-02	19.2	
28	0	521.26	9	0	2.75	521.56	519	7	1.00E-02	33.3	

Sample ID : 1307098-07 Acquisition date : 24-JUL-2013 09:32:05

Total number of lines in spectrum	28	
Number of unidentified lines	24	
Number of lines tentatively identified by NID	4	14.29%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	2.800E+02	2.800E+02	0.538E+02	19.23	
	Total Activity :		2.800E+02	2.800E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	4.464E+02	4.464E+02	1.048E+02	23.47	
	Total Activity :		4.464E+02	4.464E+02			
	Grand Total Activity :		7.264E+02	7.264E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	2.800E+02	2.800E+02	19.23	OK
	302.84	17.80	6.222E+00	3.180E+02	3.180E+02	28.12	OK
	356.01	60.00	5.860E+00	3.303E+02	3.303E+02	17.56	OK

Final Mean for 3 Valid Peaks = 2.800E+02+/- 5.383E+01 (19.23%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	4.464E+02	4.464E+02	23.47	OK

Final Mean for 1 Valid Peaks = 4.464E+02+/- 1.048E+02 (23.47%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	2.800E+02	5.383E+01	1.680E+01	2.569E+00	16.665
TH-234	4.464E+02	1.048E+02	8.774E+01	4.713E+00	5.088

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.020E+00		5.134E+00	8.148E+00	9.309E-01	-0.125
CD-109	-4.030E+01		1.022E+02	1.363E+02	1.124E+01	-0.296
PA-231	2.013E+00		1.552E+00	3.063E+00	4.356E-02	0.657
PA-234	2.602E+00		1.321E+00	2.485E+00	3.534E-02	1.047
NP-237	1.125E+01		2.824E+01	4.376E+01	3.537E+00	0.257
AM-241	2.434E+01		7.517E+00	1.532E+01	7.535E-01	1.588

VAX/VMS Peak Search Report Generated 24-JUL-2013 10:03:25.11

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709808_GE3_BAFIL_193588.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : FB @ PZ-110-SS TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 09:48:00
Sample ID : 1307098-08 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.72 0.5%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.74	1859	73	1.46	31.06	26	16	2.07E+00	2.4	8.38E+00
2	3	35.09	422	86	1.66	35.41	26	16	4.69E-01	5.9	
3	0	52.22	58	101	2.61	52.54	49	8	6.46E-02	32.6	
4	1	61.75	248	64	1.51	62.06	57	16	2.75E-01	8.0	3.74E+00
5	1	65.61	92	62	1.52	65.93	57	16	1.02E-01	17.5	
6	1	80.82	707	53	1.54	81.14	76	12	7.86E-01	4.2	1.34E+01
7	1	83.68	18	35	1.41	84.00	76	12	2.04E-02	101.6	
8	0	90.90	20	86	1.28	91.22	89	8	2.27E-02	81.8	
9	0	111.20	116	171	1.26	111.52	108	8	1.29E-01	21.6	
10	0	116.51	66	61	1.88	116.83	115	6	7.36E-02	23.2	
11	0	160.82	40	55	1.94	161.14	157	8	4.39E-02	36.8	
12	0	227.40	12	31	5.35	227.71	224	6	1.37E-02	78.9	
13	0	276.83	50	29	1.46	277.13	273	9	5.55E-02	24.1	
14	1	302.73	116	20	1.51	303.04	299	15	1.29E-01	10.7	2.70E+00
15	1	307.55	26	17	1.81	307.86	299	15	2.84E-02	31.1	
16	0	332.78	44	59	1.47	333.09	328	10	4.85E-02	37.3	
17	0	356.02	452	22	1.75	356.33	354	7	5.02E-01	5.0	
18	0	377.63	15	11	1.93	377.93	374	7	1.61E-02	45.4	
19	1	383.53	96	15	1.87	383.83	381	9	1.07E-01	13.7	2.06E+00
20	1	386.75	178	26	1.53	387.05	381	9	1.98E-01	8.7	
21	0	391.25	45	11	2.01	391.55	390	6	4.96E-02	21.0	
22	0	414.83	26	36	1.55	415.13	411	8	2.84E-02	45.3	
23	0	436.82	87	2	1.59	437.12	433	8	9.67E-02	11.1	
24	0	467.48	27	2	1.94	467.78	464	7	3.04E-02	20.7	
25	0	512.77	19	4	3.30	513.07	509	9	2.14E-02	29.8	
26	0	608.62	12	0	2.58	608.92	605	8	1.33E-02	28.9	

Sample ID : 1307098-08 Acquisition date : 24-JUL-2013 09:48:00

Total number of lines in spectrum	26	
Number of unidentified lines	22	
Number of lines tentatively identified by NID	4	15.38%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.390E+02	3.391E+02	0.606E+02	17.88	
	Total Activity :		3.390E+02	3.391E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	7.393E+02	7.393E+02	1.288E+02	17.42	
	Total Activity :		7.393E+02	7.393E+02			
	Grand Total Activity :		1.078E+03	1.078E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.390E+02	3.391E+02	17.88	OK
	302.84	17.80	6.222E+00	3.142E+02	3.143E+02	29.71	OK
	356.01	60.00	5.860E+00	3.859E+02	3.860E+02	16.97	OK

Final Mean for 3 Valid Peaks = 3.391E+02+/- 6.061E+01 (17.88%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.393E+02	7.393E+02	17.42	OK

Final Mean for 1 Valid Peaks = 7.393E+02+/- 1.288E+02 (17.42%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.391E+02	6.061E+01	1.713E+01	2.620E+00	19.790
TH-234	7.393E+02	1.288E+02	1.096E+02	5.888E+00	6.744

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-9.981E-01		6.034E+00	9.526E+00	1.088E+00	-0.105
CD-109	2.328E+01		1.051E+02	1.568E+02	1.293E+01	0.148
PA-231	2.675E+00		1.496E+00	3.063E+00	4.356E-02	0.874
PA-234	3.473E+00		1.402E+00	2.686E+00	3.820E-02	1.293
NP-237	1.079E+01		3.069E+01	4.667E+01	3.772E+00	0.231
AM-241	3.148E+01		9.088E+00	1.791E+01	8.804E-01	1.758

VAX/VMS Peak Search Report Generated 24-JUL-2013 09:50:36.22

C
Fzu

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709809_GE2_BAFIL_193587.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-110-SS TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 09:35:19
Sample ID : 1307098-09 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.89	1922	98	1.40	31.00	26	15	2.14E+00	2.4	8.44E+00
2	2	35.09	447	104	1.53	35.21	26	15	4.97E-01	6.1	
3	0	52.69	47	103	1.85	52.81	48	9	5.24E-02	41.5	
4	2	61.87	189	56	1.60	61.98	57	12	2.10E-01	9.7	2.96E+00
5	2	65.73	116	58	1.61	65.84	57	12	1.29E-01	14.4	
6	1	80.96	712	39	1.50	81.07	76	11	7.91E-01	4.0	6.22E+00
7	1	83.96	31	33	1.50	84.07	76	11	3.50E-02	54.0	
8	1	111.76	153	55	1.55	111.87	108	11	1.70E-01	11.2	3.28E+00
9	1	116.03	33	49	1.56	116.14	108	11	3.66E-02	37.5	
10	2	185.57	34	42	1.82	185.68	181	19	3.81E-02	32.9	1.58E+00
11	2	192.21	14	36	1.83	192.32	181	19	1.55E-02	73.1	
12	0	277.64	52	37	1.86	277.75	272	9	5.74E-02	25.6	
13	2	302.87	164	17	1.39	302.98	299	13	1.82E-01	8.4	4.56E+00
14	2	307.06	15	36	1.97	307.16	299	13	1.68E-02	64.4	
15	2	333.64	66	17	1.99	333.75	329	13	7.39E-02	15.7	9.74E-01
16	2	338.14	20	13	2.00	338.25	329	13	2.26E-02	41.9	
17	0	355.97	516	27	1.42	356.08	351	10	5.73E-01	4.8	
18	0	364.22	12	20	1.51	364.33	362	7	1.38E-02	65.3	
19	6	383.65	120	22	1.96	383.75	380	18	1.33E-01	11.9	6.75E+00
20	6	386.89	205	15	1.82	387.00	380	18	2.28E-01	8.4	
21	6	391.29	43	15	2.30	391.40	380	18	4.73E-02	26.5	
22	1	414.72	32	6	1.88	414.83	411	16	3.59E-02	22.5	1.68E+00
23	1	418.07	23	6	1.89	418.17	411	16	2.60E-02	35.8	
24	1	421.72	14	6	1.89	421.83	411	16	1.60E-02	43.3	
25	0	436.91	95	8	1.37	437.01	434	7	1.05E-01	11.5	
26	6	468.11	22	0	3.10	468.22	464	12	2.48E-02	25.7	9.89E-01
27	6	472.90	12	0	3.11	473.00	464	12	1.37E-02	38.0	
28	0	510.90	23	12	3.79	511.00	505	12	2.56E-02	36.6	

Sample ID : 1307098-09 Acquisition date : 24-JUL-2013 09:35:19

Total number of lines in spectrum	28	
Number of unidentified lines	24	
Number of lines tentatively identified by NID	4	14.29%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.601E+02	3.602E+02	0.691E+02	19.19	
	Total Activity :		3.601E+02	3.602E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	6.478E+02	6.478E+02	1.391E+02	21.48	
	Total Activity :		6.478E+02	6.478E+02			
	Grand Total Activity :		1.008E+03	1.008E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.601E+02	3.602E+02	19.19	OK
	302.84	17.80	7.560E+00	3.653E+02	3.653E+02	34.25	OK
	356.01	60.00	7.170E+00	3.599E+02	3.599E+02	17.93	OK

Final Mean for 3 Valid Peaks = 3.602E+02+/- 6.913E+01 (19.19%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	6.478E+02	6.478E+02	21.48	OK

Final Mean for 1 Valid Peaks = 6.478E+02+/- 1.391E+02 (21.48%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.602E+02	6.913E+01	1.731E+01	2.947E+00	20.808
TH-234	6.478E+02	1.391E+02	1.379E+02	1.139E+01	4.698

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-9.488E-02		6.014E+00	9.715E+00	1.492E+00	-0.010
CD-109	-4.996E+01		1.107E+02	1.706E+02	1.959E+01	-0.293
PA-231	2.895E+01		4.573E+00	8.930E+00	1.701E-01	3.242
PA-234	2.889E+00		1.653E+00	3.020E+00	6.229E-02	0.956
NP-237	-2.594E+01		3.199E+01	4.689E+01	5.294E+00	-0.553
AM-241	2.045E+01		1.002E+01	1.858E+01	1.438E+00	1.101

VAX/VMS Peak Search Report Generated 24-JUL-2013 10:06:19.44

C
From

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709810_GE2_BAFIL_193589.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-110-SS DIS
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 09:51:05
Sample ID : 1307098-10 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.89	1989	99	1.39	31.00	26	15	2.21E+00	2.3	6.23E+00
2	2	35.15	440	96	1.53	35.26	26	15	4.88E-01	6.1	
3	0	52.76	48	112	1.59	52.87	50	8	5.34E-02	40.6	
4	0	61.73	196	120	1.71	61.85	59	6	2.18E-01	11.3	
5	0	65.84	66	101	1.31	65.95	65	5	7.32E-02	26.2	
6	0	80.94	774	82	1.38	81.05	77	7	8.60E-01	4.1	
7	3	111.77	213	41	1.88	111.89	107	20	2.37E-01	8.4	2.56E+00
8	3	116.20	48	37	1.88	116.32	107	20	5.33E-02	29.5	
9	0	160.82	20	82	1.42	160.93	156	7	2.20E-02	79.1	
10	0	184.91	31	84	3.11	185.02	182	8	3.47E-02	53.5	
11	0	276.64	43	38	1.57	276.75	273	8	4.76E-02	29.6	
12	2	302.90	154	16	1.56	303.01	298	18	1.71E-01	8.9	1.09E+00
13	2	306.74	21	22	1.97	306.85	298	18	2.30E-02	48.8	
14	0	324.82	8	15	2.10	324.93	322	6	8.89E-03	86.4	
15	0	333.50	61	33	1.40	333.61	329	8	6.77E-02	20.9	
16	1	351.88	10	6	1.83	351.99	350	12	1.17E-02	39.2	1.66E+00
17	1	355.93	506	9	1.58	356.03	350	12	5.63E-01	4.5	
18	0	366.54	19	16	1.81	366.65	362	9	2.12E-02	43.9	
19	1	383.72	95	20	1.86	383.83	381	9	1.05E-01	14.2	7.22E+00
20	1	386.84	163	26	1.53	386.95	381	9	1.81E-01	9.2	
21	0	391.21	43	20	1.59	391.32	390	6	4.73E-02	23.6	
22	1	414.72	42	9	1.88	414.83	411	10	4.64E-02	19.4	2.17E+00
23	1	417.84	23	13	1.89	417.95	411	10	2.52E-02	38.4	
24	0	437.04	89	16	1.36	437.14	433	8	9.90E-02	13.1	
25	0	468.65	17	12	1.25	468.75	465	8	1.85E-02	43.6	
26	0	510.61	28	6	2.58	510.71	506	11	3.06E-02	25.2	
27	0	580.40	8	0	1.33	580.50	578	6	8.89E-03	35.4	

Sample ID : 1307098-10 Acquisition date : 24-JUL-2013 09:51:05

Total number of lines in spectrum	27	
Number of unidentified lines	23	
Number of lines tentatively identified by NID	4	14.81%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.916E+02	3.916E+02	0.756E+02	19.30	
	Total Activity :		3.916E+02	3.916E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	6.726E+02	6.726E+02	1.644E+02	24.44	
	Total Activity :		6.726E+02	6.726E+02			
	Grand Total Activity :		1.064E+03	1.064E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.916E+02	3.916E+02	19.30	OK
	302.84	17.80	7.560E+00	3.427E+02	3.428E+02	34.83	OK
	356.01	60.00	7.170E+00	3.535E+02	3.535E+02	17.65	OK

Final Mean for 3 Valid Peaks = 3.916E+02+/- 7.561E+01 (19.30%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	6.726E+02	6.726E+02	24.44	OK

Final Mean for 1 Valid Peaks = 6.726E+02+/- 1.644E+02 (24.44%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.916E+02	7.561E+01	1.899E+01	3.234E+00	20.621
TH-234	6.726E+02	1.644E+02	1.619E+02	1.338E+01	4.155

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.521E+00		4.897E+00	9.433E+00	1.449E+00	0.479
CD-109	-1.537E+01		1.045E+02	1.812E+02	2.081E+01	-0.085
PA-231	2.923E+01		4.567E+00	8.926E+00	1.700E-01	3.274
PA-234	3.184E+00		1.775E+00	3.219E+00	6.639E-02	0.989
NP-237	1.287E-01		3.172E+01	5.174E+01	5.842E+00	0.002
AM-241	2.791E+01		1.133E+01	1.985E+01	1.536E+00	1.406

VAX/VMS Peak Search Report Generated 24-JUL-2013 10:26:24.62

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709811_GE2_BAFIL_193591.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-4 TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 10:11:02
Sample ID : 1307098-11 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.16	42	157	1.66	28.28	26	14	4.66E-02	58.5	1.08E+01
2	3	30.91	1802	102	1.40	31.03	26	14	2.00E+00	2.5	
3	3	35.05	462	87	1.68	35.17	26	14	5.13E-01	5.8	
4	3	52.81	47	68	1.74	52.92	50	20	5.19E-02	31.2	1.37E+00
5	3	61.85	183	72	1.76	61.96	50	20	2.04E-01	10.3	
6	3	65.69	89	76	1.77	65.80	50	20	9.94E-02	19.3	
7	1	80.98	810	58	1.41	81.09	76	12	9.00E-01	3.8	3.03E+00
8	1	84.89	14	65	1.50	85.01	76	12	1.58E-02	88.0	
9	0	92.72	30	67	2.07	92.83	90	7	3.28E-02	49.4	
10	0	111.68	155	101	1.28	111.80	108	7	1.72E-01	13.4	
11	0	116.32	44	86	1.70	116.43	115	6	4.86E-02	37.2	
12	0	164.45	43	101	7.41	164.57	156	13	4.78E-02	51.1	
13	0	277.19	50	48	1.73	277.30	272	10	5.56E-02	29.4	
14	4	302.84	161	15	1.60	302.95	299	18	1.79E-01	8.6	1.20E+00
15	4	307.39	24	16	2.38	307.50	299	18	2.71E-02	43.2	
16	3	333.73	76	16	1.85	333.84	329	14	8.49E-02	14.1	1.47E+00
17	3	338.44	16	10	2.20	338.55	329	14	1.74E-02	54.1	
18	0	355.93	540	26	1.38	356.04	352	8	6.00E-01	4.6	
19	0	368.98	15	7	2.10	369.09	367	6	1.66E-02	38.6	
20	1	383.77	99	10	1.86	383.87	380	15	1.09E-01	13.3	2.57E+00
21	1	386.90	188	13	1.86	387.00	380	15	2.08E-01	8.9	
22	1	390.90	37	15	1.86	391.01	380	15	4.06E-02	27.4	
23	5	414.57	39	8	2.76	414.68	411	14	4.36E-02	22.5	1.28E+00
24	5	418.69	13	12	2.51	418.80	411	14	1.42E-02	71.2	
25	5	421.47	12	14	2.77	421.58	411	14	1.36E-02	63.3	
26	0	437.03	89	7	1.51	437.14	432	10	9.83E-02	12.1	
27	1	467.86	22	1	1.93	467.96	465	14	2.41E-02	22.2	8.39E-01
28	1	472.07	13	2	1.93	472.18	465	14	1.45E-02	37.9	
29	0	511.01	36	6	2.08	511.11	505	12	4.00E-02	21.5	
30	0	742.24	7	2	1.66	742.34	738	7	7.22E-03	51.2	
31	0	881.66	4	3	1.39	881.76	878	6	4.60E-03	81.9	
32	0	1173.74	6	2	2.81	1173.82	1170	7	7.01E-03	52.7	

Sample ID : 1307098-11 Acquisition date : 24-JUL-2013 10:11:02

Total number of lines in spectrum	32	
Number of unidentified lines	27	
Number of lines tentatively identified by NID	5	15.63%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.100E+02	4.100E+02	0.780E+02	19.03	
NP-237	2.14E+06Y	1.00	2.010E+01	2.010E+01	3.547E+01	176.50	
	Total Activity :		4.301E+02	4.301E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	6.283E+02	6.283E+02	1.423E+02	22.64	
	Total Activity :		6.283E+02	6.283E+02			

Grand Total Activity : 1.058E+03 1.058E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	4.100E+02	4.100E+02	19.03	OK
	302.84	17.80	7.560E+00	3.599E+02	3.600E+02	34.50	OK
	356.01	60.00	7.170E+00	3.770E+02	3.770E+02	17.73	OK
	Final Mean for 3 Valid Peaks = 4.100E+02+/- 7.804E+01 (19.03%)						
NP-237	86.50	12.60*	1.691E+01	2.010E+01	2.010E+01	176.50	OK
	Final Mean for 1 Valid Peaks = 2.010E+01+/- 3.547E+01 (176.50%)						

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	6.283E+02	6.283E+02	22.64	OK
	Final Mean for 1 Valid Peaks = 6.283E+02+/- 1.423E+02 (22.64%)						

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.100E+02	7.804E+01	1.899E+01	3.234E+00	21.590
TH-234	6.283E+02	1.423E+02	1.424E+02	1.177E+01	4.412
NP-237	2.010E+01	3.547E+01	5.170E+01	5.837E+00	0.389

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.137E+00		5.584E+00	9.323E+00	1.432E+00	0.122
CD-109	-4.421E+01		1.232E+02	1.670E+02	1.917E+01	-0.265
PA-231	2.869E+01		4.502E+00	8.817E+00	1.679E-01	3.254
PA-234	2.631E+00		1.834E+00	3.251E+00	6.705E-02	0.809
AM-241	2.003E+01		9.698E+00	1.882E+01	1.456E+00	1.065

VAX/VMS Peak Search Report Generated 24-JUL-2013 10:42:01.10

7/24/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709812_GE2_BAFIL_193594.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-4 DIS
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 10:26:42
Sample ID : 1307098-12 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.91	1946	96	1.42	31.02	27	17	2.16E+00	2.4	6.03E+00
2	4	35.24	443	74	1.64	35.35	27	17	4.92E-01	5.8	
3	0	52.37	53	95	2.99	52.48	49	8	5.93E-02	34.4	
4	1	61.75	186	60	1.46	61.87	58	12	2.07E-01	9.6	4.21E+00
5	1	65.84	89	67	1.47	65.96	58	12	9.85E-02	16.3	
6	0	80.98	700	136	1.29	81.09	77	8	7.78E-01	4.8	
7	0	92.89	31	95	2.45	93.00	89	8	3.44E-02	57.6	
8	0	111.45	176	105	1.25	111.57	108	7	1.95E-01	12.3	
9	0	116.30	43	74	2.05	116.41	115	6	4.78E-02	36.3	
10	0	139.83	20	118	4.43	139.95	138	12	2.19E-02	112.4	
11	0	160.74	26	47	2.02	160.86	158	6	2.88E-02	46.4	
12	0	185.59	39	53	3.99	185.70	182	7	4.37E-02	34.8	
13	0	276.38	61	40	1.89	276.49	271	10	6.80E-02	23.2	
14	2	302.78	141	17	1.82	302.89	299	18	1.56E-01	9.4	1.05E+00
15	2	307.55	22	19	1.97	307.66	299	18	2.43E-02	39.5	
16	2	311.20	10	18	1.97	311.30	299	18	1.12E-02	81.9	
17	1	333.73	101	11	1.81	333.84	330	12	1.13E-01	10.5	6.13E+00
18	1	337.90	27	12	1.82	338.01	330	12	2.99E-02	28.1	
19	2	352.06	12	0	1.83	352.17	351	11	1.35E-02	2.9	1.35E+00
20	2	355.94	481	3	1.59	356.05	351	11	5.35E-01	4.6	
21	0	364.86	17	3	1.41	364.96	362	6	1.92E-02	28.6	
22	0	376.40	18	10	2.14	376.50	372	8	2.01E-02	38.3	
23	1	383.72	109	9	1.86	383.83	380	18	1.21E-01	11.8	3.06E+00
24	1	386.93	182	9	1.86	387.04	380	18	2.02E-01	9.0	
25	1	390.95	44	9	1.86	391.05	380	18	4.84E-02	22.0	
26	2	414.74	21	5	2.07	414.84	411	15	2.29E-02	36.3	1.76E+00
27	2	417.69	21	8	2.08	417.80	411	15	2.29E-02	37.6	
28	2	421.71	7	11	2.08	421.82	411	15	8.15E-03	80.9	
29	0	436.93	76	9	1.40	437.04	432	9	8.44E-02	13.5	
30	0	480.32	7	0	1.47	480.43	478	5	7.78E-03	37.8	
31	0	504.35	11	0	2.07	504.45	502	6	1.22E-02	30.2	
32	0	511.29	36	0	1.56	511.39	508	8	4.00E-02	16.7	
33	0	933.69	9	0	1.33	933.78	930	8	1.00E-02	33.3	

Sample ID : 1307098-12 Acquisition date : 24-JUL-2013 10:26:42

Total number of lines in spectrum 33
Number of unidentified lines 29
Number of lines tentatively identified by NID 4 12.12%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.542E+02	3.542E+02	0.705E+02	19.91	
	Total Activity :		3.542E+02	3.542E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	6.392E+02	6.392E+02	1.363E+02	21.33	
	Total Activity :		6.392E+02	6.392E+02			

Grand Total Activity : 9.934E+02 9.935E+02

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.542E+02	3.542E+02	19.91	OK
	302.84	17.80	7.560E+00	3.142E+02	3.142E+02	35.35	OK
	356.01	60.00	7.170E+00	3.360E+02	3.360E+02	17.72	OK

Final Mean for 3 Valid Peaks = 3.542E+02+/- 7.052E+01 (19.91%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	6.392E+02	6.392E+02	21.33	OK

Final Mean for 1 Valid Peaks = 6.392E+02+/- 1.363E+02 (21.33%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.542E+02	7.052E+01	1.817E+01	3.094E+00	19.493
TH-234	6.392E+02	1.363E+02	1.528E+02	1.262E+01	4.185

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.501E+00		5.610E+00	8.799E+00	1.351E+00	-0.171
CD-109	-6.089E+01		1.336E+02	1.779E+02	2.043E+01	-0.342
PA-231	2.692E+01		4.519E+00	8.800E+00	1.676E-01	3.060
PA-234	4.207E+00		1.655E+00	3.266E+00	6.736E-02	1.288
NP-237	-1.070E+01		3.790E+01	5.198E+01	5.869E+00	-0.206
AM-241	1.629E+01		1.051E+01	1.883E+01	1.457E+00	0.865

VAX/VMS Peak Search Report Generated 24-JUL-2013 10:27:11.98

c 7/24/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709813_GE3_BAFIL_193592.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-100-SS TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 10:11:51
Sample ID : 1307098-13 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.35 0.5%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.75	2044	93	1.52	31.07	26	13	2.27E+00	2.3	2.28E+01
2	4	35.08	500	64	1.62	35.40	26	13	5.56E-01	5.2	
3	0	52.60	76	67	1.90	52.92	50	6	8.49E-02	20.4	
4	3	61.67	278	67	1.46	61.99	58	13	3.09E-01	7.3	1.33E+00
5	3	65.71	95	87	1.67	66.03	58	13	1.05E-01	17.9	
6	1	80.82	756	69	1.54	81.14	76	16	8.40E-01	4.0	9.69E+00
7	1	83.68	23	43	1.41	84.00	76	16	2.55E-02	84.7	
8	0	93.21	45	64	1.35	93.53	91	7	4.98E-02	33.1	
9	0	111.31	179	140	1.34	111.63	108	8	1.99E-01	13.6	
10	0	116.62	47	53	1.81	116.93	115	6	5.21E-02	29.4	
11	0	160.95	28	71	1.55	161.26	159	7	3.14E-02	52.4	
12	0	277.08	45	38	1.83	277.39	273	9	5.01E-02	28.9	
13	2	302.81	123	28	1.59	303.12	297	14	1.37E-01	10.9	1.41E+00
14	2	306.35	12	35	1.99	306.66	297	14	1.34E-02	92.9	
15	0	334.46	102	22	1.95	334.76	330	11	1.13E-01	13.3	
16	0	355.91	505	42	1.45	356.22	352	8	5.61E-01	5.0	
17	0	366.66	32	22	6.18	366.96	362	11	3.54E-02	34.6	
18	0	376.83	17	10	2.38	377.13	373	8	1.87E-02	40.8	
19	8	383.44	85	13	2.08	383.75	381	9	9.45E-02	15.7	1.24E+01
20	8	386.74	191	15	1.41	387.04	381	9	2.12E-01	7.9	
21	0	391.46	44	10	1.47	391.76	390	6	4.86E-02	20.3	
22	1	414.87	48	10	1.89	415.17	411	14	5.36E-02	18.2	3.63E+00
23	1	420.53	12	1	1.90	420.83	411	14	1.38E-02	54.2	
24	0	436.83	116	10	1.49	437.13	432	9	1.29E-01	10.4	
25	0	468.75	34	7	1.80	469.05	464	10	3.81E-02	22.6	
26	2	509.95	15	6	2.16	510.25	507	9	1.65E-02	36.0	4.50E-01
27	2	512.45	9	2	2.16	512.75	507	9	1.04E-02	62.4	

Sample ID : 1307098-13 Acquisition date : 24-JUL-2013 10:11:51

Total number of lines in spectrum 27
Number of unidentified lines 23
Number of lines tentatively identified by NID 4 14.81%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.622E+02	3.622E+02	0.643E+02	17.76	
	Total Activity :		3.622E+02	3.622E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	8.305E+02	8.305E+02	1.330E+02	16.02	
	Total Activity :		8.305E+02	8.305E+02			

Grand Total Activity : 1.193E+03 1.193E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.622E+02	3.622E+02	17.76	OK
	302.84	17.80	6.222E+00	3.337E+02	3.338E+02	29.96	OK
	356.01	60.00	5.860E+00	4.311E+02	4.312E+02	16.89	OK

Final Mean for 3 Valid Peaks = 3.622E+02+/- 6.433E+01 (17.76%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	8.305E+02	8.305E+02	16.02	OK

Final Mean for 1 Valid Peaks = 8.305E+02+/- 1.330E+02 (16.02%)

Flag: "*" = Keyline

Sample ID : 1307098-13 Acquisition date : 24-JUL-2013 10:11:51

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.622E+02	6.433E+01	1.900E+01	2.906E+00	19.060
TH-234	8.305E+02	1.330E+02	1.190E+02	6.390E+00	6.981

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.338E-03		6.130E+00	9.884E+00	1.129E+00	0.000
CD-109	-8.544E+01		1.101E+02	1.607E+02	1.325E+01	-0.532
PA-231	2.331E+00		1.462E+00	2.968E+00	4.222E-02	0.785
PA-234	4.434E+00		1.502E+00	2.910E+00	4.139E-02	1.524
NP-237	-1.262E+01		3.271E+01	5.035E+01	4.070E+00	-0.251
AM-241	3.810E+01		9.641E+00	1.957E+01	9.624E-01	1.947

VAX/VMS Peak Search Report Generated 24-JUL-2013 10:43:09.90

7/24/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709814_GE3_BAFIL_193595.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-100-SS DIS
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 10:27:45
Sample ID : 1307098-14 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.58 0.5%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.78	1950	69	1.48	31.10	26	16	2.17E+00	2.3	7.35E+00
2	3	35.03	539	55	1.59	35.35	26	16	5.99E-01	4.9	
3	9	52.16	72	92	3.18	52.48	49	24	8.01E-02	25.8	5.27E+00
4	9	61.85	252	68	1.89	62.17	49	24	2.80E-01	8.3	
5	9	65.71	160	78	2.26	66.03	49	24	1.78E-01	12.7	
6	0	80.99	803	96	1.77	81.31	77	9	8.93E-01	4.2	
7	0	92.93	37	84	1.81	93.24	90	8	4.11E-02	45.9	
8	1	111.75	197	50	1.59	112.07	108	13	2.18E-01	9.3	3.41E+00
9	1	116.54	30	52	1.60	116.85	108	13	3.32E-02	43.1	
10	0	159.96	49	63	1.58	160.27	156	9	5.49E-02	32.2	
11	0	239.63	20	44	1.50	239.94	236	9	2.19E-02	65.2	
12	0	266.43	9	26	1.82	266.74	264	8	1.03E-02	98.7	
13	0	276.45	54	25	1.82	276.76	273	8	5.99E-02	21.2	
14	0	302.87	99	65	1.25	303.18	299	7	1.10E-01	15.1	
15	0	333.74	63	36	1.18	334.04	330	7	6.96E-02	19.2	
16	0	338.31	18	20	1.90	338.61	337	5	2.00E-02	44.1	
17	0	355.88	485	20	1.50	356.19	351	10	5.39E-01	4.9	
18	0	364.71	19	16	1.99	365.01	362	7	2.07E-02	42.6	
19	5	383.58	75	32	2.06	383.88	381	9	8.37E-02	18.2	1.15E+01
20	5	386.70	149	51	1.49	387.00	381	9	1.66E-01	10.1	
21	0	391.23	43	21	1.26	391.53	390	6	4.79E-02	23.9	
22	0	415.22	40	31	1.57	415.53	412	9	4.49E-02	28.9	
23	0	436.85	86	9	1.64	437.15	432	8	9.57E-02	12.2	
24	1	467.74	30	5	1.93	468.04	463	14	3.33E-02	20.2	1.01E+00
25	1	471.88	10	4	1.94	472.18	463	14	1.11E-02	50.6	
26	0	510.86	19	6	2.14	511.16	507	8	2.13E-02	31.8	

Sample ID : 1307098-14 Acquisition date : 24-JUL-2013 10:27:45

Total number of lines in spectrum 26
Number of unidentified lines 22
Number of lines tentatively identified by NID 4 15.38%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.851E+02	3.851E+02	0.688E+02	17.86	
	Total Activity :		3.851E+02	3.851E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	7.509E+02	7.509E+02	1.346E+02	17.92	
	Total Activity :		7.509E+02	7.509E+02			
	Grand Total Activity :		1.136E+03	1.136E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : 1307098-14 Acquisition date : 24-JUL-2013 10:27:45

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.851E+02	3.851E+02	17.86	OK
	302.84	17.80	6.222E+00	2.687E+02	2.687E+02	36.63	OK
	356.01	60.00	5.860E+00	4.141E+02	4.142E+02	16.75	OK

Final Mean for 3 Valid Peaks = 3.851E+02+/- 6.879E+01 (17.86%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.509E+02	7.509E+02	17.92	OK

Final Mean for 1 Valid Peaks = 7.509E+02+/- 1.346E+02 (17.92%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.851E+02	6.879E+01	1.825E+01	2.791E+00	21.103
TH-234	7.509E+02	1.346E+02	1.153E+02	6.195E+00	6.511

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-4.060E+00		5.961E+00	8.682E+00	9.918E-01	-0.468
CD-109	7.804E+01		1.128E+02	1.781E+02	1.469E+01	0.438
PA-231	1.919E+00		1.507E+00	2.983E+00	4.242E-02	0.643
PA-234	4.428E+00		1.443E+00	2.834E+00	4.030E-02	1.563
NP-237	1.815E+01		3.213E+01	5.004E+01	4.045E+00	0.363
AM-241	2.905E+01		8.790E+00	1.779E+01	8.745E-01	1.633

VAX/VMS Peak Search Report Generated 24-JUL-2013 10:31:35.20

7/24/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709815_GE1_BAFIL_193593.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : D-3 TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 10:16:18
Sample ID : 1307098-15 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE1 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.90	1885	78	1.54	31.13	27	13	2.09E+00	2.4	9.79E+00
2	3	35.14	467	57	1.73	35.37	27	13	5.19E-01	5.4	
3	0	52.61	42	103	2.83	52.84	50	8	4.70E-02	43.9	
4	4	62.04	292	84	1.88	62.27	58	14	3.25E-01	7.5	3.96E+00
5	4	66.27	137	73	2.11	66.50	58	14	1.52E-01	14.8	
6	0	81.34	768	148	1.92	81.57	77	10	8.53E-01	4.7	
7	0	93.93	50	95	1.57	94.16	90	8	5.58E-02	36.6	
8	0	111.97	199	73	1.74	112.20	109	6	2.21E-01	9.8	
9	0	117.37	34	73	2.26	117.60	116	6	3.82E-02	44.4	
10	0	276.95	59	38	1.23	277.16	273	8	6.54E-02	22.3	
11	3	303.38	154	28	1.80	303.59	300	11	1.71E-01	8.9	3.04E+01
12	3	307.33	27	23	1.96	307.55	300	11	3.05E-02	36.7	
13	0	334.07	81	18	1.86	334.28	331	6	9.00E-02	13.9	
14	0	356.43	531	22	1.89	356.64	351	12	5.90E-01	4.7	
15	0	377.09	11	16	1.45	377.30	375	6	1.23E-02	63.3	
16	4	384.19	124	9	1.74	384.40	382	14	1.38E-01	10.1	2.43E+00
17	4	387.25	223	6	1.94	387.46	382	14	2.48E-01	7.8	
18	4	391.16	51	5	2.50	391.37	382	14	5.62E-02	26.2	
19	5	416.47	35	28	2.78	416.68	413	10	3.94E-02	33.7	9.31E+00
20	5	419.79	10	18	1.73	420.00	413	10	1.12E-02	82.5	
21	0	437.49	122	11	1.88	437.69	434	9	1.36E-01	10.3	
22	0	469.16	42	8	2.86	469.36	462	15	4.61E-02	21.2	
23	0	512.87	9	14	1.98	513.07	508	10	9.86E-03	83.0	
24	0	609.86	10	4	1.01	610.05	606	7	1.06E-02	46.0	
25	0	700.67	7	0	2.83	700.86	698	6	7.78E-03	37.8	
26	0	711.54	7	4	1.67	711.73	708	6	7.68E-03	61.0	

Sample ID : 1307098-15 Acquisition date : 24-JUL-2013 10:16:18

Total number of lines in spectrum 26
Number of unidentified lines 22
Number of lines tentatively identified by NID 4 15.38%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.561E+02	3.561E+02	0.688E+02	19.31	
	Total Activity :		3.561E+02	3.561E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	3.941E+02	3.941E+02	0.627E+02	15.91	
	Total Activity :		3.941E+02	3.941E+02			
	Grand Total Activity :		7.501E+02	7.502E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : 1307098-15 Acquisition date : 24-JUL-2013 10:16:18

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.963E+01	3.561E+02	3.561E+02	19.31	OK
	302.84	17.80	4.915E+00	5.290E+02	5.290E+02	34.20	OK
	356.01	60.00	6.963E+00	3.818E+02	3.818E+02	17.80	OK

Final Mean for 3 Valid Peaks = 3.561E+02+/- 6.878E+01 (19.31%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.941E+02	3.941E+02	15.91	OK

Final Mean for 1 Valid Peaks = 3.941E+02+/- 6.271E+01 (15.91%)

Flag: "*" = Keyline

Sample ID : 1307098-15 Acquisition date : 24-JUL-2013 10:16:18

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.561E+02	6.878E+01	1.813E+01	2.976E+00	19.640
TH-234	3.941E+02	6.271E+01	5.170E+01	1.656E+00	7.623

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.257E+00		1.324E+01	2.085E+01	6.509E+00	-0.060
CD-109	-7.702E+01		1.582E+02	2.039E+02	2.638E+01	-0.378
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.346E+00		1.617E+00	3.419E+00	6.425E-02	2.441
NP-237	3.522E+01		3.915E+01	6.225E+01	7.579E+00	0.566
AM-241	1.095E+01		3.323E+00	6.490E+00	1.523E-01	1.687

C
Filter

VAX/VMS Peak Search Report Generated 24-JUL-2013 10:47:06.63

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709816_GE1_BAFIL_193596.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : D-3 DIS
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 10:31:49
Sample ID : 1307098-16 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE1 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.92	2028	85	1.57	31.15	27	13	2.25E+00	2.3	1.50E+01
2	3	35.19	431	63	1.71	35.43	27	13	4.79E-01	5.8	
3	0	52.17	39	99	2.57	52.40	49	7	4.37E-02	44.7	
4	2	61.92	243	77	1.59	62.15	58	13	2.70E-01	8.4	1.05E+00
5	2	65.85	106	83	1.74	66.08	58	13	1.18E-01	17.9	
6	4	81.22	717	59	1.67	81.45	76	13	7.97E-01	4.1	1.68E+00
7	4	84.71	22	61	2.14	84.94	76	13	2.46E-02	104.7	
8	0	93.33	43	100	1.61	93.55	90	9	4.82E-02	44.0	
9	3	112.07	234	51	1.78	112.30	106	15	2.60E-01	7.9	1.07E+00
10	3	116.27	59	49	2.00	116.50	106	15	6.52E-02	25.3	
11	0	162.50	40	101	1.96	162.72	157	11	4.48E-02	51.4	
12	0	186.32	21	85	1.99	186.54	183	8	2.36E-02	78.0	
13	0	205.01	34	50	4.65	205.24	201	8	3.77E-02	40.0	
14	0	224.04	23	52	3.19	224.25	218	10	2.54E-02	62.8	
15	0	277.19	55	36	1.55	277.41	273	9	6.16E-02	23.7	
16	0	303.19	130	36	1.92	303.40	300	7	1.45E-01	11.6	
17	1	333.93	75	29	1.84	334.14	330	17	8.30E-02	15.9	2.34E+00
18	1	338.62	30	20	1.84	338.83	330	17	3.32E-02	32.4	
19	0	356.52	512	23	1.77	356.73	352	9	5.69E-01	4.7	
20	0	366.02	20	25	1.58	366.23	362	9	2.23E-02	50.1	
21	2	384.15	126	18	2.06	384.36	381	17	1.39E-01	10.8	3.61E+00
22	2	387.15	214	14	1.77	387.35	381	17	2.37E-01	8.2	
23	2	391.70	43	15	1.91	391.91	381	17	4.76E-02	22.3	
24	3	415.34	38	9	2.29	415.55	409	16	4.26E-02	23.7	2.34E+00
25	3	418.83	16	12	2.30	419.03	409	16	1.82E-02	53.0	
26	0	437.58	108	15	1.73	437.79	433	10	1.20E-01	11.7	
27	0	468.48	21	2	1.83	468.68	466	6	2.37E-02	23.6	
28	0	473.26	8	3	1.00	473.47	472	5	8.33E-03	48.3	
29	0	511.47	23	2	2.09	511.67	507	10	2.53E-02	24.5	
30	0	912.33	6	0	1.88	912.50	910	5	6.67E-03	40.8	

Sample ID : 1307098-16 Acquisition date : 24-JUL-2013 10:31:49

Total number of lines in spectrum	30	
Number of unidentified lines	25	
Number of lines tentatively identified by NID	5	16.67%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.326E+02	3.327E+02	0.624E+02	18.74	
NP-237	2.14E+06Y	1.00	3.446E+01	3.446E+01	7.227E+01	209.74	
	Total Activity :		3.671E+02	3.671E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	3.279E+02	3.279E+02	0.578E+02	17.61	
	Total Activity :		3.279E+02	3.279E+02			
	Grand Total Activity :		6.950E+02	6.950E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : 1307098-16 Acquisition date : 24-JUL-2013 10:31:49

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.963E+01	3.326E+02	3.327E+02	18.74	OK
	302.84	17.80	4.915E+00	4.475E+02	4.476E+02	37.28	OK
	356.01	60.00	6.963E+00	3.682E+02	3.682E+02	17.86	OK
	Final Mean for 3 Valid Peaks = 3.327E+02+/- 6.235E+01 (18.74%)						
NP-237	86.50	12.60*	1.532E+01	3.446E+01	3.446E+01	209.74	OK
	Final Mean for 1 Valid Peaks = 3.446E+01+/- 7.227E+01 (209.74%)						

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.279E+02	3.279E+02	17.61	OK
	Final Mean for 1 Valid Peaks = 3.279E+02+/- 5.776E+01 (17.61%)						

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.327E+02	6.235E+01	1.911E+01	3.137E+00	17.409
TH-234	3.279E+02	5.776E+01	5.802E+01	1.859E+00	5.652
NP-237	3.446E+01	7.227E+01	5.335E+01	6.495E+00	0.646

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	6.303E+00		1.160E+01	1.990E+01	6.212E+00	0.317
CD-109	-6.036E+00		1.393E+02	1.948E+02	2.519E+01	-0.031
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.701E+00		1.699E+00	3.549E+00	6.669E-02	2.452
AM-241	8.380E+00		3.230E+00	6.333E+00	1.486E-01	1.323

VAX/VMS Peak Search Report Generated 24-JUL-2013 11:12:13.66

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709817_GE5_BAFIL_193605.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-100-SD TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 10:56:58
Sample ID : 1307098-17 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.12 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	20.80	48	15	0.50	205.00	190	26	5.35E-02	26.2	2.20E+00
2	3	21.28	63	12	0.55	209.57	190	26	7.02E-02	18.2	
3	0	25.55	28	17	1.29	250.51	236	25	3.11E-02	45.5	
4	0	31.00	1838	85	0.74	302.88	292	21	2.04E+00	2.6	
5	2	35.18	382	69	0.68	342.96	333	25	4.25E-01	7.6	1.43E+00
6	2	36.07	101	22	0.62	351.46	333	25	1.12E-01	20.7	
7	8	53.15	50	12	0.75	515.44	502	21	5.53E-02	18.7	8.50E-01
8	8	53.59	9	4	0.30	519.66	502	21	1.03E-02	66.4	
9	0	61.72	239	31	0.66	597.60	584	27	2.66E-01	8.5	
10	1	65.89	91	48	0.72	637.63	626	27	1.01E-01	19.1	2.56E+00
11	1	66.34	16	36	0.66	642.00	626	27	1.77E-02	103.2	
12	0	79.67	19	38	0.24	769.90	758	17	2.14E-02	69.0	
13	0	81.04	783	49	0.65	783.01	774	22	8.70E-01	4.1	
14	0	111.81	161	49	0.87	1078.29	1067	22	1.79E-01	12.4	
15	0	115.88	42	27	0.48	1117.29	1108	20	4.64E-02	30.1	
16	0	206.64	11	12	0.49	1988.22	1975	19	1.24E-02	64.2	
17	1	301.87	97	15	1.06	2902.00	2890	26	1.08E-01	12.3	5.97E+00
18	1	302.80	43	8	1.06	2911.00	2890	26	4.82E-02	16.6	
19	0	306.83	21	12	0.48	2949.68	2929	27	2.36E-02	37.0	
20	2	333.01	63	4	1.33	3200.89	3186	26	6.97E-02	13.8	4.23E+00
21	2	333.55	64	2	1.10	3206.00	3186	26	7.12E-02	11.4	
22	1	354.81	99	6	1.12	3410.00	3398	32	1.10E-01	18.9	1.61E+01
23	1	355.74	325	7	1.13	3419.00	3398	32	3.61E-01	5.9	
24	0	383.17	69	5	0.72	3682.22	3667	26	7.64E-02	13.6	
25	2	385.54	19	9	1.27	3704.89	3695	29	2.08E-02	66.2	1.57E+00
26	2	386.17	165	8	1.29	3711.00	3695	29	1.83E-01	8.3	
27	0	413.91	31	3	0.21	3977.11	3962	29	3.47E-02	20.9	

Sample ID : 1307098-17 Acquisition date : 24-JUL-2013 10:56:58

Total number of lines in spectrum	27	
Number of unidentified lines	21	
Number of lines tentatively identified by NID	6	22.22%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.955E+02	3.955E+02	0.684E+02	17.30	
	Total Activity :		3.955E+02	3.955E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	2.159E+02	2.159E+02	0.378E+02	17.49	
	Total Activity :		2.159E+02	2.159E+02			
	Grand Total Activity :		6.114E+02	6.115E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.955E+02	3.955E+02	17.30	OK
	302.84	17.80	2.575E+00	2.844E+02	2.845E+02	42.35	OK
	356.01	60.00	4.312E+00	3.770E+02	3.770E+02	18.64	OK

Final Mean for 3 Valid Peaks = 3.955E+02+/- 6.843E+01 (17.30%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.159E+02	2.159E+02	17.49	OK

Final Mean for 1 Valid Peaks = 2.159E+02+/- 3.776E+01 (17.49%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.955E+02	6.843E+01	1.365E+00	2.009E-01	289.853
TH-234	2.159E+02	3.776E+01	3.395E+01	4.368E-01	6.359

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	8.982E+00		1.399E+01	2.782E+01	9.430E+00	0.323
CD-109	3.138E+01		9.306E+01	1.785E+02	1.718E+01	0.176
PA-231	-2.500E-01		8.243E-01	1.455E+00	1.637E-02	-0.172
PA-234	2.925E+00	+	1.070E+00	1.988E+00	2.238E-02	1.471
NP-237	-2.910E+01		2.650E+01	4.054E+01	3.576E+00	-0.718
AM-241	9.832E-01		1.228E+00	2.229E+00	2.510E-02	0.441

VAX/VMS Peak Search Report Generated 24-JUL-2013 11:29:40.97

7/24/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709818_GE5_BAFIL_193615.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-100 SD DIS
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 11:13:34
Sample ID : 1307098-18 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.13 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	19.87	29	3	0.60	196.01	186	36	3.19E-02	33.1	2.19E+00
2	2	20.80	57	9	0.61	205.02	186	36	6.32E-02	22.6	
3	2	22.16	16	7	0.51	218.00	186	36	1.74E-02	27.9	
4	0	30.99	1944	85	0.75	302.80	290	26	2.16E+00	2.6	
5	2	35.12	360	26	0.66	342.40	330	28	4.00E-01	6.6	4.69E+00
6	2	36.02	106	9	0.57	351.00	330	28	1.18E-01	16.1	
7	0	53.47	22	23	0.57	518.42	510	14	2.45E-02	45.2	
8	2	61.13	33	13	0.65	592.00	585	24	3.70E-02	42.7	2.39E+00
9	2	61.72	183	27	0.78	597.60	585	24	2.04E-01	10.0	
10	6	65.51	48	21	0.66	634.00	628	27	5.34E-02	24.4	3.27E+00
11	6	66.09	45	16	0.46	639.57	628	27	5.01E-02	27.5	
12	6	66.56	22	24	0.88	644.10	628	27	2.39E-02	73.6	
13	0	80.95	791	17	0.77	782.13	763	33	8.79E-01	3.8	
14	5	110.00	31	11	1.23	1060.88	1046	43	3.45E-02	41.5	1.18E+00
15	5	110.88	29	14	1.12	1069.40	1046	43	3.21E-02	63.1	
16	5	111.86	162	10	0.68	1078.72	1046	43	1.80E-01	9.5	
17	0	192.33	11	17	0.18	1850.89	1830	23	1.17E-02	83.6	
18	0	231.38	14	7	0.57	2225.61	2206	24	1.55E-02	44.8	
19	5	275.50	31	10	1.03	2649.00	2640	25	3.47E-02	23.8	7.47E-01
20	5	276.03	20	6	0.61	2654.13	2640	25	2.26E-02	37.3	
21	5	276.85	11	0	0.61	2661.96	2640	25	1.25E-02	28.5	
22	2	301.49	22	3	1.28	2898.36	2890	26	2.43E-02	40.1	6.03E+00
23	2	302.39	192	3	1.06	2907.00	2890	26	2.14E-01	5.8	
24	0	306.69	34	0	0.83	2948.26	2934	24	3.78E-02	17.1	
25	0	333.00	56	6	0.15	3200.78	3187	24	6.21E-02	15.9	
26	6	355.25	280	10	0.91	3414.25	3398	31	3.12E-01	6.9	6.83E-01
27	6	355.86	62	9	1.03	3420.08	3398	31	6.91E-02	28.7	
28	3	382.63	60	4	1.16	3677.00	3666	27	6.66E-02	14.8	8.27E-01
29	3	383.38	28	4	0.97	3684.21	3666	27	3.09E-02	32.3	
30	1	385.86	69	8	1.16	3708.00	3695	28	7.69E-02	18.2	2.05E+00
31	1	386.38	99	6	1.16	3713.00	3695	28	1.10E-01	12.5	
32	0	390.15	24	4	0.60	3749.20	3736	22	2.71E-02	25.1	

Sample ID : 1307098-18 Acquisition date : 24-JUL-2013 11:13:34

Total number of lines in spectrum	32	
Number of unidentified lines	25	
Number of lines tentatively identified by NID	7	21.88%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.992E+02	3.992E+02	0.680E+02	17.04	
	Total Activity :		3.992E+02	3.992E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	1.655E+02	1.655E+02	0.337E+02	20.35	
AM-241	432.20Y	1.00	2.782E+00	2.782E+00	2.379E+00	85.52	
	Total Activity :		1.683E+02	1.683E+02			
	Grand Total Activity :		5.675E+02	5.675E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.992E+02	3.992E+02	17.04	OK
	302.84	17.80	2.575E+00	1.259E+03	1.259E+03	28.87	OK
	356.01	60.00	4.312E+00	7.216E+01	7.217E+01	59.16	OK

Final Mean for 3 Valid Peaks = 3.992E+02+/- 6.802E+01 (17.04%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.655E+02	1.655E+02	20.35	OK

Final Mean for 1 Valid Peaks = 1.655E+02+/- 3.368E+01 (20.35%)

AM-241	59.54	35.90*	1.000E+02	2.782E+00	2.782E+00	85.52	OK

Final Mean for 1 Valid Peaks = 2.782E+00+/- 2.379E+00 (85.52%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.992E+02	6.802E+01	1.188E+01	1.750E+00	33.596
TH-234	1.655E+02	3.368E+01	3.482E+01	4.479E-01	4.754
AM-241	2.782E+00	2.379E+00	1.625E+00	1.829E-02	1.712

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-5.393E+00		1.495E+01	2.588E+01	8.774E+00	-0.208
CD-109	4.981E+01		8.925E+01	1.770E+02	1.704E+01	0.281
PA-231	-6.382E-01		8.376E-01	1.351E+00	1.521E-02	-0.472
PA-234	7.257E-01	+	4.058E-01	2.072E+00	2.333E-02	0.350
NP-237	-1.133E+01		2.248E+01	3.848E+01	3.394E+00	-0.294

KB 7/24/13

VAX/VMS Peak Search Report Generated 24-JUL-2013 11:47:40.35

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709819_GE5_BAFIL_193625.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-112-AS TOT
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 11:32:22
Sample ID : 1307098-19 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.13 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	18.34	5	13	0.31	181.39	174	10	5.83E-03	133.7	
2	0	21.15	85	24	0.32	208.29	201	14	9.43E-02	16.4	
3	0	31.01	1904	112	0.82	302.91	290	26	2.12E+00	2.7	
4	2	35.12	380	10	0.68	342.37	333	24	4.23E-01	6.0	8.32E-01
5	2	36.05	55	1	0.51	351.34	333	24	6.09E-02	20.7	
6	0	53.45	33	40	0.72	518.26	506	20	3.66E-02	43.6	
7	0	61.81	200	59	0.69	598.51	584	27	2.23E-01	11.4	
8	0	66.08	100	29	0.72	639.46	625	29	1.11E-01	16.4	
9	0	81.03	772	53	0.65	782.89	766	29	8.57E-01	4.2	
10	1	111.36	63	31	0.76	1074.00	1050	39	7.03E-02	28.7	1.96E+00
11	1	111.99	130	33	0.77	1080.00	1050	39	1.45E-01	12.6	
12	0	115.91	34	28	0.31	1117.64	1105	24	3.82E-02	38.4	
13	0	160.49	23	15	0.56	1545.40	1533	20	2.59E-02	37.2	
14	0	276.11	38	10	1.02	2654.89	2639	27	4.19E-02	24.1	
15	1	302.18	53	7	1.06	2905.00	2891	26	5.89E-02	20.6	1.51E+00
16	1	302.80	51	4	1.06	2911.00	2891	26	5.69E-02	16.3	
17	0	332.90	53	13	1.19	3199.79	3185	27	5.92E-02	19.0	
18	0	355.35	372	12	0.86	3415.26	3398	32	4.13E-01	5.5	
19	1	382.84	59	9	1.16	3679.00	3668	25	6.51E-02	18.0	1.74E+00
20	1	383.46	44	13	1.16	3685.00	3668	25	4.94E-02	22.7	
21	0	386.22	144	19	0.79	3711.46	3697	28	1.60E-01	10.3	
22	0	390.20	20	11	0.73	3749.66	3734	25	2.21E-02	39.7	

Sample ID : 1307098-19 Acquisition date : 24-JUL-2013 11:32:22

Total number of lines in spectrum	22	
Number of unidentified lines	16	
Number of lines tentatively identified by NID	6	27.27%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.896E+02	3.896E+02	0.679E+02	17.43	
	Total Activity :		3.896E+02	3.896E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	1.809E+02	1.809E+02	0.420E+02	23.20	
	Total Activity :		1.809E+02	1.809E+02			
	Grand Total Activity :		5.705E+02	5.705E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.896E+02	3.896E+02	17.43	OK
	302.84	17.80	2.575E+00	3.357E+02	3.357E+02	41.92	OK
	356.01	60.00	4.312E+00	4.315E+02	4.315E+02	18.23	OK

Final Mean for 3 Valid Peaks = 3.896E+02+/- 6.792E+01 (17.43%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.809E+02	1.809E+02	23.20	OK

Final Mean for 1 Valid Peaks = 1.809E+02+/- 4.197E+01 (23.20%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.896E+02	6.792E+01	1.336E+01	1.967E+00	29.169
TH-234	1.809E+02	4.197E+01	1.730E+01	2.225E-01	10.459

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.246E+01		1.581E+01	2.458E+01	8.332E+00	-0.507
CD-109	5.186E+01		9.184E+01	1.814E+02	1.746E+01	0.286
PA-231	4.953E-01		7.924E-01	1.623E+00	1.827E-02	0.305
PA-234	3.929E+00	+	1.302E+00	2.068E+00	2.328E-02	1.900
NP-237	-4.123E+00		2.544E+01	4.566E+01	4.028E+00	-0.090
AM-241	4.459E-01		1.436E+00	2.333E+00	2.626E-02	0.191

KGB 7/24/13

VAX/VMS Peak Search Report Generated 24-JUL-2013 12:03:28.59

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709820_GE5_BAFIL_193633.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-112-AS DIS
Deposition Date :
Sample Date : 24-JUL-2013 00:00:00 Acquisition date : 24-JUL-2013 11:48:11
Sample ID : 1307098-20 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.09 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	6.91	5	8	0.27	71.67	65	9	5.26E-03	121.9	
2	0	21.16	89	21	0.90	208.38	200	18	9.91E-02	16.3	
3	0	31.01	1981	75	0.84	302.92	292	26	2.20E+00	2.6	
4	7	35.13	352	35	0.70	342.44	334	25	3.91E-01	6.6	1.78E+00
5	7	36.04	70	18	0.72	351.18	334	25	7.72E-02	26.1	
6	0	53.51	37	27	0.28	518.81	507	18	4.07E-02	32.9	
7	1	61.55	154	10	0.65	596.00	583	30	1.71E-01	10.8	1.44E+00
8	1	62.18	91	8	0.65	602.00	583	30	1.01E-01	18.2	
9	1	65.61	32	30	0.66	635.00	627	23	3.54E-02	43.2	1.43E+00
10	1	66.24	38	32	0.66	641.00	627	23	4.24E-02	35.9	
11	1	79.61	65	12	0.69	769.33	760	35	7.22E-02	18.0	7.62E-01
12	1	81.00	721	13	0.70	782.67	760	35	8.01E-01	3.9	
13	0	84.12	32	17	1.11	812.57	800	20	3.56E-02	31.9	
14	0	111.85	155	42	0.90	1078.69	1067	21	1.72E-01	12.0	
15	0	116.25	33	39	0.37	1120.84	1103	26	3.63E-02	47.5	
16	0	161.10	16	25	0.61	1551.30	1535	20	1.76E-02	64.3	
17	0	193.59	12	17	0.11	1863.04	1843	22	1.32E-02	72.7	
18	0	275.88	34	11	0.29	2652.62	2636	25	3.82E-02	25.1	
19	0	302.31	112	12	0.72	2906.25	2891	27	1.25E-01	11.0	
20	1	332.41	33	1	1.21	3195.05	3184	30	3.68E-02	23.6	6.46E-01
21	1	332.92	13	3	1.10	3200.00	3184	30	1.47E-02	64.9	
22	1	333.65	27	2	1.10	3207.00	3184	30	3.03E-02	22.9	
23	0	355.35	367	9	0.75	3415.17	3398	30	4.07E-01	5.5	
24	1	382.74	12	6	1.16	3678.00	3666	29	1.31E-02	77.9	2.63E+00
25	1	383.15	93	8	1.16	3682.00	3666	29	1.04E-01	10.5	
26	0	386.16	129	14	0.71	3710.89	3696	25	1.44E-01	10.2	
27	0	416.91	14	9	0.81	4005.93	3993	21	1.52E-02	49.0	

Sample ID : 1307098-20 Acquisition date : 24-JUL-2013 11:48:11

Total number of lines in spectrum	27	
Number of unidentified lines	21	
Number of lines tentatively identified by NID	6	22.22%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.642E+02	3.642E+02	0.624E+02	17.13	
	Total Activity :		3.642E+02	3.642E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	8.237E+01	8.237E+01	3.021E+01	36.68	
	Total Activity :		8.237E+01	8.237E+01			
	Grand Total Activity :		4.465E+02	4.466E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.642E+02	3.642E+02	17.13	OK
	302.84	17.80	2.575E+00	7.365E+02	7.365E+02	34.38	OK
	356.01	60.00	4.312E+00	4.255E+02	4.256E+02	18.14	OK

Final Mean for 3 Valid Peaks = 3.642E+02+/- 6.237E+01 (17.13%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	8.237E+01	8.237E+01	36.68	OK

Final Mean for 1 Valid Peaks = 8.237E+01+/- 3.021E+01 (36.68%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.642E+02	6.237E+01	1.381E+01	2.033E+00	26.371
TH-234	8.237E+01	3.021E+01	2.397E+01	3.083E-01	3.437

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	7.511E+00		1.481E+01	2.886E+01	9.782E+00	0.260
CD-109	3.503E+01		9.579E+01	1.836E+02	1.767E+01	0.191
PA-231	-4.241E-01		8.210E-01	1.393E+00	1.568E-02	-0.305
PA-234	4.126E+00	+	1.356E+00	2.004E+00	2.255E-02	2.060
NP-237	9.548E+00		2.589E+01	4.701E+01	4.147E+00	0.203
AM-241	9.201E-01		1.334E+00	2.337E+00	2.631E-02	0.394