US EPA ARCHIVE DOCUMENT

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ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #13-04132-OR

May 24, 2013

EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN

US EPA ARCHIVE DOCUMENT

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Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 13-04132

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

Date for Partial	Initials	Date	Initials	Checklist Items
		4/18/13	KC	Sample Log-In
		5-22-13	JG	Data Compilation
		5-23-13	MT	First Technical Data Review
		5/23/13	MSA	Second Technical Data Review
		5/23/13		Data Entry/Electronic Deliverable
		5/23/13		Case Narrative
		05/24/13	AJT	Electronic Deliverable Proof
		5/24/13	MSA	Samples Analyzed within Holding Time Yes? [X] No? [ ]
		5/24/13	MSA	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by: _____ 5/24/13

Laboratory Manager — Date

Copy No. _____

Radiochemistry Services

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SECTION I

CHAIN OF CUSTODY
&
pH CHECK SHEET

US EPA ARCHIVE DOCUMENT

REC'D APR 18 2013

13-04132

Chain of Custody Record

№ 1604

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

EBERLINE SERVICES

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

Page 1 of 2

Purchase Order #:

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Diss U-238, U-235, U-234	Diss Ra-226, Ra-228	Diss Thor 230, 232	Tot U-238, 235, 234	Tot Ra 226, 228	Tot Thor 230, 232	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
PZ-208-55	4/12/13	0910	Aqueous	1	X	X	X	X	X	X	(1)	
PZ-101-55		0915			X	X	X	X	X	X		
MW-1224		0926			X	X	X	X	X	X		
PZ-113-[redacted]55		0940			X	X	X	X	X	X		
I-73		1005			X	X	X	X	X	X		
PZ-113-A5		1035			X	X	X	X	X	X		
PZ-107-55		1046			X	X	X	X	X	X		
PZ-116-55		1046			X	X	X	X	X	X		
4,5 D-14		1105			X	X	X	X	X	X		
6,7 PZ-112-A5		1118			X	X	X	X	X	X		
8,9 PZ-202-[redacted]55		1232			X	X	X	X	X	X		
10,11 Dup 03	4/12/13	—			X	X	X	X	X	X		
12,13 PZ-106-55	4/15/13	1559			X	X	X	X	X	X		
14,15 FB@PZ-100-125	4/16/13	0840			X	X	X	X	X	X		
16,17 PZ-100-55		0850			X	X	X	X	X	X		
18,19 S-53		0900	↓	↓	X	X	X	X	X	X	↓	
I-65	4/16/13	1047	Aqueous	1	X	X	X	X	X	X	(1)	

(1) Lab to filter for dissolved parameters.

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	Fed Expt Courier	4/17/13	0800
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
	Kristen Carleton	4/18/13	800
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:

Sample Custodian Remarks (Completed By Laboratory):

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

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04132
Lab Deadline	5/9/2013
Analysis	UUISO - Level 4
Sample Matrix	Water

Comments
Fxns 04, 06, 08, 10, 12, 14, 16, & 18 are TOTAL Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	38	MM1.3
05	38	MM1.3
06	45	MM1.3
07	45	MM1.3
08	46	MM1.3
09	46	MM1.3
10	40	MM1.3
11	40	MM1.3
12	36	MM1.3
13	36	MM1.3
14	39	MM1.3
15	39	MM1.3
16	37	MM1.3
17	37	MM1.3
18	41	MM1.3
19	41	MM1.3

	Location (circle one)					Initials	Date
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	[illegible]	5/3/13 0700
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	[illegible]	5/6/13 1420
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	JPD	5/6/13 1420
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	0930 TCM	5/9/13
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	0930 C	[illegible]
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	KCB	5/9/13 1605
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04132
Lab Deadline	See Comments
Analysis	UUISO - Level 4
Sample Matrix	WA

Comments

Re-Analysis: 2Fxns 04, 06, 08, 10, 12, 14, 16, & 18 are TOTAL

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

Original Lab Deadline: 05/16/13
Rerun Lab Deadline: 05/16/13

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	38	MM1.3
05	38	MM1.3
06	45	MM1.3
07	45	MM1.3
08	46	MM1.3
09	46	MM1.3
10	40	MM1.3
11	40	MM1.3
12	36	MM1.3
13	36	MM1.3
14	39	MM1.3
15	39	MM1.3
16	37	MM1.3
17	37	MM1.3
18	41	MM1.3
19	41	MM1.3

	Location (circle one)					Technician Initials	
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room	[illegible] 5/13/1307	
Relinquished by	Sample Storage	Rough Prep	(Prep)	Separations	Count Room	[illegible] 5/14/13 0545	
Received by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	0545 RM 5/14/13	
Relinquished by	Sample Storage	Rough Prep	Prep	(Separations)	Count Room	1015 RM 5/10/13	
Received by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	1012 [illegible]	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	(Count Room)	[illegible] 0622	
Received by	(Sample Storage)	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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Printed: 5/10/2013 9:23 AM

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Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04132
Lab Deadline	5/9/2013
Analysis	ThISO - Level 4
Sample Matrix	Water

Comments

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

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

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	38	MM1.3
05	38	MM1.3
06	45	MM1.3
07	45	MM1.3
08	46	MM1.3
09	46	MM1.3
10	40	MM1.3
11	40	MM1.3
12	36	MM1.3
13	36	MM1.3
14	39	MM1.3
15	39	MM1.3
16	37	MM1.3
17	37	MM1.3
18	41	MM1.3
19	41	MM1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	5/7/13 1047	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	RM	5/7/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0930 RM	5/9/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0930	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04132
Lab Deadline	5/9/2013
Analysis	Ra226 - Level 4
Sample Matrix	Water

Comments

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

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

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	38	MM1.3
05	38	MM1.3
06	45	MM1.3
07	45	MM1.3
08	46	MM1.3
09	46	MM1.3
10	40	MM1.3
11	40	MM1.3
12	36	MM1.3
13	36	MM1.3
14	39	MM1.3
15	39	MM1.3
16	37	MM1.3
17	37	MM1.3
18	41	MM1.3
19	41	MM1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		5/3/13 0700
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		5/8/13 1400
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		5/9/13 1820
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		5/14/13 1700
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		5/14/13 1715
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04132
Lab Deadline	5/9/2013
Analysis	Ra228 - Level 4
Sample Matrix	Water

Comments

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

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

Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
04	38	MM1.3
05	38	MM1.3
06	45	MM1.3
07	45	MM1.3
08	46	MM1.3
09	46	MM1.3
10	40	MM1.3
11	40	MM1.3
12	36	MM1.3
13	36	MM1.3
14	39	MM1.3
15	39	MM1.3
16	37	MM1.3
17	37	MM1.3
18	41	MM1.3
19	41	MM1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JBT	5/3/13 0700
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	5/8/13 1400
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	5/9/13 1820
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	5/14/13 1700
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	5/14/13 1715
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	5/16/13 1230
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		5-21-13 1405
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	5/21/13 1405
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	5/21/13 1620
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order
13-04132
Received By
KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	MM1.3		
02	BLANK	0		WA	MM1.3		
03	DUP	0		WA	MM1.3		
04	D-14 TOT	1		WA	MM1.3	9.50	38
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / 7 / 7 / 9.5000 / 38				
05	D-14 DIS	1		WA	MM1.3	0.00	38
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / / / / 38				
06	PZ-112-AS TOT	1		WA	MM1.3	9.50	45
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / 7 / 7 / 9.5000 / 45				
07	PZ-112-AS DIS	1		WA	MM1.3	0.00	45
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / / / / 45				
08	PZ-202-SS TOT	1		WA	MM1.3	9.50	46
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / 7 / 7 / 9.5000 / 46				
09	PZ-202-SS DIS	1		WA	MM1.3	0.00	46
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / / / / 46				
10	DUP07 TOT	1		WA	MM1.3	9.50	40
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / 7 / 7 / 9.5000 / 40				
11	DUP07 DIS	1		WA	MM1.3	0.00	40
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / / / / 40				
12	PZ-106-KS TOT	1		WA	MM1.3	9.50	36
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / 7 / 7 / 9.5000 / 36				
13	PZ-106-KS DIS	1		WA	MM1.3	0.00	36
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / / / / 36				
14	FB PZ-100-KS TOT	1		WA	MM1.3	9.50	39
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / 7 / 7 / 9.5000 / 39				
15	FB PZ-100-KS DIS	1		WA	MM1.3	0.00	39
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / / / / 39				
16	PZ-100-KS TOT	1		WA	MM1.3	9.50	37
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / 7 / 7 / 9.5000 / 37				
17	PZ-100-KS DIS	1		WA	MM1.3	0.00	37
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / / / / 37				
18	S-53 TOT	1		WA	MM1.3	8.00	41
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / 7 / 7 / 8.0000 / 41				
19	S-53 DIS	1		WA	MM1.3	0.00	41
			Container Number / pH Orig / pH Final / Volume (L) / CPM				
			1 / / / / 41				

VGJ 04/18/13

Received by: Kristen Coulston Date: 4/18/13

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

0011

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SECTION II

SAMPLE ACKNOWLEDGEMENT

US EPA ARCHIVE DOCUMENT

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
Engineering Management Support, Inc.	West Lake OU-1	Environmental	04/18/2013	28	13-04132
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
West Lake OU-1	West Lake OU-1	W	05/09/2013	05/15/2013	05/16/2013

Internal ID	Client ID	Sample Date	Matrix	Storage	Ra226	Ra228	ThISO	UUISO																					Ttl
01	LCS	04/18/13	WA	MM1.3	X	X	X	X																					4
02	BLANK	04/18/13	WA	MM1.3	X	X	X	X																					4
03	DUP	04/18/13	WA	MM1.3	X	X	X	X																					4
04	D-14 TOT	04/12/13 11:05	WA	MM1.3	X	X	X	X																					4
05	D-14 DIS	04/12/13 11:05	WA	MM1.3	X	X	X	X																					4
06	PZ-112-AS TOT	04/12/13 11:18	WA	MM1.3	X	X	X	X																					4
07	PZ-112-AS DIS	04/12/13 11:18	WA	MM1.3	X	X	X	X																					4
08	PZ-202-SS TOT	04/12/13 12:32	WA	MM1.3	X	X	X	X																					4
09	PZ-202-SS DIS	04/12/13 12:32	WA	MM1.3	X	X	X	X																					4
10	DUP07 TOT	04/12/13 00:00	WA	MM1.3	X	X	X	X																					4
11	DUP07 DIS	04/12/13 00:00	WA	MM1.3	X	X	X	X																					4
12	PZ-106-KS TOT	04/15/13 15:59	WA	MM1.3	X	X	X	X																					4
13	PZ-106-KS DIS	04/15/13 15:59	WA	MM1.3	X	X	X	X																					4
14	FB at PZ-100-KS TOT	04/16/13 08:40	WA	MM1.3	X	X	X	X																					4
15	FB at PZ-100-KS DIS	04/16/13 08:40	WA	MM1.3	X	X	X	X																					4
16	PZ-100-KS TOT	04/16/13 08:50	WA	MM1.3	X	X	X	X																					4
17	PZ-100-KS DIS	04/16/13 08:50	WA	MM1.3	X	X	X	X																					4
18	S-53 TOT	04/16/13 09:00	WA	MM1.3	X	X	X	X																					4
19	S-53 DIS	04/16/13 09:00	WA	MM1.3	X	X	X	X																					4
																													0
		Totals Per Analysis (non QA samples)			16	16	16	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

Sample Log In Report

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

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

Invoice
Paul V. Rosasco, P.E.
Engineering Management Support, Inc.
7220 West Jefferson Avenue, Suite 406
Lakewood, CO 80235
Voice 303-640-3426
Fax

Contact
Lyn Fitzgerald
Voice 303-601-4255
Fax

Report Data
Paul V. Rosasco, P.E.
Engineering Management Support, Inc
7220 West Jefferson Ave, Suite 406
Lakewood, CO 80235
Voice 303-940-3426
Fax

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 13-04132

SAMPLE MATRIX/MATRICES: (CIRCLE ONE OR BOTH)

(AQUEOUS) NON-AQUEOUS

(CIRCLE EITHER YES, NO, OR N/A)

WERE SAMPLES:

Received in good condition?	(Y)	N	
If aqueous, properly preserved	(Y)	N	N/A

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	(Y)	N
Unbroken on outside of package?	(Y)	N
Present on samples?	(Y)	N
Unbroken on samples?	(Y)	N
Was chain of custody present upon sample receipt?	(Y)	N

IF THE RESPONSE TO ANY OF THE ABOVE IS **NO**, A DISCREPANT SAMPLE RECEIPT REPORT (DSR) HAS BEEN ISSUED.

REMARKS: _____

SIGNATURE: Kristen Carlston DATE: 4/18/13

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SECTION III

CASE NARRATIVE

EBERLINE SERVICES

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

EBS-OR-35599

May 24, 2013

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

CASE NARRATIVE
Work Order # 13-04132-OR

SAMPLE RECEIPT

This work order contains eight water samples received 04/18/2013. All samples were analyzed as total and dissolved for Isotopic Uranium, Isotopic Thorium and Radium-226/228.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
D-14 TOT	13-04132-04	PZ-106-KS TOT	13-04132-12
D-14 DIS	13-04132-05	PZ-106-KS DIS	13-04132-13
PZ-112-AS TOT	13-04132-06	FB at PZ-100-KS TOT	13-04132-14
PZ-112-AS DIS	13-04132-07	FB at PZ-100-KS DIS	13-04132-15
PZ-202-SS TOT	13-04132-08	PZ-100-KS TOT	13-04132-16
PZ-202-SS DIS	13-04132-09	PZ-100-KS DIS	13-04132-17
DUP07 TOT	13-04132-10	S-53 TOT	13-04132-18
DUP07 DIS	13-04132-11	S-53 DIS	13-04132-19

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.

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ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM

Samples were filtered to disassociate dissolved and total fractions. All samples were prepared by mixed acid digestions as appropriate. Uranium was selectively extracted by ion exchange. Uranium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using energy specific regions of interest for Uranium-234, Uranium-235 and Uranium-238. Chemical recovery was determined by the use of a Uranium-232 tracer. Activity of the Uranium-232 tracer was determined by alpha spectroscopy using an energy specific region of interest.

1st Analytical Attempt

Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was slightly low for sample fractions -05, -06, -07 and -18 (Client IDs: D-14 DIS, PZ-112-AS TOT, PZ-112-AS DIS and S-53 TOT, respectively). Chemical recovery was acceptable for all other samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 and Uranium-238 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-235 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-234 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

2nd Analytical Attempt

Sample fractions -05, -06, -07 and -18 (Client IDs: D-14 DIS, PZ-112-AS TOT, PZ-112-AS DIS and S-53 TOT, respectively) were reanalyzed due to low chemical recoveries. Samples demonstrated acceptable results for all Uranium analyses. Due to interferences chemical recovery was low for sample fraction -18 (Client ID: S-53 TOT). Chemical recovery was acceptable for all other samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234, 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.

ISOTOPIC THORIUM

Samples were filtered to disassociate dissolved and total fractions. All samples were prepared by mixed acid digestions as appropriate. Thorium was selectively extracted by ion exchange. Thorium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using energy specific regions of interest for Thorium-228, Thorium-230 and Thorium-232. Chemical recovery was determined by the use of a Thorium-229 tracer. Activity of the Thorium-229 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Samples demonstrated acceptable results for all Thorium analyses. Chemical recovery was acceptable for all samples. The Thorium-228, Thorium-230 and Thorium-232 method blank demonstrated acceptable results. Results for the Thorium-228 and Thorium-230 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Thorium-232 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Thorium-228, Thorium-230 and Thorium-232 laboratory control sample demonstrated an acceptable percent recovery.

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ANALYTICAL RESULTS CONTINUED

RADIUM-226

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

Samples demonstrated acceptable results for all Radium-226 analyses. Due to interferences chemical recovery was low for sample fraction -18 (Client ID: S-53 TOT). Chemical recovery was acceptable for all other samples. The Radium-226 method blank demonstrated acceptable results. Results for the Radium-226 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-226 laboratory control sample demonstrated an acceptable percent recovery.

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. Due to interferences chemical recovery was low for sample fraction -18 (Client ID: S-53 TOT). Chemical recovery was acceptable for all other samples. The Radium-228 method blank demonstrated acceptable results. Results for the Radium-228 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

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

M.R. McDougall
Laboratory Manager

Date: 5/24/2013

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SECTION IV

ANALYTICAL RESULTS SUMMARY

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7220 West Jefferson Ave, Suite 406
Lakewood, CO 80235

Project: West Lake OU-1
SDG: 1304132
Received: 04/18/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
LCS13-04132-01	13-04132-01	05/15/2013 16:51:46	Radium-226	E903.0	10.38	1.25	0.23		pCi/l
LCS13-04132-01	13-04132-01	05/21/2013 13:47:17	Radium-228	E904.0	9.46	2.03	2.04		pCi/l
LCS13-04132-01	13-04132-01	05/09/2013 16:28:50	Thorium-228	HASL 300, 4.5.2	4.62	0.69	0.12		pCi/l
LCS13-04132-01	13-04132-01	05/09/2013 16:28:50	Thorium-230	HASL 300, 4.5.2	4.48	0.68	0.07		pCi/l
LCS13-04132-01	13-04132-01	05/09/2013 16:28:50	Thorium-232	HASL 300, 4.5.2	4.53	0.68	0.06		pCi/l
LCS13-04132-01	13-04132-01	05/09/2013 09:57:46	Uranium-234	HASL 300, 4.5.2	7.58	1.14	0.11		pCi/l
LCS13-04132-01	13-04132-01	05/16/2013 12:25:05	Uranium-234	HASL 300, 4.5.2	7.45	1.00	0.10		pCi/l
LCS13-04132-01	13-04132-01	05/09/2013 09:57:46	Uranium-235	HASL 300, 4.5.2	0.56	0.22	0.10		pCi/l
LCS13-04132-01	13-04132-01	05/16/2013 12:25:05	Uranium-235	HASL 300, 4.5.2	0.68	0.22	0.10		pCi/l
LCS13-04132-01	13-04132-01	05/09/2013 09:57:46	Uranium-238	HASL 300, 4.5.2	7.55	1.13	0.15		pCi/l
LCS13-04132-01	13-04132-01	05/16/2013 12:25:05	Uranium-238	HASL 300, 4.5.2	7.76	1.04	0.08		pCi/l
BLANK13-04132-02	13-04132-02	05/15/2013 16:51:43	Radium-226	E903.0	0.03	0.07	0.15	U	pCi/l
BLANK13-04132-02	13-04132-02	05/21/2013 13:46:21	Radium-228	E904.0	0.39	0.34	0.69	J	pCi/l
BLANK13-04132-02	13-04132-02	05/09/2013 16:28:52	Thorium-228	HASL 300, 4.5.2	0.03	0.07	0.14	U	pCi/l
BLANK13-04132-02	13-04132-02	05/09/2013 16:28:52	Thorium-230	HASL 300, 4.5.2	0.27	0.15	0.13	J	pCi/l
BLANK13-04132-02	13-04132-02	05/09/2013 16:28:52	Thorium-232	HASL 300, 4.5.2	-0.02	0.04	0.11	U	pCi/l
BLANK13-04132-02	13-04132-02	05/09/2013 09:57:48	Uranium-234	HASL 300, 4.5.2	0.06	0.09	0.13	U	pCi/l
BLANK13-04132-02	13-04132-02	05/16/2013 15:38:27	Uranium-234	HASL 300, 4.5.2	0.06	0.08	0.14	U	pCi/l
BLANK13-04132-02	13-04132-02	05/09/2013 09:57:48	Uranium-235	HASL 300, 4.5.2	0.09	0.11	0.13	U	pCi/l
BLANK13-04132-02	13-04132-02	05/16/2013 15:38:27	Uranium-235	HASL 300, 4.5.2	0.06	0.09	0.14	U	pCi/l
BLANK13-04132-02	13-04132-02	05/09/2013 09:57:48	Uranium-238	HASL 300, 4.5.2	0.04	0.07	0.12	U	pCi/l
BLANK13-04132-02	13-04132-02	05/16/2013 15:38:27	Uranium-238	HASL 300, 4.5.2	0.01	0.04	0.10	U	pCi/l
FB at PZ-100-KS TOT DUP	13-04132-03	05/15/2013 16:51:43	Radium-226	E903.0	0.05	0.07	0.13	U	pCi/l
FB at PZ-100-KS TOT DUP	13-04132-03	05/21/2013 13:46:21	Radium-228	E904.0	0.57	0.38	0.74	J	pCi/l
PZ-106-KS TOT DUP	13-04132-03	05/09/2013 16:28:46	Thorium-228	HASL 300, 4.5.2	0.03	0.07	0.13	U	pCi/l
PZ-106-KS TOT DUP	13-04132-03	05/09/2013 16:28:46	Thorium-230	HASL 300, 4.5.2	0.28	0.13	0.08		pCi/l
PZ-106-KS TOT DUP	13-04132-03	05/09/2013 16:28:46	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.08	U	pCi/l
PZ-106-KS TOT DUP	13-04132-03	05/09/2013 09:57:42	Uranium-234	HASL 300, 4.5.2	2.19	0.41	0.06		pCi/l
PZ-112-AS TOT DUP	13-04132-03	05/16/2013 15:38:28	Uranium-234	HASL 300, 4.5.2	0.12	0.21	0.37	U	pCi/l
PZ-106-KS TOT DUP	13-04132-03	05/09/2013 09:57:42	Uranium-235	HASL 300, 4.5.2	0.21	0.12	0.07		pCi/l
PZ-112-AS TOT DUP	13-04132-03	05/16/2013 15:38:28	Uranium-235	HASL 300, 4.5.2	0.21	0.25	0.30	U	pCi/l
PZ-106-KS TOT DUP	13-04132-03	05/09/2013 09:57:42	Uranium-238	HASL 300, 4.5.2	0.78	0.22	0.08		pCi/l
PZ-112-AS TOT DUP	13-04132-03	05/16/2013 15:38:28	Uranium-238	HASL 300, 4.5.2	0.07	0.17	0.35	U	pCi/l

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Project: West Lake OU-1
SDG: 1304132
Received: 04/18/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
D-14 TOT	13-04132-04	05/15/2013 16:51:44	Radium-226	E903.0	1.97	0.46	0.17		pCi/l
D-14 TOT	13-04132-04	05/21/2013 13:46:22	Radium-228	E904.0	1.74	0.55	1.00		pCi/l
D-14 TOT	13-04132-04	05/09/2013 16:28:47	Thorium-228	HASL 300, 4.5.2	0.99	0.28	0.12		pCi/l
D-14 TOT	13-04132-04	05/09/2013 16:28:47	Thorium-230	HASL 300, 4.5.2	1.15	0.30	0.05		pCi/l
D-14 TOT	13-04132-04	05/09/2013 16:28:47	Thorium-232	HASL 300, 4.5.2	1.17	0.30	0.07		pCi/l
D-14 TOT	13-04132-04	05/09/2013 09:57:44	Uranium-234	HASL 300, 4.5.2	0.75	0.39	0.26		pCi/l
D-14 TOT	13-04132-04	05/09/2013 09:57:44	Uranium-235	HASL 300, 4.5.2	-0.02	0.11	0.26	U	pCi/l
D-14 TOT	13-04132-04	05/09/2013 09:57:44	Uranium-238	HASL 300, 4.5.2	1.05	0.47	0.18		pCi/l
D-14 DIS	13-04132-05	05/15/2013 16:51:45	Radium-226	E903.0	0.79	0.30	0.22		pCi/l
D-14 DIS	13-04132-05	05/21/2013 13:46:22	Radium-228	E904.0	1.39	0.45	0.80		pCi/l
D-14 DIS	13-04132-05	05/09/2013 16:28:48	Thorium-228	HASL 300, 4.5.2	0.05	0.07	0.12	U	pCi/l
D-14 DIS	13-04132-05	05/09/2013 16:28:48	Thorium-230	HASL 300, 4.5.2	0.16	0.10	0.08	J	pCi/l
D-14 DIS	13-04132-05	05/09/2013 16:28:48	Thorium-232	HASL 300, 4.5.2	0.00	0.03	0.06	U	pCi/l
D-14 DIS	13-04132-05	05/16/2013 15:38:29	Uranium-234	HASL 300, 4.5.2	0.27	0.59	1.15	U	pCi/l
D-14 DIS	13-04132-05	05/16/2013 15:38:29	Uranium-235	HASL 300, 4.5.2	0.21	0.50	1.05	U	pCi/l
D-14 DIS	13-04132-05	05/16/2013 15:38:29	Uranium-238	HASL 300, 4.5.2	0.71	0.82	1.07	U	pCi/l
PZ-112-AS TOT	13-04132-06	05/15/2013 16:52:11	Radium-226	E903.0	0.95	0.38	0.17		pCi/l
PZ-112-AS TOT	13-04132-06	05/21/2013 13:46:26	Radium-228	E904.0	2.24	0.50	0.84		pCi/l
PZ-112-AS TOT	13-04132-06	05/09/2013 16:28:49	Thorium-228	HASL 300, 4.5.2	0.11	0.11	0.16	U	pCi/l
PZ-112-AS TOT	13-04132-06	05/09/2013 16:28:49	Thorium-230	HASL 300, 4.5.2	0.19	0.11	0.10	J	pCi/l
PZ-112-AS TOT	13-04132-06	05/09/2013 16:28:49	Thorium-232	HASL 300, 4.5.2	0.05	0.07	0.10	U	pCi/l
PZ-112-AS TOT	13-04132-06	05/16/2013 15:38:30	Uranium-234	HASL 300, 4.5.2	0.08	0.24	0.51	U	pCi/l
PZ-112-AS TOT	13-04132-06	05/16/2013 15:38:30	Uranium-235	HASL 300, 4.5.2	0.06	0.17	0.40	U	pCi/l
PZ-112-AS TOT	13-04132-06	05/16/2013 15:38:30	Uranium-238	HASL 300, 4.5.2	0.09	0.19	0.38	U	pCi/l
PZ-112-AS DIS	13-04132-07	05/15/2013 16:52:12	Radium-226	E903.0	0.74	0.31	0.16		pCi/l
PZ-112-AS DIS	13-04132-07	05/21/2013 13:46:26	Radium-228	E904.0	1.05	0.44	0.82	J	pCi/l
PZ-112-AS DIS	13-04132-07	05/09/2013 16:29:24	Thorium-228	HASL 300, 4.5.2	0.01	0.08	0.17	U	pCi/l
PZ-112-AS DIS	13-04132-07	05/09/2013 16:29:24	Thorium-230	HASL 300, 4.5.2	0.20	0.13	0.10	J	pCi/l
PZ-112-AS DIS	13-04132-07	05/09/2013 16:29:24	Thorium-232	HASL 300, 4.5.2	0.03	0.06	0.12	U	pCi/l
PZ-112-AS DIS	13-04132-07	05/16/2013 11:43:37	Uranium-234	HASL 300, 4.5.2	0.26	0.27	0.28	U	pCi/l
PZ-112-AS DIS	13-04132-07	05/16/2013 11:43:37	Uranium-235	HASL 300, 4.5.2	0.00	0.23	0.50	U	pCi/l
PZ-112-AS DIS	13-04132-07	05/16/2013 11:43:37	Uranium-238	HASL 300, 4.5.2	0.27	0.30	0.41	U	pCi/l

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Project: West Lake OU-1
SDG: 1304132
Received: 04/18/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
PZ-202-SS TOT	13-04132-08	05/15/2013 16:52:14	Radium-226	E903.0	0.85	0.30	0.15		pCi/l
PZ-202-SS TOT	13-04132-08	05/21/2013 13:46:26	Radium-228	E904.0	0.69	0.44	0.86	J	pCi/l
PZ-202-SS TOT	13-04132-08	05/09/2013 16:29:25	Thorium-228	HASL 300, 4.5.2	0.16	0.11	0.13	J	pCi/l
PZ-202-SS TOT	13-04132-08	05/09/2013 16:29:25	Thorium-230	HASL 300, 4.5.2	0.39	0.17	0.10		pCi/l
PZ-202-SS TOT	13-04132-08	05/09/2013 16:29:25	Thorium-232	HASL 300, 4.5.2	0.10	0.08	0.09	J	pCi/l
PZ-202-SS TOT	13-04132-08	05/09/2013 12:54:35	Uranium-234	HASL 300, 4.5.2	1.69	0.34	0.07		pCi/l
PZ-202-SS TOT	13-04132-08	05/09/2013 12:54:35	Uranium-235	HASL 300, 4.5.2	0.13	0.09	0.09	J	pCi/l
PZ-202-SS TOT	13-04132-08	05/09/2013 12:54:35	Uranium-238	HASL 300, 4.5.2	0.78	0.21	0.08		pCi/l
PZ-202-SS DIS	13-04132-09	05/15/2013 16:52:16	Radium-226	E903.0	0.38	0.20	0.17		pCi/l
PZ-202-SS DIS	13-04132-09	05/21/2013 13:46:27	Radium-228	E904.0	0.86	0.41	0.78	J	pCi/l
PZ-202-SS DIS	13-04132-09	05/09/2013 16:29:26	Thorium-228	HASL 300, 4.5.2	0.10	0.09	0.11	J	pCi/l
PZ-202-SS DIS	13-04132-09	05/09/2013 16:29:26	Thorium-230	HASL 300, 4.5.2	0.13	0.09	0.08	J	pCi/l
PZ-202-SS DIS	13-04132-09	05/09/2013 16:29:26	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.06	U	pCi/l
PZ-202-SS DIS	13-04132-09	05/09/2013 12:54:36	Uranium-234	HASL 300, 4.5.2	1.62	0.32	0.05		pCi/l
PZ-202-SS DIS	13-04132-09	05/09/2013 12:54:36	Uranium-235	HASL 300, 4.5.2	0.05	0.06	0.06	U	pCi/l
PZ-202-SS DIS	13-04132-09	05/09/2013 12:54:36	Uranium-238	HASL 300, 4.5.2	0.63	0.18	0.05		pCi/l
DUP07 TOT	13-04132-10	05/15/2013 16:52:17	Radium-226	E903.0	4.11	0.81	0.21		pCi/l
DUP07 TOT	13-04132-10	05/21/2013 13:46:21	Radium-228	E904.0	1.80	0.65	1.20	J	pCi/l
DUP07 TOT	13-04132-10	05/09/2013 16:29:27	Thorium-228	HASL 300, 4.5.2	0.10	0.08	0.10	J	pCi/l
DUP07 TOT	13-04132-10	05/09/2013 16:29:27	Thorium-230	HASL 300, 4.5.2	0.10	0.08	0.09	J	pCi/l
DUP07 TOT	13-04132-10	05/09/2013 16:29:27	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.06	U	pCi/l
DUP07 TOT	13-04132-10	05/09/2013 12:55:17	Uranium-234	HASL 300, 4.5.2	0.16	0.16	0.17	U	pCi/l
DUP07 TOT	13-04132-10	05/09/2013 12:55:17	Uranium-235	HASL 300, 4.5.2	-0.01	0.10	0.21	U	pCi/l
DUP07 TOT	13-04132-10	05/09/2013 12:55:17	Uranium-238	HASL 300, 4.5.2	0.03	0.08	0.17	U	pCi/l
DUP07 DIS	13-04132-11	05/15/2013 16:52:19	Radium-226	E903.0	2.31	0.60	0.21		pCi/l
DUP07 DIS	13-04132-11	05/21/2013 13:46:21	Radium-228	E904.0	2.47	0.56	0.95		pCi/l
DUP07 DIS	13-04132-11	05/09/2013 16:29:28	Thorium-228	HASL 300, 4.5.2	-0.01	0.04	0.11	U	pCi/l
DUP07 DIS	13-04132-11	05/09/2013 16:29:28	Thorium-230	HASL 300, 4.5.2	0.11	0.08	0.07	J	pCi/l
DUP07 DIS	13-04132-11	05/09/2013 16:29:28	Thorium-232	HASL 300, 4.5.2	-0.01	0.03	0.07	U	pCi/l
DUP07 DIS	13-04132-11	05/09/2013 12:55:19	Uranium-234	HASL 300, 4.5.2	0.23	0.19	0.17	J	pCi/l
DUP07 DIS	13-04132-11	05/09/2013 12:55:19	Uranium-235	HASL 300, 4.5.2	0.04	0.12	0.26	U	pCi/l
DUP07 DIS	13-04132-11	05/09/2013 12:55:19	Uranium-238	HASL 300, 4.5.2	0.13	0.14	0.15	U	pCi/l

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Project: West Lake OU-1
SDG: 1304132
Received: 04/18/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
PZ-106-KS TOT	13-04132-12	05/15/2013 16:52:20	Radium-226	E903.0	0.38	0.20	0.16		pCi/l
PZ-106-KS TOT	13-04132-12	05/21/2013 13:46:21	Radium-228	E904.0	0.31	0.43	0.89	U	pCi/l
PZ-106-KS TOT	13-04132-12	05/09/2013 16:29:29	Thorium-228	HASL 300, 4.5.2	-0.01	0.04	0.12	U	pCi/l
PZ-106-KS TOT	13-04132-12	05/09/2013 16:29:29	Thorium-230	HASL 300, 4.5.2	0.09	0.08	0.09	J	pCi/l
PZ-106-KS TOT	13-04132-12	05/09/2013 16:29:29	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.07	U	pCi/l
PZ-106-KS TOT	13-04132-12	05/09/2013 12:55:21	Uranium-234	HASL 300, 4.5.2	2.25	0.40	0.05		pCi/l
PZ-106-KS TOT	13-04132-12	05/09/2013 12:55:21	Uranium-235	HASL 300, 4.5.2	0.07	0.07	0.09	U	pCi/l
PZ-106-KS TOT	13-04132-12	05/09/2013 12:55:21	Uranium-238	HASL 300, 4.5.2	0.86	0.22	0.07		pCi/l
PZ-106-KS DIS	13-04132-13	05/15/2013 16:52:22	Radium-226	E903.0	0.32	0.19	0.15	J	pCi/l
PZ-106-KS DIS	13-04132-13	05/21/2013 13:46:22	Radium-228	E904.0	0.43	0.43	0.87	U	pCi/l
PZ-106-KS DIS	13-04132-13	05/09/2013 16:29:59	Thorium-228	HASL 300, 4.5.2	0.04	0.05	0.08	U	pCi/l
PZ-106-KS DIS	13-04132-13	05/09/2013 16:29:59	Thorium-230	HASL 300, 4.5.2	0.16	0.10	0.06	J	pCi/l
PZ-106-KS DIS	13-04132-13	05/09/2013 16:29:59	Thorium-232	HASL 300, 4.5.2	0.01	0.04	0.09	U	pCi/l
PZ-106-KS DIS	13-04132-13	05/09/2013 12:55:23	Uranium-234	HASL 300, 4.5.2	2.02	0.37	0.06		pCi/l
PZ-106-KS DIS	13-04132-13	05/09/2013 12:55:23	Uranium-235	HASL 300, 4.5.2	0.09	0.08	0.09	J	pCi/l
PZ-106-KS DIS	13-04132-13	05/09/2013 12:55:23	Uranium-238	HASL 300, 4.5.2	0.73	0.20	0.07		pCi/l
FB at PZ-100-KS TOT	13-04132-14	05/15/2013 16:52:24	Radium-226	E903.0	0.00	0.07	0.17	U	pCi/l
FB at PZ-100-KS TOT	13-04132-14	05/21/2013 13:47:07	Radium-228	E904.0	0.19	0.45	0.94	U	pCi/l
FB at PZ-100-KS TOT	13-04132-14	05/09/2013 16:30:00	Thorium-228	HASL 300, 4.5.2	0.04	0.05	0.06	U	pCi/l
FB at PZ-100-KS TOT	13-04132-14	05/09/2013 16:30:00	Thorium-230	HASL 300, 4.5.2	0.18	0.10	0.06		pCi/l
FB at PZ-100-KS TOT	13-04132-14	05/09/2013 16:30:00	Thorium-232	HASL 300, 4.5.2	0.00	0.03	0.05	U	pCi/l
FB at PZ-100-KS TOT	13-04132-14	05/09/2013 12:55:25	Uranium-234	HASL 300, 4.5.2	0.08	0.07	0.08	J	pCi/l
FB at PZ-100-KS TOT	13-04132-14	05/09/2013 12:55:25	Uranium-235	HASL 300, 4.5.2	0.04	0.05	0.07	U	pCi/l
FB at PZ-100-KS TOT	13-04132-14	05/09/2013 12:55:25	Uranium-238	HASL 300, 4.5.2	0.06	0.06	0.07	U	pCi/l
FB at PZ-100-KS DIS	13-04132-15	05/15/2013 16:52:25	Radium-226	E903.0	0.00	0.05	0.10	U	pCi/l
FB at PZ-100-KS DIS	13-04132-15	05/21/2013 13:47:07	Radium-228	E904.0	0.56	0.39	0.77	J	pCi/l
FB at PZ-100-KS DIS	13-04132-15	05/09/2013 16:29:55	Thorium-228	HASL 300, 4.5.2	-0.01	0.03	0.08	U	pCi/l
FB at PZ-100-KS DIS	13-04132-15	05/09/2013 16:29:55	Thorium-230	HASL 300, 4.5.2	0.17	0.10	0.06		pCi/l
FB at PZ-100-KS DIS	13-04132-15	05/09/2013 16:29:55	Thorium-232	HASL 300, 4.5.2	0.00	0.04	0.08	U	pCi/l
FB at PZ-100-KS DIS	13-04132-15	05/09/2013 12:55:28	Uranium-234	HASL 300, 4.5.2	0.07	0.06	0.07	J	pCi/l
FB at PZ-100-KS DIS	13-04132-15	05/09/2013 12:55:28	Uranium-235	HASL 300, 4.5.2	0.04	0.05	0.06	U	pCi/l
FB at PZ-100-KS DIS	13-04132-15	05/09/2013 12:55:28	Uranium-238	HASL 300, 4.5.2	-0.02	0.03	0.10	U	pCi/l

US EPA ARCHIVE DOCUMENT

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

Project: West Lake OU-1
SDG: 1304132
Received: 04/18/2013
Matrix: Water

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	MDA	Qualifier	Units
PZ-100-KS TOT	13-04132-16	05/15/2013 16:52:27	Radium-226	E903.0	0.16	0.14	0.12	J	pCi/l
PZ-100-KS TOT	13-04132-16	05/21/2013 13:47:08	Radium-228	E904.0	0.84	0.54	1.05	J	pCi/l
PZ-100-KS TOT	13-04132-16	05/09/2013 16:29:57	Thorium-228	HASL 300, 4.5.2	0.09	0.08	0.08	J	pCi/l
PZ-100-KS TOT	13-04132-16	05/09/2013 16:29:57	Thorium-230	HASL 300, 4.5.2	0.39	0.17	0.07		pCi/l
PZ-100-KS TOT	13-04132-16	05/09/2013 16:29:57	Thorium-232	HASL 300, 4.5.2	0.03	0.05	0.09	U	pCi/l
PZ-100-KS TOT	13-04132-16	05/09/2013 12:55:30	Uranium-234	HASL 300, 4.5.2	0.16	0.09	0.07		pCi/l
PZ-100-KS TOT	13-04132-16	05/09/2013 12:55:30	Uranium-235	HASL 300, 4.5.2	0.03	0.04	0.07	U	pCi/l
PZ-100-KS TOT	13-04132-16	05/09/2013 12:55:30	Uranium-238	HASL 300, 4.5.2	0.06	0.06	0.06	U	pCi/l
PZ-100-KS DIS	13-04132-17	05/15/2013 16:52:29	Radium-226	E903.0	0.26	0.16	0.14	J	pCi/l
PZ-100-KS DIS	13-04132-17	05/21/2013 13:47:09	Radium-228	E904.0	0.96	0.38	0.69	J	pCi/l
PZ-100-KS DIS	13-04132-17	05/09/2013 16:30:07	Thorium-228	HASL 300, 4.5.2	0.02	0.04	0.09	U	pCi/l
PZ-100-KS DIS	13-04132-17	05/09/2013 16:30:07	Thorium-230	HASL 300, 4.5.2	0.08	0.07	0.06	J	pCi/l
PZ-100-KS DIS	13-04132-17	05/09/2013 16:30:07	Thorium-232	HASL 300, 4.5.2	0.00	0.03	0.06	U	pCi/l
PZ-100-KS DIS	13-04132-17	05/09/2013 12:55:33	Uranium-234	HASL 300, 4.5.2	0.07	0.06	0.05	J	pCi/l
PZ-100-KS DIS	13-04132-17	05/09/2013 12:55:33	Uranium-235	HASL 300, 4.5.2	0.01	0.03	0.06	U	pCi/l
PZ-100-KS DIS	13-04132-17	05/09/2013 12:55:33	Uranium-238	HASL 300, 4.5.2	0.10	0.07	0.07	J	pCi/l
S-53 TOT	13-04132-18	05/15/2013 16:52:31	Radium-226	E903.0	0.14	0.31	0.62	U	pCi/l
S-53 TOT	13-04132-18	05/21/2013 13:47:31	Radium-228	E904.0	-2.53	4.71	10.29	U	pCi/l
S-53 TOT	13-04132-18	05/09/2013 16:30:03	Thorium-228	HASL 300, 4.5.2	19.95	3.92	0.12		pCi/l
S-53 TOT	13-04132-18	05/09/2013 16:30:03	Thorium-230	HASL 300, 4.5.2	19.58	3.85	0.13		pCi/l
S-53 TOT	13-04132-18	05/09/2013 16:30:03	Thorium-232	HASL 300, 4.5.2	19.05	3.75	0.18		pCi/l
S-53 TOT	13-04132-18	05/16/2013 15:38:31	Uranium-234	HASL 300, 4.5.2	45.30	19.89	3.63		pCi/l
S-53 TOT	13-04132-18	05/16/2013 15:38:31	Uranium-235	HASL 300, 4.5.2	11.37	7.53	4.81	J	pCi/l
S-53 TOT	13-04132-18	05/16/2013 15:38:31	Uranium-238	HASL 300, 4.5.2	53.49	22.91	3.29		pCi/l
S-53 DIS	13-04132-19	05/15/2013 16:52:33	Radium-226	E903.0	0.84	0.33	0.14		pCi/l
S-53 DIS	13-04132-19	05/21/2013 13:47:32	Radium-228	E904.0	1.46	0.62	1.15	J	pCi/l
S-53 DIS	13-04132-19	05/09/2013 16:30:05	Thorium-228	HASL 300, 4.5.2	0.03	0.05	0.09	U	pCi/l
S-53 DIS	13-04132-19	05/09/2013 16:30:05	Thorium-230	HASL 300, 4.5.2	0.22	0.12	0.07		pCi/l
S-53 DIS	13-04132-19	05/09/2013 16:30:05	Thorium-232	HASL 300, 4.5.2	0.11	0.08	0.07	J	pCi/l
S-53 DIS	13-04132-19	05/09/2013 12:55:39	Uranium-234	HASL 300, 4.5.2	5.90	0.82	0.07		pCi/l
S-53 DIS	13-04132-19	05/09/2013 12:55:39	Uranium-235	HASL 300, 4.5.2	0.40	0.16	0.08		pCi/l
S-53 DIS	13-04132-19	05/09/2013 12:55:39	Uranium-238	HASL 300, 4.5.2	4.74	0.69	0.05		pCi/l

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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
818·843·7000 FAX 818·843·6168

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

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

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

CURRENT DATE: 9/6/2012 0:00

SOLUTION REFERENCE #: IPL 479-50 | SOLUTION #: U-8

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

Radionuclide: $^{234, 235, 238}U$ | Reference Date: 1/1/1995 0:00
Certified Activity: 8.016E+00 µCi
Certified Concentration: µCi per gram

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

Chemical Composition of Standard Solution
Uranyl nitrate in dilute HNO_3

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

Dilute to a volume of 1000.00 **milliliters**

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

And after dilution the activity of this solution is 1.77955E+04 **dpm/ml**

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

Expiration Date: September 6, 2013

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

QC Approval _____ Date: 9/26/12

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Rev.8; 11/01/03
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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: $^{234, 235, 238}U$
Parent Solution Conc.: 1.7796E+04 dpm/ml

Reference Date: 1/1/1995 0:00

Chemical Composition of Standard Solution
Uranly Nitrate in 1M HNO_3

Dilution Instructions:

Dilution Solvent Used: 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 7.1182E+01 dpm/ml

NOTES:

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

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

Isotopic ratios from manufacturer's data sheet

Expiration Date: September 6, 2013

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

QC Approval _____ Date: 9/26/12

RECORD COPY

Tracer Solution for Environmental Analysis & Disequilibrium Studies

Product Description & Measurement Certificate

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

Method of measurement (see reverse of this certificate)

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

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

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

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

Not measured

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

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

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

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

Approved Signatory

Roger Wiltshire

Project Ref. AE2315

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

AEA Technology is the trading name of AEA Technology plc

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PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 12/13/2012 0:00

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

SOLUTION #: U-10

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

Radionuclide: ^{232}U

Reference Date: 3/1/2000 0:00

Certified Activity: 9.760E-01 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross: Weight, Grams

Empty Ampoule: Weight, Grams

Solution Net: Weight, Grams

Total Activity in Ampoule: 0.9760 µCi

Chemical Composition of Standard Solution

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

Dilution Instructions:

Dilution Solvent Used: 2M HNO_3

Dilute to a volume of: 1000.00 milliliters

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

And after dilution the activity of this solution is: 2.167E+03 dpm/ml

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

Expiration Date: December 7, 2013

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

QC Approval: _____ Date: 12/13/12

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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

US EPA ARCHIVE DOCUMENT

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

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Received
OCT 14 1991
TMA/Eberline
Oak Ridge Lab

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

Description of Solution

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

Radioimpurities

See attached technical data sheet

Radioactive Daughters

See attached technical data sheet

Radionuclide Concentration

0.207 µCi/gram.

Method of Calibration

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

Uncertainty of Measurement

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

NIST Traceability

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

Notes

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

QUALITY CONTROL

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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

EBERLINE SERVICES | QUALITY CONTROL PROGRAM
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RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

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

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

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

Reference Date: 11/1/1991 0:00

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

Dilution Instructions:

Dilution Solvent Used: 0.1N HNO_3

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 2.2999E+01 dpm/ml

NOTES:

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

Expiration Date: March 4, 2014

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

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

QC Approval _____ Date: 3/21/13

US EPA ARCHIVE DOCUMENT

Th-8

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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

Description of Solution

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

Radioimpurities: None detected (other than daughters).

Radioactive Daughters

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

Radionuclide Concentration

(Th-232) 0.00779 μCi/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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

Anna U. Khan
QUALITY CONTROL

Nov. 8, 1993
Date Signed

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

US EPA ARCHIVE DOCUMENT

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

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

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

CURRENT DATE: 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

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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
Parent Solution Conc.: 2.07E+02 dpm/ml

Reference Date: 11/1/1993 0:00

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

Dilution Instructions:

Dilution Solvent Used: 1% Nitric Acid

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 1.0355E+02 dpm/ml

NOTES:

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

Expiration Date: 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

US EPA ARCHIVE DOCUMENT

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

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QUALITY CONTROL PROGRAM

MP-009

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

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

CURRENT DATE: 11/9/2012 0:00

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

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

Radionuclide: ^{229}Th
Reference Date: 1/15/2002 0:00
Certified Activity: 1.013E+00 µCi
Certified Concentration: µCi per gram

Ampoule /Solution Gross	8.7752	Weight, Grams
Empty Ampoule	3.7591	Weight, Grams
Solution Net	5.0161	Weight, Grams
Total Activity in Ampoule	1.0130	µCi

Chemical Composition of Standard Solution

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

Dilution Instructions:

Dilution Solvent Used: 0.1 M HNO_3

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 2.249E+03 dpm/ml

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

Expiration Date: October 9, 2013

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

QC Approval _____ Date: 11/12/12

13a-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.

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EBERLINE SERVICES

QUALITY CONTROL PROGRAM

QCP-009

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

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

CURRENT DATE: 9/20/2012 0:00

SOLUTION REFERENCE #: NIST SRM4251C

SOLUTION #: Ba-6

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

Radionuclide: ^{133}Barium

Reference Date: 9/1/1993 0:00

Certified Activity: µCi

Certified Concentration: 1.318E+01 µCi per gram

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

Chemical Composition of Standard Solution

$^{133}BaCl_2$ in 1M HCl

Dilution Instructions:

Dilution Solvent Used: 1M HCl

Dilute to a volume of: 1000.00 milliliters

Certified Total Activity of: 66.5577 µCi

Which Equals: 1.478E+08 dpm at the date listed above

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

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

Expiration Date: September 20, 2013

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

QC Approval: _____ Date: 9/27/12

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Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

Reference Date: 9/1/1993 0:00

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

Dilution Instructions:

Dilution Solvent Used: 1M HCl

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 3.6950E+03 dpm/ml

NOTES:

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

Expiration Date: September 20, 2013

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

QC Approval _____ Date: 9/27/12

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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

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).

Anna M. Klein
QUALITY CONTROL

Feb. 3, 1994
Date Signed

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

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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 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

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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 STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

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

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

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

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

Dilution Instructions:
Dilution Solvent Used 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

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

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

NOTES:

Expiration Date: November 9, 2013

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

QC Approval _____ Date: 11/12/12

RA-11

ANALYTICS

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

62680-416

Ra-228 5 mL Liquid in Flame Sealed Vial

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

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

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

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

*99% Confidence Level

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

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

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

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

Q A APPROVED: 11/7/01

New vial from the 6/11/01 shipment.
P.S. Different activity Level
8/9/11

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

CURRENT DATE: 4/16/2012 0:00

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

Principal Radionuclide	Half Life, Years	Half Life, Days
^{226}Ra	5.750E+00	2.100E+03

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

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

Chemical Composition of Standard Solution

$^{226}Ra(NO_3)_2$ 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: April 12, 2013

Recertified By _____ Date: 4/16/12

Verified & Approved By _____ Date: _____

QC Approval _____ Date: 4/16/12

US EPA ARCHIVE DOCUMENT

SECTION VI

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	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	0.84	93.29%	16.60%	100.00%	3.60%	8.12E+00	2.92E-01	7.58E+00	1.26E+00	U-8a	3.52E+01	3.60E+00	5.12E-01
U-238	0.57	95.33%	16.62%	100.00%	3.60%	7.92E+00	2.85E-01	7.55E+00	1.25E+00	U-8a	3.44E+01	3.60E+00	5.12E-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	0.17	2.48	2.25E+00	4.31E-01	2.19E+00	4.43E-01
U-238	0.48	9.61	8.56E-01	2.26E-01	7.78E-01	2.26E-01
U-235	1.97	98.31	7.26E-02	7.04E-02	2.13E-01	1.21E-01

QC Summary

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

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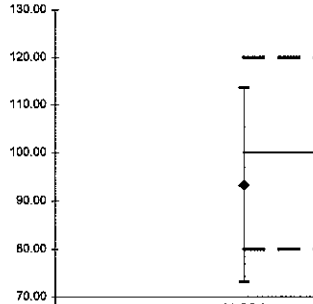
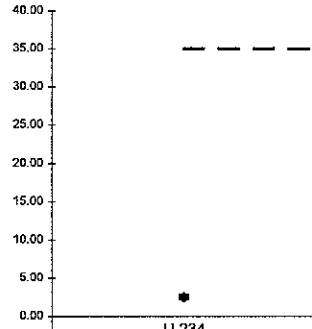
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	UUISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



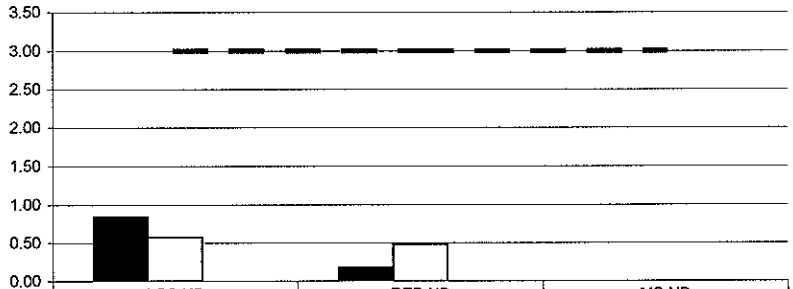
	U-234	U-238
Lower Error	73.09	75.11
Upper Error	113.50	115.54
%R	93.29	95.33
LCL	80	80
Mean	100	100
UCL	120	120

Replicate Sample RPD



	U-234	U-238	U-235
Lower Error	2.73	10.94	131.19
Upper Error	2.24	8.28	65.42
RPD	2.48	9.61	98.31
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
U-234	0.84	0.17	0.00
U-238	0.57	0.48	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

US EPA ARCHIVE DOCUMENT

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	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	1.15	91.69%	15.25%	100.00%	3.60%	8.12E+00	2.92E-01	7.45E+00	1.14E+00	U-8a	3.52E+01	3.60E+00	5.12E-01
U-238	0.26	98.01%	15.14%	100.00%	3.60%	7.92E+00	2.85E-01	7.76E+00	1.18E+00	U-8a	3.44E+01	3.60E+00	5.12E-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	41.52	7.68E-02	2.43E-01	1.17E-01	2.07E-01
U-238	0.17	27.57	8.93E-02	1.93E-01	6.76E-02	1.69E-01
U-235	0.98	115.42	5.53E-02	1.69E-01	2.06E-01	2.50E-01

QC Summary

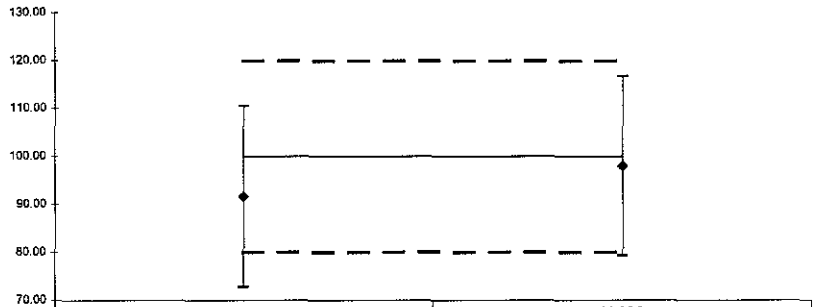
LCS Relative Bias	*LCS % R*	*LCS ND*	*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
0.92	OK	OK			INV	OK
0.98	OK	OK			INV	OK
	OK	OK			NA	OK

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

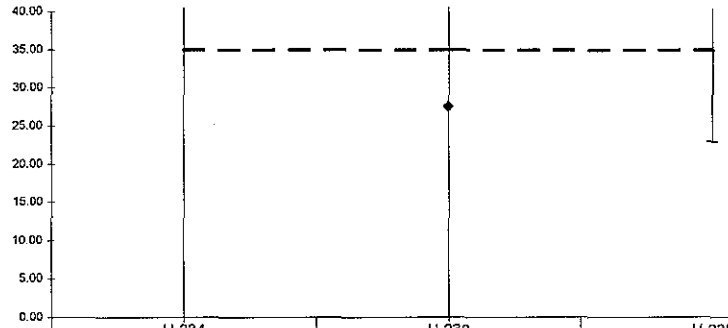
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	UUISO	2	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



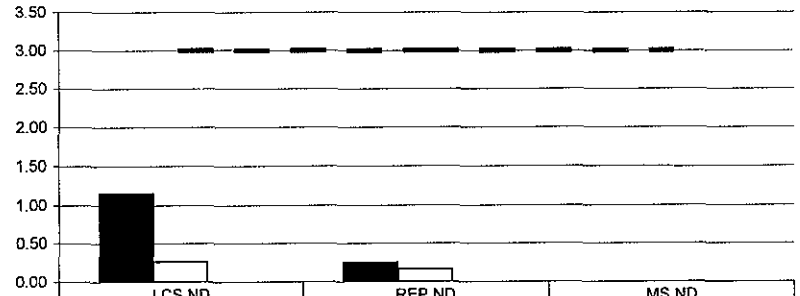
	U-234	U-238
Lower Error	72.84	79.26
Upper Error	110.53	116.75
%R	91.69	98.01
LCL	80	80
Mean	100	100
UCL	120	120

Replicate Sample RPD



	U-234	U-238	U-235
Lower Error	89.70	59.40	207.93
Upper Error	-6.66	-4.26	22.92
RPD	41.52	27.57	115.42
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
U-234	1.15	0.25	0.00
U-238	0.26	0.17	0.00
	0.00	0.00	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	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	0.42	96.31%	17.73%	100.00%	3.60%	4.80E+00	1.73E-01	4.62E+00	8.19E-01	Th-8b	1.04E+02	3.60E+00	1.03E-01
TH-230	2.09	82.71%	19.51%	100.00%	2.70%	5.41E+00	1.46E-01	4.48E+00	8.74E-01	Th-1b	2.35E+01	2.70E+00	5.11E-01
TH-232	0.64	94.54%	17.43%	100.00%	3.60%	4.80E+00	1.73E-01	4.53E+00	7.90E-01	Th-8b	1.04E+02	3.60E+00	1.03E-01

Matrix Spike

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

Replicate Sample

Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
TH-228	1.13	544.07	-1.37E-02	3.56E-02	2.97E-02	6.65E-02
TH-230	2.33	99.38	9.47E-02	8.31E-02	2.82E-01	1.33E-01
TH-232	0.07	6.97	4.09E-02	5.33E-02	3.81E-02	5.17E-02

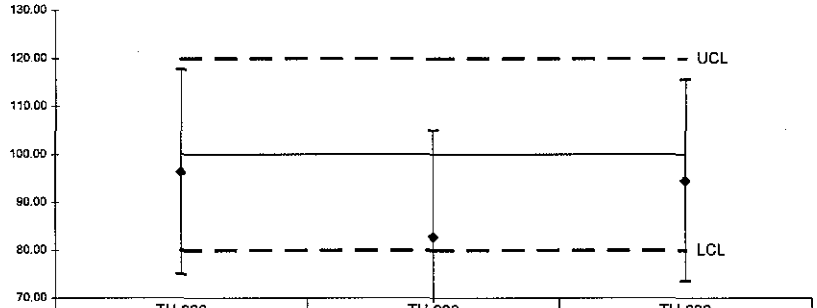
QC Summary

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

US EPA ARCHIVE DOCUMENT

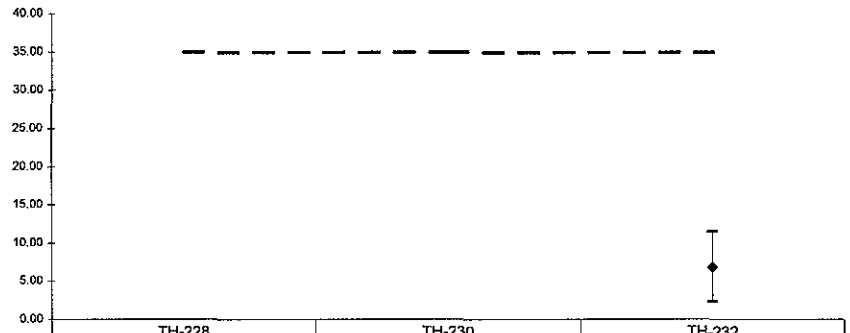
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	ThISO	1	pCi	l	Engineering Management Support, Inc.

LCS % Recovery



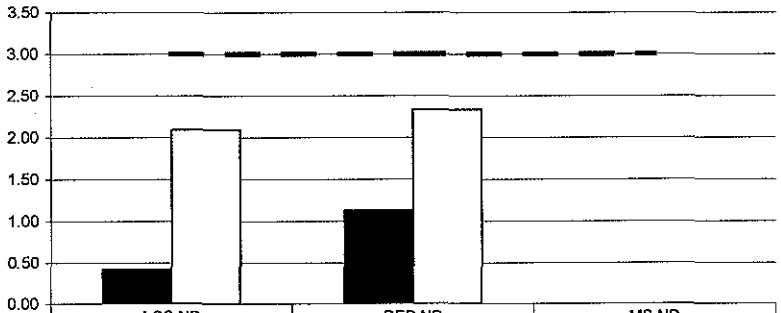
	TH-228	TH-230	TH-232
Lower Error	74.98	60.50	73.51
Upper Error	117.64	104.92	115.57
%R	96.31	82.71	94.54
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	2285.14	127.93	11.60
Upper Error	-1197.00	70.82	2.34
RPD	544.07	99.38	6.97
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	0.42	1.13	0.00
TH-230	2.09	2.33	0.00
UCL	3	3	3

No Matrix Spike

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	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	0.08	101.03%	24.31%	100.00%	4.60%	1.03E+01	4.73E-01	1.04E+01	2.52E+00	Ra-5b	4.41E+01	4.60E+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-226	0.82	175.30	3.00E-03	6.89E-02	4.56E-02	7.43E-02

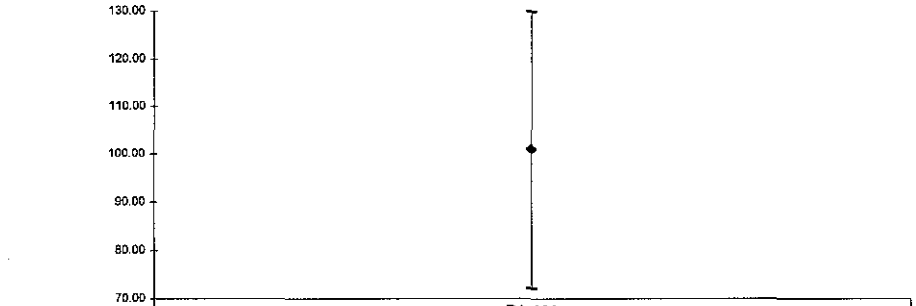
QC Summary

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

US EPA ARCHIVE DOCUMENT

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	Ra226	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery

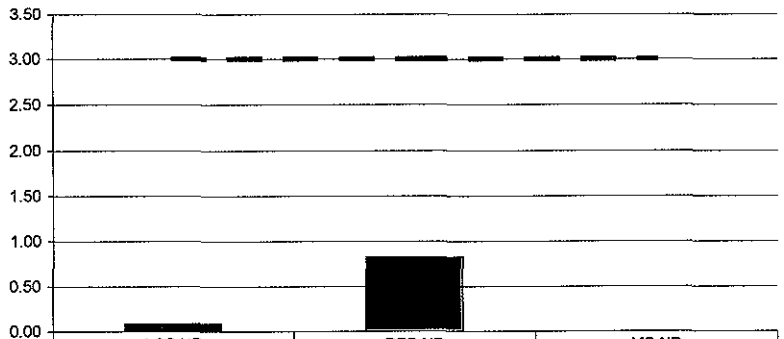


	RA-226
Lower Error	72.12
Upper Error	129.95
%R	101.03
LCL	80
Mean	100
UCL	120

Replicate Sample RPD

	RA-226
Lower Error	433.66
Upper Error	-83.07
RPD	175.30
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-226	0.08	0.82	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	Ra228	1	pCi	l	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	0.33	105.56%	31.21%	100.00%	5.10%	8.96E+00	4.57E-01	9.46E+00	2.95E+00	Ra-11	3.88E+01	5.10E+00	5.12E-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	1.23	99.19	1.92E-01	4.51E-01	5.71E-01	4.03E-01

QC Summary

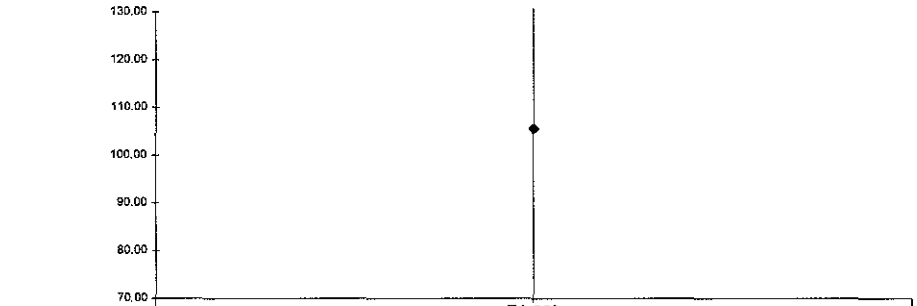
LCS Relative Bias	*LCS % R*	*LCS ND*	*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.06	OK	OK			NA	OK

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04132	Ra228	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery

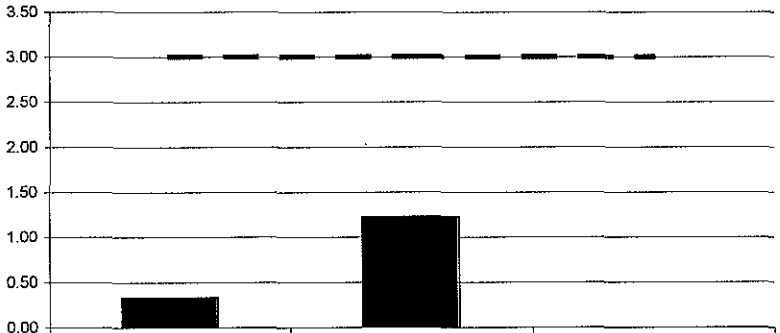


	RA-228
Lower Error	69.25
Upper Error	141.87
%R	105.56
LCL	80
Mean	100
UCL	120

Replicate Sample RPD

	RA-228
Lower Error	154.67
Upper Error	43.71
RPD	99.19
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-228	0.33	1.23	0.00
UCL	3	3	3

No Matrix Spike

Version

US EPA ARCHIVE DOCUMENT

SECTION VII

LABORATORY TECHNICIAN'S NOTES

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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	13-04132
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 09:49	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN

5/3/13

US EPA ARCHIVE DOCUMENT

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	13-04132
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 09:49	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/08/13 18:12	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.

5/8/13

US EPA ARCHIVE DOCUMENT

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	13-04132
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 09:49	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/08/13 18:12	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	05/09/13 06:01	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.

5/9/13

US EPA ARCHIVE DOCUMENT

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04132	
Analysis Code	Run
UUISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	5/3/2013
013708P	Anion Exchange Resin	Reagent Grade	JDEMELAS	5/8/2013
013826S	HCl - HF	6.5N - 0.04N	JDEMELAS	5/8/2013
013675D02	Hydrochloric Acid	0.5N	JDEMELAS	5/8/2013
013734S	Hydrochloric Acid	6.5N	JDEMELAS	5/8/2013
013809P	Hydrochloric Acid	Reagent Grade	JDEMELAS	5/8/2013
013839S	Hydrochloric Acid	8N	JDEMELAS	5/8/2013
013844S	HCl - NH4I	8N - 0.1M	JDEMELAS	5/8/2013
013246S	Carbon substrate	Solution	RMARTZ	5/9/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	5/9/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	5/9/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	5/9/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	5/9/2013

Date	Sample #	Client	Received Time	CT Time	Analysis Req.	Tech
5/7/13	1705007A(3,4)	UCOR	1727	2hr	NP22#	C
5/7/13	1304135A(1-4,7)	UCOR	1439	2hr 50mins	PU	KCB
5/7/13	1304135A(4)	UCOR	1440	2hr 50 mins	PUNT	KCB
5/7/13	1305008A(1-3)	Limited	1442	2hr 50min	UU	KCB
5/7/13	1304131A(11-19)	Eng. Manag. Sv.	1745	2hr 50	Th	KB
5/7/13	1304135A(1-2)	UCOR	1744	2hr 50	NP	KB
5/7/13	Daily Pickup	UCOR	0726	1	ME	C
5/8/13	1704110A(6-8)	Energy Sol.	0755	2hr	NP22#	C
5/8/13	1704110A(1-4)	Energy Sol.	0757	2hr	PU&TH	—
5/8/13	1704133-A1(1-4)	UCOR	0759	2hr	Nat U	C
5/8/13	1704110A(5-8)	Energy Sol.	0818	2hr	PU&TH	—
5/8/13	1704105A(1)	UCOR	0858	2hr	PU&TH	—
5/8/13	1704110A(1-5)	Energy Sol.	0927	2hr	Gamma	C
5/8/13	1705010A(1-4,7)	UCOR	1157	2hr	PU&TH	C
5/8/13	1705010A(4)	UCOR	1152	2hr	PUNT	C
5/8/13	1304131A(3-7)	Eng. Manag. Sv.	1248	2hr 50	UU	KB
5/8/13	1305010A(4)	UCOR	1513	2hr 50	PU	KB
5/8/13	1305010A(4)	UCOR	1514	2hr 50	PUNT	KB
5/8/13	1304131A(14-19)	Eng. Manag. Sv.	1554	2hr 50	UU	KCB
5/8/13	Daily Pickup	UCOR	0737	1	—	—
5/9/13	1705016A(5)	UCOR	0948	2hr	U&TH50	C
5/9/13	1304140A(1-4)	UCOR	0949	2hr	U&TH50	C
5/9/13	1704122A(1-6)	Energy	0957	2hr	U&TH50	—

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Date	Sample #	Client	Lapel Time	CT Time	Analyst	Tech
5/7/13	1705007A (3-4)	UCOR	1727	2hr	NP???	C
5/7/13	1304135A (1-4,7)	UCOR	1439	2hr 50mins	PU	KB
5/7/13	1304135A (4)	UCOR	1440	2hr 50 mins	PUNT	KB
5/7/13	1305008A (1-3)	Limited	1442	2hr 50mins	UU	KB
5/7/13	1304131A (11-19)	Eng. Manag. Su.	1745	2hr 50	th	KB
5/7/13	1304135A (1-2)	UCOR	1746	2hr 50	NP	KB
5/7/13	Daily Pulse	UCOR	0826	—	—	C
5/8/13	1704110A (4-7)	Energy 20[illegible]	0855	2hr	NP???	C
5/8/13	1704110A (1-4)	Energy Sol.	0855	2hr	PU250	—
5/8/13	1704135A (1-4)	UCOR	0859	2hr	Nu6	C
5/8/13	1704110A (5-7)	Energy Sol.	0858	2hr	PU250	—
5/8/13	1704135A (1)	UCOR	0858	2hr	PU250	—
5/8/13	1704110A (1-7)	Energy Sol.	0927	2hr	Alpha	C
5/8/13	1705010A (1-4,7)	UCOR	1152	2hr	PU250	C
5/8/13	1705010A (4)	UCOR	1152	2hr	PUNT	C
5/8/13	1304131A (3-7)	Eng. Manag. Su.	1248	2hr 50	UU	KB
5/8/13	1305010A (4)	UCOR	1513	2hr 50	PU	KB
5/8/13	1305010A (4)	UCOR	1514	2hr 50	PUNT	KB
5/8/13	1304131A (11-19)	Eng. Manag. Su.	1554	2hr 50	UU	KB
5/9/13	Daily Pulse	UCOR	0857	—	—	—
5/9/13	1705016A (1)	UCOR	0948	2hr	UU250	C
5/9/13	1304130A (1-4)	UCOR	0949	2hr	UU250	C
5/9/13	1704132A (1-6)	Energy	0957	2hr	UU250	—
5/9/13	1304132A (10-19)	Eng. Manag. Su.	1255	2hr 50	UU	KB

US EPA ARCHIVE DOCUMENT

Alpha #2

Date	Sample #	Client	Start Time	End Time	Analyst	Tech
5/9/17	1304170A(2-4)	UCOR	1254	2hr50min	NP	KB
5/9/17	1304132A(7-9)	Eng. Manag. Svc	1254	2hr50min	UU	KB

US EPA ARCHIVE DOCUMENT

ISO U NOTES
Run 2

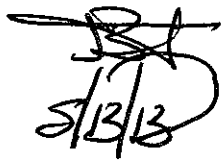
EBERLINE SERVICES

Work Order Analysis Notes

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

Internal Work Order	13-04132
Analysis Code	UUISO
Run Number	2

#	Date	Dept	User	Notes
1	05/13/13 07:36	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN



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Work Order Analysis Notes

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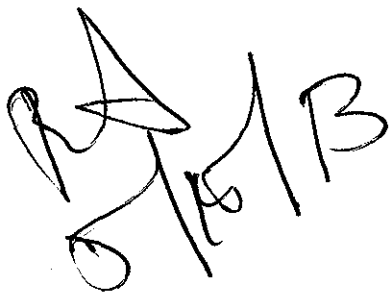
Internal Work Order	13-04132
Analysis Code	UUISO
Run Number	2

#	Date	Dept	User	Notes
1	05/13/13 07:36	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/15/13 14:25	CHEM	RMARTZ	ADDED ~5 MLS OF CONCENTRATED HCL TO BEAKERS AND TOOK TO DRYNESS. ADDED ~15 MLS OF 8N HCL TO BEAKERS AND ALLOWED TO COOL. TRANSFERRED SAMPLES TO NEW, LABELED C-TUBES WITH 8N HCL TO A VOLUMNE OF ~35 MLS. PRECONDITIONED RESIN COLUMN WITH 35 ML 8N HCL & CENTRIFUGED SAMPLES; ADDED SAMPLES TO COLUMNS; AFTER SAMPLES RAN THROUGH COLUMNS, ADDED 35 ML 8N HCL/NH4I & LET RUN THROUGH, FOLLOWED UP WITH ADDING 35 ML 6.5N HCL/0.04N HF & THEN 10 ML 6.5N HCL. ELUTED SAMPLES WITH 50 ML 0.5N 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.



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Work Order Analysis Notes

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

Internal Work Order	13-04132
Analysis Code	UUISO
Run Number	2

#	Date	Dept	User	Notes
1	05/13/13 07:36	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/15/13 14:25	CHEM	RMARTZ	ADDED ~5 MLS OF CONCENTRATED HCL TO BEAKERS AND TOOK TO DRYNESS. ADDED ~15 MLS OF 8N HCL TO BEAKERS AND ALLOWED TO COOL. TRANSFERRED SAMPLES TO NEW, LABELED C-TUBES WITH 8N HCL TO A VOLUMNE OF ~35 MLS. PRECONDITIONED RESIN COLUMN WITH 35 ML 8N HCL & CENTRIFUGED SAMPLES; ADDED SAMPLES TO COLUMNS; AFTER SAMPLES RAN THROUGH COLUMNS, ADDED 35 ML 8N HCL/NH4I & LET RUN THROUGH, FOLLOWED UP WITH ADDING 35 ML 6.5N HCL/0.04N HF & THEN 10 ML 6.5N HCL. ELUTED SAMPLES WITH 50 ML 0.5N 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	05/16/13 06:12	CHEM	RMARTZ	ADDED 0.1 ML NEODYMIUM CARRIER, 0.3 ML TITANOUS CHLORIDE, & 1 ML HF TO C-TUBES; LET SET SIT IN ICE BATH FOR ONE HOUR. SET UP FILTERS BY ADDING ALCOHOL & CARBON SUBSTRATE THEN ADDED SAMPLES; WHEN SAMPLES WERE THROUGH FILTERS, ADDED 10 ML DI H2O RINSES FROM C-TUBES, REMOVED FILTERS, LET DRY IN DESSICATOR, THEN SENT SET TO COUNT ROOM.

RA 5/16/13

US EPA ARCHIVE DOCUMENT

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04132	
Analysis Code	Run
UUISO	2

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013797P	Nitric Acid	Reagent Grade	JBARNARD	5/13/2013
013708P	Anion Exchange Resin	Reagent Grade	RMARTZ	5/15/2013
013841S	HCl - HF	6.5N - 0.04N	RMARTZ	5/15/2013
013859S	HCl - NH4I	8N - 0.1M	RMARTZ	5/15/2013
013675D02	Hydrochloric Acid	0.5N	RMARTZ	5/15/2013
013853S	Hydrochloric Acid	6.5N	RMARTZ	5/15/2013
013849S	Hydrochloric Acid	8N	RMARTZ	5/15/2013
013246S	Carbon substrate	Solution	RMARTZ	5/16/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	5/16/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	5/16/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	5/16/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	5/16/2013

Date	Sample #	Client	Lead Out	CT Time	Analyst	Tech
5/17/13	Daily Pulse	UCOR	0628	1hr	MK	—
5/17/13	1304171AC(1-6)	Energy	0630	2hr	Ra6	C
5/17/13	1304172AC(1-4)	UCOR	0948	2hr	Am241	C
5/17/13	1304173AC(1-4)	UCOR	0948	2hr	Am241	C
5/17/13	1304174AC(1-4)	UCOR	1247	2hr	U238	C
5/17/13	1304175AC(1-4)	UCOR	1247	2hr	Pu238	C
5/13/13	1304124A(8-11)	Utah Div of Rad	1602	2hr 30m	iso-U	AG
5/14/13	Daily Pulse	UCOR	0617	1hr	MK	—
5/14/13	1304171AC(1-4)	TEC	0951	2hr	Ra6	C
5/14/13	1304172AC(1-2)	UCOR	0951	2hr	Ra6	C
5/14/13	1304162AC(1-5)	~~Energy~~ ENVIRotech	1401	2hr 40m	U238	C
5/14/13	1304161AC(1)	~~Energy~~ ENVIRotech	~~1401~~	~~2hr 40m~~	U238	C
5/15/13	Daily Pulse	UCOR	0572	1hr	MK	—
5/15/13	1304172AC(6-11)	UTAH Div of Rad	0548	2hr	Th230	C
5/15/13	1305073AC(1-4)	UCOR	1021	2hr	U238	—
5/15/13	1305073AC(1-2)	UCOR	1021	2hr	Th230	—
5/16/13	1304182A(1-4,7)	UCOR	1715	2hr 50mins	PU	C
5/16/13	1304182A (4)	UCOR	1715	2hr 50mins	TRNT	C
5/16/13	1304182A (4)	UCOR	1648	2hr 50mins	Am243	KB
5/15/13	1304132A (1-5)	Eng. Manag. Su.	1645	2hr 50m	Ra6	KB
5/16/13	Daily Pulse	UCOR	0577	1hr	MK	—
5/16/13	1304168AC(1-6)	Energy	0950	2hr	Ra6	C
5/16/13	1305071AC(9)	Energy	0920	2hr	Ra6	C
5/16/13	1305005AC(1-4)	UCOR	0920	2hr	Am241	C
5/16/13	1305005AC(1)	UCOR	0920	2hr	Am241	C
~~5/16/13~~	~~1305047A(6)~~	~~UCOR~~	NA NC	5/14/13	~~Th230~~	~~C~~
~~5/16/13~~	~~1304178AC(1-6) Energy~~					
5/16/13	1304126B (1-4)	ERA	1225	2hr 50m	Ra-226	AG
5/16/13	1305043A (6)	UCOR	1225	2hr 50min	iso-U	AG
5/16/13	1304132B (1)	Eng Manag Su	1225	2hr 50m	iso-U	AG

US EPA ARCHIVE DOCUMENT

Alpha #2

Date	Sample #	Client	Time Rec'd	CT Time	Analyst	Tech
5/9/13	1304170A(2-4)	UCOR	1254	2hr 50 min	Np	KB
5/9/13	1304132A(7-9)	Eng. Manag. Sv	1254	2hr 50 min	UU	KB
5/9/13	1304132A(7-12)	Eng. Manag Sv.	1629	2hr 50 mins	Th	KB
5/10/13	Daily Pulser	LMS	0508	10	Np	—
5/10/13	1704141A(1-4)	AMR	0700	2hr	Po210	C
5/10/13	~~5/9~~ 1306CAC	LMS	1047	2hr	Np	C
5/10/13	1705017A(4,6)	UCOR	1718	2hr	Th230	C
5/10/13	1705017ANX(4,6)	UCOR	1714	2hr	Th-Nat	C
5/10/13	1704178B(1,2)	United	1718	2hr	Pu230	C
5/10/13	System Blkgd	Lab	1710	16.40 hrs	α	KB
5/11/13	Daily Pulser	Lab	1056	10 min	NA	MC
5/11/13	#19 cal check	Lab	1137	2 1/2 Hr	α	AG
5/11/13	1304114A(1-7)	Analysts Inc	1457	2Hr 50m	Am-241	AG
5/12/13	Daily Pulser	Lab	1119	10 min	NA	AC
5/12/13	1304107A(7-13)	Eng. Manage Sv	1210	2Hr 50m	Ra-226	AG
5/13/13	Daily Pulser	LMS	0552	10	Np	—
5/13/13	1704180A(1-4)	Westwood	0950	2hr	Am-241	C
5/13/13	1705072A(1-4)	UCOR	0850	2hr	Th-230	C
5/13/13	1705005A(1,2)	UCOR	0850	2hr	Th-230	C
5/13/13	1704124A(1-7)	UTK Physics Dept	0921	2hr	Th-230	C
5/14/13	Daily Pulser	LMS	0817	10	Np	—
5/14/13	1704161A(1-4)	STOMP	0952	2hr 16hr	Ra-226	C
5/14/13	1704161A(2-7)	TN Dept	1109	~~2hr~~ 16hr	Th-230	C
5/15/13	Daily Pulser	Lab	0552	10	Np	—
5/15/13	1704167A(1-7)	TN Dept	0945	16hr 40	Th-230	C
5/16/13	Daily Pulser	LMS	0827	10	Np	—
5/16/13	1705021A(1-8)	Roctest	0822	2hr	Ra-226	C
5/16/13	1705005A(2-4)	UCOR	1142	2hr	Am-241	C
5/16/13	1705004A(1-4)	UCOR	1142	2hr	Th-230	C
5/16/13	1305043ANT(4,6)	UCOR	1538	2Hr 50m	Pu (NT)	AG
5/16/13	1304132B(2,3,5,6,18)	Eng Manage Sv	1538	2Hr 50m	Iso-U	AG

Alpha #3

Date	Sample #	Client	Location	Time	Analyst	
5/15/13	1304182A (1-4)	UCOR	1715	2hr 30 min	Th	C
5/15/13	1304182A (1-4)	UCOR	1720	2hr 30 min	Np	C
5/16/13	1304182A (1-4)	UCOR	1349	2hr 30 min	Am^{241}	KB
5/15/13	1304182A (1-3)	UCOR	1350	2hr 30 min	Am^{243}	KB
5/15/13	1304132A (6-19)	Eng. Manag. Su.	1652	2hr 30 min	Rad	KB

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ISO TH NOTES

EBERLINE SERVICES

Work Order Analysis Notes

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

Internal Work Order	13-04132
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 09:49	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN

5/3/13

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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	13-04132
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 09:49	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/08/13 18:13	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to 35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with deiononized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.

5/8/13

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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	13-04132
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 09:49	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/08/13 18:13	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to 35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with deiononized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.
3	05/09/13 06:01	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.

RA 5/9/13

US EPA ARCHIVE DOCUMENT

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04132	
Analysis Code	Run
ThISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	5/3/2013
013708P	Anion Exchange Resin	Reagent Grade	JDEMELAS	5/8/2013
013839S	Hydrochloric Acid	8N	JDEMELAS	5/8/2013
013809P	Hydrochloric Acid	Reagent Grade	JDEMELAS	5/8/2013
013833S	Nitric Acid	8N	JDEMELAS	5/8/2013
013797P	Nitric Acid	Reagent Grade	JDEMELAS	5/8/2013
013246S	Carbon substrate	Solution	RMARTZ	5/9/2013
013017S	Cerrium Carrier	0.1mg/ml	RMARTZ	5/9/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	5/9/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	5/9/2013

Date	Sample #	Client	Local Time	CT Time	Analyzer	Tech
5/7/13	1705007A(3,4)	UCOR	1727	2hr50	NP237	C
5/7/13	1304135A(1-4,7)	UCOR	1439	2hr50mins	PU	KB
5/7/13	1304135A (4)	UCOR	1440	2hr50 mins	PUNT	KB
5/7/13	1305008A (1-3)	Limited	1442	2hr50min	UU	KB
5/7/13	1304131A (11-19)	Eng. Manag. Su.	1745	2hr50	Th	KB
5/7/13	1304135A (1-2)	UCOR	1746	2hr50	Np	KB
5/8/13	Daily Pulse	UCOR	0726	1	ME	C
5/8/13	1704110A(6-7)	Energy Sol.	0755	2hr50	NP237	C
5/8/13	1704110A(1-4)	Energy Sol.	0757	2hr50	PU239	C
5/8/13	1704105A(1-4)	UCOR	0759	2hr50	Np6	C
5/8/13	1704110A(5-7)	Energy Sol.	0818	2hr50	PU239	C
5/8/13	1704105A(1)	UCOR	0838	2hr50	PU239	C
5/8/13	1704110A(1-4)	Energy Sol.	0927	2hr50	Americ	C
5/8/13	1705010A(1-4,7)	UCOR	1127	2hr50	PU239	C
5/8/13	1705010A(4)	UCOR	1127	2hr50	PUNT	C
5/8/13	1304131A(3-7)	Eng. Manag. Su.	1248	2hr50	UU	KB
5/8/13	1305010A (4)	UCOR	1513	2hr50	PU	KB
5/8/13	1305010A (4)	UCOR	1514	2hr50	PUNT	KB
5/8/13	1304131A (14-19)	Eng. Manag. Su.	1554	2hr50	UU	KB
5/9/13	Daily Pulse	UCOR	0857	1	ME	C
5/9/13	1705016A(5)	UCOR	0948	2hr50	U235	C
5/9/13	1304130A(1-4)	UCOR	0949	2hr50	U235	C
5/9/13	1704122A(1-6)	Energy	0957	2hr50	U235	C
5/9/13	1304132A(10-19)	Eng. Manag. Su.	1255	2hr50	UU	KB
5/9/13	1304132A (13-19)	Eng. Manag. Su.	1630	2hr50	Th	KB

Alpha #1

Date	Sample #	Client	Sample Time	CT Time	Analyst	Tech
5/9/13	1304170A(2-4)	UCOR	1254	2hr 50 min	NP	KB
5/9/13	1304132A(7-9)	Eng. Manag. Svc	1254	2hr 50 min	UU	KB
5/9/13	1304132A(7-12)	Eng. Manag Svc.	1629	2hr 50 mins	TH	KB

Date	Sample #	Client	Count Time	CT Date	Analysis	Tech
5/7/13	1705010A(1-4)	UCOR	1011	2hr50min	Th/U	C
5/7/13	1705010A(1,2)	UCOR	1011	2hr50min	Th/U	C
5/7/13	1705010A(3,4)	UCOR	1719	2hr50min	U/Th	C
5/7/13	1705010A(1-4)	UCOR	1715	2hr50min	U/Th	C
5/7/13	13050008A (4-5)	Unitech	1653	2hr50min	U/Th	KCB
5/7/13	1304131A (1-4)	Eng. Manag. Svc.	1654	2hr50min	Th	KCB
5/8/13	Daily Pulser	UCOR	0926	10min	Bi	C
5/8/13	1704135A(3,4)	UCOR	0952	2hr50min	U/Th	C
5/8/13	1704170A(1-4)	Energy Solutions	0953	2hr50min	U/Th	C
5/8/13	1704110A(6-8)	Energy Solutions	0928	2hr50min	Th/U	C
5/8/13	1704110A(1-7)	Energy Solutions	0928	2hr50min	Th/U	C
5/8/13	1305010A(1-4)	UCOR	1242	2hr50min	Th	KCB
5/8/13	1305010A(4)	UCOR	1242	2hr50min	Th NT	KCB
5/8/13	1304135A(1)	UCOR	1243	2hr50min	Th	KCB
5/8/13	1304131A(9-13)	Eng. Manag. Svc.	1554	2hr50min	U/Th	KCB
5/9/13	Daily Pulser	UCOR	0950	10min	Bi	C
5/9/13	1704170A(1-4)	UCOR	0946	2hr50min	Th/U	C
5/9/13	1704170A(1,2)	UCOR	0947	2hr50min	Th/U	C
5/9/13	1305017A(1-4,6)	UCOR	1253	2hr50min	Np	KCB
5/9/13	1304170A(1)	UCOR	1253	2hr50min	Np	KCB
5/9/13	1304132A (1-6)	Eng. Manag. Svc.	1629	2hr50min	Th	KCB

0054

US EPA ARCHIVE DOCUMENT

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	13-04132
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 12:44	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED SAMPLES 4 AND 18 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- FRACTION 18 WAS EXTREMELY DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

5/3/13

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Work Order Analysis Notes

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

Internal Work Order	13-04132
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 12:44	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED SAMPLES 4 AND 18 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- FRACTION 18 WAS EXTREMELY DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	05/09/13 18:18	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	05/14/13 16:58	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.8 IN AP-006 REV 12 FOR RA 226 ANALYSIS (SYRNGE FILTERED-PRECIP-FILTERED-DRIED-OBTAIN FINAL WEIGHT)-SUBMIT TO COUNT ROOM.

L. Walker
5/14/13

US EPA ARCHIVE DOCUMENT

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04132	
Analysis Code	Run
Ra226	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	5/3/2013
013575D02	Ammonium Sulfate	200 mg/ml	JBARNARD	5/3/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	5/3/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	5/3/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	5/3/2013
013416P	Perchloric Acid	Reagent Grade	JBARNARD	5/3/2013
009098P	Sulfuric Acid	Reagent Grade	JBARNARD	5/3/2013
013824S	EDTA	0.25M	LWALKER	5/9/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	5/14/2013
013751D01	Ammonium Sulfate	200 mg/ml	LWALKER	5/14/2013

US EPA ARCHIVE DOCUMENT

Alpha #3

Date	Sample #	Client	Loaded Time	Counted Time	Analyzed for	Check
5/15/13	1304182A (1-4)	UCOR	1052	2hr	Th	C
5/15/13	1304182A (1-4)	UCOR	1054	2hr	Th230	C
5/15/13	1304182A (1-4)	UCOR	1054	2hr	U Isotopic	C
5/15/13	1304182A (1-4)	UCOR	1054	2hr	Pu Isotopic	C
5/15/13	1304182A (1-4)	UCOR	1058	2hr	Pu239	C
5/15/13	1304182A (1-4)	UCOR	1056	2hr	Pu241	C
5/15/13	1304182A (1-4)	UCOR	1056	2hr	Pu241	C
5/16/13	1304182A (1-4)	UCOR	1715	2hr 00 mins	Th	C
5/16/13	1304182A (1-4)	UCOR	1720	2hr 00 min	Np	C
5/16/13	1304182A (1-4)	UCOR	1349	2hr 00 mins	Am241	KB
5/15/13	1304182A (1-3)	UCOR	1350	2hr 00 min	Am243	KB
5/15/13	1304132A (6-19)	Eng. Manag. Su.	1452	2hr 00 min	Rad	KB

0089

Alpha #1

Date	Sample #	Client	Lead Out	CT Time	Analyst	Check
5/17/13	Daily Pulse	UU	0828	1hr	MK	—
5/17/13	13041718A(1-6)	Energy	0828	2hr	RAG	—
5/17/13	13041728A(1-4)	UCOR	0948	2hr	AMZ43	C
5/17/13	13041728A(1-4)	UCOR	0948	2hr	AMZ43	C
5/17/13	13041728A(1-4)	UCOR	1247	2hr	U/PU	C
5/17/13	13041728A(1-4)	UCOR	1247	2hr	PU	C
5/13/13	13041724A(8-11)	Utah Div of Rad	1602	2hr 50m	ISO-U	AG
5/17/13	Daily Pulse	UU	0917	1hr	MK	—
5/17/13	13041718A(1-4)	TEC	0951	2hr	RAG	C
5/17/13	13041728A(1,2)	UCOR	0951	2hr	RAG	C
5/17/13	13041624A(1-5)	~~Cry~~ YM Dept.	1106	2hr 44m	U/PU	C
5/17/13	13041614A(1)	~~Cry~~ ~~YM Dept~~	~~1106~~	1hr 40m	U/PU	C
5/18/13	Daily Pulse	UU	0952	1hr	MK	—
5/15/13	13041724A(6-11)	UTAH Div of Rad	0548	2hr	TH/U	—
5/15/13	13041728A(1-4)	UCOR	1021	2hr	U/PU	—
5/15/13	13041728A(1,2)	UCOR	1021	2hr	TH/U	—
5/16/13	13041824A(1-4,7)	UCOR	1715	2hr 50mins	PU	C
5/16/13	13041824A(4)	UCOR	1715	2hr 50mins	TH/NT	C
5/16/13	13041824A(4)	UCOR	1648	2hr 50mins	Am243	KB
5/15/13	13041324A(1-5)	Eng. Manag. Su.	1645	2hr 50m	RAG	KB

US EPA ARCHIVE DOCUMENT

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	13-04132
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 12:44	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED SAMPLES 4 AND 18 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- FRACTION 18 WAS EXTREMELY DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

5/3/13

US EPA ARCHIVE DOCUMENT

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	13-04132
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 12:44	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED SAMPLES 4 AND 18 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- FRACTION 18 WAS EXTREMELY DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	05/16/13 12:37	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	05/20/13 20:13	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)

L. Walker
5/20/13

US EPA ARCHIVE DOCUMENT

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	13-04132
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	05/03/13 12:44	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED SAMPLES 4 AND 18 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- FRACTION 18 WAS EXTREMELY DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	05/16/13 12:37	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	05/20/13 20:13	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)
4	05/21/13 13:09	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)

5-21-13

US EPA ARCHIVE DOCUMENT

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
13-04132	
Analysis Code	Run
Ra228	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	5/3/2013
013575D02	Ammonium Sulfate	200 mg/ml	JBARNARD	5/3/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	5/3/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	5/3/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	5/3/2013
013416P	Perchloric Acid	Reagent Grade	JBARNARD	5/3/2013
009098P	Sulfuric Acid	Reagent Grade	JBARNARD	5/3/2013
011504D23	Ammonium Sulfide	2%	LWALKER	5/20/2013
013797P	Nitric Acid	Reagent Grade	LWALKER	5/20/2013
013690S	Sodium Hydroxide	10M	LWALKER	5/20/2013
013801S	Yttrium Carrier	9 mg/ml	LWALKER	5/20/2013
012729D09	Lead Carrier	1.5 mg/ml	LWALKER	5/20/2013
012717D05	Ammonium Oxalate	5%	TSMITH	5/21/2013
013624D09	Nitric Acid	1N	TSMITH	5/21/2013
013686S	Nitric Acid	6N	TSMITH	5/21/2013
013690S	Sodium Hydroxide	10M	TSMITH	5/21/2013
013065D04	Sodium Hydroxide	18M	TSMITH	5/21/2013

Date	Sample #	Client	Time In	TAT	Analysis	Tech
5/17/13	1704152RA(1-4)	Data Res	1148	7m	RAR	C
5/17/13	170502RA(1-8)	Accutest	1251	7m	RA	C
5/17/13	1305035AG(9-12)	Accutest	1453	2hr	AG	AG
5/18/13	Weekly Blgd	Lab	1117	12hr	OR	AG
5/17/13	Duplicate	"	0524	6m	RA	C
5/17/13	EF76C	"	0052	7m	RA	C
5/17/13	1705005RA(1-4)	Ucon	0747	7m	Subcy	C
5/20/13	1704152RA(5-7)	Calscience	1007	7m	RA	C
5/17/13	1704127RA(1)	Calscience	1007	7m	RA	C
5/20/13	1305038CL(1-3,5,7)	UCOR	1454	30mins	CL36	KB
5/17/13	Duplicate	"	0541	6m	RA	C
5/17/13	EF76C	"	0614	7m	RA	C
5/17/13	1705067AB(1-9)	Ucore	0800	7m	RA	C
5/17/13	1704168AB(1-6)	Accutest	1105	7m	RA	C
5/21/13	1305005Pb (1-4)	UCOR	1107	2hrs	Pb210	KB
5/21/13	1304132RA(14-19)	Eng. Manag. Su	1413	2hrs	RAD	KB
5/21/13	1304132RA1(1)	Eng. Manag Su,	1413	30mins	Ra228	KB

LB4110 RED

Date	Sample #	Client	Time	TAT	Analyst	Rec'd
05/20/13	1304182341(1-4,6)	LICOR	0746	7d	SRG/AJ	C
5/20/13	1305071RA(1-5)	Accutest	1001	7d	RAC	C
5/20/13	1305071RA(1,4)	Accutest	1001	7d	RAB	C
5/20/13	1305039CL(1-3,5)	LICOR	1457	30 mins	CL36	KB
5/20/13	1305044CL(1-3,5)	LICOR	1458	30 mins	CL36	KB
5/21/13	EFTOC	MS	0711	7d	LM	C
5/21/13	Diwon	MS	0546	6d	MS	C
5/21/13	1305071RA(1-4)	LICOR	0758	7d	RAB	C
5/21/13	1304182RA(1-4)	LICOR	0758	7d	RAB	C
5/21/13	1305071RA(1-4)	LICOR	0758	7d	RAB	C
5/21/13	1305027AD(1-4)	Environ	1010	7d	AD	C
5/21/13	1304173AD 4-4)	TEC	1010	7d	AD	C
5/21/13	1305027NP(1-4)	LICOR	1012	1d	NP	C
5/21/13	1305024NP(1-4)	LICOR	1022	1d	NP	C
5/21/13	1304182Pb (1-4)	LICOR	1058	2hrs	Pb210	KB
5/21/13	1304132RA(2-13)	Eng. Manag Su.	1412	2hrs	Ra8	KB

US EPA ARCHIVE DOCUMENT

SECTION VIII

ANALYTICAL DATA (ISOTOPIC URANIUM)

US EPA ARCHIVE DOCUMENT

RUN 1

US EPA ARCHIVE DOCUMENT

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

13-04132
UUISO
Run 1

Work Order	13-04132
Analysis Code	UUISO
Run	1
Date Received	4/18/2013
Lab Deadline	5/9/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EML U-02 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	U-232
Radiometric Sol#	U-10a
Tracer Act (dpm/g)	19.089
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/18/13 00:00	1.0000E+00
02	MBL	BLANK		04/18/13 00:00	1.0000E+00
03	DUP	PZ-106-KS TOT	36	04/15/13 15:59	1.0000E+00
04	TRG	D-14 TOT	38	04/12/13 11:05	1.0000E+00
05	TRG	D-14 DIS	38	04/12/13 11:05	1.0000E+00
06	TRG	PZ-112-AS TOT	45	04/12/13 11:18	1.0000E+00
07	TRG	PZ-112-AS DIS	45	04/12/13 11:18	1.0000E+00
08	TRG	PZ-202-SS TOT	46	04/12/13 12:32	1.0000E+00
09	TRG	PZ-202-SS DIS	46	04/12/13 12:32	1.0000E+00
10	TRG	DUP07 TOT	40	04/12/13 00:00	1.0000E+00
11	TRG	DUP07 DIS	40	04/12/13 00:00	1.0000E+00
12	DO	PZ-106-KS TOT	36	04/15/13 15:59	1.0000E+00
13	TRG	PZ-106-KS DIS	36	04/15/13 15:59	1.0000E+00
14	TRG	FB at PZ-100-KS TOT	39	04/16/13 08:40	1.0000E+00
15	TRG	FB at PZ-100-KS DIS	39	04/16/13 08:40	1.0000E+00
16	TRG	PZ-100-KS TOT	37	04/16/13 08:50	1.0000E+00
17	TRG	PZ-100-KS DIS	37	04/16/13 08:50	1.0000E+00
18	TRG	S-53 TOT	41	04/16/13 09:00	1.0000E+00
19	TRG	S-53 DIS	41	04/16/13 09:00	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.

13-04132
UUISO
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.6073	11.6		0.00								
02	MBL	0.6047	11.5		0.00								
03	DUP	0.6001	11.5		0.00								
04	TRG	0.5716	10.9		0.00								
05	TRG	0.5958	11.4		0.00								
06	TRG	0.5744	11.0		0.00								
07	TRG	0.5941	11.3		0.00								
08	TRG	0.5911	11.3		0.00								
09	TRG	0.5793	11.1		0.00								
10	TRG	0.5857	11.2		0.00								
11	TRG	0.5954	11.4		0.00								
12	DO	0.5586	10.7		0.00								
13	TRG	0.5908	11.3		0.00								
14	TRG	0.5864	11.2		0.00								
15	TRG	0.5803	11.1		0.00								
16	TRG	0.5882	11.2		0.00								
17	TRG	0.5827	11.1		0.00								
18	TRG	0.5810	11.1		0.00								
19	TRG	0.5772	11.0		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.

US EPA ARCHIVE DOCUMENT

13-04132
UUISO
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			05/03/13 09:43	JBARNARD				
02	MBL			05/03/13 09:43	JBARNARD				
03	DUP			05/03/13 09:43	JBARNARD				
04	TRG			05/03/13 09:43	JBARNARD				
05	TRG			05/03/13 09:43	JBARNARD				
06	TRG			05/03/13 09:43	JBARNARD				
07	TRG			05/03/13 09:43	JBARNARD				
08	TRG			05/03/13 09:43	JBARNARD				
09	TRG			05/03/13 09:43	JBARNARD				
10	TRG			05/03/13 09:43	JBARNARD				
11	TRG			05/03/13 09:43	JBARNARD				
12	DO			05/03/13 09:43	JBARNARD				
13	TRG			05/03/13 09:43	JBARNARD				
14	TRG			05/03/13 09:43	JBARNARD				
15	TRG			05/03/13 09:43	JBARNARD				
16	TRG			05/03/13 09:43	JBARNARD				
17	TRG			05/03/13 09:43	JBARNARD				
18	TRG			05/03/13 09:43	JBARNARD				
19	TRG			05/03/13 09:43	JBARNARD				

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

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04132
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	7.58E+00	1.14E+00	1.08E-01	8.12E+00	93.29	OK		OK	
02	U-234	MBL	BLANK	pCi/l	6.33E-02	8.80E-02	1.33E-01					OK	OK
03	U-234	DUP	PZ-106-KS TOT	pCi/l	2.19E+00	4.14E-01	5.62E-02				OK	OK	
04	U-234	TRG	D-14 TOT	pCi/l	7.50E-01	3.94E-01	2.64E-01					OK	
05	U-234	TRG	D-14 DIS	pCi/l	1.97E-01	3.39E-01	5.90E-01					OK	
06	U-234	TRG	PZ-112-AS TOT	pCi/l	-4.29E-02	1.72E-01	4.41E-01					OK	
07	U-234	TRG	PZ-112-AS DIS	pCi/l	6.37E-01	4.58E-01	4.53E-01					OK	
08	U-234	TRG	PZ-202-SS TOT	pCi/l	1.69E+00	3.37E-01	6.98E-02					OK	
09	U-234	TRG	PZ-202-SS DIS	pCi/l	1.62E+00	3.17E-01	4.80E-02					OK	
10	U-234	TRG	DUP07 TOT	pCi/l	1.55E-01	1.62E-01	1.69E-01					OK	
11	U-234	TRG	DUP07 DIS	pCi/l	2.33E-01	1.86E-01	1.67E-01					OK	
12	U-234	DO	PZ-106-KS TOT	pCi/l	2.25E+00	4.00E-01	4.91E-02					OK	
13	U-234	TRG	PZ-106-KS DIS	pCi/l	2.02E+00	3.69E-01	5.62E-02					OK	
14	U-234	TRG	FB at PZ-100-KS TOT	pCi/l	7.58E-02	6.60E-02	7.57E-02					OK	
15	U-234	TRG	FB at PZ-100-KS DIS	pCi/l	7.38E-02	6.13E-02	7.14E-02					OK	
16	U-234	TRG	PZ-100-KS TOT	pCi/l	1.62E-01	9.38E-02	6.82E-02					OK	
17	U-234	TRG	PZ-100-KS DIS	pCi/l	7.02E-02	5.84E-02	5.02E-02					OK	
18	U-234	TRG	S-53 TOT	pCi/l	1.14E+01	7.37E+00	2.13E+00					INV	
19	U-234	TRG	S-53 DIS	pCi/l	5.90E+00	8.20E-01	7.25E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-1

US EPA ARCHIVE DOCUMENT

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04132
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	04/18/13 00:00	1.00E+00	81.94	0.00	0.00			
02	U-234	MBL	04/18/13 00:00	1.00E+00	56.59	0.00	0.00			
03	U-234	DUP	04/15/13 15:59	1.00E+00	103.70	0.00	0.00			
04	U-234	TRG	04/12/13 11:05	1.00E+00	33.64	0.00	0.00			
05	U-234	TRG	04/12/13 11:05	1.00E+00	14.80	0.00	0.00			
06	U-234	TRG	04/12/13 11:18	1.00E+00	18.79	0.00	0.00			
07	U-234	TRG	04/12/13 11:18	1.00E+00	23.14	0.00	0.00			
08	U-234	TRG	04/12/13 12:32	1.00E+00	124.13	0.00	0.00			
09	U-234	TRG	04/12/13 12:32	1.00E+00	118.63	0.00	0.00			
10	U-234	TRG	04/12/13 00:00	1.00E+00	35.91	0.00	0.00			
11	U-234	TRG	04/12/13 00:00	1.00E+00	40.96	0.00	0.00			
12	U-234	DO	04/15/13 15:59	1.00E+00	123.48	0.00	0.00			
13	U-234	TRG	04/15/13 15:59	1.00E+00	126.72	0.00	0.00			
14	U-234	TRG	04/16/13 08:40	1.00E+00	110.62	0.00	0.00			
15	U-234	TRG	04/16/13 08:40	1.00E+00	123.82	0.00	0.00			
16	U-234	TRG	04/16/13 08:50	1.00E+00	110.70	0.00	0.00			
17	U-234	TRG	04/16/13 08:50	1.00E+00	116.03	0.00	0.00			
18	U-234	TRG	04/16/13 09:00	1.00E+00	4.17	0.00	0.00			
19	U-234	TRG	04/16/13 09:00	1.00E+00	120.51	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-1

US EPA ARCHIVE DOCUMENT

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04132	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	05/09/13 09:57		A_Spec	Alpha_041	170	4.63 E+02	7.00 E-03	19.8
02	U-234	MBL	05/09/13 09:57		A_Spec	Alpha_042	170	2.49 E+00	3.00 E-03	18.5
03	U-234	DUP	05/09/13 09:57		A_Spec	Alpha_044	170	1.63 E+02	1.00 E-03	19
04	U-234	TRG	05/09/13 09:57		A_Spec	Alpha_046	170	1.70 E+01	0.00 E+00	17.9
05	U-234	TRG	05/09/13 09:57		A_Spec	Alpha_047	170	2.00 E+00	0.00 E+00	18.2
06	U-234	TRG	05/09/13 09:57		A_Spec	Alpha_048	170	-5.10 E-01	3.00 E-03	16.8
07	U-234	TRG	05/09/13 12:54		A_Spec	Alpha_025	170	9.64 E+00	8.00 E-03	17.4
08	U-234	TRG	05/09/13 12:54		A_Spec	Alpha_027	170	1.36 E+02	4.00 E-03	17.3
09	U-234	TRG	05/09/13 12:54		A_Spec	Alpha_029	170	1.41 E+02	1.00 E-03	19.5
10	U-234	TRG	05/09/13 12:55		A_Spec	Alpha_033	170	3.83 E+00	1.00 E-03	18.2
11	U-234	TRG	05/09/13 12:55		A_Spec	Alpha_034	170	6.66 E+00	2.00 E-03	18.6
12	U-234	DO	05/09/13 12:55		A_Spec	Alpha_035	170	1.91 E+02	1.00 E-03	18.3
13	U-234	TRG	05/09/13 12:55		A_Spec	Alpha_037	170	1.72 E+02	2.00 E-03	17.8
14	U-234	TRG	05/09/13 12:55		A_Spec	Alpha_040	170	6.00 E+00	0.00 E+00	19
15	U-234	TRG	05/09/13 12:55		A_Spec	Alpha_041	170	6.81 E+00	7.00 E-03	19.8
16	U-234	TRG	05/09/13 12:55		A_Spec	Alpha_042	170	1.25 E+01	3.00 E-03	18.5
17	U-234	TRG	05/09/13 12:55		A_Spec	Alpha_044	170	5.83 E+00	1.00 E-03	19
18	U-234	TRG	05/09/13 12:55		A_Spec	Alpha_046	170	3.20 E+01	0.00 E+00	17.9
19	U-234	TRG	05/09/13 12:55		A_Spec	Alpha_047	170	4.88 E+02	0.00 E+00	18.2

US EPA ARCHIVE DOCUMENT

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04132
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	7.55E+00	1.13E+00	1.46E-01	7.92E+00	95.33	OK		OK	
02	U-238	MBL	BLANK	pCi/l	4.20E-02	7.14E-02	1.21E-01					OK	OK
03	U-238	DUP	PZ-106-KS TOT	pCi/l	7.78E-01	2.19E-01	8.04E-02				OK	OK	
04	U-238	TRG	D-14 TOT	pCi/l	1.05E+00	4.68E-01	1.83E-01					OK	
05	U-238	TRG	D-14 DIS	pCi/l	3.76E-01	3.99E-01	4.09E-01					OK	
06	U-238	TRG	PZ-112-AS TOT	pCi/l	2.23E-01	2.93E-01	4.00E-01					OK	
07	U-238	TRG	PZ-112-AS DIS	pCi/l	0.00E+00	1.82E-01	3.95E-01					OK	
08	U-238	TRG	PZ-202-SS TOT	pCi/l	7.76E-01	2.11E-01	7.77E-02					OK	
09	U-238	TRG	PZ-202-SS DIS	pCi/l	6.28E-01	1.79E-01	4.78E-02					OK	
10	U-238	TRG	DUP07 TOT	pCi/l	3.35E-02	8.04E-02	1.68E-01					OK	
11	U-238	TRG	DUP07 DIS	pCi/l	1.33E-01	1.39E-01	1.45E-01					OK	
12	U-238	DO	PZ-106-KS TOT	pCi/l	8.56E-01	2.18E-01	7.03E-02					OK	
13	U-238	TRG	PZ-106-KS DIS	pCi/l	7.25E-01	1.97E-01	7.02E-02					OK	
14	U-238	TRG	FB at PZ-100-KS TOT	pCi/l	5.65E-02	5.59E-02	6.60E-02					OK	
15	U-238	TRG	FB at PZ-100-KS DIS	pCi/l	-2.22E-02	2.62E-02	9.64E-02					OK	
16	U-238	TRG	PZ-100-KS TOT	pCi/l	6.03E-02	5.74E-02	6.18E-02					OK	
17	U-238	TRG	PZ-100-KS DIS	pCi/l	9.58E-02	7.12E-02	7.18E-02					OK	
18	U-238	TRG	S-53 TOT	pCi/l	1.83E+01	1.12E+01	1.48E+00					INV	
19	U-238	TRG	S-53 DIS	pCi/l	4.74E+00	6.90E-01	5.03E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-1

US EPA ARCHIVE DOCUMENT

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	13-04132	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-238	LCS	04/18/13 00:00	1.00E+00	81.94	0.00	0.00			
02	U-238	MBL	04/18/13 00:00	1.00E+00	56.59	0.00	0.00			
03	U-238	DUP	04/15/13 15:59	1.00E+00	103.70	0.00	0.00			
04	U-238	TRG	04/12/13 11:05	1.00E+00	33.64	0.00	0.00			
05	U-238	TRG	04/12/13 11:05	1.00E+00	14.80	0.00	0.00			
06	U-238	TRG	04/12/13 11:18	1.00E+00	18.79	0.00	0.00			
07	U-238	TRG	04/12/13 11:18	1.00E+00	23.14	0.00	0.00			
08	U-238	TRG	04/12/13 12:32	1.00E+00	124.13	0.00	0.00			
09	U-238	TRG	04/12/13 12:32	1.00E+00	118.63	0.00	0.00			
10	U-238	TRG	04/12/13 00:00	1.00E+00	35.91	0.00	0.00			
11	U-238	TRG	04/12/13 00:00	1.00E+00	40.96	0.00	0.00			
12	U-238	DO	04/15/13 15:59	1.00E+00	123.48	0.00	0.00			
13	U-238	TRG	04/15/13 15:59	1.00E+00	126.72	0.00	0.00			
14	U-238	TRG	04/16/13 08:40	1.00E+00	110.62	0.00	0.00			
15	U-238	TRG	04/16/13 08:40	1.00E+00	123.82	0.00	0.00			
16	U-238	TRG	04/16/13 08:50	1.00E+00	110.70	0.00	0.00			
17	U-238	TRG	04/16/13 08:50	1.00E+00	116.03	0.00	0.00			
18	U-238	TRG	04/16/13 09:00	1.00E+00	4.17	0.00	0.00			
19	U-238	TRG	04/16/13 09:00	1.00E+00	120.51	0.00	0.00			

US EPA ARCHIVE DOCUMENT

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04132
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	05/09/13 09:57		A_Spec	Alpha_041	170	4.63 E+02	1.80 E-02	19.8
02	U-238	MBL	05/09/13 09:57		A_Spec	Alpha_042	170	1.66 E+00	2.00 E-03	18.5
03	U-238	DUP	05/09/13 09:57		A_Spec	Alpha_044	170	5.80 E+01	0.00 E+00	19
04	U-238	TRG	05/09/13 09:57		A_Spec	Alpha_046	170	2.38 E+01	1.00 E-03	17.9
05	U-238	TRG	05/09/13 09:57		A_Spec	Alpha_047	170	3.83 E+00	1.00 E-03	18.2
06	U-238	TRG	05/09/13 09:57		A_Spec	Alpha_048	170	2.66 E+00	2.00 E-03	16.8
07	U-238	TRG	05/09/13 12:54		A_Spec	Alpha_025	170	1.00 E+00	0.00 E+00	17.4
08	U-238	TRG	05/09/13 12:54		A_Spec	Alpha_027	170	6.30 E+01	6.00 E-03	17.3
09	U-238	TRG	05/09/13 12:54		A_Spec	Alpha_029	170	5.48 E+01	1.00 E-03	19.5
10	U-238	TRG	05/09/13 12:55		A_Spec	Alpha_033	170	8.30 E-01	1.00 E-03	18.2
11	U-238	TRG	05/09/13 12:55		A_Spec	Alpha_034	170	3.83 E+00	1.00 E-03	18.6
12	U-238	DO	05/09/13 12:55		A_Spec	Alpha_035	170	7.30 E+01	0.00 E+00	18.3
13	U-238	TRG	05/09/13 12:55		A_Spec	Alpha_037	170	6.20 E+01	0.00 E+00	17.8
14	U-238	TRG	05/09/13 12:55		A_Spec	Alpha_040	170	4.49 E+00	3.00 E-03	19
15	U-238	TRG	05/09/13 12:55		A_Spec	Alpha_041	170	-2.06 E+00	1.80 E-02	19.8
16	U-238	TRG	05/09/13 12:55		A_Spec	Alpha_042	170	4.66 E+00	2.00 E-03	18.5
17	U-238	TRG	05/09/13 12:55		A_Spec	Alpha_044	170	8.00 E+00	0.00 E+00	19
18	U-238	TRG	05/09/13 12:55		A_Spec	Alpha_046	170	5.18 E+01	1.00 E-03	17.9
19	U-238	TRG	05/09/13 12:55		A_Spec	Alpha_047	170	3.94 E+02	1.00 E-03	18.2

US EPA ARCHIVE DOCUMENT

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-1

Run: 1
Analysis Code: UUISO
Eberline Services Work Order: 13-04132
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	5.59E-01	2.20E-01	9.66E-02					OK	
02	U-235	MBL	BLANK	pCi/l	8.87E-02	1.08E-01	1.31E-01					OK	OK
03	U-235	DUP	PZ-106-KS TOT	pCi/l	2.13E-01	1.20E-01	6.93E-02				INV	OK	
04	U-235	TRG	D-14 TOT	pCi/l	-1.85E-02	1.10E-01	2.60E-01					OK	
05	U-235	TRG	D-14 DIS	pCi/l	-6.20E-02	2.49E-01	6.37E-01					OK	
06	U-235	TRG	PZ-112-AS TOT	pCi/l	0.00E+00	2.88E-01	6.22E-01					OK	
07	U-235	TRG	PZ-112-AS DIS	pCi/l	5.38E-02	1.65E-01	3.90E-01					OK	
08	U-235	TRG	PZ-202-SS TOT	pCi/l	1.27E-01	9.14E-02	8.61E-02					OK	
09	U-235	TRG	PZ-202-SS DIS	pCi/l	5.44E-02	5.61E-02	5.92E-02					OK	
10	U-235	TRG	DUP07 TOT	pCi/l	-8.50E-03	9.94E-02	2.09E-01					OK	
11	U-235	TRG	DUP07 DIS	pCi/l	4.31E-02	1.20E-01	2.58E-01					OK	
12	U-235	DO	PZ-106-KS TOT	pCi/l	7.26E-02	7.02E-02	8.71E-02					OK	
13	U-235	TRG	PZ-106-KS DIS	pCi/l	8.70E-02	7.57E-02	8.69E-02					OK	
14	U-235	TRG	FB at PZ-100-KS TOT	pCi/l	4.41E-02	5.34E-02	6.50E-02					OK	
15	U-235	TRG	FB at PZ-100-KS DIS	pCi/l	3.56E-02	4.60E-02	6.39E-02					OK	
16	U-235	TRG	PZ-100-KS TOT	pCi/l	2.93E-02	4.49E-02	6.69E-02					OK	
17	U-235	TRG	PZ-100-KS DIS	pCi/l	1.23E-02	2.95E-02	6.19E-02					OK	
18	U-235	TRG	S-53 TOT	pCi/l	4.67E+00	3.83E+00	2.10E+00					INV	
19	U-235	TRG	S-53 DIS	pCi/l	3.95E-01	1.58E-01	7.83E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-1

US EPA ARCHIVE DOCUMENT

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04132
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-235	LCS	04/18/13 00:00	1.00E+00	81.94	0.00	0.00			
02	U-235	MBL	04/18/13 00:00	1.00E+00	56.59	0.00	0.00			
03	U-235	DUP	04/15/13 15:59	1.00E+00	103.70	0.00	0.00			
04	U-235	TRG	04/12/13 11:05	1.00E+00	33.64	0.00	0.00			
05	U-235	TRG	04/12/13 11:05	1.00E+00	14.80	0.00	0.00			
06	U-235	TRG	04/12/13 11:18	1.00E+00	18.79	0.00	0.00			
07	U-235	TRG	04/12/13 11:18	1.00E+00	23.14	0.00	0.00			
08	U-235	TRG	04/12/13 12:32	1.00E+00	124.13	0.00	0.00			
09	U-235	TRG	04/12/13 12:32	1.00E+00	118.63	0.00	0.00			
10	U-235	TRG	04/12/13 00:00	1.00E+00	35.91	0.00	0.00			
11	U-235	TRG	04/12/13 00:00	1.00E+00	40.96	0.00	0.00			
12	U-235	DO	04/15/13 15:59	1.00E+00	123.48	0.00	0.00			
13	U-235	TRG	04/15/13 15:59	1.00E+00	126.72	0.00	0.00			
14	U-235	TRG	04/16/13 08:40	1.00E+00	110.62	0.00	0.00			
15	U-235	TRG	04/16/13 08:40	1.00E+00	123.82	0.00	0.00			
16	U-235	TRG	04/16/13 08:50	1.00E+00	110.70	0.00	0.00			
17	U-235	TRG	04/16/13 08:50	1.00E+00	116.03	0.00	0.00			
18	U-235	TRG	04/16/13 09:00	1.00E+00	4.17	0.00	0.00			
19	U-235	TRG	04/16/13 09:00	1.00E+00	120.51	0.00	0.00			

US EPA ARCHIVE DOCUMENT

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04132
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	05/09/13 09:57		A_Spec	Alpha_041	170	2.77 E+01	2.00 E-03	19.8
02	U-235	MBL	05/09/13 09:57		A_Spec	Alpha_042	170	2.83 E+00	1.00 E-03	18.5
03	U-235	DUP	05/09/13 09:57		A_Spec	Alpha_044	170	1.28 E+01	1.00 E-03	19
04	U-235	TRG	05/09/13 09:57		A_Spec	Alpha_046	170	-3.40 E-01	2.00 E-03	17.9
05	U-235	TRG	05/09/13 09:57		A_Spec	Alpha_047	170	-5.10 E-01	3.00 E-03	18.2
06	U-235	TRG	05/09/13 09:57		A_Spec	Alpha_048	170	1.00 E+00	0.00 E+00	16.8
07	U-235	TRG	05/09/13 12:54		A_Spec	Alpha_025	170	6.60 E-01	2.00 E-03	17.4
08	U-235	TRG	05/09/13 12:54		A_Spec	Alpha_027	170	8.32 E+00	4.00 E-03	17.3
09	U-235	TRG	05/09/13 12:54		A_Spec	Alpha_029	170	3.83 E+00	1.00 E-03	19.5
10	U-235	TRG	05/09/13 12:55		A_Spec	Alpha_033	170	-1.70 E-01	1.00 E-03	18.2
11	U-235	TRG	05/09/13 12:55		A_Spec	Alpha_034	170	1.00 E+00	0.00 E+00	18.6
12	U-235	DO	05/09/13 12:55		A_Spec	Alpha_035	170	5.00 E+00	0.00 E+00	18.3
13	U-235	TRG	05/09/13 12:55		A_Spec	Alpha_037	170	6.00 E+00	0.00 E+00	17.8
14	U-235	TRG	05/09/13 12:55		A_Spec	Alpha_040	170	2.83 E+00	1.00 E-03	19
15	U-235	TRG	05/09/13 12:55		A_Spec	Alpha_041	170	2.66 E+00	2.00 E-03	19.8
16	U-235	TRG	05/09/13 12:55		A_Spec	Alpha_042	170	1.83 E+00	1.00 E-03	18.5
17	U-235	TRG	05/09/13 12:55		A_Spec	Alpha_044	170	8.30 E-01	1.00 E-03	19
18	U-235	TRG	05/09/13 12:55		A_Spec	Alpha_046	170	1.07 E+01	2.00 E-03	17.9
19	U-235	TRG	05/09/13 12:55		A_Spec	Alpha_047	170	2.65 E+01	3.00 E-03	18.2

Count Room Report
Client: Engineering Management Su

13-04132-UUISO-1 (pCi/l) in WA
Tracer ID: U-10a

Printed: 5/9/2013 6:02 AM
Page 1 of 1

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/18/13 00:00	1.0000	0.6073	11.5927		0.00		
02	MBL	BLANK	04/18/13 00:00	1.0000	0.6047	11.5431		0.00		
03	DUP	PZ-106-KS TOT	04/15/13 15:59	1.0000	0.6001	11.4553		0.00		
04	TRG	D-14 TOT	04/12/13 11:05	1.0000	0.5716	10.9113		0.00		
05	TRG	D-14 DIS	04/12/13 11:05	1.0000	0.5958	11.3732		0.00		
06	TRG	PZ-112-AS TOT	04/12/13 11:18	1.0000	0.5744	10.9647		0.00		
07	TRG	PZ-112-AS DIS	04/12/13 11:18	1.0000	0.5941	11.3408		0.00		
08	TRG	PZ-202-SS TOT	04/12/13 12:32	1.0000	0.5911	11.2835		0.00		
09	TRG	PZ-202-SS DIS	04/12/13 12:32	1.0000	0.5793	11.0583		0.00		
10	TRG	DUP07 TOT	04/12/13 00:00	1.0000	0.5857	11.1804		0.00		
11	TRG	DUP07 DIS	04/12/13 00:00	1.0000	0.5954	11.3656		0.00		
12	DO	PZ-106-KS TOT	04/15/13 15:59	1.0000	0.5586	10.6631		0.00		
13	TRG	PZ-106-KS DIS	04/15/13 15:59	1.0000	0.5908	11.2778		0.00		
14	TRG	FB at PZ-100-KS TOT	04/16/13 08:40	1.0000	0.5864	11.1938		0.00		
15	TRG	FB at PZ-100-KS DIS	04/16/13 08:40	1.0000	0.5803	11.0773		0.00		
16	TRG	PZ-100-KS TOT	04/16/13 08:50	1.0000	0.5882	11.2281		0.00		
17	TRG	PZ-100-KS DIS	04/16/13 08:50	1.0000	0.5827	11.1232		0.00		
18	TRG	S-53 TOT	04/16/13 09:00	1.0000	0.5810	11.0907		0.00		
19	TRG	S-53 DIS	04/16/13 09:00	1.0000	0.5772	11.0182		0.00		

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-04132	1	UUISO	5/3/2013 9:42	JBARNARD		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
U-234	U-8a	35.240	5/3/2013	0.500	0.5118				8.12	0.292	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	5/3/2013	0.500	0.5118				7.92	0.285	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	19.089	5/3/2013	0.6073	0.6300
02	U-232	U-10a	19.089	5/3/2013	0.6047	0.6300
03	U-232	U-10a	19.089	5/3/2013	0.6001	0.6300
04	U-232	U-10a	19.089	5/3/2013	0.5716	0.6300
05	U-232	U-10a	19.089	5/3/2013	0.5958	0.6300
06	U-232	U-10a	19.089	5/3/2013	0.5744	0.6300
07	U-232	U-10a	19.089	5/3/2013	0.5941	0.6300
08	U-232	U-10a	19.089	5/3/2013	0.5911	0.6300
09	U-232	U-10a	19.089	5/3/2013	0.5793	0.6300
10	U-232	U-10a	19.089	5/3/2013	0.5857	0.6300
11	U-232	U-10a	19.089	5/3/2013	0.5954	0.6300
12	U-232	U-10a	19.089	5/3/2013	0.5586	0.6300
13	U-232	U-10a	19.089	5/3/2013	0.5908	0.6300
14	U-232	U-10a	19.089	5/3/2013	0.5864	0.6300
15	U-232	U-10a	19.089	5/3/2013	0.5803	0.6300
16	U-232	U-10a	19.089	5/3/2013	0.5882	0.6300
17	U-232	U-10a	19.089	5/3/2013	0.5827	0.6300
18	U-232	U-10a	19.089	5/3/2013	0.5810	0.6300
19	U-232	U-10a	19.089	5/3/2013	0.5772	0.6300

Balance Printer Tapes

Tracer

```
0.6073 g
0.6047 g
-0.6001 g
-0.5716 g
-0.5958 g
-0.5744 g
-0.5941 g
-0.5911 g
-0.5793 g
-0.5857 g
-0.5954 g
```

```
-0.5586 g
-0.5908 g
-0.5864 g
-0.5803 g
-0.5882 g
-0.5827 g
-0.5810 g
-0.5772 g
```

LCS

```
0.5118 g
```

Matrix Spike

US EPA ARCHIVE DOCUMENT

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Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04132	1	UUISO	liters	5/9/2013	JBARNARD

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	PZ-106-KS TOT	DUP					1.0000E+00	1.0000E+00				
04	D-14 TOT	TRG					1.0000E+00	1.0000E+00				
05	D-14 DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-112-AS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-112-AS DIS	TRG					1.0000E+00	1.0000E+00				
08	PZ-202-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-202-SS DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP07 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP07 DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-106-KS TOT	DO					1.0000E+00	1.0000E+00				
13	PZ-106-KS DIS	TRG					1.0000E+00	1.0000E+00				
14	FB at PZ-100-KS TOT	TRG					1.0000E+00	1.0000E+00				
15	FB at PZ-100-KS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-100-KS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-100-KS DIS	TRG					1.0000E+00	1.0000E+00				
18	S-53 TOT	TRG					1.0000E+00	1.0000E+00				
19	S-53 DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: _____ Date: 5/3/13

ICB 5/9/13

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 56377
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 5/9/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 9:57:46 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: 0.1621 +/- 0.0098
Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
Chem. Recovery Factor: 0.8194 +/- 0.0517

Control Certificate Name: NatU_U-8A
Chem. Recov. of Control: U-238 0.929240 +/- 0.076392
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	5.263	317.66	11.00	0.34	0.00E+000	13.6
U-234		4.718	462.81	9.12	1.19	0.00E+000	32.1
U-235		4.398	27.66	37.53	0.34	0.00E+000	3.0
U-238		4.137	462.94	9.14	3.06	0.00E+000	8.5

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.989	5302.50*	5.20E+000 +/- 6.19E-001	7.83E-002 +/- 9.31E-003
U-234	0.987	4761.50*	7.58E+000 +/- 1.14E+000	1.08E-001 +/- 1.28E-002
U-235	0.999	4385.50*	5.59E-001 +/- 2.20E-001	9.66E-002 +/- 1.15E-002
U-238	0.984	4184.40*	7.55E+000 +/- 1.13E+000	1.46E-001 +/- 1.73E-002

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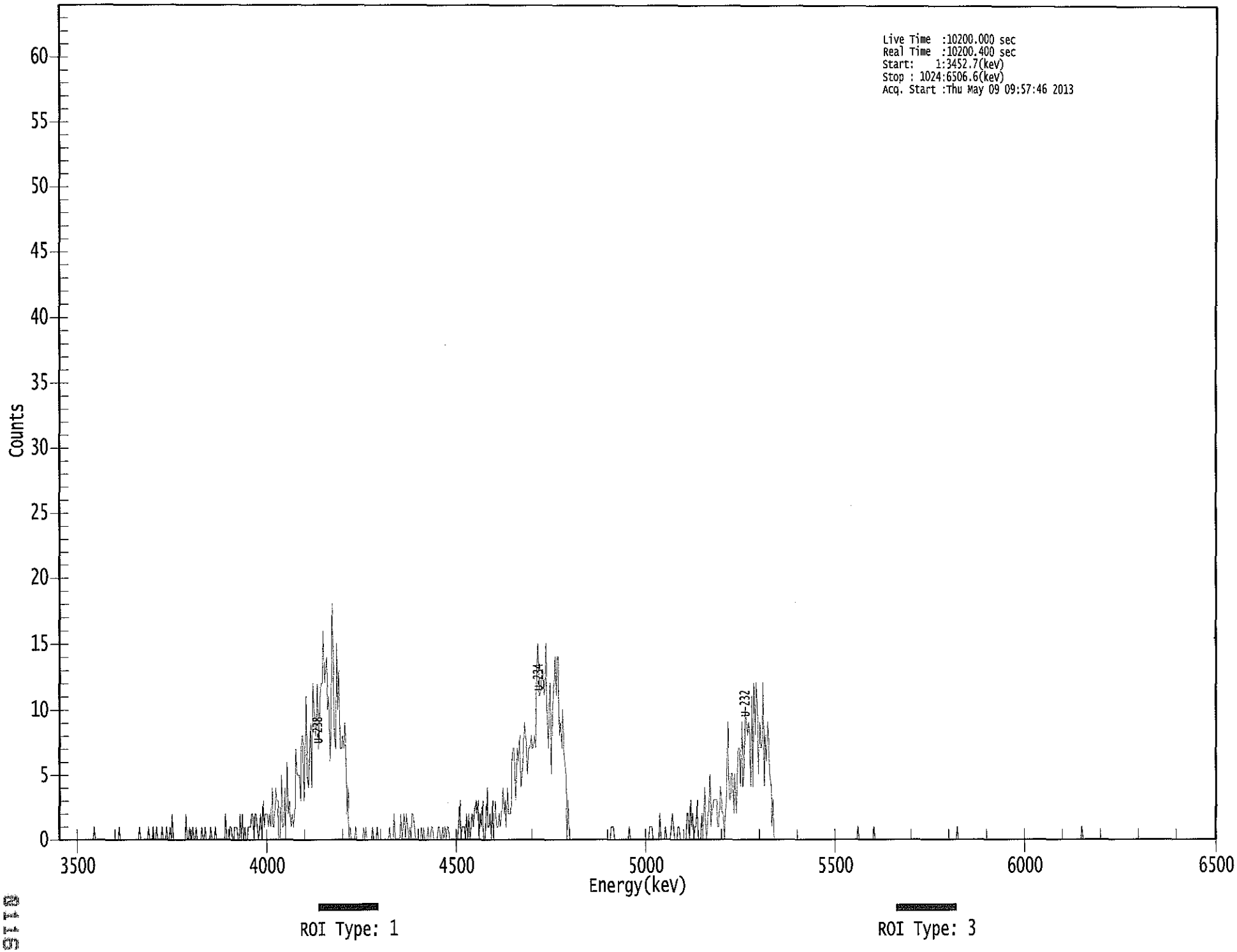
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057535.CNF



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

Sample Title: 01

Elapsed Live time: 10200
Elapsed Real Time: 10200

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

369:	3	2	3	0	2	1	3	0

Sample Title: 01

Channel								
377:	0	1	4	1	1	2	0	3
385:	0	3	2	1	1	2	1	2
393:	4	2	3	1	4	2	2	2
401:	6	7	7	3	5	7	6	8
409:	4	5	6	9	8	7	5	7
417:	7	8	7	7	8	7	13	15
425:	11	11	13	13	11	12	15	10
433:	7	10	12	5	10	11	14	11
441:	14	14	8	9	7	10	7	6
449:	5	0	3	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:	0	0	0	0	0	0	0	0
489:	1	1	1	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	0	0	0	0	0
521:	0	0	1	1	1	0	0	0
529:	0	0	0	2	0	0	0	0
537:	1	0	0	0	0	1	2	1
545:	0	0	0	1	1	0	0	0
553:	0	0	0	2	2	0	3	1
561:	2	0	1	1	3	0	0	0
569:	2	0	4	2	0	1	3	5
577:	1	2	3	3	3	3	1	1
585:	4	3	2	2	0	2	5	9
593:	3	3	5	5	2	5	2	4
601:	7	7	4	9	4	5	10	9
609:	8	9	8	4	11	4	12	8
617:	12	10	5	9	7	7	12	4
625:	8	6	9	7	5	4	1	3
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	1	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	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	0	0	0	0	0	0	0

Sample Title: 01

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	1	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	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 5/9/13

Apex-Alpha™

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_042
Chamber Serial Number: 05026930B
Detector Serial Number: 84185
Env. Background: System Bkgd 56378
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 5/9/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 9:57:48 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: 0.1045 +/- 0.0077
Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
Chem. Recovery Factor: 0.5659 +/- 0.0429

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	5.289	203.83	13.74	0.17	0.00E+000	4.6
U-234		4.745	2.49	138.29	0.51	0.00E+000	3.0
U-235		4.445	2.83	120.53	0.17	0.00E+000	3.0
U-238		4.151	1.66	169.38	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

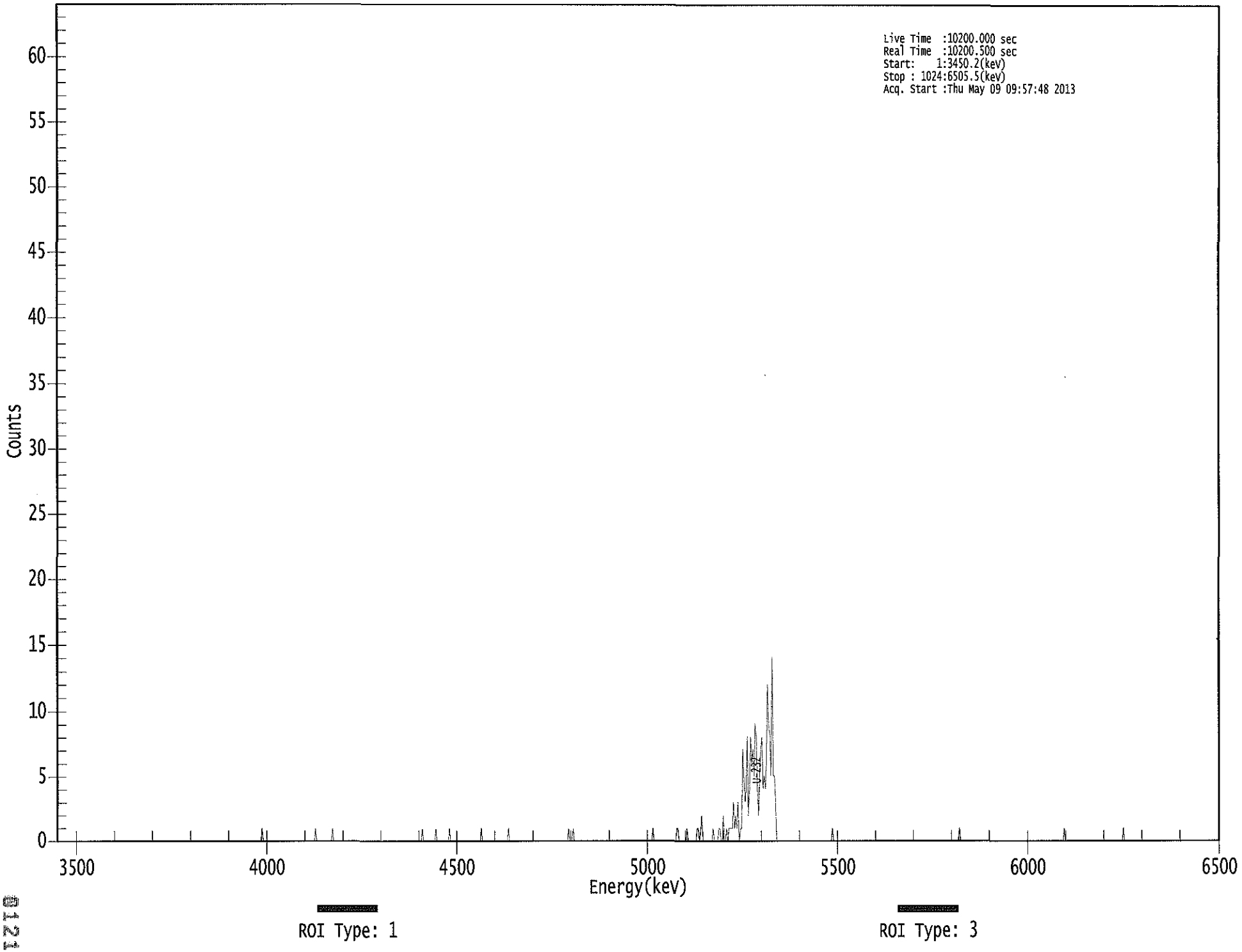
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.18E+000 +/- 7.49E-001	1.06E-001 +/- 1.53E-002
U-234	0.998	4761.50*	6.33E-002 +/- 8.80E-002	1.33E-001 +/- 1.93E-002
U-235	0.975	4385.50*	8.87E-002 +/- 1.08E-001	1.31E-001 +/- 1.89E-002
U-238	0.992	4184.40*	4.20E-002 +/- 7.14E-002	1.21E-001 +/- 1.75E-002

AG 5/10/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057536.CNF



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

Sample Title: 02

Elapsed Live time: 10200
Elapsed Real Time: 10201

Channel								
1:	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	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	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	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	1	0	0	0	0	0	0
329:	0	0	0	0	0	1	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	0	0	0

369:	0	0	0	0	0	1	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	1	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:	0	0	1	0	0	0	1	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	1	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	1	1	0	0	0	0	0
553:	0	0	1	0	0	0	0	0
561:	0	0	0	1	1	0	1	2
569:	0	0	0	0	0	0	0	0
577:	0	1	0	0	0	0	1	1
585:	0	0	2	0	0	1	0	1
593:	1	1	1	3	1	2	1	3
601:	0	1	1	7	5	3	4	8
609:	2	4	8	6	7	5	9	8
617:	4	2	5	7	8	4	5	4
625:	6	12	9	8	5	14	5	5
633:	3	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	1	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	1	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	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	1	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	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 5/9/13

Apex-Alpha™

Sample Description: PZ-106-KS TOT-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_044
Chamber Serial Number: 04026481B
Detector Serial Number: 84168
Env. Background: System Bkgd 56379
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/15/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 9:57:42 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.600 mL
Effective Efficiency: 0.1972 +/- 0.0111
Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
Chem. Recovery Factor: 1.0370 +/- 0.0609

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.274	381.83	10.03	0.17	0.00E+000	5.5
U-234		4.727	162.83	15.37	0.17	0.00E+000	12.5
U-235		4.406	12.83	55.14	0.17	0.00E+000	3.0
U-238		4.135	58.00	25.96	0.00	0.00E+000	3.7

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.14E+000 +/- 5.66E-001	5.62E-002 +/- 6.18E-003
U-234	0.991	4761.50*	2.19E+000 +/- 4.14E-001	5.62E-002 +/- 6.18E-003
U-235	0.997	4385.50*	2.13E-001 +/- 1.20E-001	6.93E-002 +/- 7.62E-003
U-238	0.983	4184.40*	7.78E-001 +/- 2.19E-001	8.04E-002 +/- 8.84E-003

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US EPA ARCHIVE DOCUMENT

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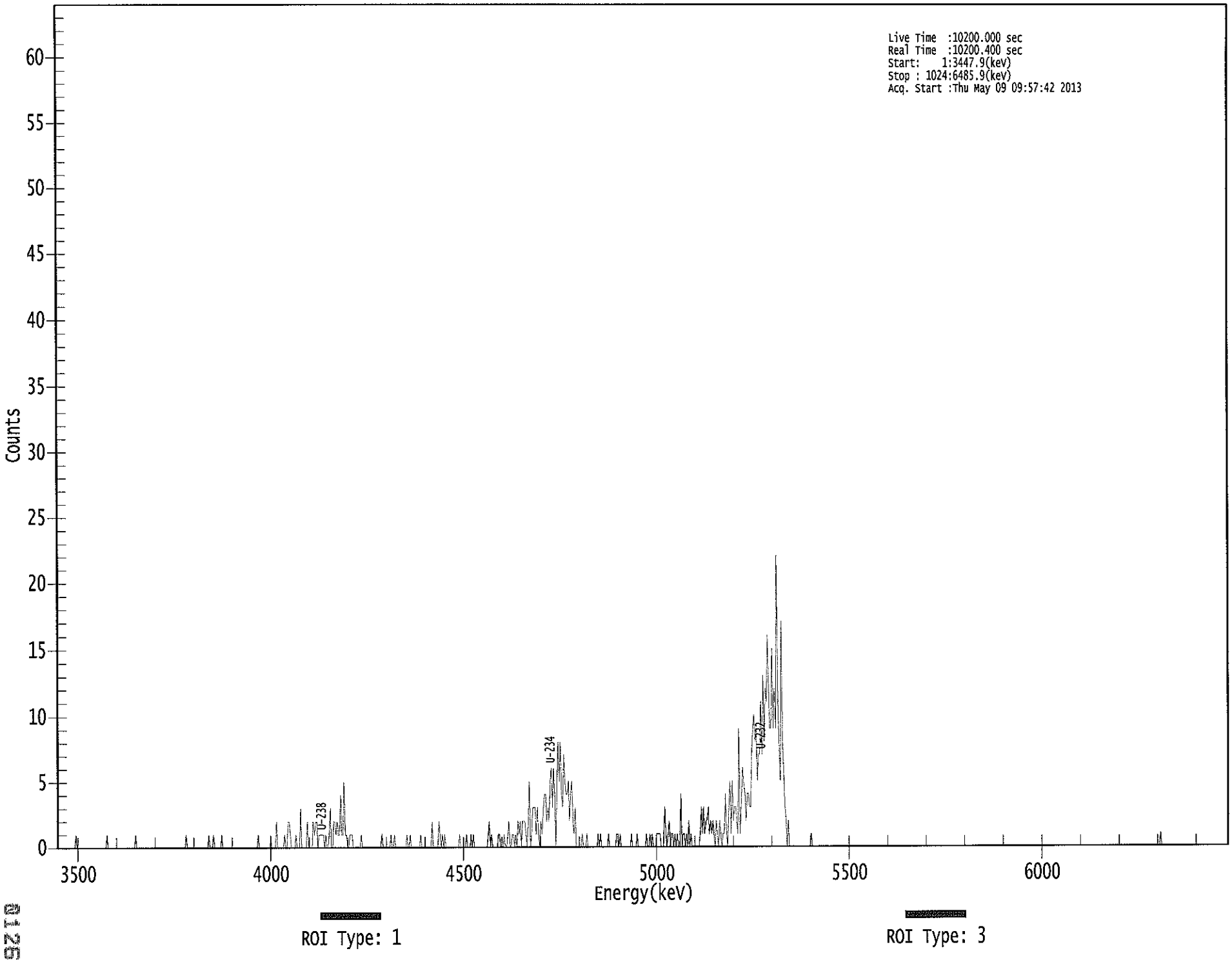

9276

****
***** 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:	1	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	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:	1	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	1	0	0	0
137:	1	0	0	0	0	0	0	1
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	1
177:	0	0	0	0	0	0	0	0
185:	0	0	1	0	0	0	0	2
193:	0	0	0	0	0	0	1	0
201:	0	2	2	1	0	0	0	0
209:	1	0	0	0	3	0	0	0
217:	0	0	2	0	0	0	0	2
225:	1	2	2	0	1	1	1	1
233:	1	0	1	0	0	1	3	0
241:	0	2	2	1	2	1	1	4
249:	1	1	5	1	1	0	0	1
257:	1	1	0	0	0	0	0	0
265:	0	1	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	1	0	0	0	0
289:	0	0	0	1	0	0	1	0
297:	0	0	0	0	0	0	0	0
305:	0	1	0	0	1	0	0	0
313:	0	0	0	0	0	1	0	0
321:	0	0	0	0	0	0	0	2
329:	0	0	0	0	0	2	1	0
337:	1	0	1	0	0	0	0	0
345:	0	0	0	0	0	0	0	1
353:	0	0	0	0	0	1	0	0
361:	0	1	0	1	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
377:	1	2	0	1	0	0	0	0
385:	0	1	1	0	0	0	1	0
393:	0	1	2	0	0	1	1	0
401:	1	0	2	1	2	0	2	2
409:	2	1	0	2	5	0	1	3
417:	3	3	1	3	1	0	2	1
425:	3	4	4	2	3	2	5	6
433:	3	6	4	0	5	8	5	8
441:	4	3	7	5	4	4	5	2
449:	4	5	2	1	3	0	0	0
457:	0	0	1	0	0	0	1	0
465:	0	0	0	0	0	0	0	0
473:	1	0	1	0	0	0	0	0
481:	0	1	0	0	0	0	0	0
489:	1	1	0	1	0	0	0	0
497:	0	0	0	0	0	1	0	0
505:	0	0	1	0	0	0	0	0
513:	0	0	1	0	0	1	0	1
521:	0	0	0	1	1	1	1	0
529:	0	0	3	1	0	1	2	0
537:	1	1	0	1	0	1	0	0
545:	4	0	1	1	0	1	0	2
553:	0	1	0	0	0	0	0	0
561:	0	1	3	1	3	1	2	2
569:	3	1	2	1	2	1	0	2
577:	1	0	2	1	0	1	1	4
585:	1	0	3	5	1	5	2	3
593:	3	2	1	9	1	3	6	5
601:	4	2	4	4	3	3	7	9
609:	10	8	9	5	7	7	11	7
617:	13	8	12	11	16	12	9	9
625:	15	9	12	9	22	11	8	5
633:	17	8	6	3	2	0	2	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	1	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 03

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

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Apex-Alpha™

Sample Description: D-14 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_046
Chamber Serial Number: 04026482B
Detector Serial Number: 58762
Env. Background: System Bkgd 56380
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 9:57:44 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.572 mL
Effective Efficiency: 0.0602 +/- 0.0059
Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
Chem. Recovery Factor: 0.3364 +/- 0.0335

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.271	111.00	18.69	0.00	0.00E+000	5.1
U-234		4.721	17.00	48.92	0.00	0.00E+000	3.7
U-235		4.396	-0.34	592.90	0.34	0.00E+000	0.0
U-238		4.151	23.83	40.32	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	4.90E+000 +/- 9.42E-001	2.65E-001 +/- 5.09E-002
U-234	0.988	4761.50*	7.50E-001 +/- 3.94E-001	2.64E-001 +/- 5.08E-002
U-235	0.999	4385.50*	-1.85E-002 +/- 1.10E-001	2.60E-001 +/- 5.00E-002
U-238	0.992	4184.40*	1.05E+000 +/- 4.68E-001	1.83E-001 +/- 3.52E-002

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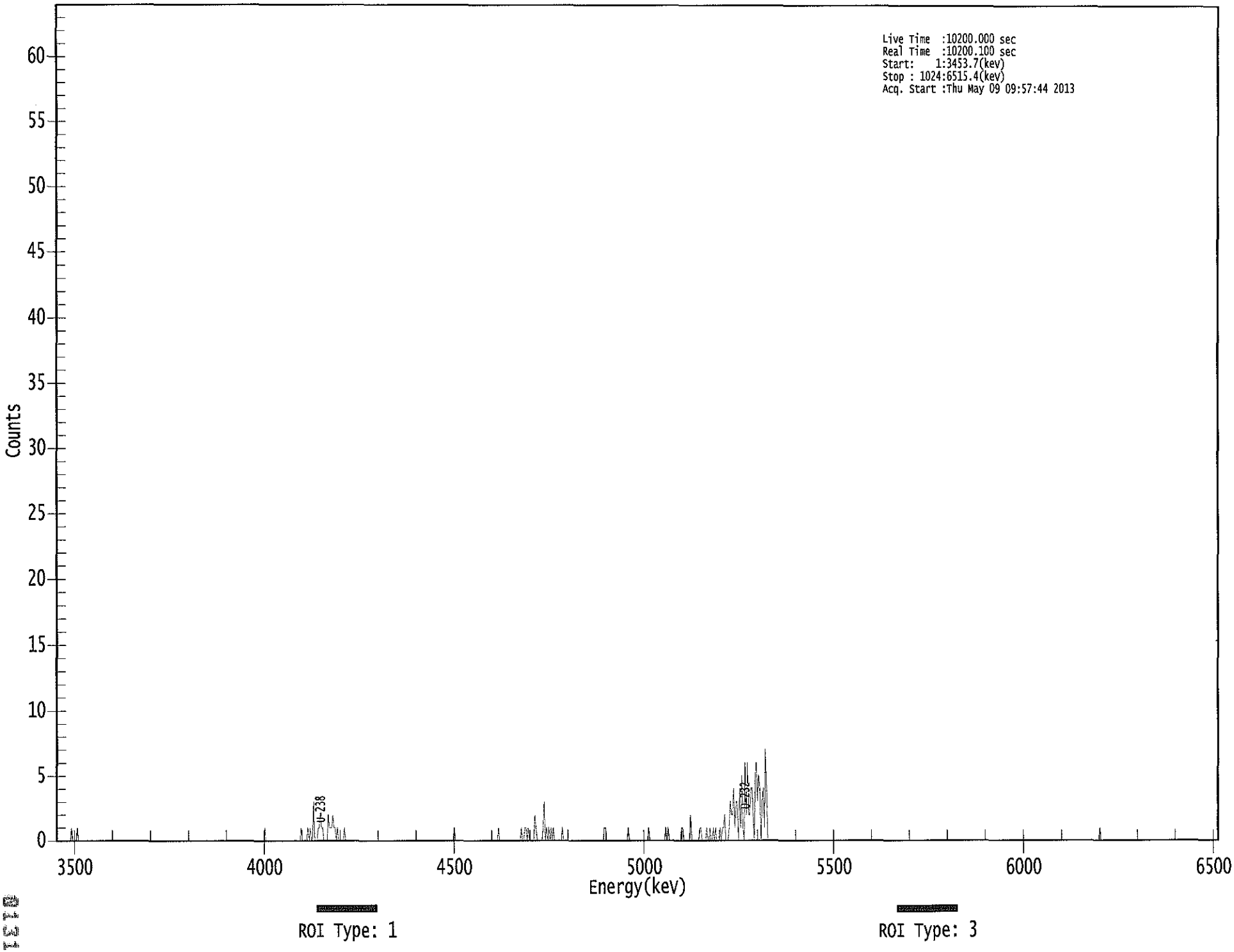

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 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	1	0	0
17:	0	0	1	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	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	1
217:	0	0	0	0	0	1	0	1
225:	0	0	3	0	0	0	1	1
233:	2	1	1	0	0	0	0	2
241:	1	1	1	2	1	1	0	1
249:	0	0	0	0	0	1	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	1	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 04

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	1	0	0	1	1	0	1
417:	0	0	0	0	0	2	1	0
425:	0	0	0	0	1	3	0	1
433:	0	1	0	1	0	1	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	1	1	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	1	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	1	0	1	0	0	0	0	0
545:	0	0	0	0	0	0	1	1
553:	0	0	0	0	0	0	2	0
561:	0	0	0	0	0	0	1	1
569:	0	0	0	0	1	0	0	1
577:	0	0	1	0	1	0	0	0
585:	1	0	1	1	2	0	0	0
593:	1	3	2	2	4	1	3	3
601:	0	4	1	5	1	0	6	2
609:	6	2	2	4	4	2	0	5
617:	6	3	5	4	0	3	4	1
625:	7	4	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: 04

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

US EPA ARCHIVE DOCUMENT

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Apex-Alpha™

Sample Description:	PZ-202-SS TOT
Spectrum File:	\\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification:	1304132A-UU
Sample Identification:	08
Sample Geometry:	Shelf 2
Procedure Description:	U iso
Detector Name:	Alpha_027
Chamber Serial Number:	
Detector Serial Number:	27
Env. Background:	System Bkgd 56370
Reagent Blank:	<not performed>
Sample Size:	1.000E+000 +/- 0.000E+000 liter
Sample Date/Time:	4/12/2013 6:52:37 AM
Acquisition Date/Time:	5/9/2013 12:54:35 PM
Acquisition Live Time:	170.0 minutes
Acquisition Real Time:	170.0 minutes
Tracer Certificate:	U232_UU-10A
Tracer Quantity:	0.591 mL
Effective Efficiency:	0.2144 +/- 0.0117
Counting Efficiency:	0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
Chem. Recovery Factor:	1.2413 +/- 0.0717
Peak Match Tolerance:	0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.283	408.98	9.71	1.02	0.00E+000	27.1
U-234		4.733	136.32	16.84	0.68	0.00E+000	12.4
U-235		4.423	8.32	71.13	0.68	0.00E+000	3.2
U-238		4.156	62.98	24.93	1.02	0.00E+000	6.2

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.07E+000 +/- 5.42E-001	7.81E-002 +/- 8.35E-003
U-234	0.994	4761.50*	1.69E+000 +/- 3.37E-001	6.98E-002 +/- 7.47E-003
U-235	0.990	4385.50*	1.27E-001 +/- 9.14E-002	8.61E-002 +/- 9.22E-003
U-238	0.994	4184.40*	7.76E-001 +/- 2.11E-001	7.77E-002 +/- 8.31E-003

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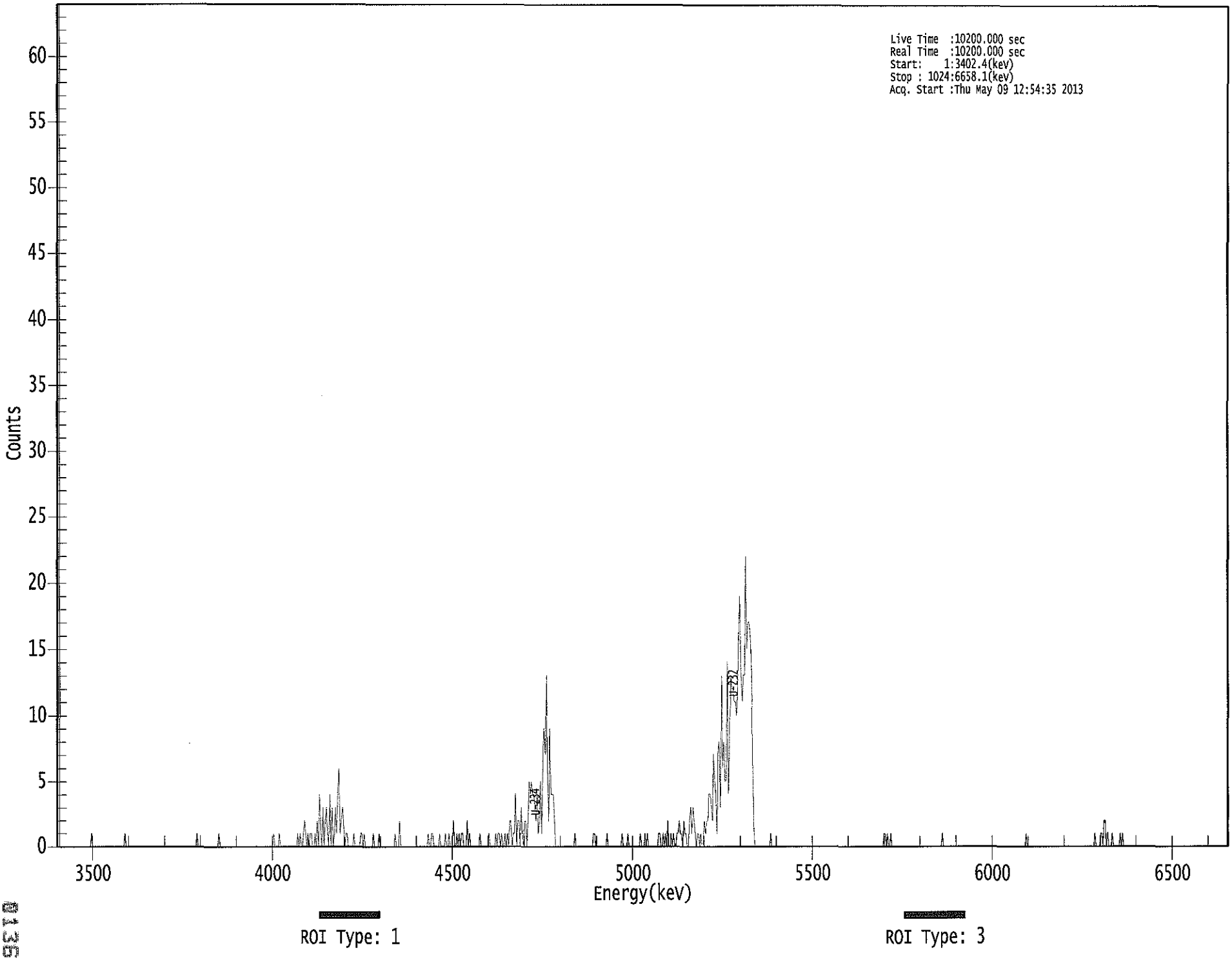
US EPA ARCHIVE DOCUMENT

0000057556.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	1	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	1	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	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	1	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	1	0	0
193:	0	0	1	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	1	0	1	0	0	1
217:	2	1	0	1	0	1	1	0
225:	0	1	0	2	0	4	1	0
233:	3	0	2	3	1	0	4	0
241:	3	0	1	3	1	4	6	1
249:	2	3	2	0	1	1	0	0
257:	0	0	0	1	0	0	0	0
265:	0	1	1	0	1	0	0	0
273:	0	0	0	0	1	0	0	0
281:	0	1	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	2	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	1	0	0	1
329:	1	0	0	0	0	0	1	0
337:	0	0	0	1	0	0	1	0
345:	0	0	2	0	0	1	0	1
353:	0	1	1	0	0	0	2	0
361:	1	0	0	0	0	0	0	0

369:	0	1	0	0	0	0	0	0

Sample Title: 08

Channel								
377:	0	1	0	0	0	0	0	1
385:	0	1	1	0	1	0	0	1
393:	0	1	0	2	2	0	1	1
401:	4	0	2	2	0	3	1	0
409:	2	2	0	2	5	4	5	4
417:	4	3	2	4	1	2	5	1
425:	7	9	7	13	5	2	9	4
433:	4	4	2	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	1	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	1	1	0	0
473:	0	0	0	0	0	0	0	0
481:	1	0	0	0	0	0	0	0
489:	0	0	0	0	0	1	0	0
497:	0	0	1	0	0	0	0	0
505:	0	0	0	0	0	1	0	0
513:	0	1	0	1	0	0	0	0
521:	0	0	0	0	0	1	1	0
529:	0	1	0	1	0	2	0	0
537:	1	0	1	0	0	1	1	2
545:	1	1	0	2	1	1	0	0
553:	2	3	1	3	2	1	0	1
561:	1	0	1	0	0	2	1	2
569:	2	4	4	3	2	7	5	4
577:	1	7	8	3	13	6	8	5
585:	5	14	4	7	13	12	12	11
593:	11	10	12	16	19	13	11	13
601:	13	22	15	17	17	16	14	8
609:	2	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	1
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	1	1	0	1	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	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	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	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	1	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	1	0	0	0	0	1
913:	1	0	2	2	0	1	0	0
921:	0	1	0	0	0	0	0	0
929:	1	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	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: PZ-202-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 09
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_029
Chamber Serial Number:
Detector Serial Number: 29
Env. Background: System Bkgd 56371
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:54:36 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.579 mL
Effective Efficiency: 0.2308 +/- 0.0123
Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
Chem. Recovery Factor: 1.1863 +/- 0.0670

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	431.32	9.45	0.68	0.00E+000	20.8
U-234		4.731	140.83	16.53	0.17	0.00E+000	4.8
U-235		4.378	3.83	102.72	0.17	0.00E+000	3.1
U-238		4.151	54.83	26.52	0.17	0.00E+000	4.7

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	4.97E+000 +/- 5.20E-001	6.49E-002 +/- 6.80E-003
U-234	0.993	4761.50*	1.62E+000 +/- 3.17E-001	4.80E-002 +/- 5.03E-003
U-235	1.000	4385.50*	5.44E-002 +/- 5.61E-002	5.92E-002 +/- 6.20E-003
U-238	0.992	4184.40*	6.28E-001 +/- 1.79E-001	4.78E-002 +/- 5.00E-003

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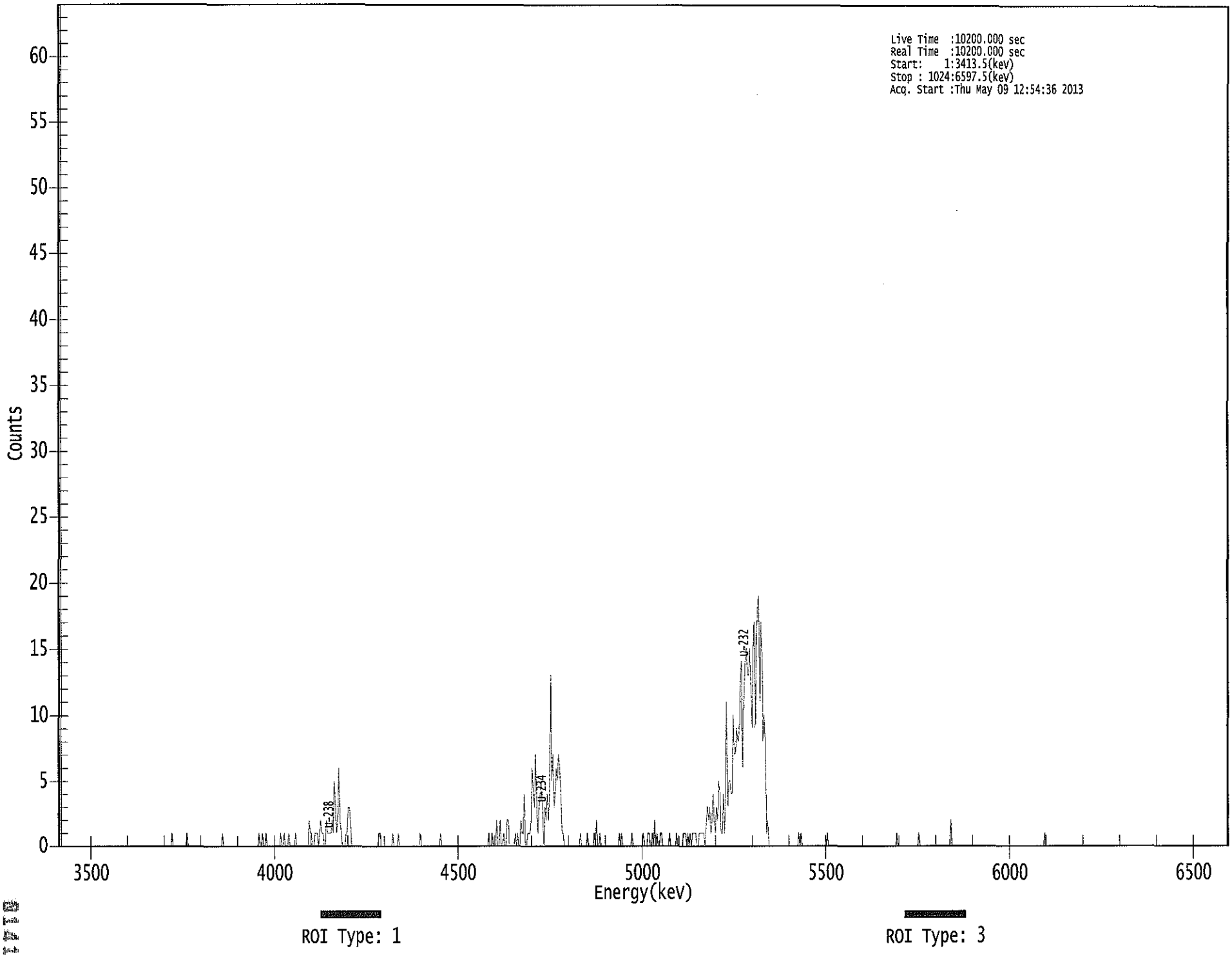

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 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	1	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	1	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	1
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	1
177:	0	0	1	0	0	1	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	1	0	0	1	0	0
201:	0	1	0	0	0	0	0	1
209:	0	0	0	0	0	0	0	0
217:	0	0	0	2	1	1	0	0
225:	1	1	1	0	1	2	1	1
233:	0	0	2	1	1	1	1	2
241:	1	5	3	1	2	6	2	1
249:	0	0	0	1	1	3	3	2
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	1	0	0	0	0	0	0
289:	0	0	0	0	1	0	0	0
297:	0	1	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	1	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	1	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: 09

Channel								
377:	1	0	0	1	0	0	0	2
385:	0	0	2	0	0	1	0	0
393:	2	2	0	0	0	0	0	1
401:	0	1	0	0	2	1	1	4
409:	0	0	1	1	1	2	6	4
417:	3	7	3	1	3	4	5	3
425:	0	3	2	4	2	4	13	5
433:	7	3	4	6	5	7	6	4
441:	1	1	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	1	0	0	0	0	0	1	0
465:	0	0	0	0	1	0	2	0
473:	0	1	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	1	0	1	0	0	0
497:	0	0	0	0	0	1	0	0
505:	0	0	0	0	0	0	0	1
513:	0	0	0	1	1	0	0	1
521:	0	2	0	1	0	0	1	1
529:	0	0	0	0	0	0	1	0
537:	0	0	0	0	1	0	0	0
545:	0	0	1	1	1	0	1	0
553:	1	0	1	1	1	1	0	0
561:	1	1	1	1	1	0	2	3
569:	2	3	1	2	4	2	1	3
577:	2	5	4	1	1	4	1	4
585:	11	3	5	5	4	4	10	7
593:	7	9	8	8	13	14	6	11
601:	14	15	13	13	15	12	9	15
609:	17	9	16	18	19	11	17	14
617:	8	10	8	1	2	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	1
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:	1	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	1	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	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	2	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	1	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

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Apex-Alpha™

Sample Description: DUP07 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 10
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_033
Chamber Serial Number: 04026479A
Detector Serial Number: 91132
Env. Background: System Bkgd 56372
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:55:17 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.586 mL
Effective Efficiency: 0.0655 +/- 0.0061
Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
Chem. Recovery Factor: 0.3591 +/- 0.0339

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.290	123.83	17.63	0.17	0.00E+000	3.4
U-234		4.709	3.83	102.72	0.17	0.00E+000	3.0
U-235		4.398	-0.17	1169.4	0.17	0.00E+000	0.0
U-238		4.205	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)
U-232	0.999	5302.50*	5.02E+000 +/- 9.14E-001	1.69E-001 +/- 3.08E-002
U-234	0.981	4761.50*	1.55E-001 +/- 1.62E-001	1.69E-001 +/- 3.08E-002
U-235	0.999	4385.50*	-8.50E-003 +/- 9.94E-002	2.09E-001 +/- 3.80E-002
U-238	0.997	4184.40*	3.35E-002 +/- 8.04E-002	1.68E-001 +/- 3.06E-002

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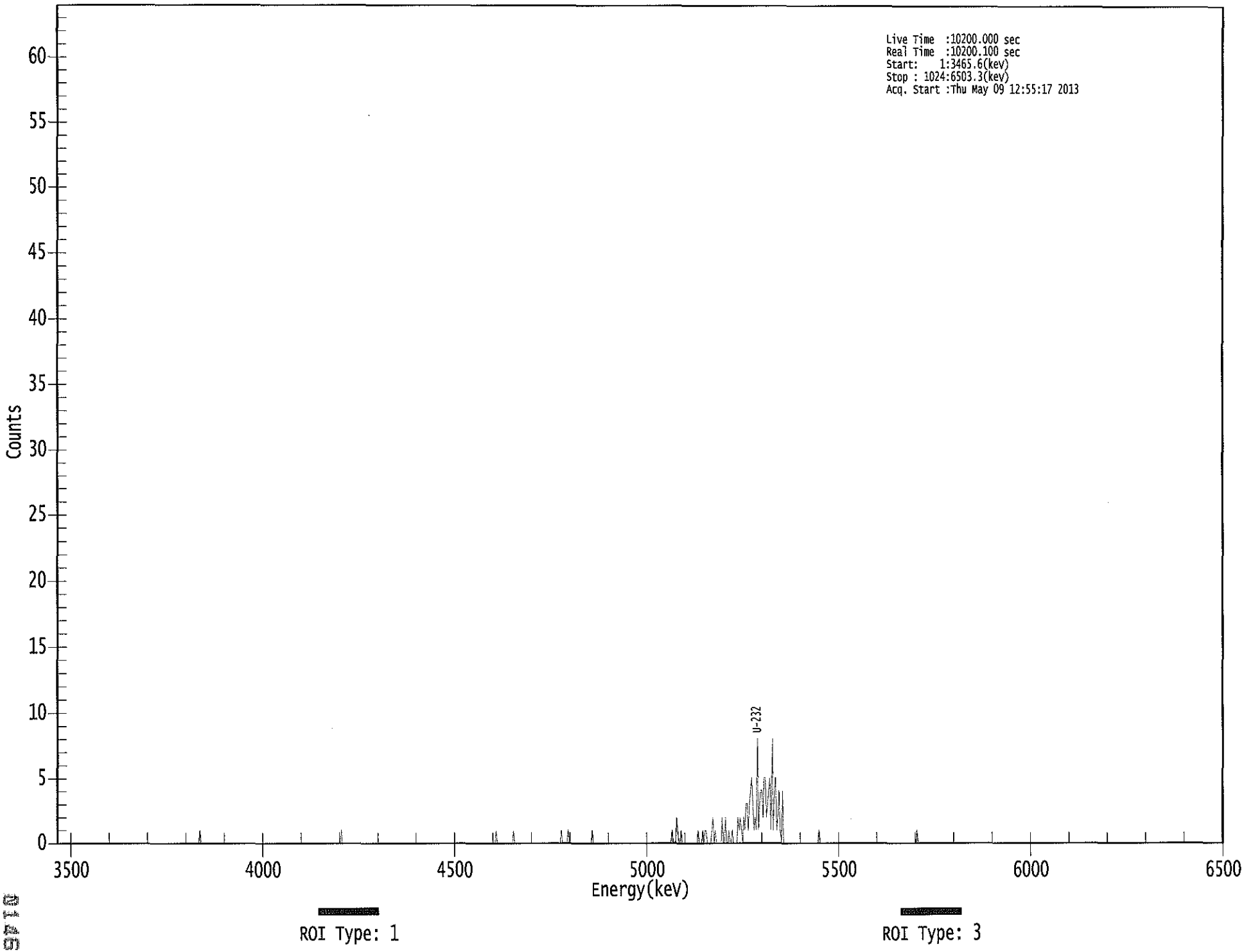
0000057558.CNF



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

Sample Title: 10

Elapsed Live time: 10200
Elapsed Real Time: 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	1	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	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	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 10

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	1	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	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:	1	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	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	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	2
545:	1	0	0	1	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	1	0	0	0	1	0
569:	1	1	0	0	0	0	1	2
577:	0	1	0	0	0	0	0	2
585:	0	0	2	0	0	1	0	0
593:	1	0	0	0	0	2	1	2
601:	1	0	2	1	3	3	1	3
609:	4	5	3	1	2	1	8	1
617:	3	4	4	2	5	5	2	3
625:	4	5	1	8	1	4	5	1
633:	2	4	1	0	4	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	1	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	1	0	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: 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

KPS 5/9/13

Apex-Alpha™

Sample Description: DUP07 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 11
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_034
Chamber Serial Number: 04026479B
Detector Serial Number: 91136
Env. Background: System Bkgd 56373
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:55:19 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.595 mL
Effective Efficiency: 0.0760 +/- 0.0065
Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
Chem. Recovery Factor: 0.4096 +/- 0.0360

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	146.00	16.28	0.00	0.00E+000	7.9
U-234		4.730	6.66	78.18	0.34	0.00E+000	3.0
U-235		4.343	1.00	277.19	0.00	0.00E+000	3.0
U-238		4.111	3.83	102.72	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.10E+000 +/- 8.62E-001	2.10E-001 +/- 3.54E-002
U-234	0.993	4761.50*	2.33E-001 +/- 1.86E-001	1.67E-001 +/- 2.82E-002
U-235	0.987	4385.50*	4.31E-002 +/- 1.20E-001	2.58E-001 +/- 4.36E-002
U-238	0.962	4184.40*	1.33E-001 +/- 1.39E-001	1.45E-001 +/- 2.45E-002

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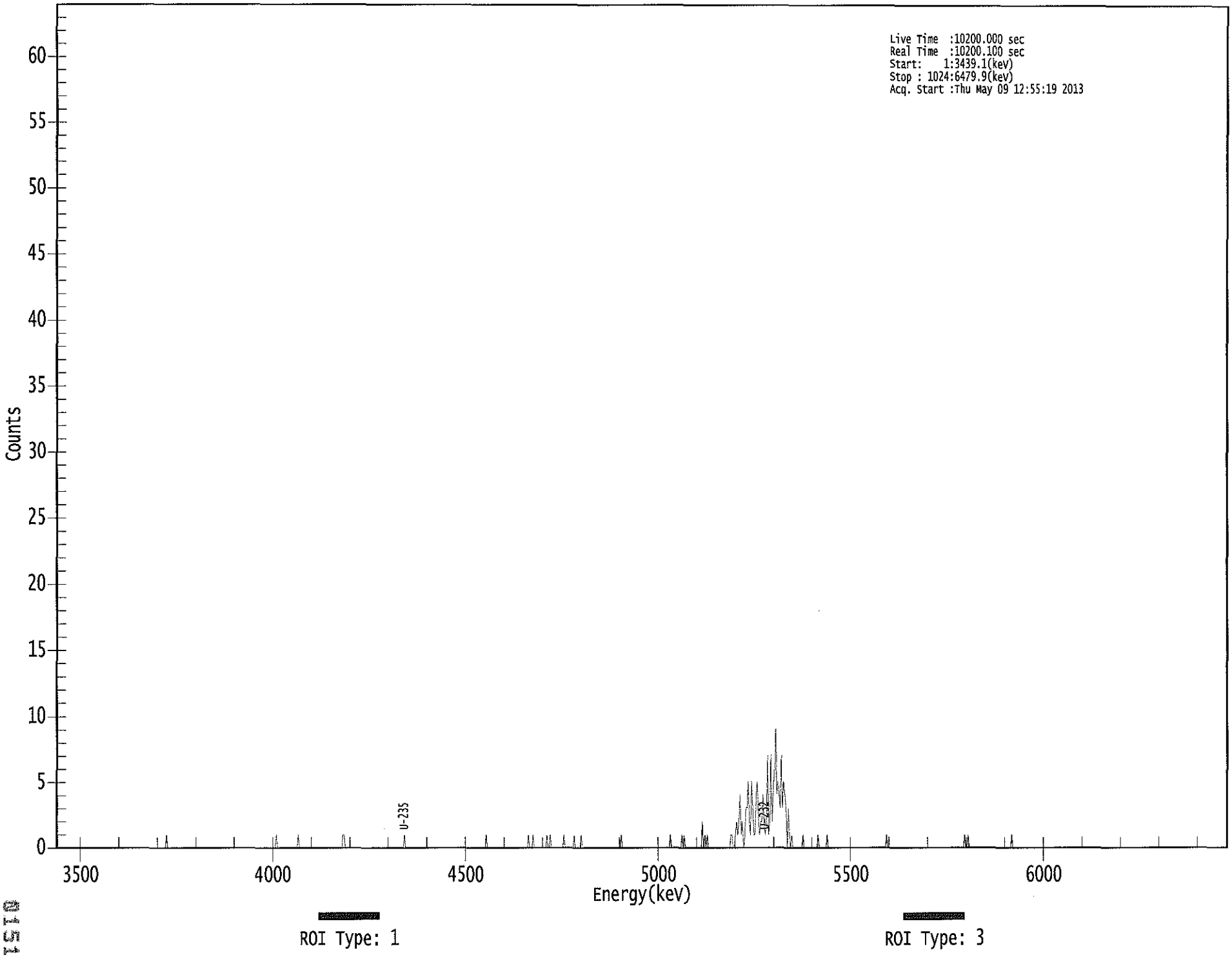
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057559.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:	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:	1	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	1	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	1	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	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	0
297:	0	0	0	0	0	0	0	0
305:	1	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	1

Sample Title: 11

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	1	0	0	0
417:	1	0	0	0	0	0	0	0
425:	0	0	0	0	1	0	0	1
433:	0	0	0	0	0	0	0	0
441:	0	0	0	1	0	0	0	0
449:	0	0	0	0	1	0	0	0
457:	0	0	1	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
545:	0	0	1	0	1	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	2	0	1	0
569:	1	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	1	1	0
593:	0	1	2	1	2	4	1	2
601:	0	1	3	3	5	2	1	5
609:	3	1	1	4	5	2	1	2
617:	2	4	2	1	2	7	1	2
625:	7	2	4	6	9	4	5	4
633:	3	7	3	5	4	3	0	3
641:	1	0	1	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	1	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	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	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	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	1	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	1	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

IGB 5/9/13

Apex-Alpha™

Sample Description: PZ-106-KS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 12
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_035
Chamber Serial Number: 04026477A
Detector Serial Number: 58771
Env. Background: System Bkgd 56374
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/15/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:55:21 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.559 mL
Effective Efficiency: 0.2254 +/- 0.0123
Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
Chem. Recovery Factor: 1.2348 +/- 0.0709

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	5.298	406.32	9.73	0.68	0.00E+000	32.6
U-234		4.756	190.83	14.20	0.17	0.00E+000	3.9
U-235		4.402	5.00	96.02	0.00	0.00E+000	2.9
U-238		4.170	73.00	23.10	0.00	0.00E+000	6.9

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	1.000	5302.50*	4.79E+000 +/- 5.14E-001	6.65E-002 +/- 7.13E-003
U-234	1.000	4761.50*	2.25E+000 +/- 4.00E-001	4.91E-002 +/- 5.27E-003
U-235	0.998	4385.50*	7.26E-002 +/- 7.02E-002	8.71E-002 +/- 9.34E-003
U-238	0.999	4184.40*	8.56E-001 +/- 2.18E-001	7.03E-002 +/- 7.54E-003

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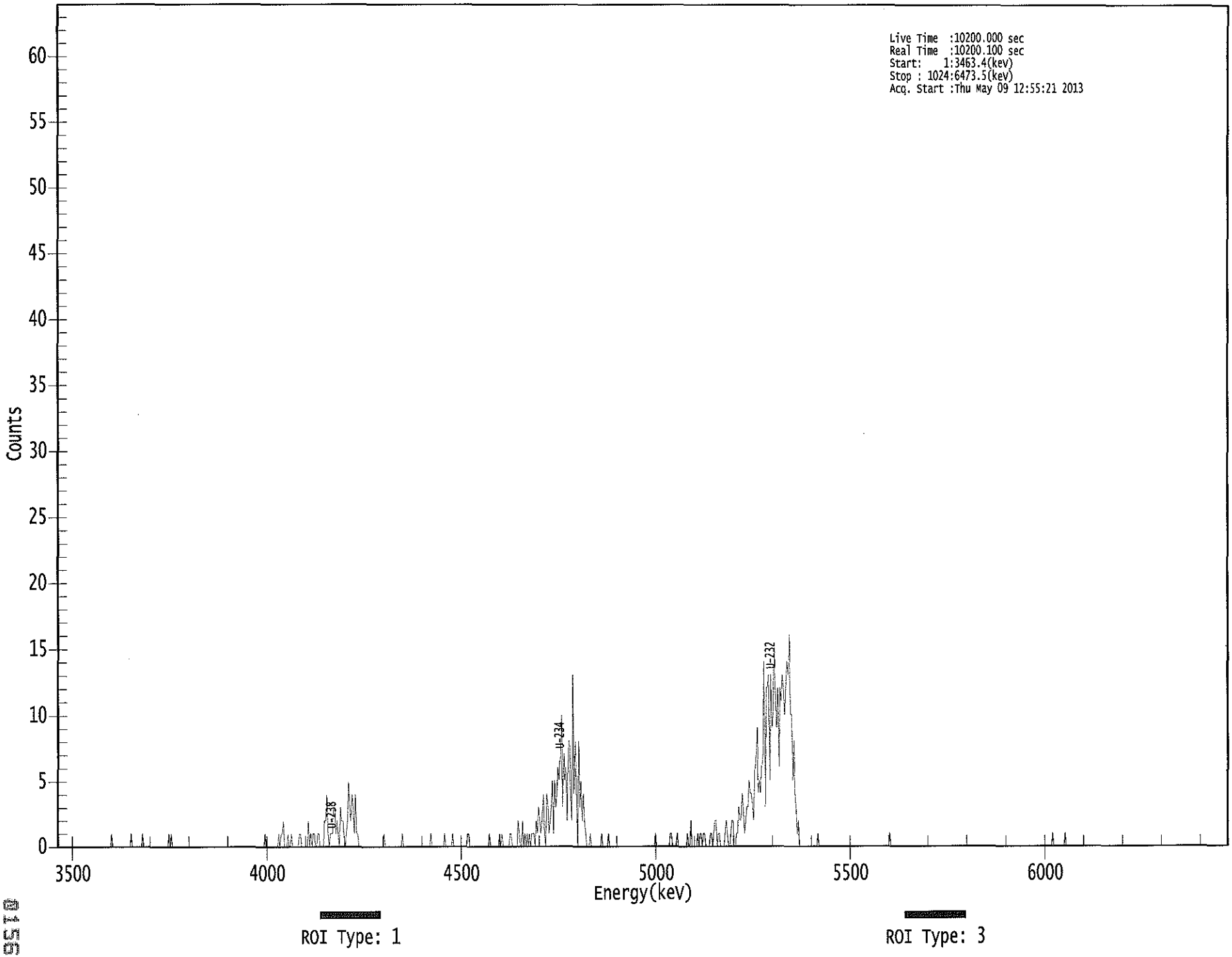
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057560.CNF



0518

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

369:	0	0	0	0	0	0	0	0

Sample Title: 12

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

801:	0	0	0	0	0	0	0	0

Sample Title: 12

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

LCB 5/9/13

Apex-Alpha™

Sample Description: PZ-106-KS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 13
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_037
Chamber Serial Number: 04026478A
Detector Serial Number: 91133
Env. Background: System Bkgd 56375
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/15/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:55:23 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.591 mL
Effective Efficiency: 0.2259 +/- 0.0121
Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
Chem. Recovery Factor: 1.2672 +/- 0.0717

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	430.66	9.45	0.34	0.00E+000	6.0
U-234		4.734	171.66	14.98	0.34	0.00E+000	16.1
U-235		4.389	6.00	86.43	0.00	0.00E+000	2.9
U-238		4.158	62.00	25.09	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	0.995	5302.50*	5.06E+000 +/- 5.30E-001	5.62E-002 +/- 5.89E-003
U-234	0.995	4761.50*	2.02E+000 +/- 3.69E-001	5.62E-002 +/- 5.88E-003
U-235	1.000	4385.50*	8.70E-002 +/- 7.57E-002	8.69E-002 +/- 9.10E-003
U-238	0.995	4184.40*	7.25E-001 +/- 1.97E-001	7.02E-002 +/- 7.35E-003

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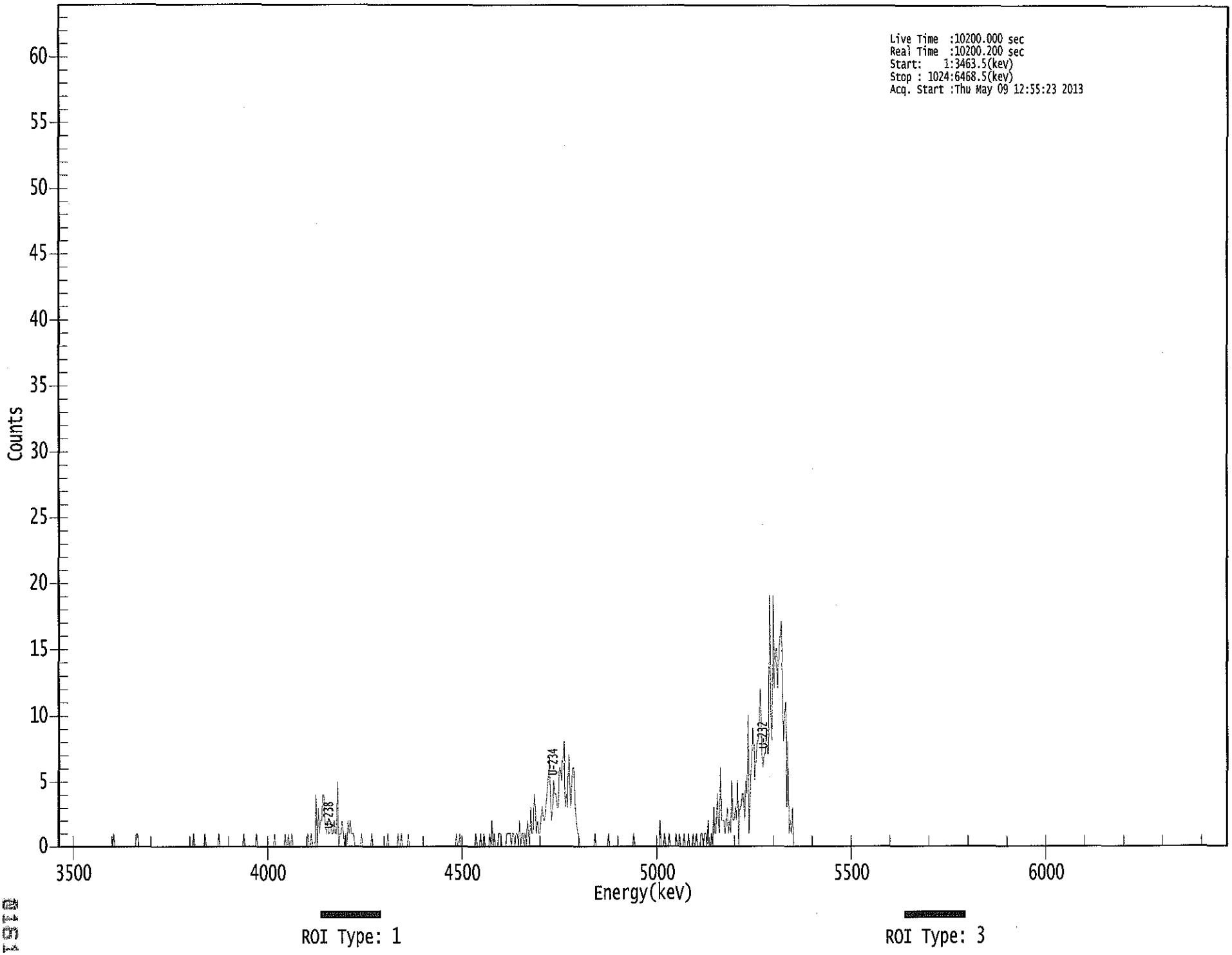
5/10/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057561.CNF



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

Sample Title: 13

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	1	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	1	1	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:	1	0	0	0	0	0	0	0
137:	0	0	0	0	1	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	1	0	0	0	0	0
169:	0	0	0	0	0	1	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	1	0	0
193:	0	0	0	0	0	0	1	0
201:	0	1	0	0	1	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	1	0	0	1	0	0
225:	0	4	0	3	1	2	2	4
233:	4	2	1	2	1	1	2	1
241:	1	2	1	1	5	0	1	1
249:	2	1	0	1	0	2	1	2
257:	1	1	1	0	0	0	0	0
265:	0	1	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:	1	0	0	0	0	0	0	0
297:	0	1	0	0	1	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	1	0	0	1
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	1	0	0

369:	0	1	0	0	1	0	0	0

Sample Title: 13

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

Apex-Alpha™

Sample Description: FB AT PZ-100-KS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 14
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 56376
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:55:25 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.586 mL
Effective Efficiency: 0.2102 +/- 0.0116
Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
Chem. Recovery Factor: 1.1062 +/- 0.0640

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	397.66	9.83	0.34	0.00E+000	12.8
U-234		4.717	6.00	86.43	0.00	0.00E+000	3.0
U-235		4.370	2.83	120.53	0.17	0.00E+000	3.0
U-238		4.071	4.49	98.45	0.51	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*	5.03E+000 +/- 5.44E-001	6.04E-002 +/- 6.54E-003
U-234	0.986	4761.50*	7.58E-002 +/- 6.60E-002	7.57E-002 +/- 8.19E-003
U-235	0.998	4385.50*	4.41E-002 +/- 5.34E-002	6.50E-002 +/- 7.04E-003
U-238	0.913	4184.40*	5.65E-002 +/- 5.59E-002	6.60E-002 +/- 7.14E-003

AG
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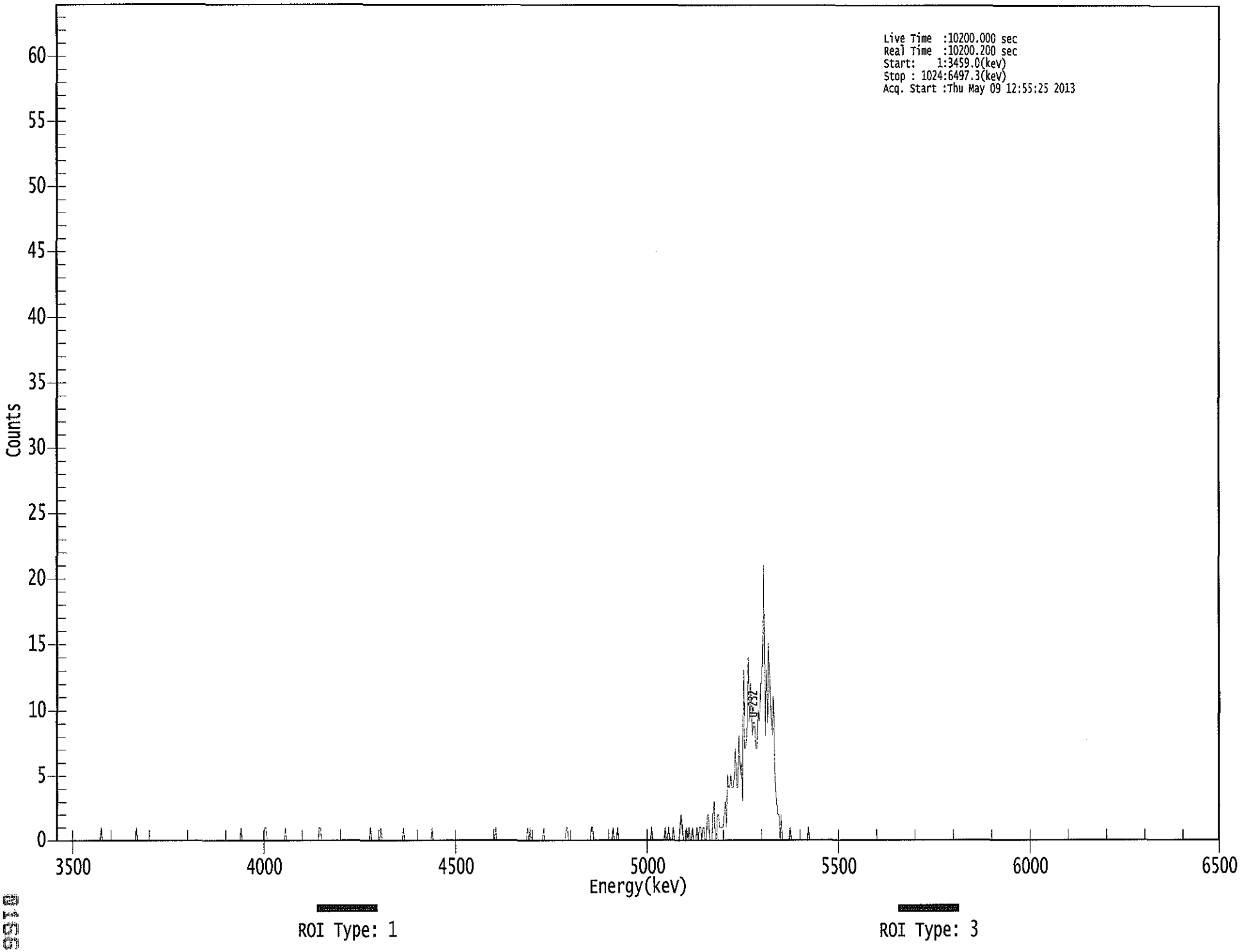
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057562.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	1
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	1	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	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	1	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	1
185:	1	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	0	1
233:	1	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	1	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	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	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	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	0	0	0	0	0	0	0
385:	0	0	1	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	1	0
417:	1	0	0	0	0	0	0	0
425:	0	0	0	0	1	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	1	1	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	1	1
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:	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	1	0	0	0	0
529:	0	0	0	0	0	0	0	1
537:	0	0	1	0	0	0	1	0
545:	0	0	0	0	1	2	1	0
553:	0	0	1	0	1	0	0	1
561:	0	0	0	1	0	1	1	0
569:	1	1	0	0	2	2	0	0
577:	0	2	3	0	0	2	2	1
585:	1	1	1	2	3	1	5	4
593:	4	5	4	4	5	7	4	4
601:	8	5	6	3	13	7	7	8
609:	14	9	12	10	8	9	9	7
617:	7	10	9	12	12	15	21	8
625:	13	9	15	12	10	8	11	8
633:	4	3	2	2	0	2	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	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: 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

LCB 5/9/13

Apex-Alpha™

Sample Description: FB AT PZ-100-KS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 15
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 56377
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:55:28 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.580 mL
Effective Efficiency: 0.2450 +/- 0.0128
Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
Chem. Recovery Factor: 1.2382 +/- 0.0679

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	458.66	9.16	0.34	0.00E+000	32.0
U-234		4.730	6.81	82.43	1.19	0.00E+000	3.0
U-235		4.383	2.66	128.85	0.34	0.00E+000	3.0
U-238		4.142	-2.06	117.31	3.06	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	4.97E+000 +/- 5.08E-001	5.19E-002 +/- 5.29E-003
U-234	0.993	4761.50*	7.38E-002 +/- 6.13E-002	7.14E-002 +/- 7.29E-003
U-235	1.000	4385.50*	3.56E-002 +/- 4.60E-002	6.39E-002 +/- 6.52E-003
U-238	0.987	4184.40*	-2.22E-002 +/- 2.62E-002	9.64E-002 +/- 9.84E-003

AG
5/10/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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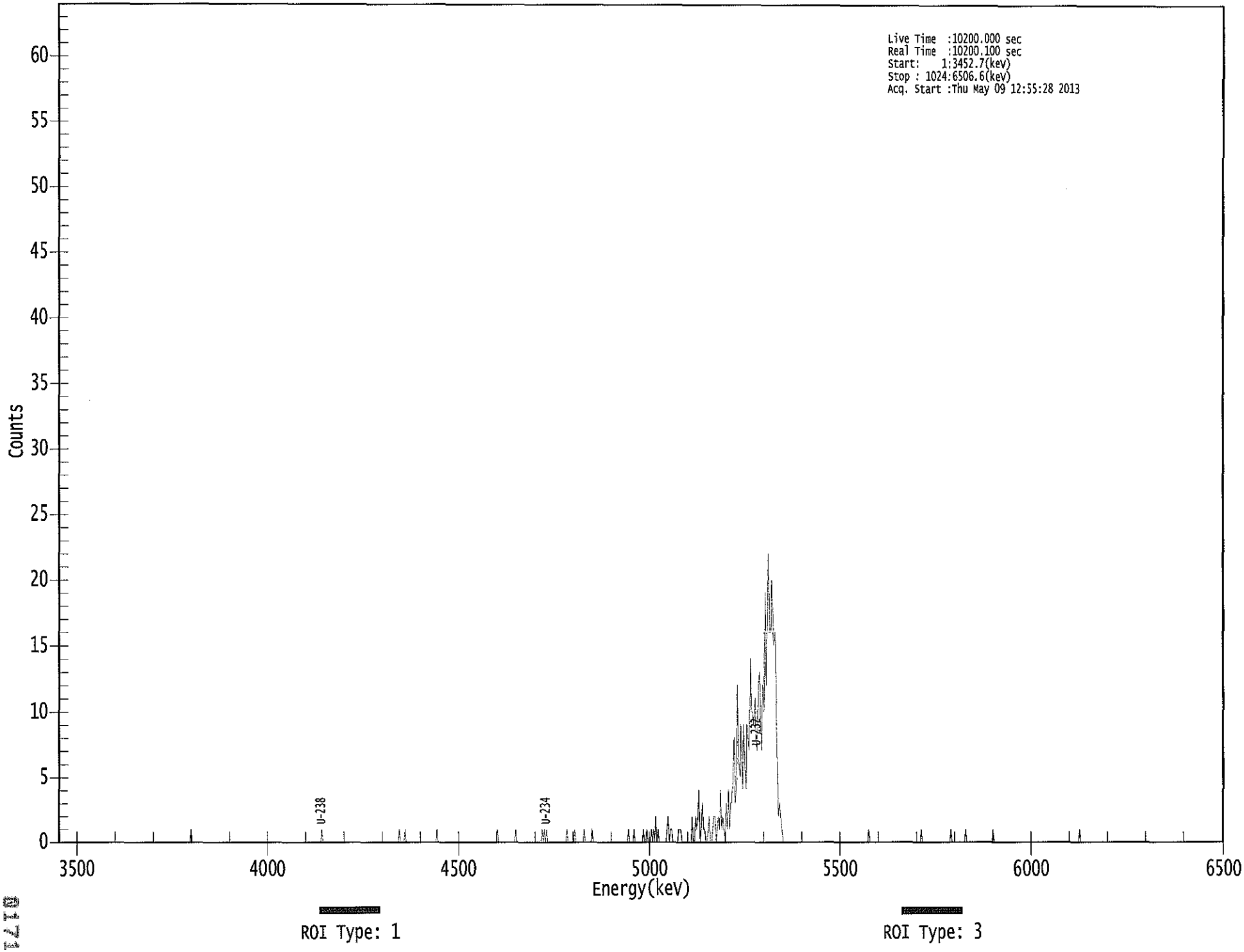

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 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	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	1	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	1
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:	1	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	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:	0	0	0	0	0	0	0	0

Sample Title: 15

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	1	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	1	0	1	0	1	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	1	0
449:	0	0	0	0	0	1	0	0
457:	0	0	0	0	0	1	0	0
465:	0	0	0	0	1	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	1	0	0	0
505:	0	1	0	0	0	0	0	0
513:	0	1	0	0	1	0	0	0
521:	1	0	1	0	2	0	1	0
529:	0	0	0	0	0	0	1	2
537:	0	1	1	0	0	0	0	0
545:	1	1	1	0	0	0	0	0
553:	0	0	0	0	2	0	0	2
561:	1	2	4	0	1	3	1	1
569:	0	0	1	2	0	0	1	2
577:	2	0	1	2	1	4	1	2
585:	1	0	3	1	4	1	3	3
593:	6	8	3	4	12	6	5	9
601:	4	9	6	4	9	8	7	14
609:	10	10	9	11	8	7	12	13
617:	10	7	12	10	19	12	17	22
625:	16	16	20	16	15	16	10	4
633:	2	3	2	1	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	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	1
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	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	1
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: 15

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

KB 5/9/13

Apex-Alpha™

Sample Description: PZ-100-KS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 16
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_042
Chamber Serial Number: 05026930B
Detector Serial Number: 84185
Env. Background: System Bkgd 56378
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:55:30 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.588 mL
Effective Efficiency: 0.2044 +/- 0.0114
Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
Chem. Recovery Factor: 1.1070 +/- 0.0647

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	387.83	9.96	0.17	0.00E+000	15.7
U-234		4.740	12.49	56.77	0.51	0.00E+000	3.0
U-235		4.461	1.83	152.56	0.17	0.00E+000	3.0
U-238		4.149	4.66	94.59	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	0.996	5302.50*	5.04E+000 +/- 5.51E-001	5.43E-002 +/- 5.93E-003
U-234	0.997	4761.50*	1.62E-001 +/- 9.38E-002	6.82E-002 +/- 7.45E-003
U-235	0.960	4385.50*	2.93E-002 +/- 4.49E-002	6.69E-002 +/- 7.31E-003
U-238	0.991	4184.40*	6.03E-002 +/- 5.74E-002	6.18E-002 +/- 6.76E-003

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5/10/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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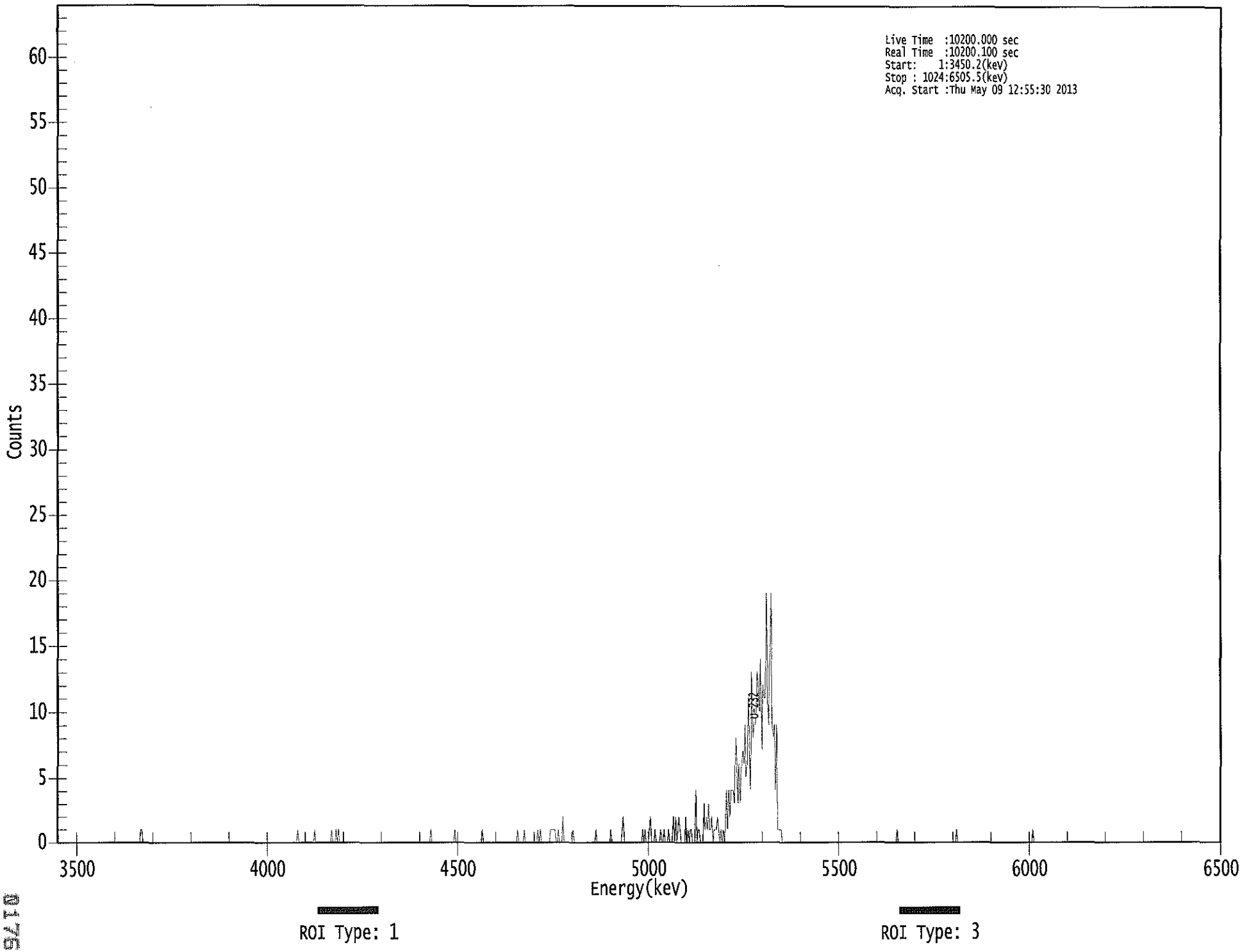

9176

****
***** 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	1	1	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	1	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	1	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	1	0	0	0	1	0	1
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:	1	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	1	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	1	0	0

Sample Title: 16

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	1	0	0	0	0	0
417:	0	0	0	0	0	0	1	0
425:	1	0	0	0	0	0	0	0
433:	0	1	1	1	1	1	0	0
441:	1	0	0	0	2	0	0	0
449:	0	0	0	0	0	1	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	1	0	0	0	0	0	0
481:	0	0	0	0	0	0	1	0
489:	0	0	0	0	0	0	0	0
497:	1	2	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	1	0	1	0	0	0
521:	1	2	0	0	0	1	0	0
529:	0	0	1	0	0	1	0	0
537:	0	1	0	0	0	2	0	2
545:	0	1	2	1	0	0	0	0
553:	2	0	1	0	1	1	0	0
561:	0	4	0	1	1	0	0	0
569:	3	1	2	1	3	1	1	2
577:	0	1	1	1	2	1	0	1
585:	0	1	0	1	4	1	4	2
593:	4	4	4	3	8	6	3	6
601:	3	6	7	6	9	5	6	11
609:	8	4	13	8	9	9	10	13
617:	12	10	14	7	12	11	11	19
625:	11	9	14	19	9	8	9	4
633:	9	1	1	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	1	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	1	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 16

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

KOS 5/9/13

Apex-Alpha™

Sample Description: PZ-100-KS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 17
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_044
Chamber Serial Number: 04026481B
Detector Serial Number: 84168
Env. Background: System Bkgd 56379
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:55:33 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.583 mL
Effective Efficiency: 0.2207 +/- 0.0120
Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
Chem. Recovery Factor: 1.1603 +/- 0.0661

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	5.267	414.83	9.63	0.17	0.00E+000	4.6
U-234		4.737	5.83	82.55	0.17	0.00E+000	3.0
U-235		4.481	0.83	239.53	0.17	0.00E+000	3.0
U-238		4.142	8.00	73.50	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.991	5302.50*	4.99E+000 +/- 5.31E-001	5.02E-002 +/- 5.34E-003
U-234	0.996	4761.50*	7.02E-002 +/- 5.84E-002	5.02E-002 +/- 5.34E-003
U-235	0.937	4385.50*	1.23E-002 +/- 2.95E-002	6.19E-002 +/- 6.58E-003
U-238	0.987	4184.40*	9.58E-002 +/- 7.12E-002	7.18E-002 +/- 7.64E-003

AG
5/14/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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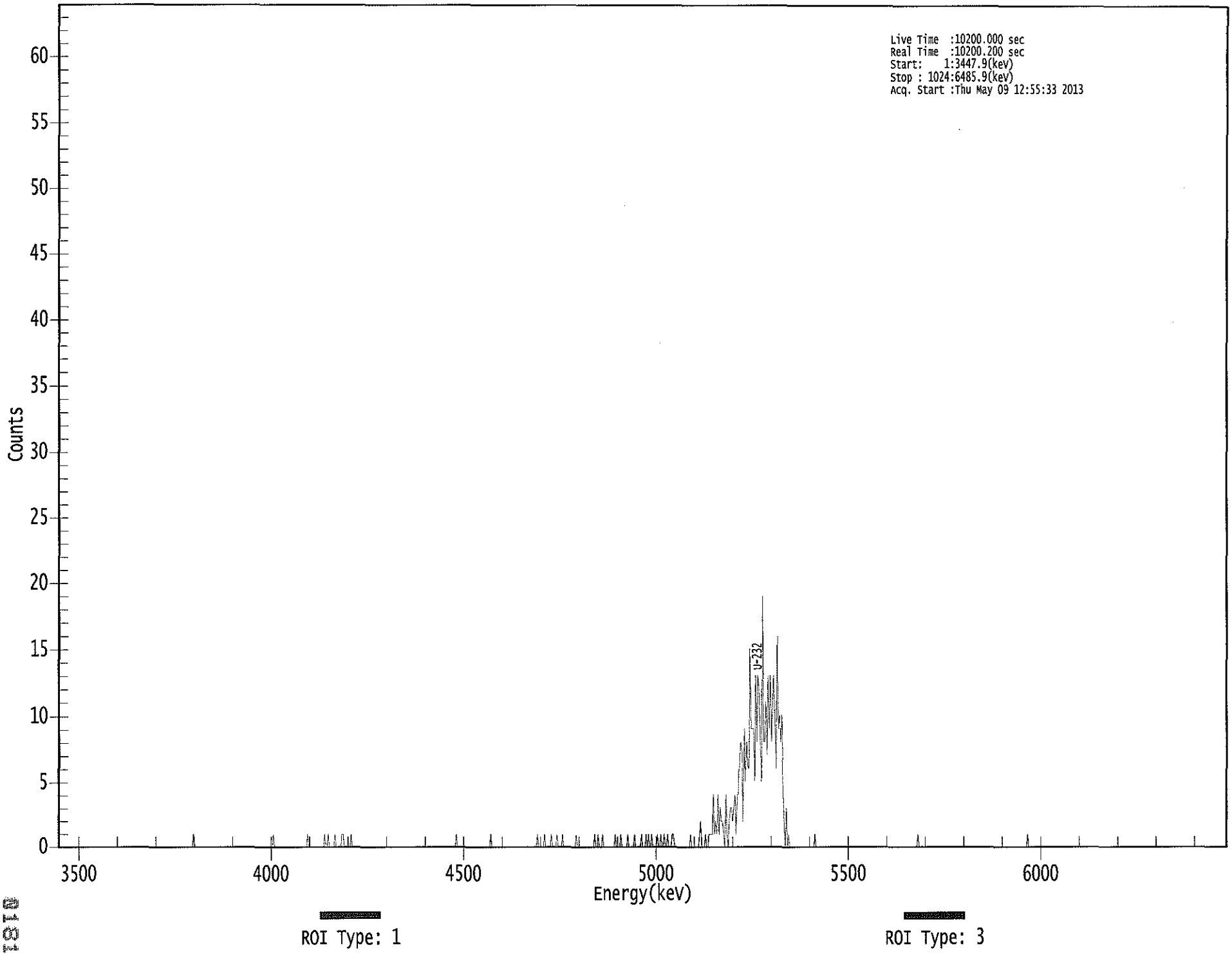

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 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	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	0	0	0	0	0	0
185:	0	0	0	0	1	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	1	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	1	0	0	1	0	0	0
241:	0	0	1	0	0	0	0	0
249:	1	1	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	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	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	0	0	0	0	0	0

Sample Title: 17

Channel								
377:	0	0	1	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	1	0	0	0	0
425:	0	1	0	0	0	0	0	1
433:	0	0	0	0	1	0	0	0
441:	0	1	0	0	0	0	0	0
449:	0	0	0	0	0	1	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	1	0	0
473:	1	0	0	0	1	0	0	0
481:	0	0	0	0	0	0	0	1
489:	0	0	0	0	1	0	0	0
497:	0	0	1	0	0	0	0	0
505:	1	0	0	0	0	0	1	0
513:	0	0	1	0	1	0	0	1
521:	0	0	0	0	1	0	0	1
529:	0	0	1	0	0	1	0	0
537:	0	1	1	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	1	0	0	0	0	0	0
561:	0	1	2	0	0	0	1	0
569:	0	1	1	1	1	4	1	2
577:	1	4	1	3	2	2	1	0
585:	4	1	0	2	3	3	2	3
593:	4	1	4	4	7	8	7	2
601:	9	5	8	6	6	15	9	9
609:	9	5	13	8	13	12	8	5
617:	19	8	8	11	7	13	9	13
625:	8	11	13	9	6	16	9	10
633:	8	10	5	2	0	3	0	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	1	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	1	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: 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:	1	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KCB 5/9/13

Apex-Alpha™

Sample Description: S-53 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-UU
Sample Identification: 19
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_047
Chamber Serial Number: 02030596A
Detector Serial Number: 91086
Env. Background: System Bkgd 56381
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 6:52:37 AM
Acquisition Date/Time: 5/9/2013 12:55:39 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.577 mL
Effective Efficiency: 0.2195 +/- 0.0120
Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
Chem. Recovery Factor: 1.2051 +/- 0.0691

Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.274	408.83	9.70	0.17	0.00E+000	20.9
U-234		4.722	488.00	8.88	0.00	0.00E+000	11.8
U-235		4.401	26.49	38.51	0.51	0.00E+000	5.9
U-238		4.146	393.83	9.88	0.17	0.00E+000	25.4

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	4.95E+000 +/- 5.29E-001	5.05E-002 +/- 5.40E-003
U-234	0.989	4761.50*	5.90E+000 +/- 8.20E-001	7.25E-002 +/- 7.75E-003
U-235	0.998	4385.50*	3.95E-001 +/- 1.58E-001	7.83E-002 +/- 8.37E-003
U-238	0.990	4184.40*	4.74E+000 +/- 6.90E-001	5.03E-002 +/- 5.37E-003

AG 5/10/13

US EPA ARCHIVE DOCUMENT

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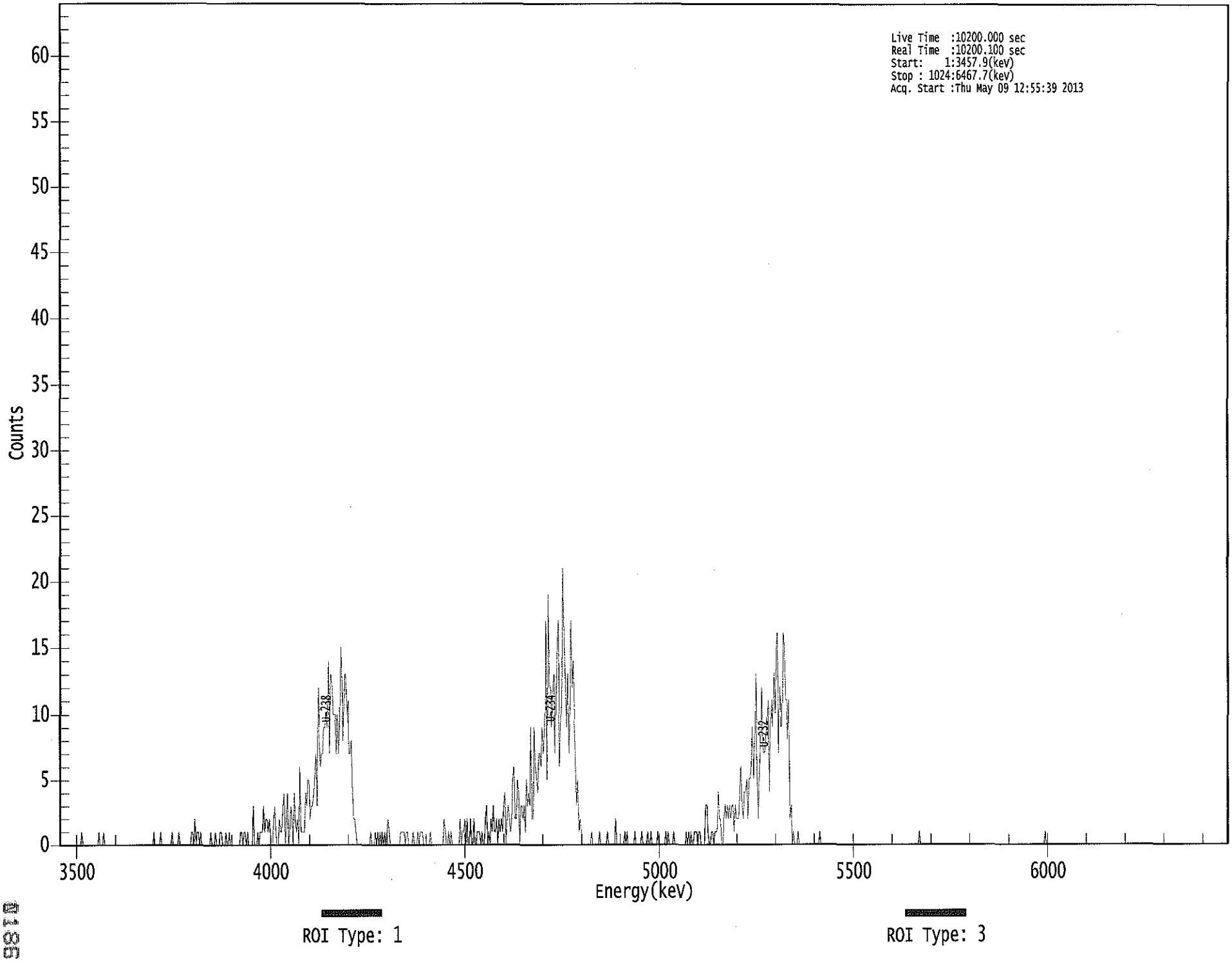
0000057565.CNF



6188

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

369:	0	1	0	0	2	3	0	1

Sample Title: 19

Channel								
377:	0	2	1	3	1	1	2	0
385:	2	1	2	1	3	4	0	2
393:	3	2	1	2	5	6	2	2
401:	5	4	0	3	3	2	3	1
409:	5	3	4	3	9	2	2	9
417:	6	5	4	7	7	6	9	7
425:	9	17	5	19	12	12	9	12
433:	13	7	12	15	17	6	9	12
441:	21	16	12	9	13	7	10	17
449:	12	14	10	7	3	5	1	2
457:	1	0	0	0	0	0	0	0
465:	0	1	0	0	0	0	0	0
473:	1	0	0	0	0	0	0	1
481:	0	0	0	0	0	0	2	0
489:	0	0	0	0	0	0	1	0
497:	1	0	0	0	0	0	0	1
505:	0	0	0	0	0	1	0	0
513:	0	0	1	0	0	1	0	0
521:	0	0	0	1	0	0	0	0
529:	0	0	1	0	1	0	0	0
537:	0	1	0	0	0	0	0	0
545:	0	0	0	0	1	0	1	0
553:	1	0	0	1	1	1	0	1
561:	1	0	0	0	0	3	3	1
569:	0	0	1	1	0	1	1	1
577:	4	2	2	0	0	2	3	2
585:	3	2	3	2	3	3	1	3
593:	2	2	2	4	6	3	2	4
601:	4	5	2	5	5	6	9	5
609:	8	13	6	2	5	7	12	8
617:	7	7	8	10	11	4	9	11
625:	9	13	10	15	16	7	12	9
633:	9	16	15	11	11	8	11	2
641:	3	0	1	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	1	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	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:	1	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	1	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

5/9/2013 5:53:04 AM

Apex-Alpha™

QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 5/9/2013
Time : 5:53:04 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	5/9/2013 5:34:02 AM
Alpha_004	21f	ALL	Passed	5/9/2013 5:34:02 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	5/9/2013 5:34:03 AM
Alpha_011	21f	ALL	Passed	5/9/2013 5:34:04 AM
Alpha_012	21f	ALL	Not Done	
Alpha_013	21f	ALL	Passed	5/9/2013 5:34:05 AM
Alpha_014	21f	ALL	Passed	5/9/2013 5:34:06 AM
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	5/9/2013 5:34:07 AM
Alpha_019	AIM730	ALL	Not Done	
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	5/9/2013 5:34:08 AM
Alpha_023	AIM730	ALL	Not Done	
Alpha_024	AIM730	ALL	Passed	5/9/2013 5:34:08 AM
Alpha_025	AIM730	ALL	Passed	5/9/2013 5:34:09 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	5/9/2013 5:34:10 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	5/9/2013 5:34:11 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Not Done	
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:12 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:13 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:15 AM
Alpha_036	Alpha Analyst100DC	ALL	Not Done	
Alpha_037	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:16 AM
Alpha_038	Alpha Analyst100DC	ALL	Not Done	
Alpha_039	Alpha Analyst100DC	ALL	Not Done	
Alpha_040	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:18 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:20 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:21 AM

Review of QA Results - Pulser Check

5/9/2013 5:53:04 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:23 AM
Alpha_045	Alpha Analyst100DC	ALL	Not Done	
Alpha_046	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:25 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:27 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:29 AM

APPROVED BY: C

APPROVAL DATE: 5/9/13

****
***** 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

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

RUN 2

US EPA ARCHIVE DOCUMENT

13-04132
UUISO
Run 2

Work Order	13-04132
Analysis Code	UUISO
Run	2
Date Received	4/18/2013
Lab Deadline	5/9/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EML U-02 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	U-232
Radiometric Sol#	U-10a
Tracer Act (dpm/g)	19.084
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/18/13 00:00	1.0000E+00
02	MBL	BLANK		04/18/13 00:00	1.0000E+00
03	DUP	PZ-112-AS TOT	45	04/12/13 11:18	2.5000E-01
05	TRG	D-14 DIS	38	04/12/13 11:05	2.5000E-01
06	DO	PZ-112-AS TOT	45	04/12/13 11:18	2.5000E-01
07	TRG	PZ-112-AS DIS	45	04/12/13 11:18	2.5000E-01
18	TRG	S-53 TOT	41	04/16/13 09:00	2.5000E-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.

13-04132
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	0.6100	11.6		0.00								
02	MBL	0.6099	11.6		0.00								
03	DUP	0.6090	11.6		0.00								
05	TRG	0.6112	11.7		0.00								
06	DO	0.6080	11.6		0.00								
07	TRG	0.6089	11.6		0.00								
18	TRG	0.6088	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.

US EPA ARCHIVE DOCUMENT

13-04132
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			05/13/13 07:33	JBARNARD				
02	MBL			05/13/13 07:33	JBARNARD				
03	DUP			05/13/13 07:33	JBARNARD				
05	TRG			05/13/13 07:33	JBARNARD				
06	DO			05/13/13 07:33	JBARNARD				
07	TRG			05/13/13 07:33	JBARNARD				
18	TRG			05/13/13 07:33	JBARNARD				

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

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Eberline Services
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-2

Run	2
Analysis Code	UUISO
Eberline Services Work Order	13-04132
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	7.45E+00	1.00E+00	9.69E-02	8.12E+00	91.69	OK		OK	
02	U-234	MBL	BLANK	pCi/l	5.81E-02	8.34E-02	1.36E-01					OK	OK
03	U-234	DUP	PZ-112-AS TOT	pCi/l	1.17E-01	2.07E-01	3.72E-01				INV	OK	
05	U-234	TRG	D-14 DIS	pCi/l	2.70E-01	5.86E-01	1.15E+00					INV	
06	U-234	DO	PZ-112-AS TOT	pCi/l	7.68E-02	2.43E-01	5.14E-01					OK	
07	U-234	TRG	PZ-112-AS DIS	pCi/l	2.61E-01	2.70E-01	2.84E-01					OK	
18	U-234	TRG	S-53 TOT	pCi/l	4.53E+01	1.99E+01	3.63E+00					INV	

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-2

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Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-04132	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-234	LCS	04/18/13 00:00	1.00E+00	112.41	0.00	0.00			
02	U-234	MBL	04/18/13 00:00	1.00E+00	83.89	0.00	0.00			
03	U-234	DUP	04/12/13 11:18	2.50E-01	105.09	0.00	0.00			
05	U-234	TRG	04/12/13 11:05	2.50E-01	29.90	0.00	0.00			
06	U-234	DO	04/12/13 11:18	2.50E-01	90.50	0.00	0.00			
07	U-234	TRG	04/12/13 11:18	2.50E-01	81.92	0.00	0.00			
18	U-234	TRG	04/16/13 09:00	2.50E-01	7.89	0.00	0.00			

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Work Order: 13-04132-UUISO-2

Run	2
Analysis Code	UUISO
Eberline Services Work Order	13-04132
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	05/16/13 12:25		A_Spec	Alpha_014	170.02	5.82 E+02	1.10 E-02	18.5
02	U-234	MBL	05/16/13 15:38		A_Spec	Alpha_022	170.02	2.81 E+00	7.00 E-03	15.3
03	U-234	DUP	05/16/13 15:38		A_Spec	Alpha_024	170.02	1.98 E+00	6.00 E-03	17.1
05	U-234	TRG	05/16/13 15:38		A_Spec	Alpha_025	170.02	1.32 E+00	4.00 E-03	17.4
06	U-234	DO	05/16/13 15:38		A_Spec	Alpha_027	170	1.13 E+00	1.10 E-02	17.3
07	U-234	TRG	05/16/13 11:43		A_Spec	Alpha_044	170	3.83 E+00	1.00 E-03	19
18	U-234	TRG	05/16/13 15:38		A_Spec	Alpha_029	170.02	6.55 E+01	3.00 E-03	19.5

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Eberline Services
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-2

Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-04132	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	7.76E+00	1.04E+00	7.63E-02	7.92E+00	98.01	OK		OK	
02	U-238	MBL	BLANK	pCi/l	1.36E-02	4.15E-02	9.84E-02					OK	OK
03	U-238	DUP	PZ-112-AS TOT	pCi/l	6.76E-02	1.69E-01	3.52E-01				INV	OK	
05	U-238	TRG	D-14 DIS	pCi/l	7.11E-01	8.20E-01	1.07E+00					INV	
06	U-238	DO	PZ-112-AS TOT	pCi/l	8.93E-02	1.93E-01	3.81E-01					OK	
07	U-238	TRG	PZ-112-AS DIS	pCi/l	2.72E-01	2.99E-01	4.07E-01					OK	
18	U-238	TRG	S-53 TOT	pCi/l	5.35E+01	2.29E+01	3.29E+00					INV	

0320

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-2

Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-04132	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-238	LCS	04/18/13 00:00	1.00E+00	112.41	0.00	0.00			
02	U-238	MBL	04/18/13 00:00	1.00E+00	83.89	0.00	0.00			
03	U-238	DUP	04/12/13 11:18	2.50E-01	105.09	0.00	0.00			
05	U-238	TRG	04/12/13 11:05	2.50E-01	29.90	0.00	0.00			
06	U-238	DO	04/12/13 11:18	2.50E-01	90.50	0.00	0.00			
07	U-238	TRG	04/12/13 11:18	2.50E-01	81.92	0.00	0.00			
18	U-238	TRG	04/16/13 09:00	2.50E-01	7.89	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-2

Run	Analysis Code	Eberline Services Work Order	Client
2	UUISO	13-04132	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	05/16/13 12:25		A_Spec	Alpha_014	170.02	6.09 E+02	5.00 E-03	18.5
02	U-238	MBL	05/16/13 15:38		A_Spec	Alpha_022	170.02	6.60 E-01	2.00 E-03	15.3
03	U-238	DUP	05/16/13 15:38		A_Spec	Alpha_024	170.02	1.15 E+00	5.00 E-03	17.1
05	U-238	TRG	05/16/13 15:38		A_Spec	Alpha_025	170.02	3.49 E+00	3.00 E-03	17.4
06	U-238	DO	05/16/13 15:38		A_Spec	Alpha_027	170	1.32 E+00	4.00 E-03	17.3
07	U-238	TRG	05/16/13 11:43		A_Spec	Alpha_044	170	4.00 E+00	0.00 E+00	19
18	U-238	TRG	05/16/13 15:38		A_Spec	Alpha_029	170.02	7.77 E+01	2.00 E-03	19.5

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-2

Client: Engineering Management Support, Inc.
Eberline Services Work Order: 13-04132
Analysis Code: UUISO
Run: 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	6.76E-01	2.18E-01	1.04E-01					OK	
02	U-235	MBL	BLANK	pCi/l	5.91E-02	8.85E-02	1.44E-01					OK	OK
03	U-235	DUP	PZ-112-AS TOT	pCi/l	2.06E-01	2.50E-01	3.04E-01				NA	OK	
05	U-235	TRG	D-14 DIS	pCi/l	2.10E-01	5.04E-01	1.05E+00					INV	
06	U-235	DO	PZ-112-AS TOT	pCi/l	5.53E-02	1.69E-01	4.01E-01					OK	
07	U-235	TRG	PZ-112-AS DIS	pCi/l	0.00E+00	2.33E-01	5.04E-01					OK	
18	U-235	TRG	S-53 TOT	pCi/l	1.14E+01	7.53E+00	4.81E+00					INV	

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-2

Client: Engineering Management Support, Inc.
Eberline Services Work Order: 13-04132
Analysis Code: UUISO
Run: 2

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-235	LCS	04/18/13 00:00	1.00E+00	112.41	0.00	0.00			
02	U-235	MBL	04/18/13 00:00	1.00E+00	83.89	0.00	0.00			
03	U-235	DUP	04/12/13 11:18	2.50E-01	105.09	0.00	0.00			
05	U-235	TRG	04/12/13 11:05	2.50E-01	29.90	0.00	0.00			
06	U-235	DO	04/12/13 11:18	2.50E-01	90.50	0.00	0.00			
07	U-235	TRG	04/12/13 11:18	2.50E-01	81.92	0.00	0.00			
18	U-235	TRG	04/16/13 09:00	2.50E-01	7.89	0.00	0.00			

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-UUISO-2

Client: Engineering Management Support, Inc.

Eberline Services Work Order: 13-04132

Analysis Code: UUISO

Run: 2

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	05/16/13 12:25		A_Spec	Alpha_014	170.02	4.28 E+01	7.00 E-03	18.5
02	U-235	MBL	05/16/13 15:38		A_Spec	Alpha_022	170.02	2.32 E+00	4.00 E-03	15.3
03	U-235	DUP	05/16/13 15:38		A_Spec	Alpha_024	170.02	2.83 E+00	1.00 E-03	17.1
05	U-235	TRG	05/16/13 15:38		A_Spec	Alpha_025	170.02	8.30 E-01	1.00 E-03	17.4
06	U-235	DO	05/16/13 15:38		A_Spec	Alpha_027	170	6.60 E-01	2.00 E-03	17.3
07	U-235	TRG	05/16/13 11:43		A_Spec	Alpha_044	170	1.00 E+00	0.00 E+00	19
18	U-235	TRG	05/16/13 15:38		A_Spec	Alpha_029	170.02	1.33 E+01	4.00 E-03	19.5

Count Room Report
Client: Engineering Management Su

13-04132-UUISO-2 (pCi/l) in
Tracer ID: U-10a

Printed: 5/16/2013 6:15 AM

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/18/13 00:00	1.0000	0.6100	11.6412		0.00		
02	MBL	BLANK	04/18/13 00:00	1.0000	0.6099	11.6393		0.00		
03	DUP	PZ-112-AS TOT	04/12/13 11:18	0.2500	0.6090	11.6222		0.00		
05	TRG	D-14 DIS	04/12/13 11:05	0.2500	0.6112	11.6641		0.00		
06	DO	PZ-112-AS TOT	04/12/13 11:18	0.2500	0.6080	11.6031		0.00		
07	TRG	PZ-112-AS DIS	04/12/13 11:18	0.2500	0.6089	11.6202		0.00		
18	TRG	S-53 TOT	04/16/13 09:00	0.2500	0.6088	11.6183		0.00		

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-04132	2	UUISO	5/13/2013 7:33	JBARNARD		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
U-234	U-8a	35.240	5/13/2013	0.500	0.5118				8.12	0.292	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	5/13/2013	0.500	0.5118				7.92	0.285	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	19.084	5/13/2013	0.6100	0.6300
02	U-232	U-10a	19.084	5/13/2013	0.6099	0.6300
03	U-232	U-10a	19.084	5/13/2013	0.6090	0.6300
05	U-232	U-10a	19.084	5/13/2013	0.6112	0.6300
06	U-232	U-10a	19.084	5/13/2013	0.6080	0.6300
07	U-232	U-10a	19.084	5/13/2013	0.6089	0.6300
18	U-232	U-10a	19.084	5/13/2013	0.6088	0.6300

Balance Printer Tapes

Tracer

0.6100 g
0.6099 g
0.6090 g
0.6112 g
0.6080 g
0.6089 g
0.6088 g

LCS

0.5118 g

Matrix Spike

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 5/13/2013 7:34 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04132	2	UUISO	liters	5/9/2013	JBARNARD

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	PZ-112-AS TOT	DUP					2.5000E-01	2.5000E-01				
05	D-14 DIS	TRG					2.5000E-01	2.5000E-01				
06	PZ-112-AS TOT	DO					2.5000E-01	2.5000E-01				
07	PZ-112-AS DIS	TRG					2.5000E-01	2.5000E-01				
18	S-53 TOT	TRG					2.5000E-01	2.5000E-01				
							2.5000E-01					

Comments	

Technician: _____ Date: 5/13/13

2380

Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000582
Batch Identification: 1304132B-UU
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_014
Chamber Serial Number:
Detector Serial Number: 14
Env. Background: System Bkgd 56975
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 5/16/2013 7:27:01 AM
Acquisition Date/Time: 5/16/2013 12:25:05 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.610 mL
Effective Efficiency: 0.2075 +/- 0.0114
Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
Chem. Recovery Factor: 1.1241 +/- 0.0650

Control Certificate Name: NatU_U-8A
Chem. Recov. of Control: U-238 0.955375 +/- 0.071124
Peak Match Tolerance: 0.150 MeV

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.266	408.28	9.74	2.72	0.00E+000	35.2
U-234		4.726	582.13	8.14	1.87	0.00E+000	18.9
U-235		4.401	42.81	30.44	1.19	0.00E+000	3.7
U-238		4.146	609.15	7.95	0.85	0.00E+000	26.4

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.991	5302.50*	5.22E+000 +/- 5.61E-001	1.10E-001 +/- 1.18E-002
U-234	0.991	4761.50*	7.45E+000 +/- 1.00E+000	9.69E-002 +/- 1.04E-002
U-235	0.998	4385.50*	6.76E-001 +/- 2.18E-001	1.04E-001 +/- 1.12E-002
U-238	0.990	4184.40*	7.76E+000 +/- 1.04E+000	7.63E-002 +/- 8.19E-003

AG
5/17/13

US EPA ARCHIVE DOCUMENT

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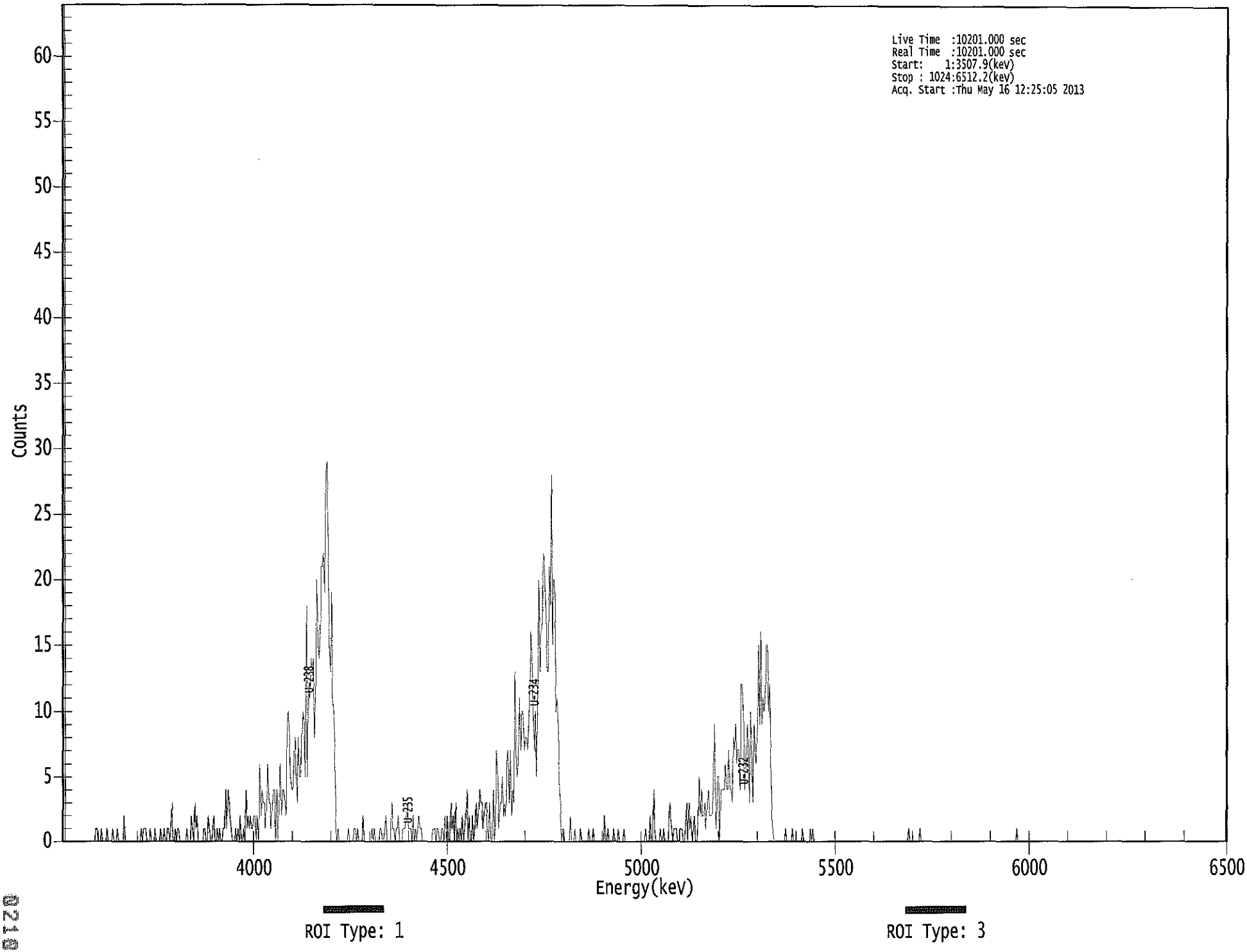
0000058254.CNF



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

Sample Title: 01

Elapsed Live time: 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	1	1	0
33:	0	0	1	0	0	0	0	1
41:	0	0	0	0	1	0	0	0
49:	1	0	0	0	0	0	2	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	1	0	1
73:	1	1	0	0	0	1	0	0
81:	0	1	0	0	0	0	1	0
89:	0	1	0	0	1	1	0	1
97:	3	0	0	1	0	1	1	0
105:	0	0	0	0	0	1	0	0
113:	0	2	1	0	3	1	2	0
121:	0	0	0	0	1	1	0	0
129:	2	1	0	0	1	2	0	0
137:	1	0	1	0	0	1	1	4
145:	1	4	3	2	1	0	0	0
153:	1	0	1	0	2	0	0	1
161:	0	4	1	2	1	2	1	1
169:	2	2	0	2	0	6	2	4
177:	3	3	1	3	6	3	3	1
185:	3	4	4	0	4	0	3	6
193:	2	4	4	3	2	9	10	8
201:	5	4	4	6	8	5	3	8
209:	5	5	8	10	9	5	18	5
217:	12	11	14	13	14	8	12	20
225:	15	14	16	21	21	22	19	28
233:	29	24	15	13	19	11	10	7
241:	1	0	1	0	0	0	0	0
249:	0	0	0	1	0	0	0	0
257:	1	1	0	1	0	0	0	0
265:	2	0	0	0	0	0	0	0
273:	1	0	1	0	0	0	0	1
281:	1	0	0	1	2	0	0	0
289:	0	3	1	1	0	1	1	2
297:	0	0	0	1	1	1	2	3
305:	1	1	1	0	2	0	1	0
313:	1	2	1	1	0	0	0	0
321:	0	0	0	0	0	1	1	1
329:	0	1	1	0	0	1	1	0
337:	2	0	2	0	0	3	1	2
345:	0	3	0	1	0	1	0	2
353:	0	1	2	4	0	2	0	0
361:	2	0	1	3	1	2	4	3

369:	3	1	2	3	3	1	0	3

Sample Title: 01

Channel								
377:	0	0	4	0	1	7	5	1
385:	3	3	5	2	3	2	6	7
393:	3	7	2	4	3	13	7	5
401:	6	11	7	10	10	7	8	8
409:	7	9	11	16	14	10	7	10
417:	5	10	20	13	16	17	22	21
425:	17	13	13	21	18	28	15	20
433:	19	10	11	9	4	3	0	1
441:	1	0	0	0	0	0	2	0
449:	0	0	1	0	0	0	0	1
457:	0	0	0	0	0	0	1	0
465:	0	0	1	0	0	0	0	0
473:	0	0	0	0	2	0	0	1
481:	0	0	0	0	1	0	0	0
489:	1	0	0	0	0	1	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	1	0	0	0	2	0	0	4
521:	1	0	0	0	0	1	0	0
529:	1	0	0	0	0	3	2	1
537:	0	1	1	1	0	0	1	1
545:	1	0	0	1	3	0	3	1
553:	2	0	1	2	0	0	1	5
561:	2	4	2	2	3	1	3	4
569:	2	2	2	4	9	4	1	5
577:	5	0	4	4	4	4	6	4
585:	4	7	4	4	3	8	7	9
593:	6	7	7	4	12	12	9	4
601:	6	9	7	3	10	7	3	9
609:	7	6	9	15	9	16	9	11
617:	10	11	15	15	10	12	6	2
625:	1	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:	0	0	1	0	0	0	0	0
657:	0	1	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	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	1	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 01

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

C
5/17/13

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000582
Batch Identification: 1304132B-UU
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_022
Chamber Serial Number:
Detector Serial Number: 22
Env. Background: System Bkgd 56977
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 5/16/2013 7:27:01 AM
Acquisition Date/Time: 5/16/2013 3:38:27 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.610 mL
Effective Efficiency: 0.1285 +/- 0.0086
Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
Chem. Recovery Factor: 0.8389 +/- 0.0587

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	5.270	252.79	12.39	2.21	0.00E+000	7.9
U-234		4.683	2.81	142.99	1.19	0.00E+000	3.1
U-235		4.366	2.32	149.13	0.68	0.00E+000	3.1
U-238		4.048	0.66	305.45	0.34	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	0.993	5302.50*	5.22E+000 +/- 6.89E-001	1.65E-001 +/- 2.18E-002
U-234	0.957	4761.50*	5.81E-002 +/- 8.34E-002	1.36E-001 +/- 1.80E-002
U-235	0.997	4385.50*	5.91E-002 +/- 8.85E-002	1.44E-001 +/- 1.90E-002
U-238	0.876	4184.40*	1.36E-002 +/- 4.15E-002	9.84E-002 +/- 1.30E-002

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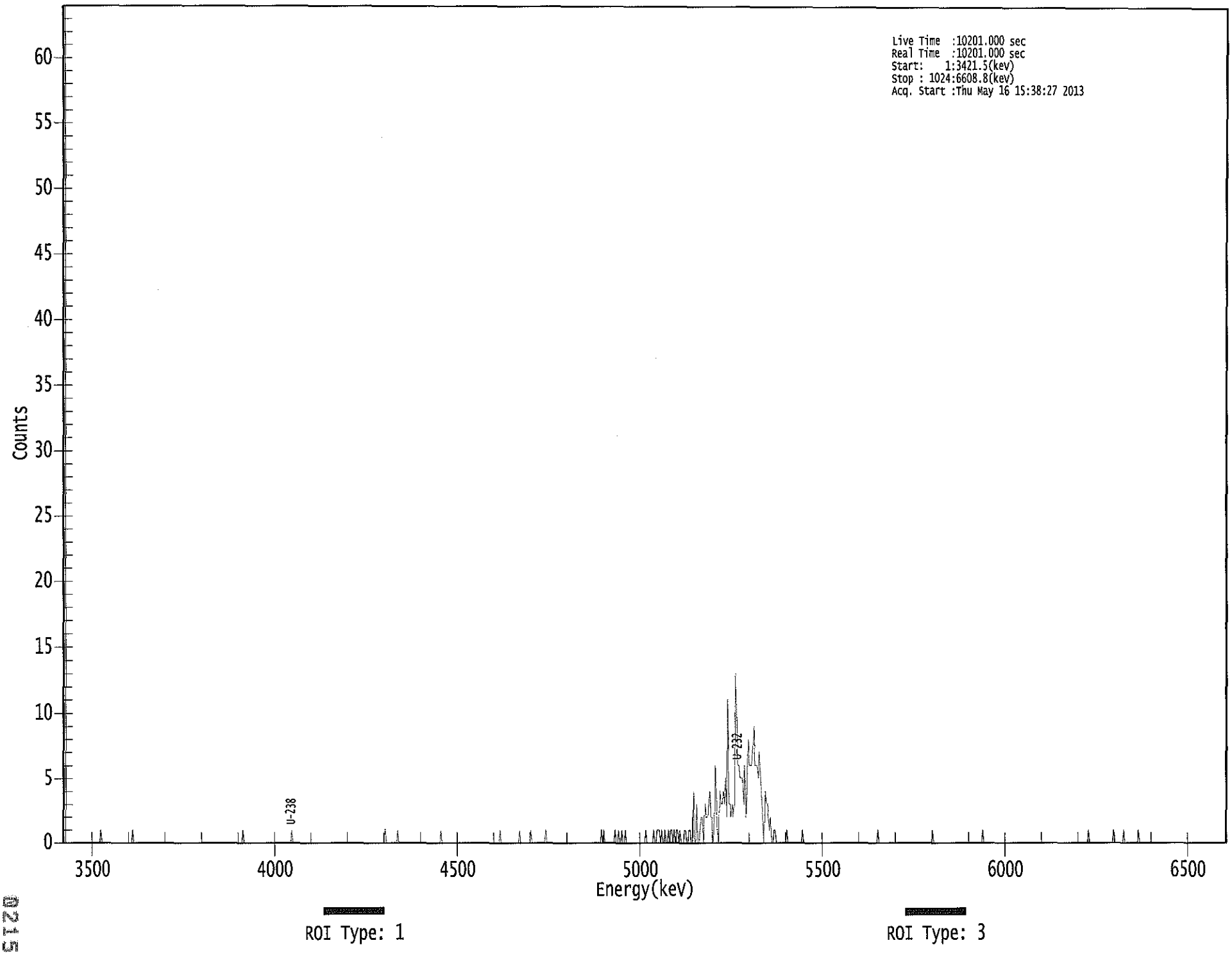
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058264.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: 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	1	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	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	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	1	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	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	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	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:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	1	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	1	0	0	0	0	0	0
409:	0	0	0	1	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	1	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	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	1	0	1	0	0	0	0
481:	0	0	0	0	0	1	0	0
489:	1	0	0	1	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	0	0	0	0	1
521:	0	0	1	1	1	0	1	0
529:	0	1	0	0	1	0	1	1
537:	0	1	0	1	1	0	1	0
545:	0	0	1	1	0	0	1	1
553:	0	0	4	0	0	3	0	0
561:	1	2	2	0	3	2	2	3
569:	4	2	2	0	1	6	3	1
577:	0	4	3	3	4	3	5	2
585:	11	3	3	2	3	2	3	13
593:	10	6	6	5	5	5	3	6
601:	2	5	8	6	6	6	7	9
609:	6	6	6	5	7	5	3	2
617:	0	4	3	3	2	1	2	0
625:	0	1	1	0	0	0	0	0
633:	0	0	0	0	1	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	1	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	1	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:	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	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	1	0	0	0	0
929:	0	0	0	0	1	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	1	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 TOT-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000582
Batch Identification: 1304132B-UU
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_024
Chamber Serial Number:
Detector Serial Number: 24
Env. Background: System Bkgd 56978
Reagent Blank: <not performed>

Sample Size: 2.500E-001 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:27:01 AM
Acquisition Date/Time: 5/16/2013 3:38:28 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.609 mL
Effective Efficiency: 0.1797 +/- 0.0104
Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
Chem. Recovery Factor: 1.0509 +/- 0.0642

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	353.13	10.46	1.87	0.00E+000	27.6
U-234		4.740	1.98	176.35	1.02	0.00E+000	3.1
U-235		4.412	2.83	120.54	0.17	0.00E+000	3.1
U-238		4.182	1.15	249.61	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	0.998	5302.50*	2.09E+001 +/- 2.38E+000	4.48E-001 +/- 5.10E-002
U-234	0.997	4761.50*	1.17E-001 +/- 2.07E-001	3.72E-001 +/- 4.24E-002
U-235	0.995	4385.50*	2.06E-001 +/- 2.50E-001	3.04E-001 +/- 3.47E-002
U-238	1.000	4184.40*	6.76E-002 +/- 1.69E-001	3.52E-001 +/- 4.01E-002

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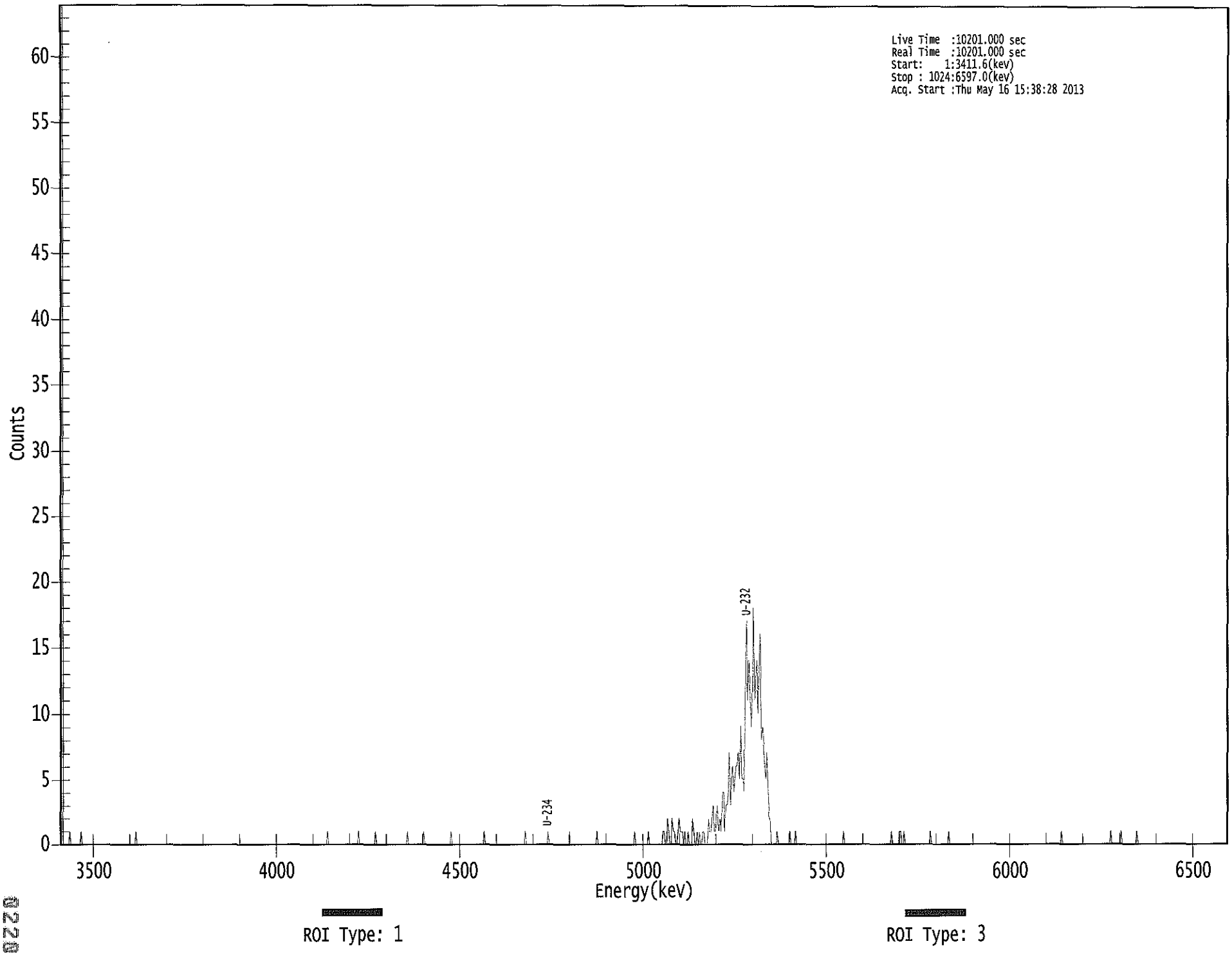
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058263.CNF



0220

****
***** 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:	1	0	0	0	0	0	0	0
17:	0	0	1	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	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	1	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	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	1	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	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:	1	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	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:	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	0	0
401:	0	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	1	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	0	0	0
465:	0	0	0	0	0	0	1	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	1
505:	0	0	0	0	0	0	0	0
513:	0	0	0	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	1	1	0	0	2	1	0	0
537:	2	1	1	0	0	1	2	1
545:	1	1	0	1	0	0	1	0
553:	0	0	2	1	0	0	1	0
561:	1	0	0	1	1	0	0	0
569:	2	1	1	2	3	1	1	3
577:	2	1	2	1	4	4	1	3
585:	3	4	7	3	5	6	4	5
593:	6	6	7	5	9	5	5	4
601:	13	17	11	14	12	9	11	18
609:	11	13	14	10	14	16	8	9
617:	8	6	5	7	4	2	2	0
625:	0	0	0	0	1	0	0	0
633:	0	0	0	0	0	0	0	1
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	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:	1	0	0	0	0	0	0	1
737:	1	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	1	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	1	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	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	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	1	0	0	0	0	0	0	0
929:	0	1	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	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 5/17/13

Sample Description: D-14 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000582
Batch Identification: 1304132B-UU
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_025
Chamber Serial Number:
Detector Serial Number: 25
Env. Background: System Bkgd 56979
Reagent Blank: <not performed>

Sample Size: 2.500E-001 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:27:01 AM
Acquisition Date/Time: 5/16/2013 3:38:29 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.611 mL
Effective Efficiency: 0.0519 +/- 0.0053
Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
Chem. Recovery Factor: 0.2990 +/- 0.0310

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	102.32	19.45	0.68	0.00E+000	8.6
U-234		4.774	1.32	215.98	0.68	0.00E+000	3.1
U-235		4.488	0.83	239.54	0.17	0.00E+000	3.1
U-238		4.110	3.49	113.53	0.51	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

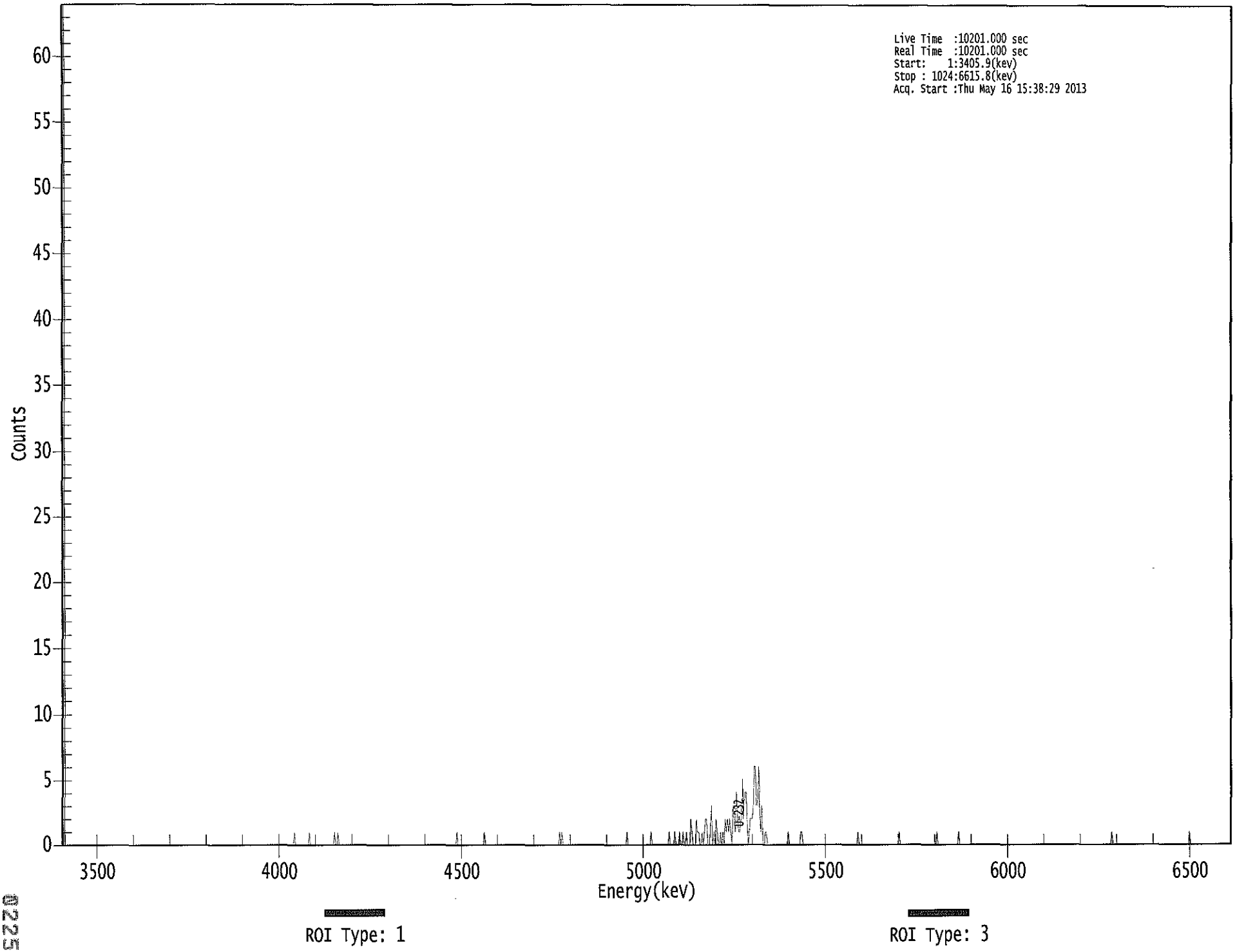
NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.990	5302.50*	2.10E+001 +/- 4.18E+000	1.16E+000 +/- 2.31E-001
U-234	0.999	4761.50*	2.70E-001 +/- 5.86E-001	1.15E+000 +/- 2.30E-001
U-235	0.927	4385.50*	2.10E-001 +/- 5.04E-001	1.05E+000 +/- 2.10E-001
U-238	0.962	4184.40*	7.11E-001 +/- 8.20E-001	1.07E+000 +/- 2.14E-001

AG
5/17/13

US EPA ARCHIVE DOCUMENT

0000058265.CNF



0225

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

Sample Title: 05

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel							
1:	10201	10201	0	0	0	0	0	0
9:	0	0	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	1	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	1	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	1	0
241:	0	1	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	1	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: 05

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	0	0
433:	0	0	0	1	0	1	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	0
513:	0	0	0	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	1	0	0	0	0
537:	1	0	0	0	1	0	0	1
545:	0	0	1	0	0	0	2	1
553:	0	0	0	2	1	1	0	0
561:	1	0	1	2	2	0	0	1
569:	3	0	1	0	2	1	0	0
577:	1	0	1	0	2	1	2	1
585:	2	1	0	3	2	1	4	2
593:	1	1	2	5	2	4	4	3
601:	0	1	2	2	2	6	6	3
609:	3	6	3	1	3	0	0	1
617:	1	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	1	1
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	1	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	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	1	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	1	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	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	1	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	1	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 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000582
Batch Identification: 1304132B-UU
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_027
Chamber Serial Number:
Detector Serial Number: 27
Env. Background: System Bkgd 56980
Reagent Blank: <not performed>

Sample Size: 2.500E-001 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:27:01 AM
Acquisition Date/Time: 5/16/2013 3:38:30 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.608 mL
Effective Efficiency: 0.1563 +/- 0.0096
Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
Chem. Recovery Factor: 0.9050 +/- 0.0584

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	306.64	11.22	1.36	0.00E+000	28.4
U-234		4.759	1.13	315.94	1.87	0.00E+000	3.2
U-235		4.303	0.66	305.43	0.34	0.00E+000	3.2
U-238		4.150	1.32	215.97	0.68	0.00E+000	3.2

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	2.08E+001 +/- 2.52E+000	4.66E-001 +/- 5.64E-002
U-234	1.000	4761.50*	7.68E-002 +/- 2.43E-001	5.14E-001 +/- 6.22E-002
U-235	0.953	4385.50*	5.53E-002 +/- 1.69E-001	4.01E-001 +/- 4.85E-002
U-238	0.992	4184.40*	8.93E-002 +/- 1.93E-001	3.81E-001 +/- 4.61E-002

RG 5/17/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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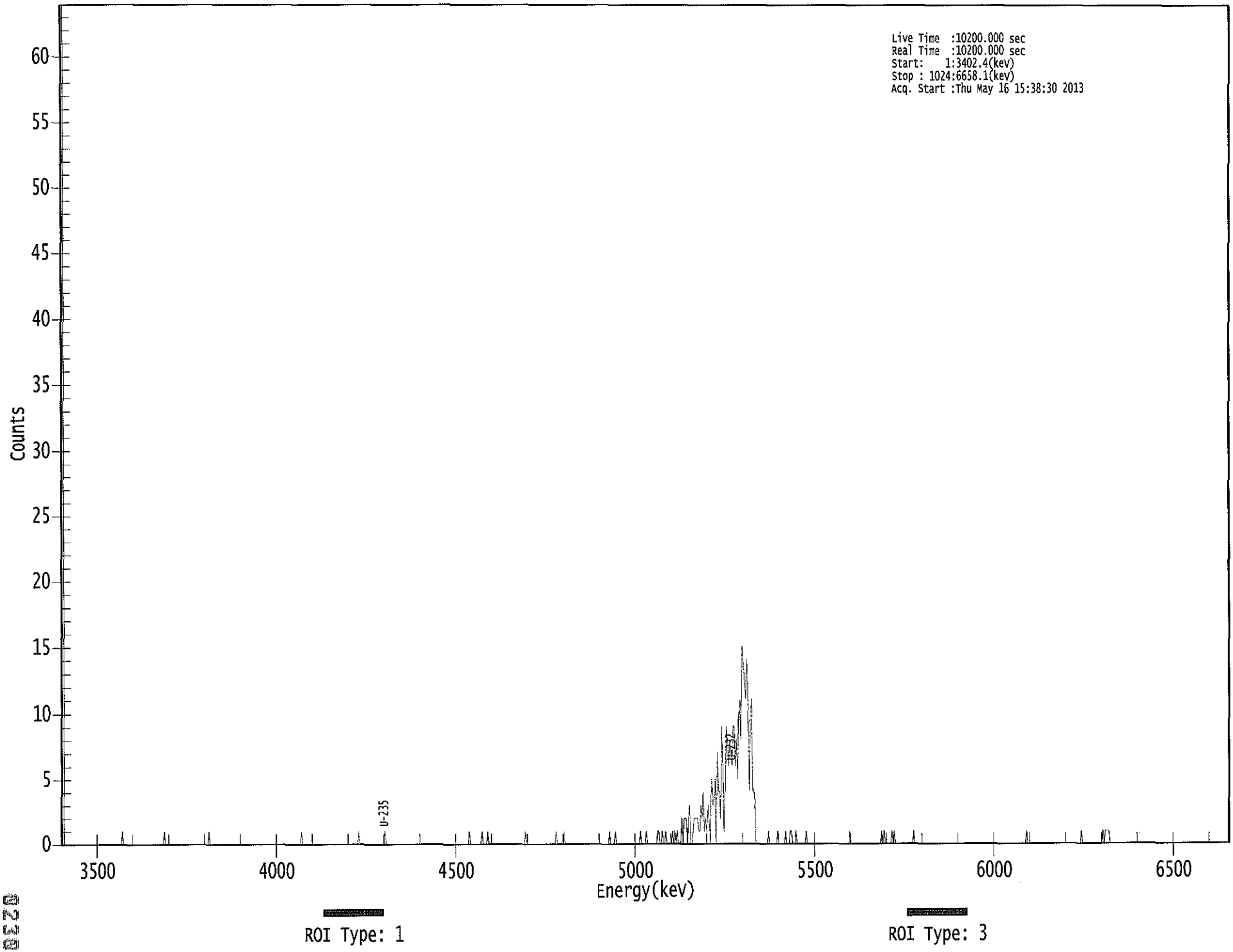


****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 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	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	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	1	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	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	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	1	0	0
361:	0	0	0	0	0	0	0	0

369:	1	0	0	0	0	1	0	0

Sample Title: 06

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	1	0
409:	0	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	1	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:	1	0	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	1	0	0	0	0
513:	1	0	0	0	0	0	0	0
521:	0	0	1	1	0	0	1	0
529:	0	1	0	0	0	0	0	1
537:	0	1	0	1	0	0	0	2
545:	0	2	2	2	0	2	3	0
553:	0	1	2	2	2	2	1	1
561:	3	2	4	1	2	1	3	2
569:	0	5	3	3	5	0	7	4
577:	4	2	9	5	1	4	9	8
585:	6	8	7	6	9	9	6	8
593:	5	10	11	8	15	14	12	11
601:	14	10	4	10	11	4	4	3
609:	0	0	0	0	0	0	0	0
617:	0	0	0	1	0	0	0	0
625:	0	0	0	1	0	0	0	0
633:	0	0	1	0	0	0	1	1
641:	0	0	0	1	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	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	1	0
721:	1	0	0	0	0	0	0	1
729:	0	1	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	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 06

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	1	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	1	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	1	0	1	1	1	1	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\00000582
Batch Identification: 1304132B-UU
Sample Identification: 07
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_044
Chamber Serial Number: 04026481B
Detector Serial Number: 84168
Env. Background: System Bkgd 56989
Reagent Blank: <not performed>

Sample Size: 2.500E-001 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:27:01 AM
Acquisition Date/Time: 5/16/2013 11:43:37 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.609 mL
Effective Efficiency: 0.1558 +/- 0.0096
Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
Chem. Recovery Factor: 0.8192 +/- 0.0525

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	306.00	11.22	0.00	0.00E+000	20.0
U-234		4.706	3.83	102.72	0.17	0.00E+000	3.0
U-235		4.398	0.00	1960.0	0.00	0.00E+000	0.0
U-238		4.108	4.00	109.57	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

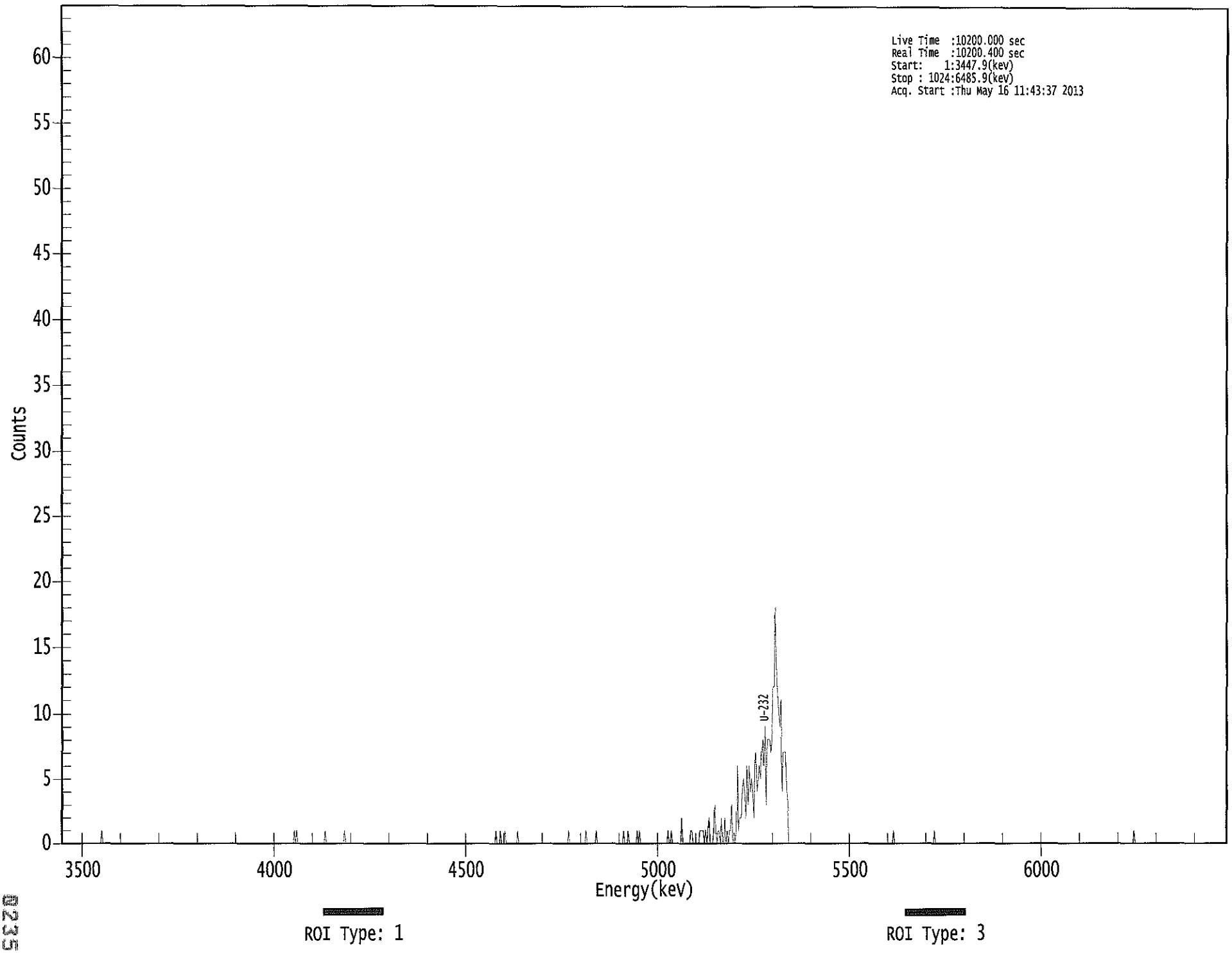
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	2.09E+001 +/- 2.53E+000	4.09E-001 +/- 4.95E-002
U-234	0.978	4761.50*	2.61E-001 +/- 2.70E-001	2.84E-001 +/- 3.44E-002
U-235	0.999	4385.50*	0.00E+000 +/- 2.33E-001	5.04E-001 +/- 6.10E-002
U-238	0.959	4184.40*	2.72E-001 +/- 2.99E-001	4.07E-001 +/- 4.92E-002

AG
5/17/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058247.CNF



529

****
***** 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:	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	1	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	1	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	0	0	0	1
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	1	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	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: 07

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

801:	0	0	0	0	0	0	0	0

Sample Title: 07

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

Sign

Sample Description: S-53 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000582
Batch Identification: 1304132B-UU
Sample Identification: 18
Sample Geometry: Shelf 2
Procedure Description: U iso

Detector Name: Alpha_029
Chamber Serial Number:
Detector Serial Number: 29
Env. Background: System Bkgd 56981
Reagent Blank: <not performed>

Sample Size: 2.500E-001 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 7:27:01 AM
Acquisition Date/Time: 5/16/2013 3:38:31 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.609 mL
Effective Efficiency: 0.0154 +/- 0.0029
Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
Chem. Recovery Factor: 0.0789 +/- 0.0148

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	5.246	30.15	36.28	0.85	0.00E+000	3.9
U-234		4.681	65.49	24.33	0.51	0.00E+000	9.3
U-235		4.429	13.32	55.28	0.68	0.00E+000	3.1
U-238		4.105	77.66	22.30	0.34	0.00E+000	3.6

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

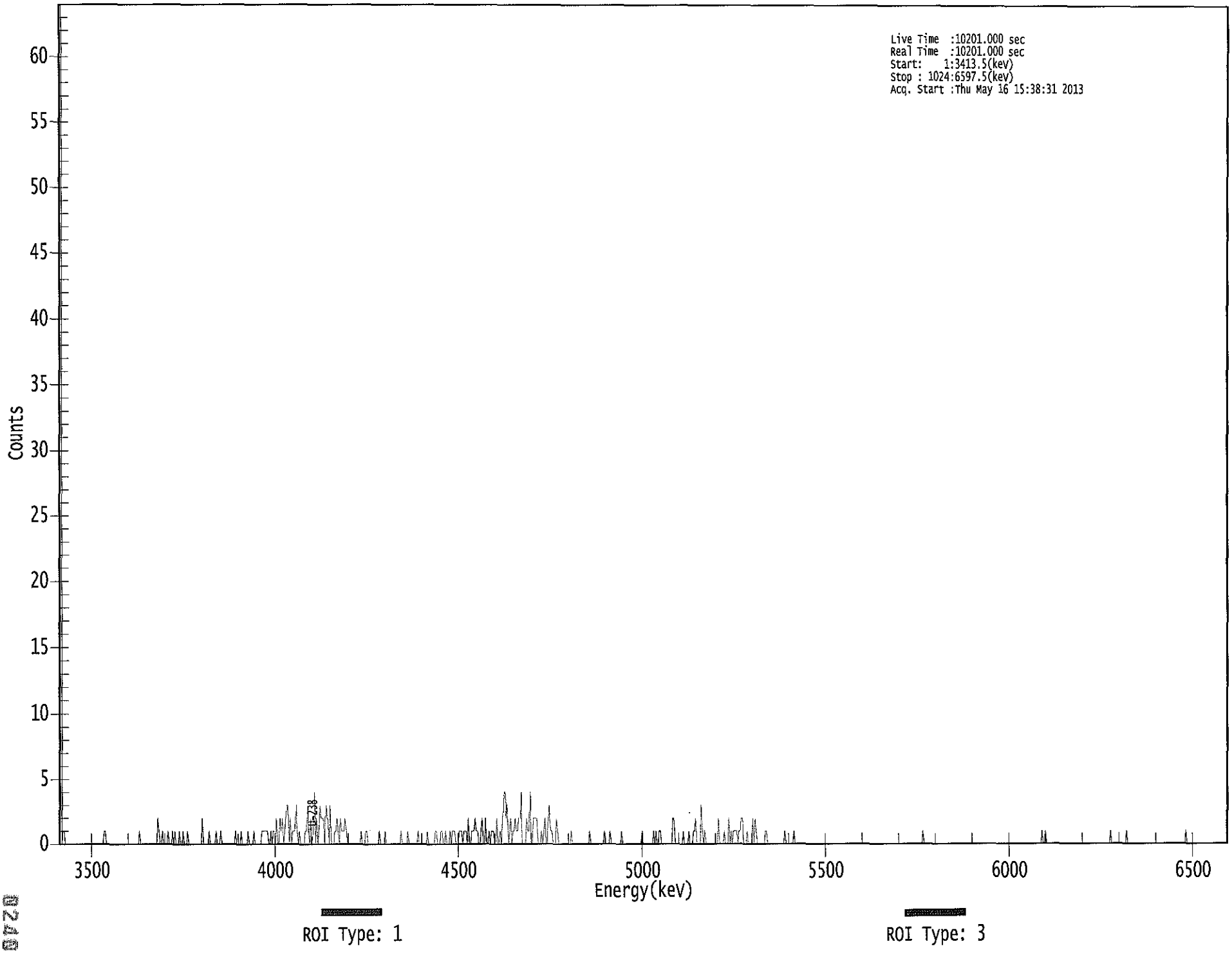
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.978	5302.50*	2.09E+001 +/- 7.63E+000	4.15E+000 +/- 1.52E+000
U-234	0.955	4761.50*	4.53E+001 +/- 1.99E+001	3.63E+000 +/- 1.33E+000
U-235	0.987	4385.50*	1.14E+001 +/- 7.53E+000	4.81E+000 +/- 1.76E+000
U-238	0.956	4184.40*	5.35E+001 +/- 2.29E+001	3.29E+000 +/- 1.20E+000

AG
5/17/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058267.CNF



6720

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

369:	0	1	2	0	0	2	0	0

Sample Title: 18

Channel								
377:	1	0	1	1	1	0	0	2
385:	0	0	1	0	2	4	4	2
393:	3	0	1	2	0	1	1	2
401:	1	1	2	2	4	0	0	0
409:	0	2	1	1	4	0	0	2
417:	2	2	2	0	0	0	1	0
425:	1	2	0	0	3	2	1	1
433:	0	0	0	2	1	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:	1	0	0	0	0	0	0	0
473:	0	0	0	0	0	1	0	0
481:	0	0	1	0	0	0	0	0
489:	0	0	0	0	1	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	1	0
513:	0	0	0	0	0	0	0	0
521:	1	0	1	0	0	1	1	0
529:	0	0	0	0	0	0	0	0
537:	0	2	2	0	0	0	0	0
545:	0	0	1	0	0	0	0	1
553:	0	0	0	1	1	2	0	0
561:	0	0	3	1	0	1	0	0
569:	0	0	0	0	0	0	0	0
577:	0	2	0	0	0	0	1	0
585:	0	0	2	0	1	0	1	1
593:	1	1	0	1	1	2	2	0
601:	0	0	1	0	0	0	0	2
609:	0	2	1	0	0	0	0	0
617:	0	0	1	1	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	1	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	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	1	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 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	1	0	0	1
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	1	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	1	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	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

5/16/2013 5:55:31 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 5/16/2013
Time : 5:55:31 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	5/16/2013 5:33:32 AM
Alpha_004	21f	ALL	Passed	5/16/2013 5:33:33 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	5/16/2013 5:33:34 AM
Alpha_011	21f	ALL	Passed	5/16/2013 5:33:35 AM
Alpha_012	21f	ALL	Not Done	
Alpha_013	21f	ALL	Passed	5/16/2013 5:33:36 AM
Alpha_014	21f	ALL	Passed	5/16/2013 5:33:37 AM
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	5/16/2013 5:33:37 AM
Alpha_019	AIM730	ALL	Passed	5/16/2013 5:33:38 AM
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	5/16/2013 5:33:39 AM
Alpha_023	AIM730	ALL	Not Done	
Alpha_024	AIM730	ALL	Passed	5/16/2013 5:33:40 AM
Alpha_025	AIM730	ALL	Passed	5/16/2013 5:33:41 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	5/16/2013 5:33:42 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	5/16/2013 5:33:42 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Not Done	
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:44 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:45 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:46 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:48 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:49 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:51 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:52 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:54 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:56 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:57 AM

Review of QA Results - Pulser Check

5/16/2013 5:55:31 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Passed	5/11/2013 10:55:58 AM
Alpha_044	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:33:59 AM
Alpha_045	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:34:01 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:34:02 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:34:04 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	5/16/2013 5:34:06 AM

APPROVED BY: C

APPROVAL DATE: 5/16/13

****
***** 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

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

SECTION IX

ANALYTICAL DATA (ISOTOPIC THORIUM)

13-04132
ThISO
Run 1

US EPA ARCHIVE DOCUMENT

Work Order	13-04132
Analysis Code	ThISO
Run	1
Date Received	4/18/2013
Lab Deadline	5/9/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EML Th-01 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Th-229
Radiometric Sol#	Th-18a
Tracer Act (dpm/g)	22.467
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/18/13 00:00	1.0000E+00
02	MBL	BLANK		04/18/13 00:00	1.0000E+00
03	DUP	PZ-106-KS TOT	36	04/15/13 15:59	1.0000E+00
04	TRG	D-14 TOT	38	04/12/13 11:05	1.0000E+00
05	TRG	D-14 DIS	38	04/12/13 11:05	1.0000E+00
06	TRG	PZ-112-AS TOT	45	04/12/13 11:18	1.0000E+00
07	TRG	PZ-112-AS DIS	45	04/12/13 11:18	1.0000E+00
08	TRG	PZ-202-SS TOT	46	04/12/13 12:32	1.0000E+00
09	TRG	PZ-202-SS DIS	46	04/12/13 12:32	1.0000E+00
10	TRG	DUP07 TOT	40	04/12/13 00:00	1.0000E+00
11	TRG	DUP07 DIS	40	04/12/13 00:00	1.0000E+00
12	DO	PZ-106-KS TOT	36	04/15/13 15:59	1.0000E+00
13	TRG	PZ-106-KS DIS	36	04/15/13 15:59	1.0000E+00
14	TRG	FB at PZ-100-KS TOT	39	04/16/13 08:40	1.0000E+00
15	TRG	FB at PZ-100-KS DIS	39	04/16/13 08:40	1.0000E+00
16	TRG	PZ-100-KS TOT	37	04/16/13 08:50	1.0000E+00
17	TRG	PZ-100-KS DIS	37	04/16/13 08:50	1.0000E+00
18	TRG	S-53 TOT	41	04/16/13 09:00	1.0000E+00
19	TRG	S-53 DIS	41	04/16/13 09:00	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.

S3-5-00

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	0.4848	10.9		0.00								
02	MBL	0.2425	5.4		0.00								
03	DUP	0.2403	5.4		0.00								
04	TRG	0.2346	5.3		0.00								
05	TRG	0.2383	5.4		0.00								
06	TRG	0.2368	5.3		0.00								
07	TRG	0.2392	5.4		0.00								
08	TRG	0.2379	5.3		0.00								
09	TRG	0.2387	5.4		0.00								
10	TRG	0.2396	5.4		0.00								
11	TRG	0.2374	5.3		0.00								
12	DO	0.2378	5.3		0.00								
13	TRG	0.2383	5.4		0.00								
14	TRG	0.2357	5.3		0.00								
15	TRG	0.2381	5.3		0.00								
16	TRG	0.2379	5.3		0.00								
17	TRG	0.2385	5.4		0.00								
18	TRG	0.2319	5.2		0.00								
19	TRG	0.2368	5.3		0.00								

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

US EPA ARCHIVE DOCUMENT

13-04132
ThISO
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			05/03/13 09:39	JBARNARD				
02	MBL			05/03/13 09:39	JBARNARD				
03	DUP			05/03/13 09:39	JBARNARD				
04	TRG			05/03/13 09:39	JBARNARD				
05	TRG			05/03/13 09:39	JBARNARD				
06	TRG			05/03/13 09:39	JBARNARD				
07	TRG			05/03/13 09:39	JBARNARD				
08	TRG			05/03/13 09:39	JBARNARD				
09	TRG			05/03/13 09:39	JBARNARD				
10	TRG			05/03/13 09:39	JBARNARD				
11	TRG			05/03/13 09:39	JBARNARD				
12	DO			05/03/13 09:39	JBARNARD				
13	TRG			05/03/13 09:39	JBARNARD				
14	TRG			05/03/13 09:39	JBARNARD				
15	TRG			05/03/13 09:39	JBARNARD				
16	TRG			05/03/13 09:39	JBARNARD				
17	TRG			05/03/13 09:39	JBARNARD				
18	TRG			05/03/13 09:39	JBARNARD				
19	TRG			05/03/13 09:39	JBARNARD				

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

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Eberline Services
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	13-04132	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	4.62E+00	6.94E-01	1.20E-01	4.80E+00	96.31	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	2.84E-02	7.23E-02	1.44E-01					OK	OK
03	TH-228	DUP	PZ-106-KS TOT	pCi/l	2.97E-02	6.64E-02	1.26E-01				NA	OK	
04	TH-228	TRG	D-14 TOT	pCi/l	9.92E-01	2.79E-01	1.23E-01					OK	
05	TH-228	TRG	D-14 DIS	pCi/l	4.50E-02	6.88E-02	1.18E-01					OK	
06	TH-228	TRG	PZ-112-AS TOT	pCi/l	1.12E-01	1.08E-01	1.57E-01					OK	
07	TH-228	TRG	PZ-112-AS DIS	pCi/l	1.11E-02	7.75E-02	1.71E-01					OK	
08	TH-228	TRG	PZ-202-SS TOT	pCi/l	1.56E-01	1.12E-01	1.30E-01					OK	
09	TH-228	TRG	PZ-202-SS DIS	pCi/l	9.92E-02	8.79E-02	1.09E-01					OK	
10	TH-228	TRG	DUP07 TOT	pCi/l	1.01E-01	8.38E-02	1.01E-01					OK	
11	TH-228	TRG	DUP07 DIS	pCi/l	-1.36E-02	4.00E-02	1.15E-01					OK	
12	TH-228	DO	PZ-106-KS TOT	pCi/l	-1.37E-02	3.55E-02	1.19E-01					OK	
13	TH-228	TRG	PZ-106-KS DIS	pCi/l	3.79E-02	5.28E-02	7.98E-02					OK	
14	TH-228	TRG	FB at PZ-100-KS TOT	pCi/l	3.74E-02	4.55E-02	5.52E-02					OK	
15	TH-228	TRG	FB at PZ-100-KS DIS	pCi/l	-9.17E-03	2.80E-02	7.61E-02					OK	
16	TH-228	TRG	PZ-100-KS TOT	pCi/l	8.52E-02	7.64E-02	8.15E-02					OK	
17	TH-228	TRG	PZ-100-KS DIS	pCi/l	1.67E-02	4.18E-02	8.70E-02					OK	
18	TH-228	TRG	S-53 TOT	pCi/l	1.99E+01	3.92E+00	1.16E-01					OK	
19	TH-228	TRG	S-53 DIS	pCi/l	3.09E-02	5.02E-02	8.61E-02					OK	

US EPA ARCHIVE DOCUMENT

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	13-04132	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	04/18/13 00:00	1.00E+00	131.02	0.00	0.00			
02	TH-228	MBL	04/18/13 00:00	1.00E+00	77.99	0.00	0.00			
03	TH-228	DUP	04/15/13 15:59	1.00E+00	105.22	0.00	0.00			
04	TH-228	TRG	04/12/13 11:05	1.00E+00	103.87	0.00	0.00			
05	TH-228	TRG	04/12/13 11:05	1.00E+00	106.20	0.00	0.00			
06	TH-228	TRG	04/12/13 11:18	1.00E+00	97.23	0.00	0.00			
07	TH-228	TRG	04/12/13 11:18	1.00E+00	82.97	0.00	0.00			
08	TH-228	TRG	04/12/13 12:32	1.00E+00	117.13	0.00	0.00			
09	TH-228	TRG	04/12/13 12:32	1.00E+00	103.89	0.00	0.00			
10	TH-228	TRG	04/12/13 00:00	1.00E+00	113.95	0.00	0.00			
11	TH-228	TRG	04/12/13 00:00	1.00E+00	122.99	0.00	0.00			
12	TH-228	DO	04/15/13 15:59	1.00E+00	88.57	0.00	0.00			
13	TH-228	TRG	04/15/13 15:59	1.00E+00	97.84	0.00	0.00			
14	TH-228	TRG	04/16/13 08:40	1.00E+00	110.55	0.00	0.00			
15	TH-228	TRG	04/16/13 08:40	1.00E+00	110.22	0.00	0.00			
16	TH-228	TRG	04/16/13 08:50	1.00E+00	98.05	0.00	0.00			
17	TH-228	TRG	04/16/13 08:50	1.00E+00	98.23	0.00	0.00			
18	TH-228	TRG	04/16/13 09:00	1.00E+00	70.77	0.00	0.00			
19	TH-228	TRG	04/16/13 09:00	1.00E+00	102.22	0.00	0.00			

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Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-ThISO-1

US EPA ARCHIVE DOCUMENT

Run	1
Analysis Code	ThISO
Eberline Services Work Order	13-04132
Client	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	05/09/13 16:28		A_Spec	Alpha_003	170	3.98 E+02	2.70 E-02	17.5
02	TH-228	MBL	05/09/13 16:28		A_Spec	Alpha_004	170	1.62 E+00	1.40 E-02	19.4
03	TH-228	DUP	05/09/13 16:28		A_Spec	Alpha_010	170	2.26 E+00	2.20 E-02	19.7
04	TH-228	TRG	05/09/13 16:28		A_Spec	Alpha_011	170.02	7.46 E+01	2.00 E-02	19.7
05	TH-228	TRG	05/09/13 16:28		A_Spec	Alpha_013	170.02	3.28 E+00	1.60 E-02	18.7
06	TH-228	TRG	05/09/13 16:28		A_Spec	Alpha_014	170	7.41 E+00	2.70 E-02	18.5
07	TH-228	TRG	05/09/13 16:29		A_Spec	Alpha_018	170	6.00 E-01	2.00 E-02	17.8
08	TH-228	TRG	05/09/13 16:29		A_Spec	Alpha_022	170	1.03 E+01	1.60 E-02	15.3
09	TH-228	TRG	05/09/13 16:29		A_Spec	Alpha_024	170	6.47 E+00	9.00 E-03	17.1
10	TH-228	TRG	05/09/13 16:29		A_Spec	Alpha_025	170	7.30 E+00	1.00 E-02	17.4
11	TH-228	TRG	05/09/13 16:29		A_Spec	Alpha_027	170	-1.06 E+00	1.80 E-02	17.3
12	TH-228	DO	05/09/13 16:29		A_Spec	Alpha_029	170	-8.70 E-01	1.10 E-02	19.5
13	TH-228	TRG	05/09/13 16:29		A_Spec	Alpha_033	170	2.49 E+00	3.00 E-03	18.2
14	TH-228	TRG	05/09/13 16:30		A_Spec	Alpha_034	170	2.83 E+00	1.00 E-03	18.6
15	TH-228	TRG	05/09/13 16:29		A_Spec	Alpha_035	170	-6.80 E-01	4.00 E-03	18.3
16	TH-228	TRG	05/09/13 16:29		A_Spec	Alpha_037	170	5.49 E+00	3.00 E-03	17.8
17	TH-228	TRG	05/09/13 16:30		A_Spec	Alpha_040	170	1.15 E+00	5.00 E-03	19
18	TH-228	TRG	05/09/13 16:30		A_Spec	Alpha_041	170	1.03 E+03	5.00 E-03	19.8
19	TH-228	TRG	05/09/13 16:30		A_Spec	Alpha_042	170	2.15 E+00	5.00 E-03	18.5

US EPA ARCHIVE DOCUMENT

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-ThISO-1

Run	1
Analysis Code	ThISO
Eberline Services Work Order	13-04132
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	4.48E+00	6.76E-01	7.31E-02	5.41E+00	82.71	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	2.65E-01	1.51E-01	1.33E-01					OK	OK
03	TH-230	DUP	PZ-106-KS TOT	pCi/l	2.82E-01	1.29E-01	8.08E-02				NA	OK	
04	TH-230	TRG	D-14 TOT	pCi/l	1.15E+00	3.00E-01	5.41E-02					OK	
05	TH-230	TRG	D-14 DIS	pCi/l	1.65E-01	9.84E-02	7.54E-02					OK	
06	TH-230	TRG	PZ-112-AS TOT	pCi/l	1.89E-01	1.14E-01	9.74E-02					OK	
07	TH-230	TRG	PZ-112-AS DIS	pCi/l	2.04E-01	1.28E-01	1.02E-01					OK	
08	TH-230	TRG	PZ-202-SS TOT	pCi/l	3.94E-01	1.67E-01	1.01E-01					OK	
09	TH-230	TRG	PZ-202-SS DIS	pCi/l	1.27E-01	9.07E-02	7.84E-02					OK	
10	TH-230	TRG	DUP07 TOT	pCi/l	1.05E-01	8.15E-02	8.84E-02					OK	
11	TH-230	TRG	DUP07 DIS	pCi/l	1.06E-01	7.56E-02	6.56E-02					OK	
12	TH-230	DO	PZ-106-KS TOT	pCi/l	9.47E-02	8.23E-02	9.22E-02					OK	
13	TH-230	TRG	PZ-106-KS DIS	pCi/l	1.61E-01	1.00E-01	6.20E-02					OK	
14	TH-230	TRG	FB at PZ-100-KS TOT	pCi/l	1.77E-01	9.90E-02	6.19E-02					OK	
15	TH-230	TRG	FB at PZ-100-KS DIS	pCi/l	1.67E-01	9.71E-02	6.31E-02					OK	
16	TH-230	TRG	PZ-100-KS TOT	pCi/l	3.90E-01	1.65E-01	7.26E-02					OK	
17	TH-230	TRG	PZ-100-KS DIS	pCi/l	8.29E-02	6.98E-02	5.94E-02					OK	
18	TH-230	TRG	S-53 TOT	pCi/l	1.96E+01	3.85E+00	1.35E-01					OK	
19	TH-230	TRG	S-53 DIS	pCi/l	2.20E-01	1.16E-01	6.73E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-ThISO-1

US EPA ARCHIVE DOCUMENT

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	13-04132	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	04/18/13 00:00	1.00E+00	131.02	0.00	0.00			
02	TH-230	MBL	04/18/13 00:00	1.00E+00	77.99	0.00	0.00			
03	TH-230	DUP	04/15/13 15:59	1.00E+00	105.22	0.00	0.00			
04	TH-230	TRG	04/12/13 11:05	1.00E+00	103.87	0.00	0.00			
05	TH-230	TRG	04/12/13 11:05	1.00E+00	106.20	0.00	0.00			
06	TH-230	TRG	04/12/13 11:18	1.00E+00	97.23	0.00	0.00			
07	TH-230	TRG	04/12/13 11:18	1.00E+00	82.97	0.00	0.00			
08	TH-230	TRG	04/12/13 12:32	1.00E+00	117.13	0.00	0.00			
09	TH-230	TRG	04/12/13 12:32	1.00E+00	103.89	0.00	0.00			
10	TH-230	TRG	04/12/13 00:00	1.00E+00	113.95	0.00	0.00			
11	TH-230	TRG	04/12/13 00:00	1.00E+00	122.99	0.00	0.00			
12	TH-230	DO	04/15/13 15:59	1.00E+00	88.57	0.00	0.00			
13	TH-230	TRG	04/15/13 15:59	1.00E+00	97.84	0.00	0.00			
14	TH-230	TRG	04/16/13 08:40	1.00E+00	110.55	0.00	0.00			
15	TH-230	TRG	04/16/13 08:40	1.00E+00	110.22	0.00	0.00			
16	TH-230	TRG	04/16/13 08:50	1.00E+00	98.05	0.00	0.00			
17	TH-230	TRG	04/16/13 08:50	1.00E+00	98.23	0.00	0.00			
18	TH-230	TRG	04/16/13 09:00	1.00E+00	70.77	0.00	0.00			
19	TH-230	TRG	04/16/13 09:00	1.00E+00	102.22	0.00	0.00			

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US EPA ARCHIVE DOCUMENT

Run	1
Analysis Code	ThISO
Eberline Services Work Order	13-04132
Client	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	05/09/13 16:28		A_Spec	Alpha_003	170	3.86 E+02	6.00 E-03	17.5
02	TH-230	MBL	05/09/13 16:28		A_Spec	Alpha_004	170	1.51 E+01	1.10 E-02	19.4
03	TH-230	DUP	05/09/13 16:28		A_Spec	Alpha_010	170	2.20 E+01	6.00 E-03	19.7
04	TH-230	TRG	05/09/13 16:28		A_Spec	Alpha_011	170.02	8.88 E+01	1.00 E-03	19.7
05	TH-230	TRG	05/09/13 16:28		A_Spec	Alpha_013	170.02	1.23 E+01	4.00 E-03	18.7
06	TH-230	TRG	05/09/13 16:28		A_Spec	Alpha_014	170	1.28 E+01	7.00 E-03	18.5
07	TH-230	TRG	05/09/13 16:29		A_Spec	Alpha_018	170	1.13 E+01	4.00 E-03	17.8
08	TH-230	TRG	05/09/13 16:29		A_Spec	Alpha_022	170	2.66 E+01	8.00 E-03	15.3
09	TH-230	TRG	05/09/13 16:29		A_Spec	Alpha_024	170	8.49 E+00	3.00 E-03	17.1
10	TH-230	TRG	05/09/13 16:29		A_Spec	Alpha_025	170	7.81 E+00	7.00 E-03	17.4
11	TH-230	TRG	05/09/13 16:29		A_Spec	Alpha_027	170	8.49 E+00	3.00 E-03	17.3
12	TH-230	DO	05/09/13 16:29		A_Spec	Alpha_029	170	6.15 E+00	5.00 E-03	19.5
13	TH-230	TRG	05/09/13 16:29		A_Spec	Alpha_033	170	1.08 E+01	1.00 E-03	18.2
14	TH-230	TRG	05/09/13 16:30		A_Spec	Alpha_034	170	1.37 E+01	2.00 E-03	18.6
15	TH-230	TRG	05/09/13 16:29		A_Spec	Alpha_035	170	1.27 E+01	2.00 E-03	18.3
16	TH-230	TRG	05/09/13 16:29		A_Spec	Alpha_037	170	2.57 E+01	2.00 E-03	17.8
17	TH-230	TRG	05/09/13 16:30		A_Spec	Alpha_040	170	5.83 E+00	1.00 E-03	19
18	TH-230	TRG	05/09/13 16:30		A_Spec	Alpha_041	170	1.03 E+03	9.00 E-03	19.8
19	TH-230	TRG	05/09/13 16:30		A_Spec	Alpha_042	170	1.57 E+01	2.00 E-03	18.5

US EPA ARCHIVE DOCUMENT

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-ThISO-1

Run	1
Analysis Code	ThISO
Eberline Services Work Order	13-04132
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	4.53E+00	6.82E-01	6.08E-02	4.80E+00	94.54	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	-1.79E-02	3.73E-02	1.10E-01					OK	OK
03	TH-232	DUP	PZ-106-KS TOT	pCi/l	3.81E-02	5.16E-02	8.06E-02				NA	OK	
04	TH-232	TRG	D-14 TOT	pCi/l	1.17E+00	3.04E-01	6.78E-02					OK	
05	TH-232	TRG	D-14 DIS	pCi/l	-2.27E-03	2.65E-02	5.57E-02					OK	
06	TH-232	TRG	PZ-112-AS TOT	pCi/l	5.12E-02	6.69E-02	1.05E-01					OK	
07	TH-232	TRG	PZ-112-AS DIS	pCi/l	2.95E-02	6.36E-02	1.23E-01					OK	
08	TH-232	TRG	PZ-202-SS TOT	pCi/l	1.03E-01	8.45E-02	9.31E-02					OK	
09	TH-232	TRG	PZ-202-SS DIS	pCi/l	1.24E-02	2.97E-02	6.22E-02					OK	
10	TH-232	TRG	DUP07 TOT	pCi/l	1.11E-02	2.67E-02	5.59E-02					OK	
11	TH-232	TRG	DUP07 DIS	pCi/l	-6.36E-03	2.55E-02	6.54E-02					OK	
12	TH-232	DO	PZ-106-KS TOT	pCi/l	4.09E-02	5.32E-02	7.35E-02					OK	
13	TH-232	TRG	PZ-106-KS DIS	pCi/l	1.48E-02	4.12E-02	8.90E-02					OK	
14	TH-232	TRG	FB at PZ-100-KS TOT	pCi/l	-2.20E-03	2.57E-02	5.39E-02					OK	
15	TH-232	TRG	FB at PZ-100-KS DIS	pCi/l	0.00E+00	3.65E-02	7.89E-02					OK	
16	TH-232	TRG	PZ-100-KS TOT	pCi/l	3.03E-02	5.17E-02	9.09E-02					OK	
17	TH-232	TRG	PZ-100-KS DIS	pCi/l	-2.41E-03	2.82E-02	5.92E-02					OK	
18	TH-232	TRG	S-53 TOT	pCi/l	1.90E+01	3.75E+00	1.78E-01					OK	
19	TH-232	TRG	S-53 DIS	pCi/l	1.08E-01	8.00E-02	6.71E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-ThISO-1

US EPA ARCHIVE DOCUMENT

Run	1
Analysis Code	ThISO
Eberline Services Work Order	13-04132
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	04/18/13 00:00	1.00E+00	131.02	0.00	0.00			
02	TH-232	MBL	04/18/13 00:00	1.00E+00	77.99	0.00	0.00			
03	TH-232	DUP	04/15/13 15:59	1.00E+00	105.22	0.00	0.00			
04	TH-232	TRG	04/12/13 11:05	1.00E+00	103.87	0.00	0.00			
05	TH-232	TRG	04/12/13 11:05	1.00E+00	106.20	0.00	0.00			
06	TH-232	TRG	04/12/13 11:18	1.00E+00	97.23	0.00	0.00			
07	TH-232	TRG	04/12/13 11:18	1.00E+00	82.97	0.00	0.00			
08	TH-232	TRG	04/12/13 12:32	1.00E+00	117.13	0.00	0.00			
09	TH-232	TRG	04/12/13 12:32	1.00E+00	103.89	0.00	0.00			
10	TH-232	TRG	04/12/13 00:00	1.00E+00	113.95	0.00	0.00			
11	TH-232	TRG	04/12/13 00:00	1.00E+00	122.99	0.00	0.00			
12	TH-232	DO	04/15/13 15:59	1.00E+00	88.57	0.00	0.00			
13	TH-232	TRG	04/15/13 15:59	1.00E+00	97.84	0.00	0.00			
14	TH-232	TRG	04/16/13 08:40	1.00E+00	110.55	0.00	0.00			
15	TH-232	TRG	04/16/13 08:40	1.00E+00	110.22	0.00	0.00			
16	TH-232	TRG	04/16/13 08:50	1.00E+00	98.05	0.00	0.00			
17	TH-232	TRG	04/16/13 08:50	1.00E+00	98.23	0.00	0.00			
18	TH-232	TRG	04/16/13 09:00	1.00E+00	70.77	0.00	0.00			
19	TH-232	TRG	04/16/13 09:00	1.00E+00	102.22	0.00	0.00			

8578

US EPA ARCHIVE DOCUMENT

Run	1
Analysis Code	ThISO
Eberline Services Work Order	13-04132
Client	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	05/09/13 16:28		A_Spec	Alpha_003	170	3.91 E+02	3.00 E-03	17.5
02	TH-232	MBL	05/09/13 16:28		A_Spec	Alpha_004	170	-1.02 E+00	6.00 E-03	19.4
03	TH-232	DUP	05/09/13 16:28		A_Spec	Alpha_010	170	2.98 E+00	6.00 E-03	19.7
04	TH-232	TRG	05/09/13 16:28		A_Spec	Alpha_011	170.02	9.05 E+01	3.00 E-03	19.7
05	TH-232	TRG	05/09/13 16:28		A_Spec	Alpha_013	170.02	-1.70 E-01	1.00 E-03	18.7
06	TH-232	TRG	05/09/13 16:28		A_Spec	Alpha_014	170	3.47 E+00	9.00 E-03	18.5
07	TH-232	TRG	05/09/13 16:29		A_Spec	Alpha_018	170	1.64 E+00	8.00 E-03	17.8
08	TH-232	TRG	05/09/13 16:29		A_Spec	Alpha_022	170	6.98 E+00	6.00 E-03	15.3
09	TH-232	TRG	05/09/13 16:29		A_Spec	Alpha_024	170	8.30 E-01	1.00 E-03	17.1
10	TH-232	TRG	05/09/13 16:29		A_Spec	Alpha_025	170	8.30 E-01	1.00 E-03	17.4
11	TH-232	TRG	05/09/13 16:29		A_Spec	Alpha_027	170	-5.10 E-01	3.00 E-03	17.3
12	TH-232	DO	05/09/13 16:29		A_Spec	Alpha_029	170	2.66 E+00	2.00 E-03	19.5
13	TH-232	TRG	05/09/13 16:29		A_Spec	Alpha_033	170	1.00 E+00	0.00 E+00	18.2
14	TH-232	TRG	05/09/13 16:30		A_Spec	Alpha_034	170	-1.70 E-01	1.00 E-03	18.6
15	TH-232	TRG	05/09/13 16:29		A_Spec	Alpha_035	170	1.00 E+00	0.00 E+00	18.3
16	TH-232	TRG	05/09/13 16:29		A_Spec	Alpha_037	170	2.00 E+00	0.00 E+00	17.8
17	TH-232	TRG	05/09/13 16:30		A_Spec	Alpha_040	170	-1.70 E-01	1.00 E-03	19
18	TH-232	TRG	05/09/13 16:30		A_Spec	Alpha_041	170	1.01 E+03	2.10 E-02	19.8
19	TH-232	TRG	05/09/13 16:30		A_Spec	Alpha_042	170	7.66 E+00	2.00 E-03	18.5

Count Room Report
Client: Engineering Management Su

13-04132-ThISO-1 (pCi/l) in WA
Tracer ID: Th-18a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/18/13 00:00	1.0000	0.4848	10.8920		0.00		
02	MBL	BLANK	04/18/13 00:00	1.0000	0.2425	5.4482		0.00		
03	DUP	PZ-106-KS TOT	04/15/13 15:59	1.0000	0.2403	5.3988		0.00		
04	TRG	D-14 TOT	04/12/13 11:05	1.0000	0.2346	5.2708		0.00		
05	TRG	D-14 DIS	04/12/13 11:05	1.0000	0.2383	5.3539		0.00		
06	TRG	PZ-112-AS TOT	04/12/13 11:18	1.0000	0.2368	5.3202		0.00		
07	TRG	PZ-112-AS DIS	04/12/13 11:18	1.0000	0.2392	5.3741		0.00		
08	TRG	PZ-202-SS TOT	04/12/13 12:32	1.0000	0.2379	5.3449		0.00		
09	TRG	PZ-202-SS DIS	04/12/13 12:32	1.0000	0.2387	5.3629		0.00		
10	TRG	DUP07 TOT	04/12/13 00:00	1.0000	0.2396	5.3831		0.00		
11	TRG	DUP07 DIS	04/12/13 00:00	1.0000	0.2374	5.3337		0.00		
12	DO	PZ-106-KS TOT	04/15/13 15:59	1.0000	0.2378	5.3427		0.00		
13	TRG	PZ-106-KS DIS	04/15/13 15:59	1.0000	0.2383	5.3539		0.00		
14	TRG	FB at PZ-100-KS TOT	04/16/13 08:40	1.0000	0.2357	5.2955		0.00		
15	TRG	FB at PZ-100-KS DIS	04/16/13 08:40	1.0000	0.2381	5.3494		0.00		
16	TRG	PZ-100-KS TOT	04/16/13 08:50	1.0000	0.2379	5.3449		0.00		
17	TRG	PZ-100-KS DIS	04/16/13 08:50	1.0000	0.2385	5.3584		0.00		
18	TRG	S-53 TOT	04/16/13 09:00	1.0000	0.2319	5.2101		0.00		
19	TRG	S-53 DIS	04/16/13 09:00	1.0000	0.2368	5.3202		0.00		

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-04132	1	ThISO	5/3/2013 9:37	JBARNARD	JB	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Th-228	Th-8b	103.560	5/3/2013	0.100	0.1028				4.80	0.173	0.00	0.000	0.00	0.000	0.00	0.000
Th-230	Th-1b	23.525	5/3/2013	0.500	0.5109				5.41	0.146	0.00	0.000	0.00	0.000	0.00	0.000
Th-232	Th-8b	103.560	5/3/2013	0.100	0.1028				4.80	0.173	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	22.467	5/3/2013	0.4848	0.2200
02	Th-229	Th-18a	22.467	5/3/2013	0.2425	0.2200
03	Th-229	Th-18a	22.467	5/3/2013	0.2403	0.2200
04	Th-229	Th-18a	22.467	5/3/2013	0.2346	0.2200
05	Th-229	Th-18a	22.467	5/3/2013	0.2383	0.2200
06	Th-229	Th-18a	22.467	5/3/2013	0.2368	0.2200
07	Th-229	Th-18a	22.467	5/3/2013	0.2392	0.2200
08	Th-229	Th-18a	22.467	5/3/2013	0.2379	0.2200
09	Th-229	Th-18a	22.467	5/3/2013	0.2387	0.2200
10	Th-229	Th-18a	22.467	5/3/2013	0.2396	0.2200
11	Th-229	Th-18a	22.467	5/3/2013	0.2374	0.2200
12	Th-229	Th-18a	22.467	5/3/2013	0.2378	0.2200
13	Th-229	Th-18a	22.467	5/3/2013	0.2383	0.2200
14	Th-229	Th-18a	22.467	5/3/2013	0.2357	0.2200
15	Th-229	Th-18a	22.467	5/3/2013	0.2381	0.2200
16	Th-229	Th-18a	22.467	5/3/2013	0.2379	0.2200
17	Th-229	Th-18a	22.467	5/3/2013	0.2385	0.2200
18	Th-229	Th-18a	22.467	5/3/2013	0.2319	0.2200
19	Th-229	Th-18a	22.467	5/3/2013	0.2368	0.2200

Balance Printer Tapes

Tracer

0.4848 g
0.2425 g
-0.2403 g
-0.2346 g
-0.2383 g
-0.2368 g

-0.2392 g
-0.2379 g
-0.2387 g

-0.2396 g
-0.2374 g

-0.2378 g
-0.2383 g
-0.2357 g
-0.2381 g

-0.2379 g
-0.2385 g
-0.2319 g
-0.2360 g

LCS

0.5109 g
0.1028 g

Matrix Spike

US EPA ARCHIVE DOCUMENT

Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Printed: 5/3/2013 9:41 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04132	1	ThISO	liters	5/9/2013	JBARNARD

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	PZ-106-KS TOT	DUP					1.0000E+00	1.0000E+00				
04	D-14 TOT	TRG					1.0000E+00	1.0000E+00				
05	D-14 DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-112-AS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-112-AS DIS	TRG					1.0000E+00	1.0000E+00				
08	PZ-202-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-202-SS DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP07 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP07 DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-106-KS TOT	DO					1.0000E+00	1.0000E+00				
13	PZ-106-KS DIS	TRG					1.0000E+00	1.0000E+00				
14	FB at PZ-100-KS TOT	TRG					1.0000E+00	1.0000E+00				
15	FB at PZ-100-KS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-100-KS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-100-KS DIS	TRG					1.0000E+00	1.0000E+00				
18	S-53 TOT	TRG					1.0000E+00	1.0000E+00				
19	S-53 DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: _____ Date: 5313

2552

Apex-Alpha™

C
5/10/13

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 01
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_003
Chamber Serial Number:
Detector Serial Number: 3
Env. Background: System Bkgd 56360
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 5/9/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:28:50 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.485 mL
Effective Efficiency: 0.2288 +/- 0.0132
Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
Chem. Recovery Factor: 1.3102 +/- 0.0795

Control Certificate Name: NatTh_Th-8
Chem. Recov. of Control: TH-232 0.945409 +/- 0.077895
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		5.768	13.09	62.93	3.91	0.00E+000	3.0
TH-228		5.381	398.41	9.89	4.59	0.00E+000	42.9
TH-229	T	4.875	423.64	9.54	1.36	0.00E+000	6.8
TH-230		4.641	385.98	9.99	1.02	0.00E+000	9.1
TH-232		3.967	391.49	9.91	0.51	0.00E+000	24.2

T = Tracer Peak used for Effective Efficiency

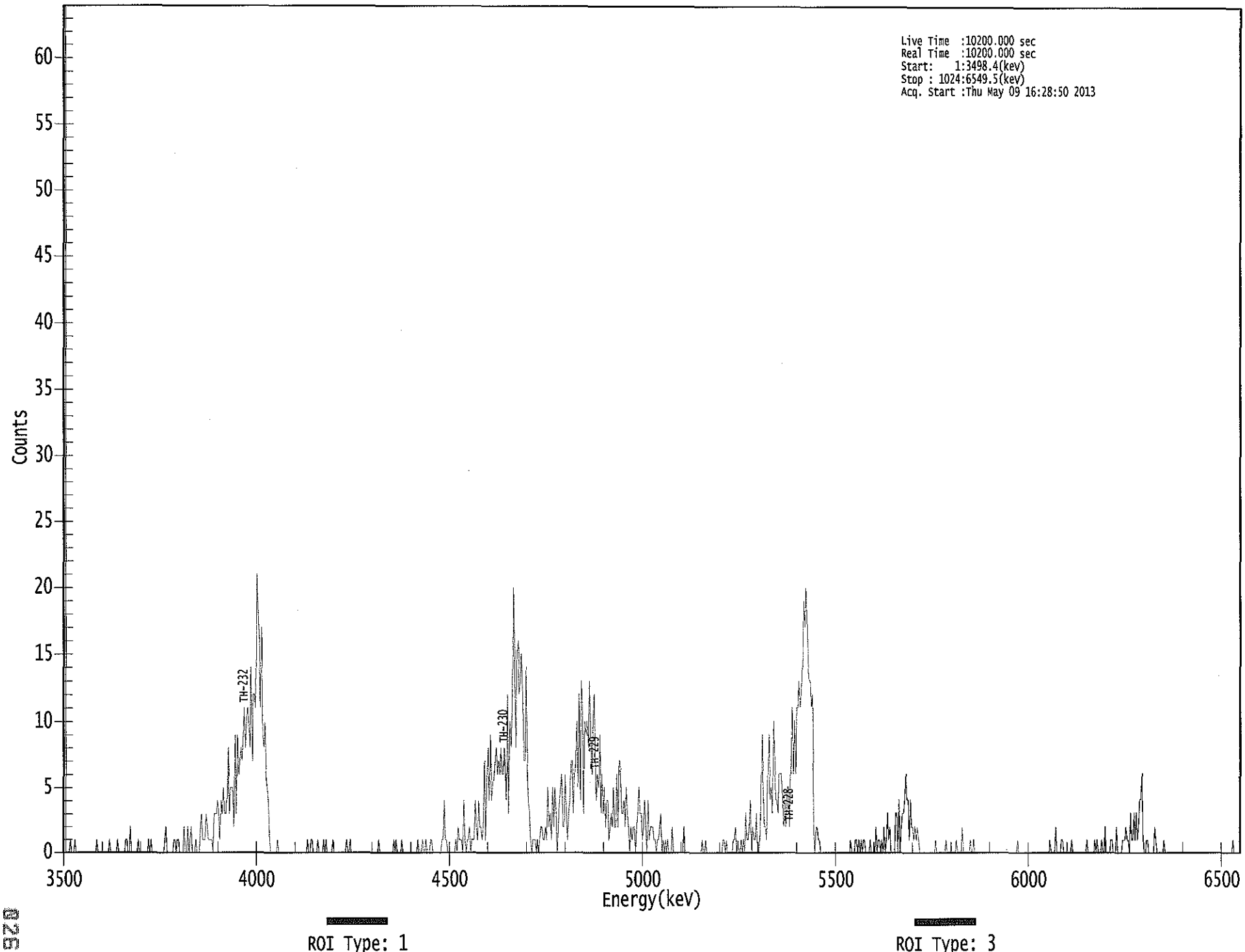
NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.965	5850.00*	1.55E-001 +/- 9.94E-002	1.16E-001 +/- 1.31E-002
TH-228	0.998	5400.00*	4.62E+000 +/- 6.94E-001	1.20E-001 +/- 1.35E-002
TH-229	1.000	4872.00*	4.93E+000 +/- 5.58E-001	7.98E-002 +/- 9.02E-003
TH-230	0.995	4672.00*	4.48E+000 +/- 6.76E-001	7.31E-002 +/- 8.27E-003
TH-232	0.995	3997.00*	4.53E+000 +/- 6.82E-001	6.08E-002 +/- 6.87E-003

AG
5/10/13

US EPA ARCHIVE DOCUMENT

0000057570.CNF



0224

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

369:	6	8	4	9	4	5	6	7

Sample Title: 01

Channel								
377:	8	6	7	6	8	6	6	8
385:	7	4	12	3	10	8	11	20
393:	15	8	15	16	12	13	15	12
401:	7	7	14	7	4	3	1	0
409:	1	1	1	0	1	0	1	2
417:	2	1	1	2	1	5	2	3
425:	1	5	2	5	3	0	2	4
433:	5	6	2	2	6	3	1	3
441:	4	7	7	3	6	7	10	5
449:	12	4	13	11	3	10	9	10
457:	8	13	9	6	10	12	6	4
465:	6	5	9	3	6	3	5	2
473:	4	4	1	2	3	2	5	2
481:	2	6	2	7	7	3	3	4
489:	2	5	3	2	0	2	1	2
497:	2	0	2	3	5	3	3	1
505:	2	4	2	0	4	1	2	2
513:	2	1	1	0	1	1	2	3
521:	0	1	0	1	0	1	0	0
529:	0	2	0	0	0	0	0	0
537:	0	0	0	2	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	1	0	0	1	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	1	1	0
577:	1	0	0	0	0	0	1	1
585:	2	0	1	0	0	1	0	1
593:	0	3	1	1	2	4	0	2
601:	1	1	3	0	0	1	4	9
609:	5	2	2	1	6	9	4	5
617:	3	10	7	4	4	3	6	6
625:	6	4	2	4	2	5	5	2
633:	7	11	6	10	6	11	11	13
641:	11	12	14	19	17	20	17	14
649:	13	13	11	12	2	0	2	2
657:	1	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	1	0	0	0
689:	1	1	0	1	0	1	0	1
697:	1	0	0	0	0	1	0	0
705:	0	0	2	0	1	1	0	1
713:	0	2	0	1	3	1	2	0
721:	0	0	0	3	3	0	4	0
729:	2	3	3	4	6	4	4	1
737:	4	2	2	1	2	1	2	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	1
769:	0	0	0	0	0	0	0	0
777:	1	0	0	0	0	2	0	0
785:	0	0	0	0	1	0	0	1
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	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	0	0	0	0
857:	0	1	0	0	0	0	2	0
865:	0	0	0	1	1	0	0	0
873:	0	0	0	0	1	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	1	0	0	0	0	0	0
897:	1	0	1	0	0	0	1	0
905:	0	2	0	0	0	0	1	1
913:	0	0	0	2	0	0	0	0
921:	1	1	1	2	1	1	0	3
929:	1	1	3	1	3	1	2	4
937:	4	6	1	0	0	1	1	0
945:	0	0	0	0	2	1	0	0
953:	0	0	0	0	1	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	1	0	0	0	0	0	0	0

Apex-Alpha™

5/10/13

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 02
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_004
Chamber Serial Number:
Detector Serial Number: 4
Env. Background: System Bkgd 56361
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 5/9/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:28:52 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.243 mL
Effective Efficiency: 0.1513 +/- 0.0137
Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
Chem. Recovery Factor: 0.7799 +/- 0.0718

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		5.913	-0.87	258.63	1.87	0.00E+000	2.9
TH-228		5.327	1.62	253.92	2.38	0.00E+000	2.9
TH-229	T	4.861	140.15	16.61	0.85	0.00E+000	3.7
TH-230		4.632	15.13	53.91	1.87	0.00E+000	2.9
TH-232		3.947	-1.02	208.15	1.02	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	0.979	5850.00*	-1.56E-002 +/- 4.05E-002	1.36E-001 +/- 2.41E-002
TH-228	0.973	5400.00*	2.84E-002 +/- 7.23E-002	1.44E-001 +/- 2.54E-002
TH-229	0.999	4872.00*	2.47E+000 +/- 4.36E-001	1.05E-001 +/- 1.86E-002
TH-230	0.992	4672.00*	2.65E-001 +/- 1.51E-001	1.33E-001 +/- 2.35E-002
TH-232	0.987	3997.00*	-1.79E-002 +/- 3.73E-002	1.10E-001 +/- 1.95E-002

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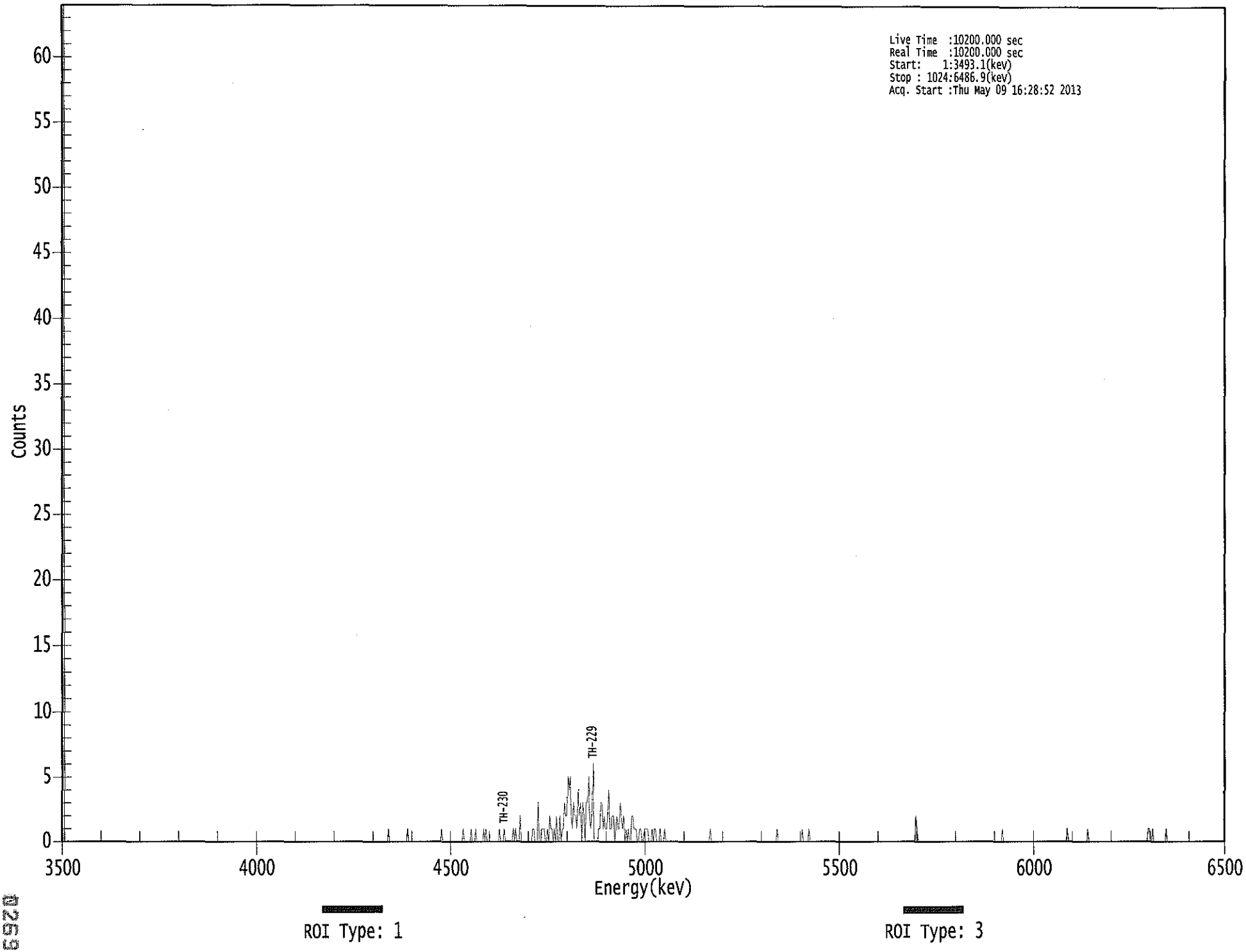
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057571.CNF



6926

****
***** 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	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	1
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	1	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	1	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	1	0	0	0	0	0	0
361:	1	0	0	0	1	0	0	0

369:	0	0	0	1	0	1	0	0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	1	0	0	0	1	0	0
393:	0	0	0	0	0	1	0	1
401:	0	0	0	2	0	0	0	0
409:	0	0	0	0	0	0	1	1
417:	0	0	0	3	0	0	1	1
425:	1	0	0	1	0	2	1	1
433:	0	1	0	2	0	0	2	0
441:	1	1	3	2	2	5	4	5
449:	2	1	3	2	2	1	4	2
457:	3	0	3	2	0	3	3	5
465:	2	1	2	6	0	0	0	0
473:	1	1	3	3	1	2	1	1
481:	2	4	1	1	2	2	0	1
489:	2	1	1	3	2	1	2	0
497:	1	0	1	0	0	2	2	1
505:	1	1	0	0	1	1	0	0
513:	1	1	1	1	0	0	0	1
521:	0	1	1	0	0	0	1	0
529:	0	0	1	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	1	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	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	1	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	2
753:	1	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	1	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	1	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	1	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	1	1	0	0	1
961:	0	0	0	0	0	0	0	0
969:	0	0	0	1	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 Tilow

Sample Description: PZ-106-KS TOT-DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 03
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_010
Chamber Serial Number:
Detector Serial Number: 10
Env. Background: System Bkgd 56362
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/15/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:28:46 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.240 mL
Effective Efficiency: 0.2070 +/- 0.0164
Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
Chem. Recovery Factor: 1.0522 +/- 0.0856

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		5.812	2.77	181.07	3.23	0.00E+000	2.9
TH-228		5.327	2.26	223.40	3.74	0.00E+000	2.9
TH-229	T	4.886	189.96	14.31	2.04	0.00E+000	6.1
TH-230		4.629	21.98	42.93	1.02	0.00E+000	5.9
TH-232		3.998	2.98	134.36	1.02	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	0.992	5850.00*	3.64E-002 +/- 6.62E-002	1.20E-001 +/- 1.86E-002
TH-228	0.972	5400.00*	2.97E-002 +/- 6.64E-002	1.26E-001 +/- 1.96E-002
TH-229	0.999	4872.00*	2.44E+000 +/- 3.80E-001	1.00E-001 +/- 1.56E-002
TH-230	0.990	4672.00*	2.82E-001 +/- 1.29E-001	8.08E-002 +/- 1.26E-002
TH-232	1.000	3997.00*	3.81E-002 +/- 5.16E-002	8.06E-002 +/- 1.25E-002

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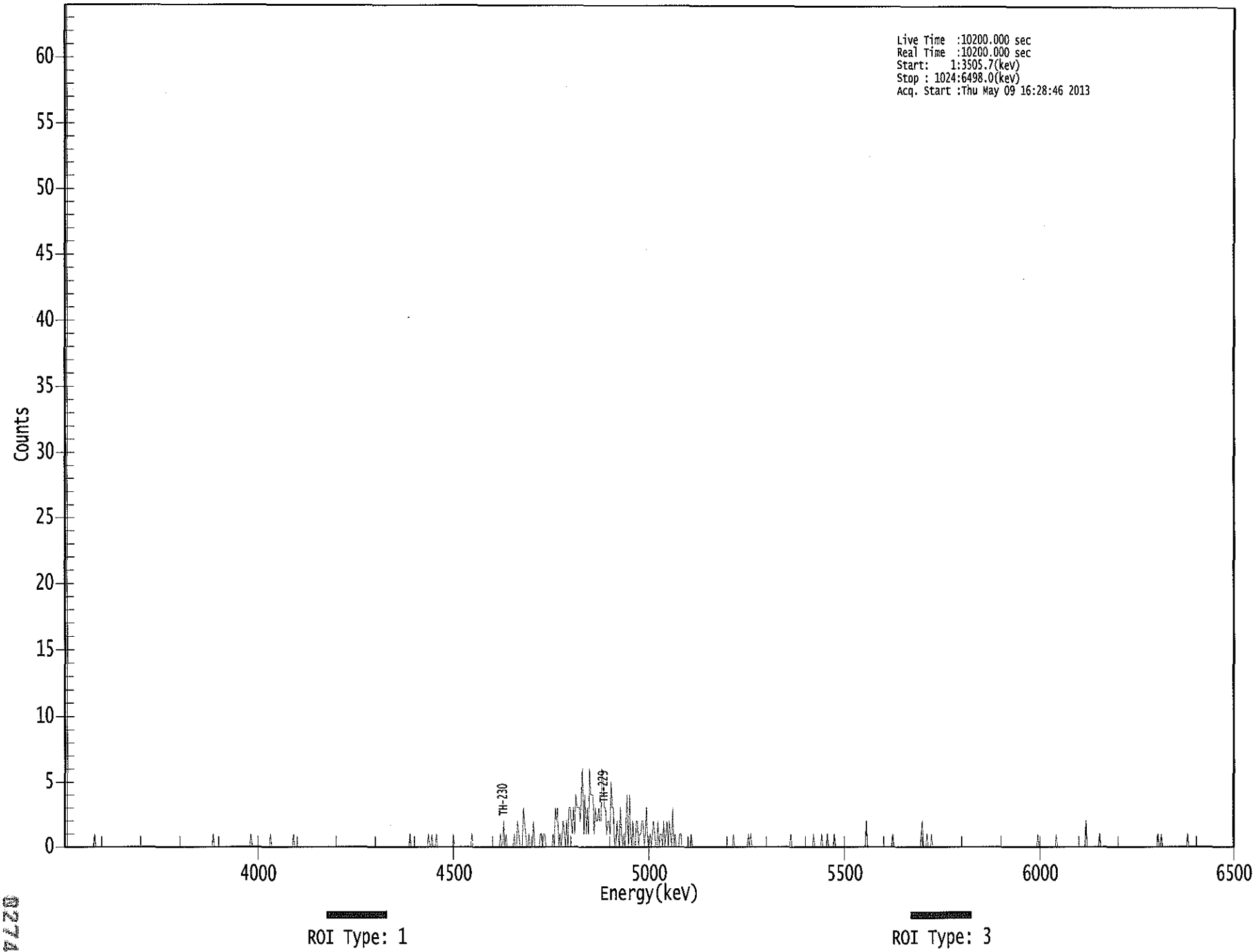
US EPA ARCHIVE DOCUMENT

0000057568.CNF



0274

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

Sample Title: 03

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	1	0	0	0	0	0
33:	0	0	0	0	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	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	1	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	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:	1	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	1	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	1	0
321:	0	1	0	0	0	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	1	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	1	0	0
385:	2	0	1	0	0	0	0	0
393:	0	1	0	0	2	1	0	0
401:	0	3	2	1	0	0	1	0
409:	0	0	2	0	0	0	0	0
417:	1	1	0	1	1	0	0	0
425:	0	0	0	1	0	3	2	3
433:	0	1	0	1	2	1	0	2
441:	0	3	3	2	1	3	1	4
449:	3	3	3	2	4	6	1	4
457:	1	3	1	6	4	4	4	1
465:	3	2	2	3	2	2	6	5
473:	3	3	1	2	2	1	5	3
481:	3	0	0	2	1	0	3	1
489:	0	1	0	2	4	0	4	1
497:	0	2	0	0	2	2	0	1
505:	1	2	2	0	1	3	0	0
513:	1	0	1	2	1	0	0	2
521:	0	1	1	0	2	0	1	2
529:	0	2	1	0	3	0	1	0
537:	0	0	1	1	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	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	1	0	0	0	0	0	0
593:	0	0	0	0	0	0	1	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:	0	0	0	0	0	0	0	1
657:	0	0	0	0	0	0	1	0
665:	0	0	0	1	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	0	0	0	0	0
697:	0	0	0	0	0	2	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	1	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	1	2	0
753:	0	0	1	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: 03

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	1	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:	0	0	0	0	0	2	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	0	0	0	0	0
953:	0	0	0	0	1	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	1	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
Floor

Sample Description: D-14 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_011
Chamber Serial Number:
Detector Serial Number: 11
Env. Background: System Bkgd 56363
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:28:47 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: 0.2049 +/- 0.0165
Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
Chem. Recovery Factor: 1.0387 +/- 0.0863

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		5.906	3.13	144.41	1.87	0.00E+000	2.7
TH-228		5.380	74.60	23.29	3.40	0.00E+000	2.7
TH-229	T	4.880	183.64	14.53	1.36	0.00E+000	10.2
TH-230		4.631	88.83	20.82	0.17	0.00E+000	2.9
TH-232		3.970	90.49	20.67	0.51	0.00E+000	8.4

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

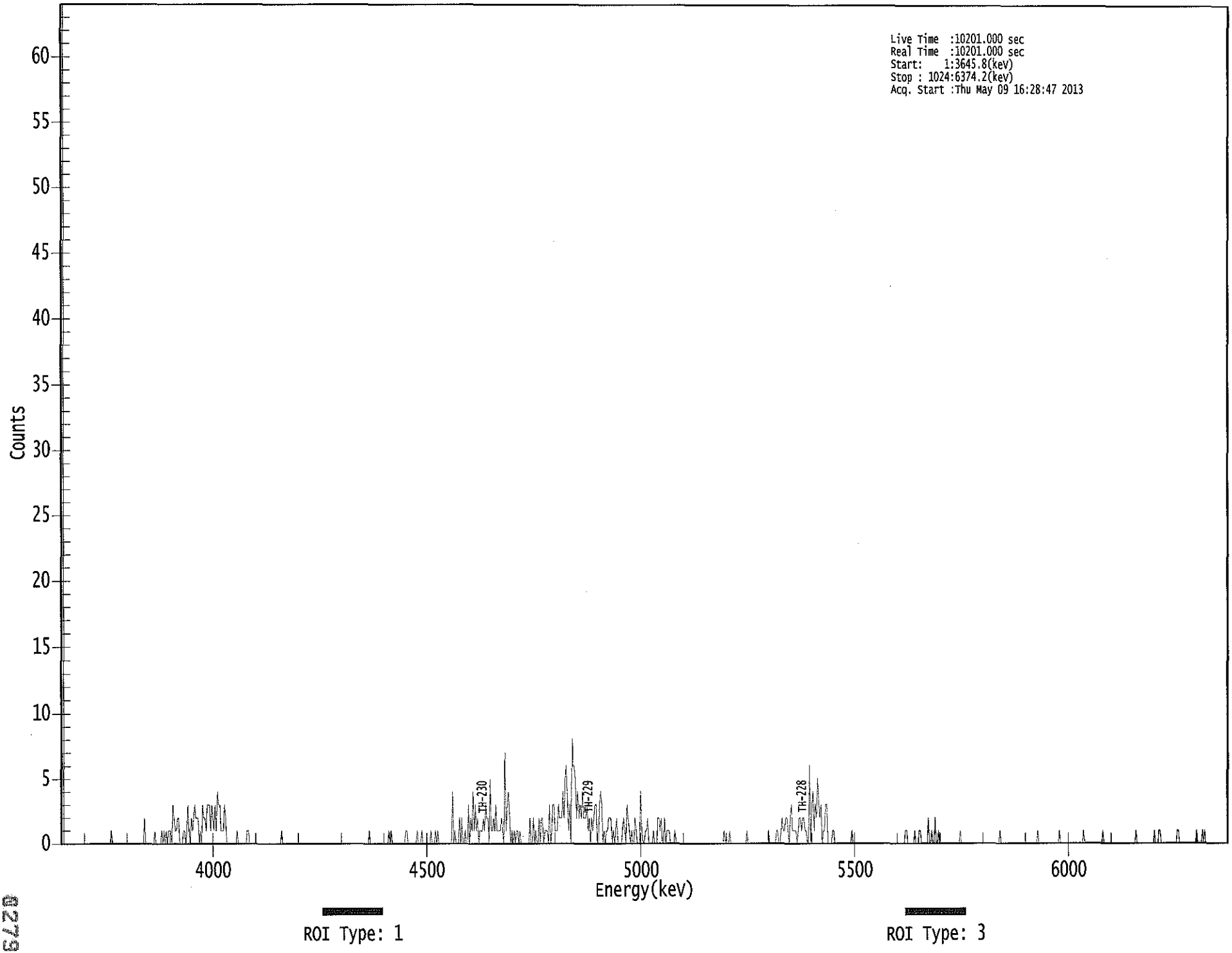
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.984	5850.00*	4.16E-002 +/- 6.04E-002	1.01E-001 +/- 1.58E-002
TH-228	0.998	5400.00*	9.92E-001 +/- 2.79E-001	1.23E-001 +/- 1.94E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 3.76E-001	8.91E-002 +/- 1.40E-002
TH-230	0.991	4672.00*	1.15E+000 +/- 3.00E-001	5.41E-002 +/- 8.51E-003
TH-232	0.996	3997.00*	1.17E+000 +/- 3.04E-001	6.78E-002 +/- 1.07E-002

AG
5/10/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057569.CNF



6229

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

Sample Title: 04

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	1	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	2	0	0	0	0	0	0
81:	0	0	1	0	0	0	0	0
89:	1	0	1	0	1	0	1	1
97:	1	0	3	2	1	1	2	2
105:	0	0	0	1	1	0	1	3
113:	1	0	2	1	2	3	2	2
121:	2	0	1	0	3	2	2	1
129:	3	3	3	1	3	2	1	3
137:	1	4	3	3	1	1	1	3
145:	2	0	0	0	0	0	0	0
153:	0	0	1	0	0	0	0	0
161:	0	0	0	1	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	1	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	1
289:	0	1	0	0	0	0	0	0
297:	0	0	0	0	0	0	1	1
305:	0	0	0	0	0	0	0	0
313:	1	0	0	0	1	0	0	0
321:	0	0	0	0	1	0	0	0
329:	1	0	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	4
345:	0	1	0	0	0	2	0	2
353:	0	0	1	0	0	3	0	2
361:	1	4	1	3	1	2	0	1

369:	1	1	2	1	3	2	2	0

Sample Title: 04

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

801:	0	0	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	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	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	0	0	0
897:	1	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	1	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	1	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	1	0
961:	0	0	1	1	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	1	1	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	1	0	0	0	0
1001:	1	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: D-14 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000576
Batch Identification: 1304132A-TH
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_013
Chamber Serial Number:
Detector Serial Number: 13
Env. Background: System Bkgd 56364
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:28:48 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: 0.1985 +/- 0.0160
Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
Chem. Recovery Factor: 1.0620 +/- 0.0879

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	4.13	119.29	1.87	0.00E+000	2.8
TH-228		5.368	3.28	151.92	2.72	0.00E+000	2.8
TH-229	T	4.869	180.66	14.60	0.34	0.00E+000	8.9
TH-230		4.633	12.32	57.62	0.68	0.00E+000	2.8
TH-232		3.971	-0.17	1169.3	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	0.984	5850.00*	5.67E-002 +/- 6.82E-002	1.04E-001 +/- 1.64E-002
TH-228	0.995	5400.00*	4.50E-002 +/- 6.88E-002	1.18E-001 +/- 1.86E-002
TH-229	1.000	4872.00*	2.42E+000 +/- 3.83E-001	6.41E-002 +/- 1.01E-002
TH-230	0.992	4672.00*	1.65E-001 +/- 9.84E-002	7.54E-002 +/- 1.19E-002
TH-232	0.997	3997.00*	-2.27E-003 +/- 2.65E-002	5.57E-002 +/- 8.81E-003

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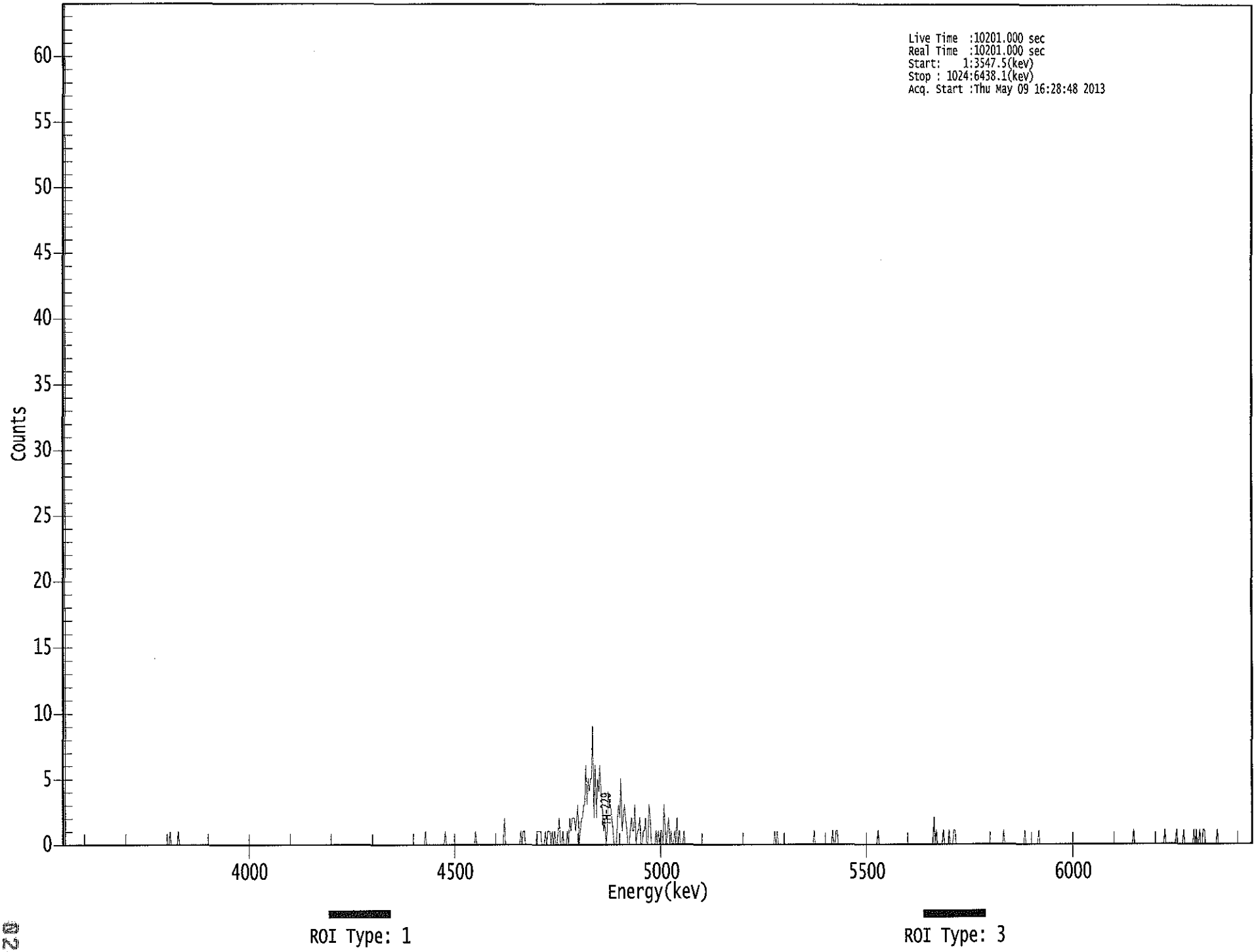
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057621.CNF



1828 0284

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

Sample Title: 05

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel								
1:	10201	10201	0	0	0	0	0	0
9:	0	0	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	1	0	0	0
97:	0	0	0	1	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:	1	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	1	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	1	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
377:	0	0	0	0	2	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	1	0	1	1	0	0
401:	0	0	0	0	0	0	0	0
409:	1	1	1	1	0	0	0	1
417:	0	1	1	1	0	1	0	1
425:	0	0	1	2	0	0	1	0
433:	0	0	1	0	2	1	2	2
441:	2	1	2	3	0	1	2	2
449:	3	3	6	3	5	4	5	5
457:	9	2	6	2	5	4	6	4
465:	3	1	2	0	1	4	3	3
473:	2	1	0	0	0	2	3	2
481:	5	1	2	3	2	1	0	0
489:	1	2	1	1	3	0	1	1
497:	2	0	0	1	1	2	0	0
505:	3	2	0	0	0	0	1	0
513:	1	0	1	1	0	3	1	0
521:	1	2	0	1	0	0	1	0
529:	2	0	1	0	0	0	1	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	1	0	1	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	0	0	0	0	0	0
657:	0	0	0	0	0	0	1	0
665:	0	1	1	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	1	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	2	0	1
753:	0	0	0	0	0	1	0	0
761:	0	0	1	0	0	0	1	1
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 05

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

CJ 5/10

Sample Description: PZ-112-AS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_014
Chamber Serial Number:
Detector Serial Number: 14
Env. Background: System Bkgd 56365
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:28:49 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.237 mL
Effective Efficiency: 0.1795 +/- 0.0152
Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
Chem. Recovery Factor: 0.9723 +/- 0.0844

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		5.858	3.45	144.10	2.55	0.00E+000	2.9
TH-228		5.333	7.41	94.56	4.59	0.00E+000	2.9
TH-229	T	4.873	162.30	15.48	1.70	0.00E+000	3.9
TH-230		4.626	12.81	57.66	1.19	0.00E+000	2.9
TH-232		3.965	3.47	129.54	1.53	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	1.000	5850.00*	5.24E-002 +/- 7.60E-002	1.27E-001 +/- 2.12E-002
TH-228	0.977	5400.00*	1.12E-001 +/- 1.08E-001	1.57E-001 +/- 2.61E-002
TH-229	1.000	4872.00*	2.41E+000 +/- 4.00E-001	1.09E-001 +/- 1.81E-002
TH-230	0.989	4672.00*	1.89E-001 +/- 1.14E-001	9.74E-002 +/- 1.62E-002
TH-232	0.995	3997.00*	5.12E-002 +/- 6.69E-002	1.05E-001 +/- 1.75E-002

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US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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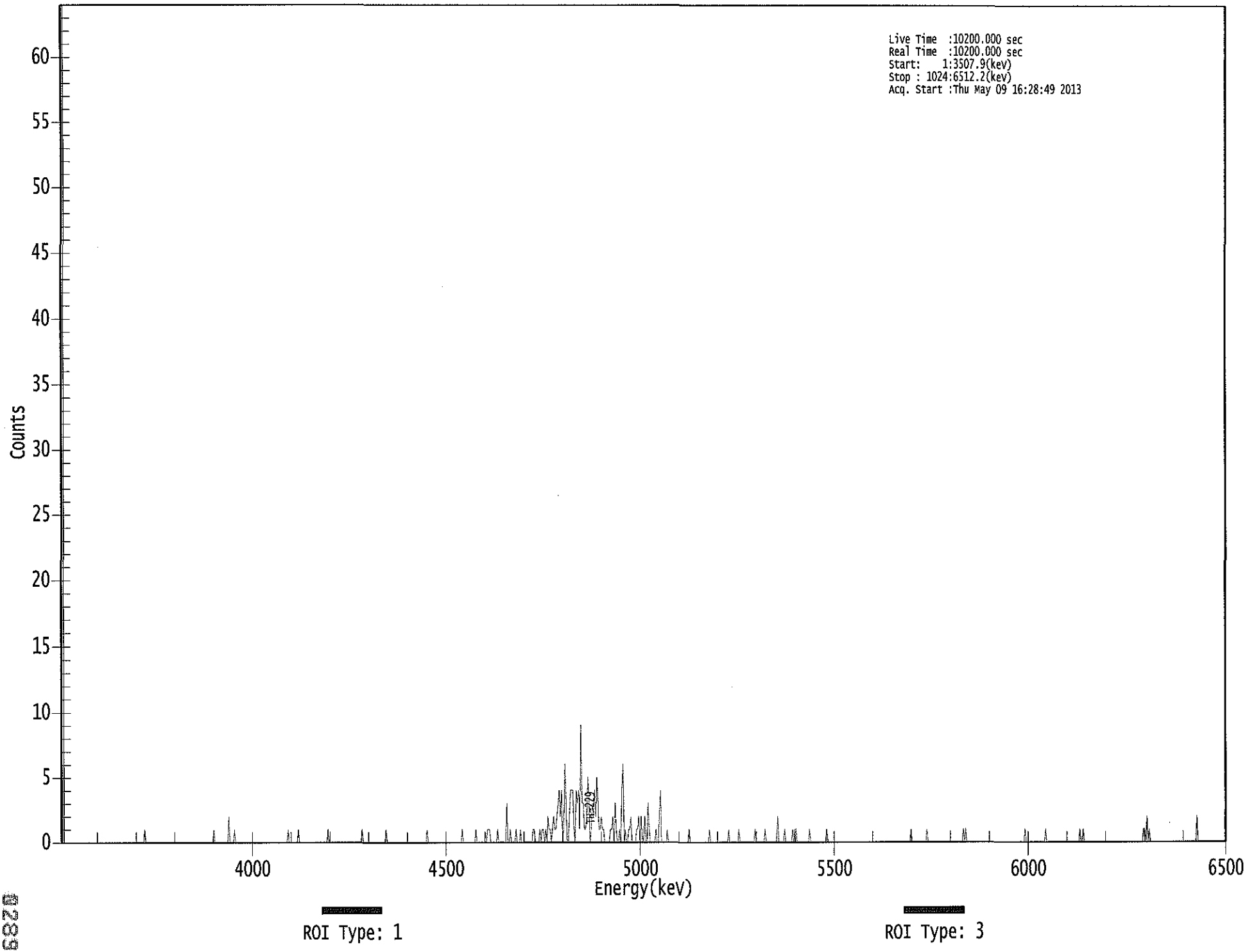

0289

****
***** 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	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	1	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	2	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	1
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	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	1	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	1	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	1	0	0	0	0	0	0	0
361:	0	0	0	0	1	0	0	0

369:	0	0	0	0	0	0	1	1

Sample Title: 06

Channel								
377:	1	0	0	0	0	0	0	1
385:	0	0	0	0	0	0	0	3
393:	0	0	1	0	0	0	0	1
401:	0	0	0	1	0	0	0	0
409:	0	0	0	0	0	0	1	1
417:	0	0	0	0	1	0	1	1
425:	0	1	0	2	1	1	0	1
433:	2	1	1	2	3	4	2	4
441:	0	1	6	3	0	0	2	4
449:	4	4	1	0	4	3	4	1
457:	9	3	3	1	1	2	5	3
465:	0	1	3	2	4	2	5	3
473:	1	1	2	1	1	0	0	0
481:	0	0	1	1	2	0	3	1
489:	0	0	1	0	4	6	0	1
497:	0	0	1	1	2	0	0	0
505:	0	1	1	2	0	2	0	0
513:	2	0	0	3	1	0	0	0
521:	0	0	1	0	0	2	4	0
529:	0	0	0	0	1	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	0	0
561:	0	0	0	0	0	0	0	0
569:	0	1	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	1	0	0	0	0	0
593:	0	0	0	1	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	1	0	0	0	0	0	0
617:	0	0	1	0	0	0	0	0
625:	0	0	0	0	0	2	0	0
633:	0	0	0	1	0	0	0	0
641:	0	0	1	0	1	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	1	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	1	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	1	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	1	0	1	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	1	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	1	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	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	1	1
953:	0	2	0	1	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	2	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\00000575
Batch Identification: 1304132A-TH
Sample Identification: 07
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_018
Chamber Serial Number:
Detector Serial Number: 18
Env. Background: System Bkgd 56366
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:29:24 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.239 mL
Effective Efficiency: 0.1474 +/- 0.0136
Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
Chem. Recovery Factor: 0.8297 +/- 0.0779

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	1.96	208.49	2.04	0.00E+000	3.1
TH-228		5.314	0.60	698.88	3.40	0.00E+000	3.1
TH-229	T	4.874	134.64	16.99	1.36	0.00E+000	7.6
TH-230		4.676	11.32	60.27	0.68	0.00E+000	3.1
TH-232		3.964	1.64	214.83	1.36	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	3.62E-002 +/- 7.58E-002	1.44E-001 +/- 2.60E-002
TH-228	0.962	5400.00*	1.11E-002 +/- 7.75E-002	1.71E-001 +/- 3.09E-002
TH-229	1.000	4872.00*	2.43E+000 +/- 4.39E-001	1.24E-001 +/- 2.23E-002
TH-230	1.000	4672.00*	2.04E-001 +/- 1.28E-001	1.02E-001 +/- 1.83E-002
TH-232	0.994	3997.00*	2.95E-002 +/- 6.36E-002	1.23E-001 +/- 2.22E-002

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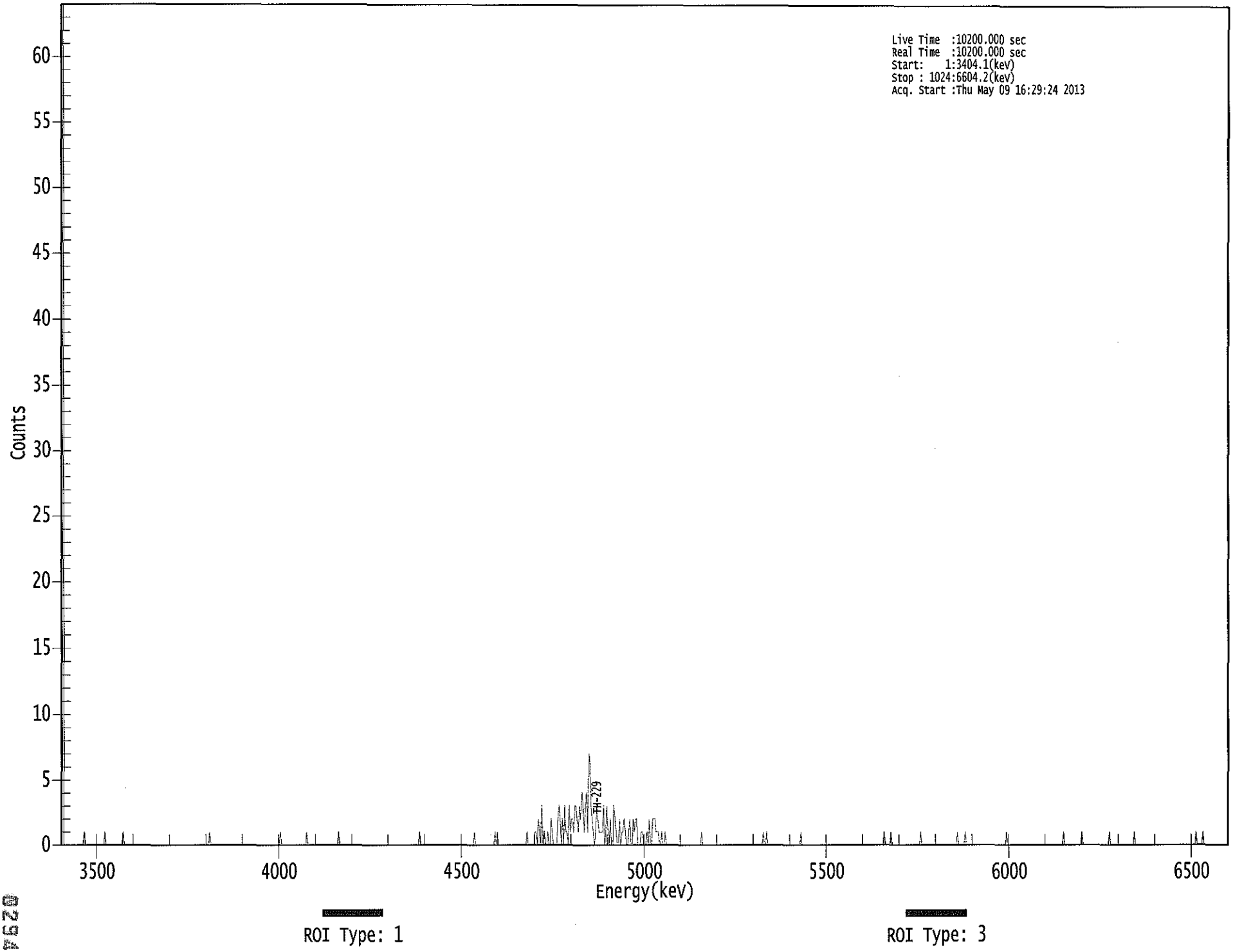
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057574.CNF



SSEB

****
***** 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	1	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	1	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	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:	1	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	1
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	1	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	1	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	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	1	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 07

Channel								
377:	0	0	0	0	1	0	1	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	1	0	0	0	0	0	0	1
417:	1	0	2	1	0	3	0	1
425:	0	0	1	0	0	2	1	0
433:	0	0	0	2	3	2	0	2
441:	0	3	1	1	0	3	1	2
449:	2	1	3	3	2	1	3	2
457:	4	3	1	3	4	1	7	6
465:	3	2	1	0	1	3	2	1
473:	1	1	1	3	0	1	3	1
481:	0	2	0	0	3	2	1	0
489:	0	2	0	1	1	2	1	0
497:	0	1	2	0	0	2	1	2
505:	2	0	0	0	1	1	0	0
513:	0	1	0	2	0	0	2	2
521:	2	1	1	1	0	0	1	0
529:	0	1	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	1	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	1
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	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	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	1	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:	0	0	0	0	0	0	0	0
753:	0	1	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	1	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: 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	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	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	1	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	1	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	1	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: PZ-202-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 08
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_022
Chamber Serial Number:
Detector Serial Number: 22
Env. Background: System Bkgd 56367
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:29:25 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: 0.1794 +/- 0.0152
Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
Chem. Recovery Factor: 1.1713 +/- 0.1015

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		5.850	3.13	144.40	1.87	0.00E+000	3.1
TH-228		5.345	10.28	69.96	2.72	0.00E+000	3.1
TH-229	T	4.862	162.98	15.41	1.02	0.00E+000	3.9
TH-230		4.647	26.64	39.09	1.36	0.00E+000	6.2
TH-232		3.971	6.98	80.28	1.02	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	4.75E-002 +/- 6.91E-002	1.15E-001 +/- 1.90E-002
TH-228	0.984	5400.00*	1.56E-001 +/- 1.12E-001	1.30E-001 +/- 2.16E-002
TH-229	0.999	4872.00*	2.42E+000 +/- 4.01E-001	9.35E-002 +/- 1.55E-002
TH-230	0.997	4672.00*	3.94E-001 +/- 1.67E-001	1.01E-001 +/- 1.68E-002
TH-232	0.997	3997.00*	1.03E-001 +/- 8.45E-002	9.31E-002 +/- 1.54E-002

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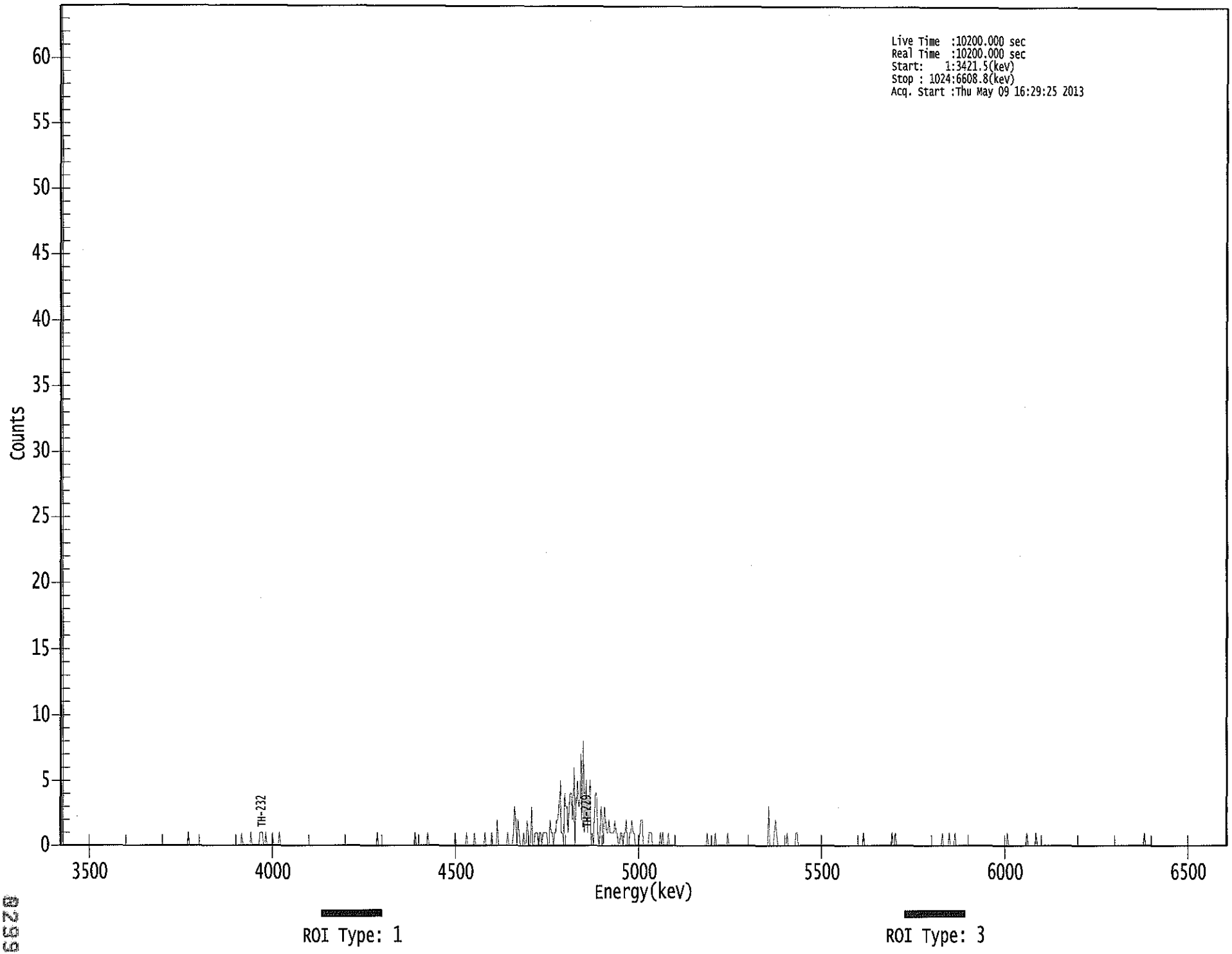
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057575.CNF



6528

****
***** 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	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	1	0	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	1
161:	0	0	0	0	0	0	0	1
169:	0	0	0	0	0	0	0	1
177:	1	1	0	0	1	0	0	0
185:	0	0	1	0	0	0	0	0
193:	1	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	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	1	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	1
313:	0	0	0	0	0	0	0	0
321:	0	0	1	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	1	0	0	0	0	0
353:	0	0	0	0	1	0	0	0
361:	0	0	0	1	0	0	0	0

369:	0	0	0	0	1	0	0	0

Sample Title: 08

Channel								
377:	0	0	1	0	0	0	0	2
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	1	3	2
401:	0	2	1	0	0	0	1	0
409:	0	2	1	0	0	3	0	0
417:	1	1	1	0	1	1	0	1
425:	1	1	1	0	0	2	1	1
433:	0	1	1	2	2	3	5	1
441:	1	0	4	3	3	1	3	4
449:	4	2	6	0	3	5	3	3
457:	7	2	8	1	2	5	1	4
465:	5	0	1	0	2	4	4	1
473:	0	1	3	2	0	3	2	1
481:	1	2	1	1	1	1	2	1
489:	1	0	0	1	1	0	1	1
497:	2	0	0	1	1	2	1	1
505:	0	0	0	0	1	2	2	0
513:	0	0	0	0	1	1	1	0
521:	0	0	0	0	0	0	1	0
529:	1	0	0	0	0	1	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	1
569:	0	0	0	0	0	0	1	0
577:	0	0	0	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	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	3	0	0
625:	0	0	1	2	1	0	0	0
633:	0	0	0	0	0	1	0	0
641:	0	0	0	0	0	1	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:	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	1	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	1	0	0
777:	0	0	0	1	0	0	0	0
785:	1	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 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	1	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	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	0	0	0
945:	0	0	0	0	0	0	1	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

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Sample Description: PZ-202-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 09
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_024
Chamber Serial Number:
Detector Serial Number: 24
Env. Background: System Bkgd 56368
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:29:26 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.239 mL
Effective Efficiency: 0.1777 +/- 0.0151
Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
Chem. Recovery Factor: 1.0389 +/- 0.0901

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	4.47	109.71	1.53	0.00E+000	3.1
TH-228		5.357	6.47	87.07	1.53	0.00E+000	3.1
TH-229	T	4.856	161.98	15.46	1.02	0.00E+000	4.3
TH-230		4.657	8.49	69.59	0.51	0.00E+000	3.1
TH-232		3.913	0.83	239.53	0.17	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.996	5850.00*	6.85E-002 +/- 7.60E-002	1.09E-001 +/- 1.81E-002
TH-228	0.990	5400.00*	9.92E-002 +/- 8.79E-002	1.09E-001 +/- 1.81E-002
TH-229	0.999	4872.00*	2.43E+000 +/- 4.03E-001	9.44E-002 +/- 1.57E-002
TH-230	0.999	4672.00*	1.27E-001 +/- 9.07E-002	7.84E-002 +/- 1.30E-002
TH-232	0.964	3997.00*	1.24E-002 +/- 2.97E-002	6.22E-002 +/- 1.03E-002

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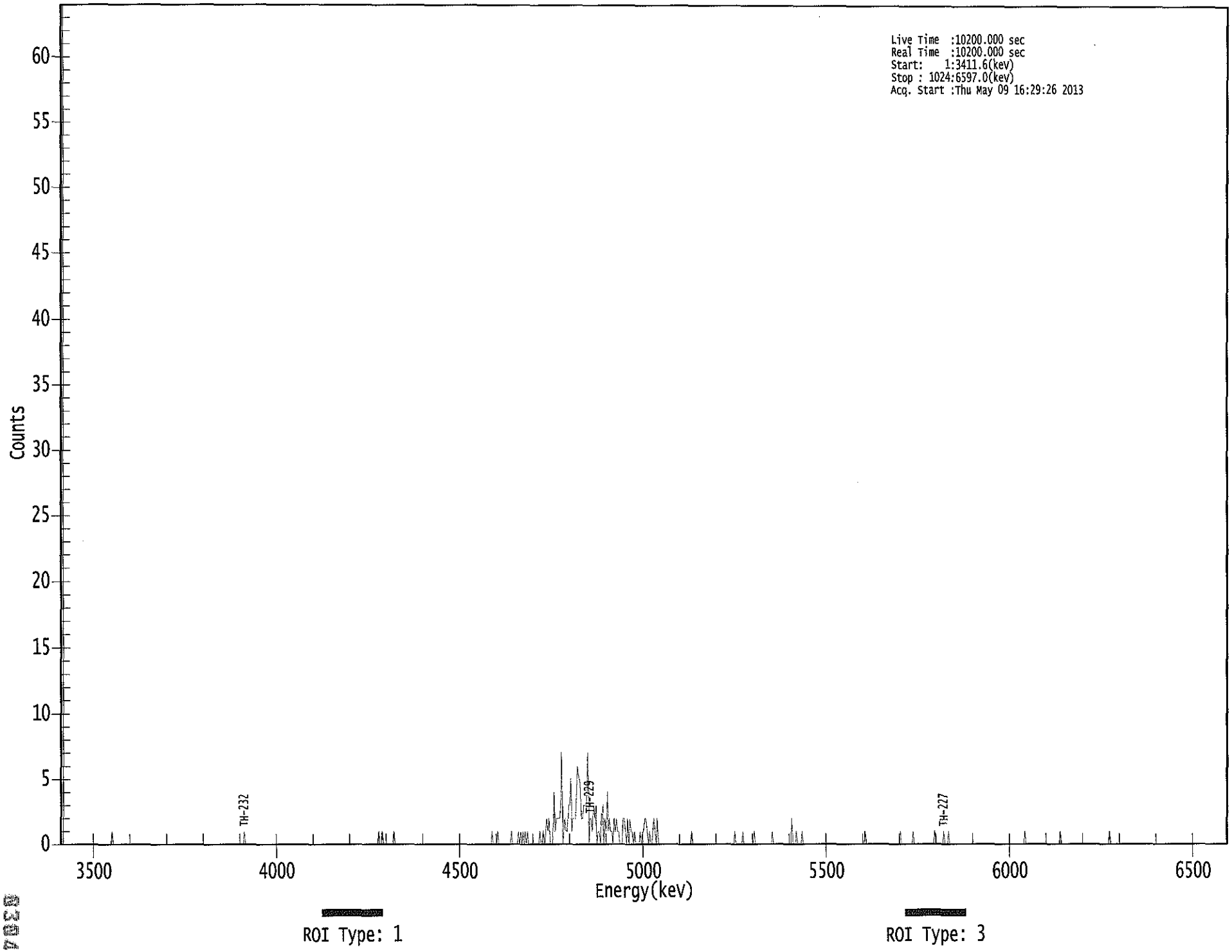
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057576.CNF



7629

****
***** 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	1	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	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	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	1	0	0	0	0	0
289:	0	0	0	0	1	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: 09

Channel								
377:	0	0	1	0	0	0	0	1
385:	0	0	0	0	0	0	0	0
393:	0	0	0	1	0	0	0	0
401:	0	1	0	1	0	1	0	1
409:	0	1	0	0	0	0	0	0
417:	0	0	0	0	1	0	0	1
425:	0	1	2	1	2	0	0	0
433:	4	1	2	2	2	2	3	7
441:	0	1	2	1	1	3	3	5
449:	1	2	2	2	4	6	5	5
457:	2	2	3	3	3	4	7	0
465:	2	2	1	3	2	3	0	1
473:	1	0	2	3	0	2	1	4
481:	1	2	1	1	0	2	1	2
489:	1	1	0	0	0	2	2	1
497:	0	2	0	2	1	1	0	1
505:	0	0	0	0	1	0	1	1
513:	2	2	1	0	1	0	0	1
521:	2	1	0	2	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	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	1
593:	0	0	0	0	0	0	1	0
601:	0	0	0	0	0	0	0	0
609:	1	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	2	0	0	0	1	0	0
649:	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	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	0	0	0	0	0
737:	1	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	1	0
769:	0	0	0	0	0	0	1	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	1	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	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	1
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™

C
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Sample Description: DUP07 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 10
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_025
Chamber Serial Number:
Detector Serial Number: 25
Env. Background: System Bkgd 56369
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:29:27 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.240 mL
Effective Efficiency: 0.1978 +/- 0.0160
Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
Chem. Recovery Factor: 1.1395 +/- 0.0945

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		5.792	0.13	2294.8	1.87	0.00E+000	3.1
TH-228		5.337	7.30	81.83	1.70	0.00E+000	3.1
TH-229	T	4.887	180.98	14.62	1.02	0.00E+000	5.5
TH-230		4.607	7.81	76.13	1.19	0.00E+000	4.7
TH-232		4.027	0.83	239.53	0.17	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.983	5850.00*	1.79E-003 +/- 4.11E-002	1.04E-001 +/- 1.65E-002
TH-228	0.980	5400.00*	1.01E-001 +/- 8.38E-002	1.01E-001 +/- 1.60E-002
TH-229	0.999	4872.00*	2.44E+000 +/- 3.86E-001	8.48E-002 +/- 1.34E-002
TH-230	0.978	4672.00*	1.05E-001 +/- 8.15E-002	8.84E-002 +/- 1.40E-002
TH-232	0.995	3997.00*	1.11E-002 +/- 2.67E-002	5.59E-002 +/- 8.85E-003

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US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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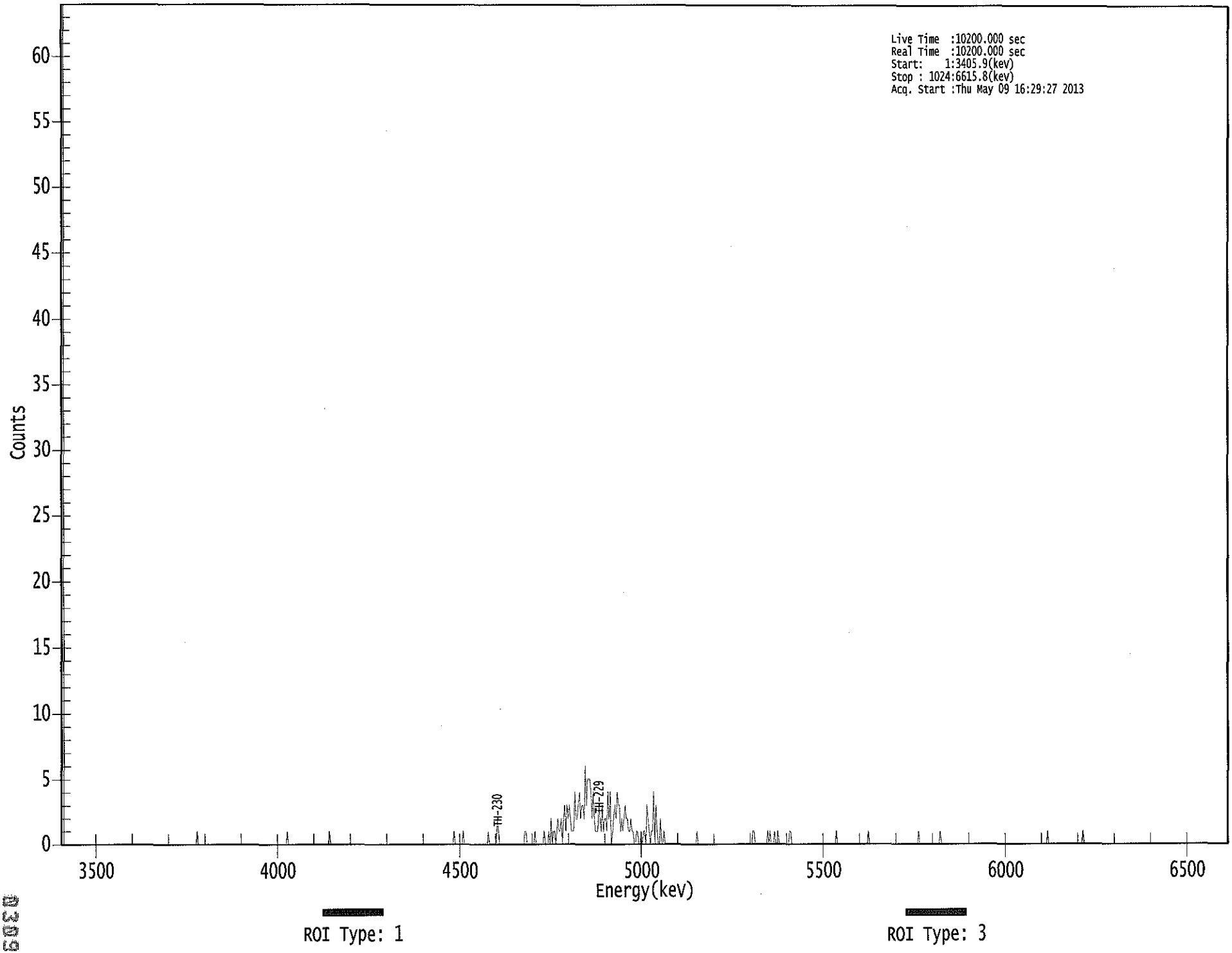


****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 10

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	1
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	1	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	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:	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:	1	0	0	0	0	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	1	0

Sample Title: 10

Channel								
377:	0	0	0	0	0	0	2	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	1	1
409:	0	0	0	0	0	0	0	1
417:	0	0	0	0	0	0	0	1
425:	0	0	0	1	0	2	0	1
433:	1	0	1	2	1	1	2	0
441:	2	3	1	3	2	3	2	1
449:	1	1	4	2	2	3	4	2
457:	3	3	2	6	3	5	5	5
465:	4	2	4	2	1	1	1	3
473:	2	1	3	1	2	2	1	4
481:	2	4	0	1	2	3	2	4
489:	3	3	1	2	1	2	3	2
497:	2	1	1	2	1	1	0	0
505:	1	1	0	0	1	0	1	1
513:	0	3	2	1	0	1	1	4
521:	0	3	1	0	0	2	0	0
529:	1	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	1	0	0
561:	0	0	0	0	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	1	1
609:	0	0	0	0	0	0	0	0
617:	0	0	0	1	0	1	0	0
625:	0	1	0	0	1	0	0	0
633:	0	0	0	0	0	0	1	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	0	0	0	0	1
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:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	1
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	1	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	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:	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	1
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™

C
Thom

Sample Description: DUP07 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 11
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_027
Chamber Serial Number:
Detector Serial Number: 27
Env. Background: System Bkgd 56370
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/12/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:29:28 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.237 mL
Effective Efficiency: 0.2125 +/- 0.0167
Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
Chem. Recovery Factor: 1.2299 +/- 0.0995

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		5.908	0.79	455.84	2.21	0.00E+000	3.2
TH-228		5.385	-1.06	293.54	3.06	0.00E+000	3.2
TH-229	T	4.861	192.64	14.18	1.36	0.00E+000	6.9
TH-230		4.658	8.49	69.59	0.51	0.00E+000	3.2
TH-232		3.947	-0.51	400.63	0.51	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

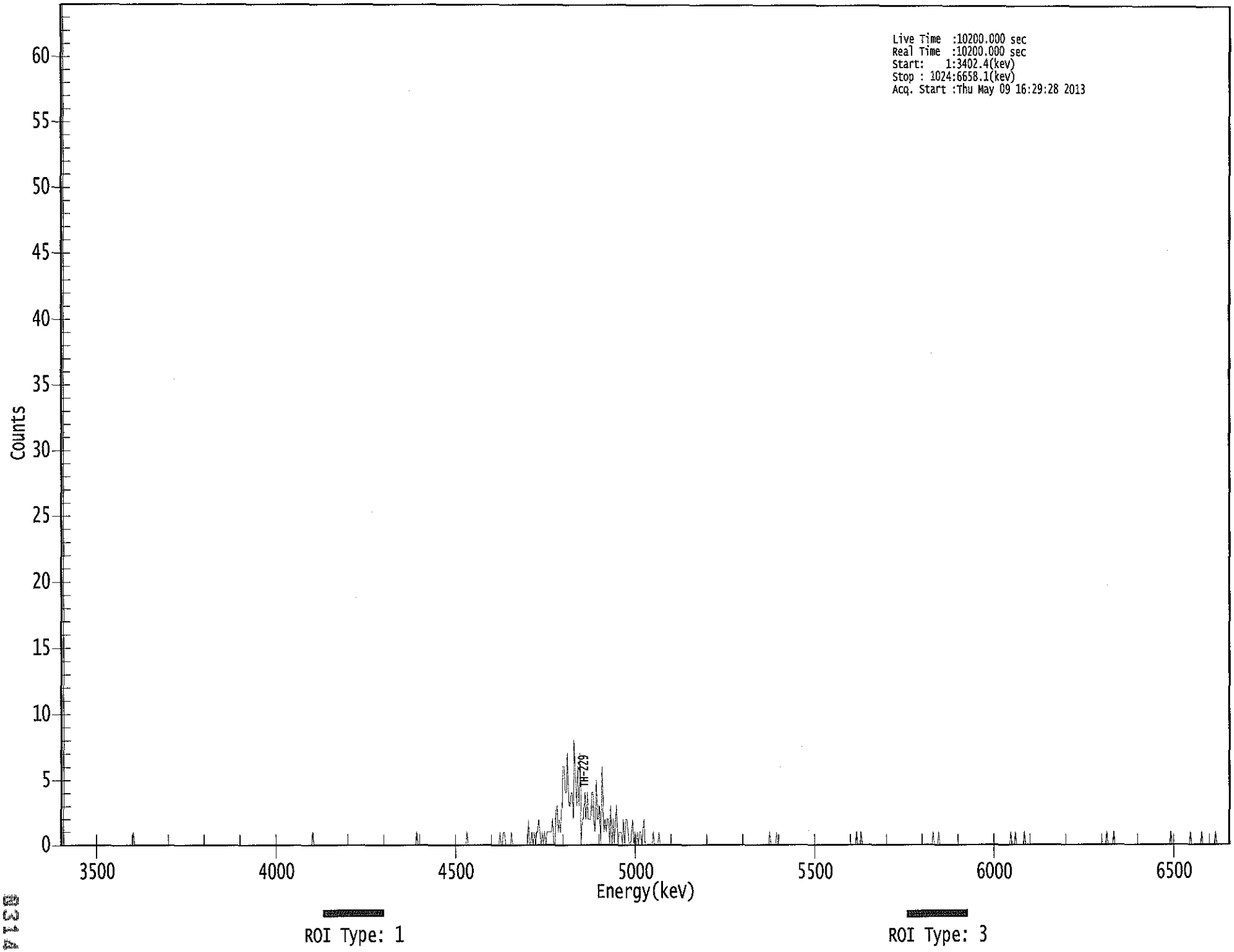
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.983	5850.00*	1.01E-002 +/- 4.62E-002	1.03E-001 +/- 1.58E-002
TH-228	0.999	5400.00*	-1.36E-002 +/- 4.00E-002	1.15E-001 +/- 1.77E-002
TH-229	0.999	4872.00*	2.41E+000 +/- 3.72E-001	8.59E-002 +/- 1.33E-002
TH-230	0.999	4672.00*	1.06E-001 +/- 7.56E-002	6.56E-002 +/- 1.01E-002
TH-232	0.987	3997.00*	-6.36E-003 +/- 2.55E-002	6.54E-002 +/- 1.01E-002

AG
5/10/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057578.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	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	1
65:	0	0	0	0	0	0	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	1	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	1
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	1	0	0	0	0
361:	0	0	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	1	1	0	0	0
393:	0	0	1	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	2	0	0	1	0	1	0
417:	1	1	2	1	0	1	0	1
425:	0	1	1	1	1	1	2	0
433:	0	3	3	1	2	1	3	6
441:	6	4	4	7	3	3	4	4
449:	2	8	5	3	6	3	7	0
457:	2	2	4	2	4	2	2	2
465:	4	4	2	1	5	2	2	3
473:	0	6	3	1	2	1	2	2
481:	0	3	0	2	0	2	3	0
489:	1	1	1	0	2	0	2	2
497:	1	0	0	1	2	0	1	0
505:	1	0	1	1	0	1	2	0
513:	0	0	0	0	0	0	1	0
521:	0	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	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	1	0	0	0
625:	0	0	1	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	1	0	0	0	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	1	0	0	0	0
769:	1	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 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	1
833:	0	0	0	1	0	0	0	0
841:	0	0	0	1	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	1	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	0	0	0	0	0	0
969:	0	0	0	1	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	1	0	0	0
993:	0	0	0	0	0	0	1	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	1	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

C
Flow

Sample Description: PZ-106-KS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 12
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_029
Chamber Serial Number:
Detector Serial Number: 29
Env. Background: System Bkgd 56371
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/15/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:29:29 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: 0.1723 +/- 0.0148
Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
Chem. Recovery Factor: 0.8857 +/- 0.0778

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		5.866	1.96	208.49	2.04	0.00E+000	3.1
TH-228		5.393	-0.87	258.63	1.87	0.00E+000	3.1
TH-229	T	4.875	156.49	15.70	0.51	0.00E+000	7.4
TH-230		4.620	6.15	85.19	0.85	0.00E+000	3.1
TH-232		3.948	2.66	128.85	0.34	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)
TH-227	0.999	5850.00*	3.10E-002 +/- 6.48E-002	1.23E-001 +/- 2.07E-002
TH-228	1.000	5400.00*	-1.37E-002 +/- 3.55E-002	1.19E-001 +/- 2.01E-002
TH-229	1.000	4872.00*	2.42E+000 +/- 4.07E-001	8.11E-002 +/- 1.36E-002
TH-230	0.986	4672.00*	9.47E-002 +/- 8.23E-002	9.22E-002 +/- 1.55E-002
TH-232	0.987	3997.00*	4.09E-002 +/- 5.32E-002	7.35E-002 +/- 1.24E-002

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US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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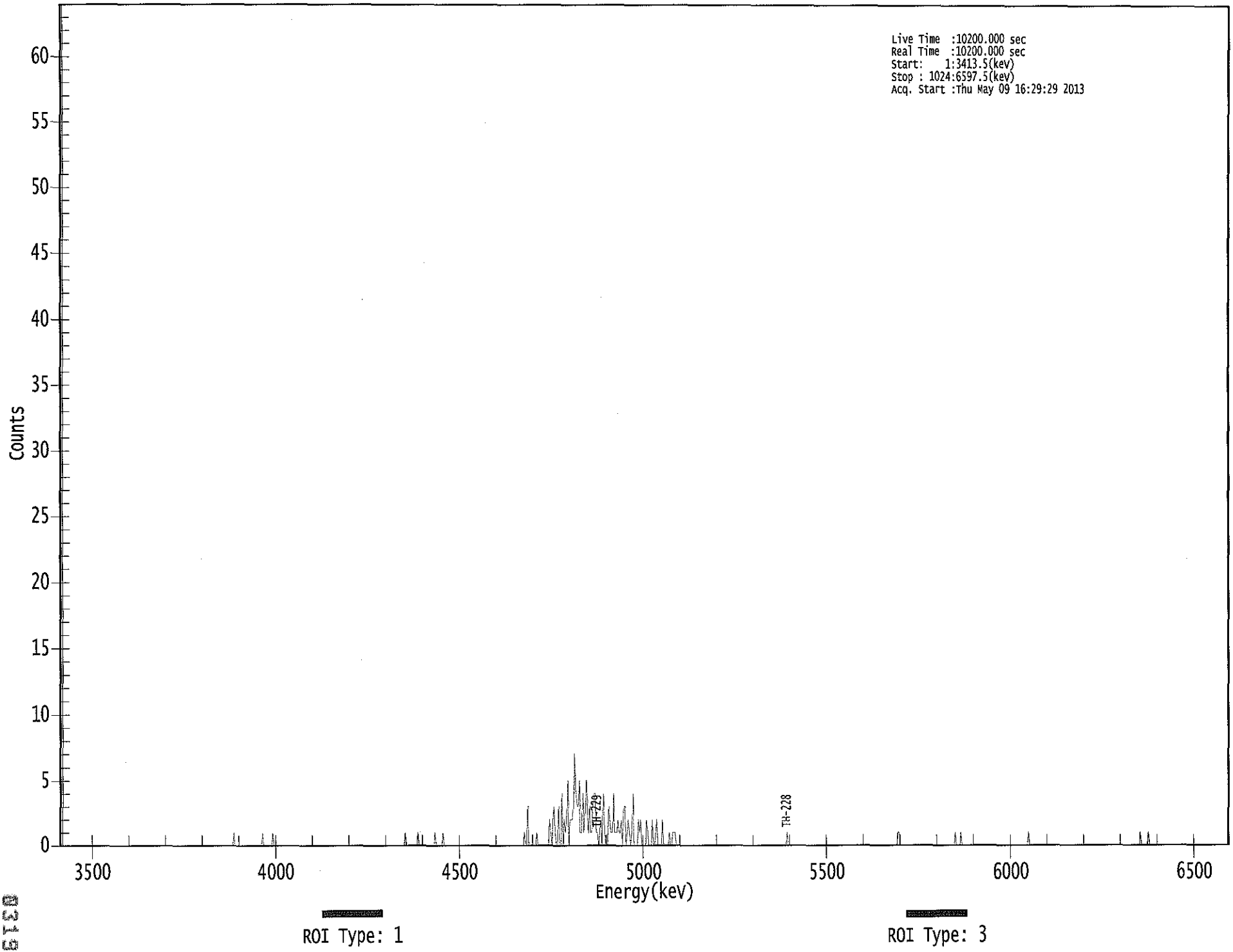

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 12

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:	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	1	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	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	1	0
305:	0	0	0	0	0	0	0	0
313:	0	1	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	1	0	0	0	0	0	0	1
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 12

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	1	0
409:	0	3	0	0	0	0	0	0
417:	0	1	0	0	0	0	0	0
425:	0	0	0	0	2	1	0	2
433:	3	1	0	0	3	0	0	4
441:	0	2	1	2	5	0	2	2
449:	2	3	7	4	3	3	5	1
457:	1	4	1	3	5	3	1	3
465:	1	1	3	4	4	1	1	0
473:	1	2	0	4	2	0	0	0
481:	3	2	1	1	4	1	1	1
489:	2	1	1	2	0	3	3	0
497:	1	2	1	0	1	4	0	0
505:	0	0	2	1	2	0	0	0
513:	0	2	1	0	0	0	2	0
521:	0	1	2	0	0	0	0	2
529:	0	0	0	0	0	1	0	0
537:	1	1	1	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	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	1	1	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	1
785:	0	0	0	0	1	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	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	1	0	0	0	0	0	0
953:	1	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

C
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Sample Description: PZ-106-KS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-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 56372
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/15/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:29:59 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: 0.1785 +/- 0.0151
Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
Chem. Recovery Factor: 0.9784 +/- 0.0844

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		5.749	1.15	249.59	0.85	0.00E+000	3.0
TH-228		5.385	2.49	138.29	0.51	0.00E+000	3.0
TH-229	T	4.865	162.49	15.40	0.51	0.00E+000	3.6
TH-230		4.655	10.83	60.10	0.17	0.00E+000	3.0
TH-232		3.950	1.00	277.19	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

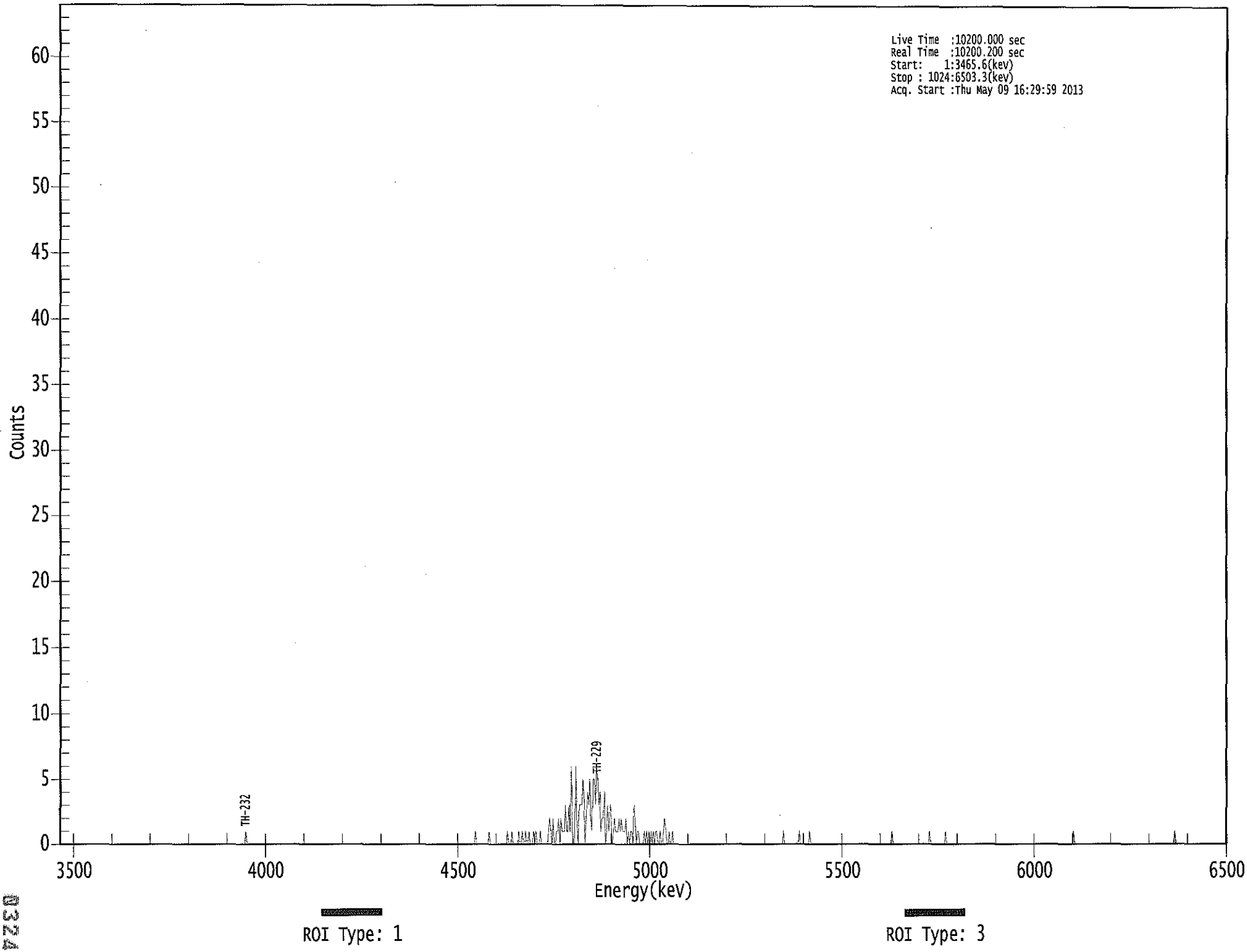
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.948	5850.00*	1.75E-002 +/- 4.39E-002	9.13E-002 +/- 1.51E-002
TH-228	0.999	5400.00*	3.79E-002 +/- 5.28E-002	7.98E-002 +/- 1.32E-002
TH-229	1.000	4872.00*	2.42E+000 +/- 4.01E-001	7.83E-002 +/- 1.30E-002
TH-230	0.999	4672.00*	1.61E-001 +/- 1.00E-001	6.20E-002 +/- 1.03E-002
TH-232	0.988	3997.00*	1.48E-002 +/- 4.12E-002	8.90E-002 +/- 1.47E-002

AG
5/10/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057581.CNF



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

Sample Title: 13

Elapsed Live time: 10200
Elapsed Real Time: 10200

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

369:	0	0	0	0	0	0	0	0

Sample Title: 13

Channel								
377:	1	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	1	0	0	0
401:	0	0	1	0	0	1	0	0
409:	1	0	0	1	0	0	0	1
417:	0	1	0	0	0	1	0	0
425:	0	0	0	0	1	2	1	0
433:	2	0	0	1	1	2	0	2
441:	1	1	1	3	1	1	3	1
449:	6	1	0	0	6	2	0	3
457:	3	3	5	3	0	2	4	3
465:	5	2	1	5	5	3	6	5
473:	3	4	1	2	2	4	0	1
481:	3	1	3	2	0	1	2	1
489:	1	1	2	1	2	1	1	1
497:	2	0	1	0	1	1	0	3
505:	2	0	1	1	0	0	0	0
513:	1	0	1	0	1	0	1	0
521:	1	0	1	1	0	0	1	0
529:	0	1	2	1	0	0	1	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	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	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	1	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	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	1	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	1	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 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:	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	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™

C
Tm

Sample Description: FB AT PZ-100-KS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-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 56373
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:30:00 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: 0.2051 +/- 0.0164
Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
Chem. Recovery Factor: 1.1055 +/- 0.0904

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		5.810	3.83	102.72	0.17	0.00E+000	3.0
TH-228		5.334	2.83	120.53	0.17	0.00E+000	3.0
TH-229	T	4.884	184.66	14.44	0.34	0.00E+000	6.6
TH-230		4.634	13.66	53.80	0.34	0.00E+000	4.5
TH-232		3.947	-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	0.992	5850.00*	5.08E-002 +/- 5.28E-002	5.54E-002 +/- 8.68E-003
TH-228	0.977	5400.00*	3.74E-002 +/- 4.55E-002	5.52E-002 +/- 8.65E-003
TH-229	0.999	4872.00*	2.40E+000 +/- 3.75E-001	6.21E-002 +/- 9.72E-003
TH-230	0.992	4672.00*	1.77E-001 +/- 9.90E-002	6.19E-002 +/- 9.69E-003
TH-232	0.987	3997.00*	-2.20E-003 +/- 2.57E-002	5.39E-002 +/- 8.44E-003

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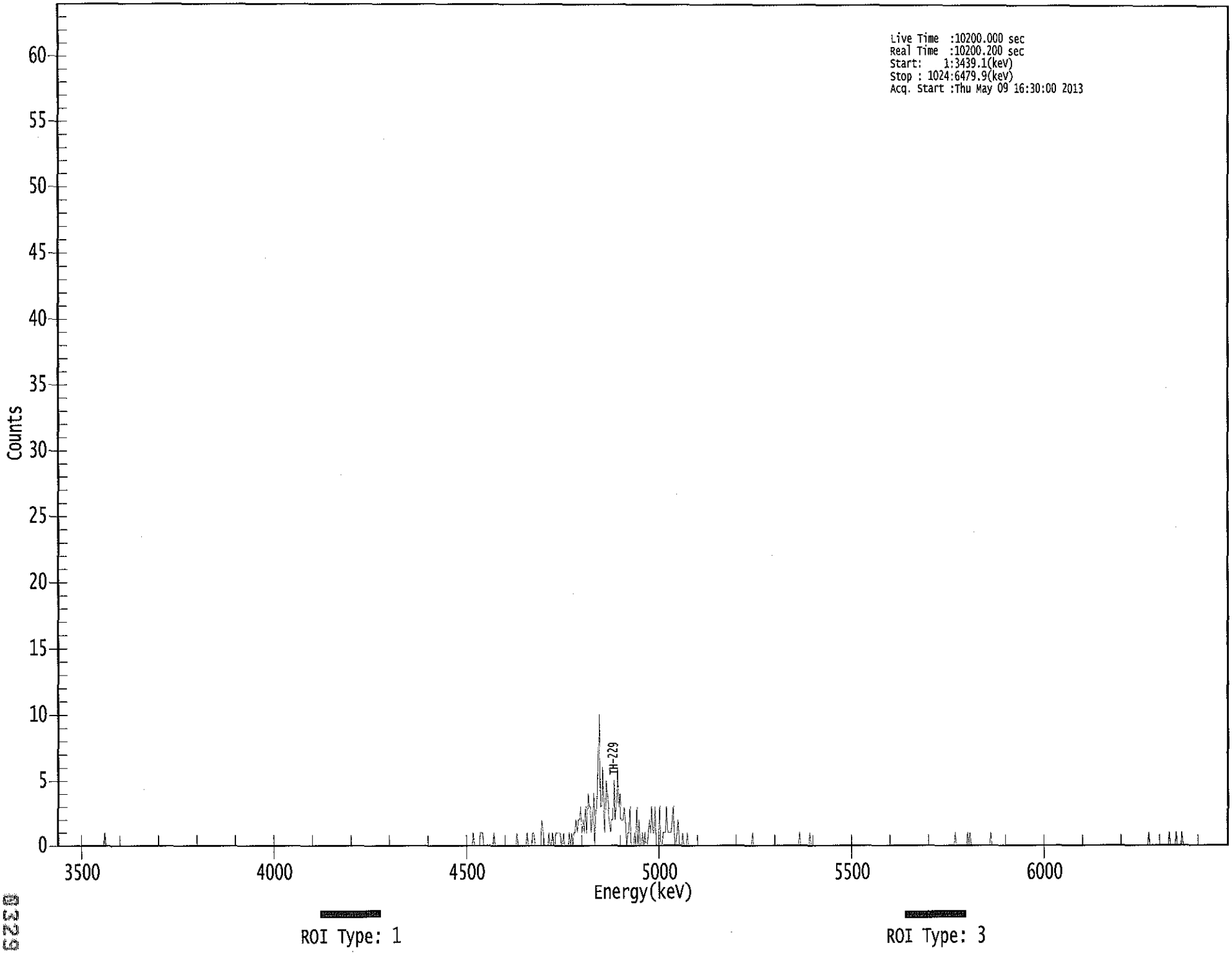
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057582.CNF



6239

****
***** 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	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	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	1	0	0	0	0

369:	0	1	1	1	0	0	0	0

Sample Title: 14

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	1	0	0	0	0	0	0
409:	0	0	1	0	0	0	0	1
417:	1	0	0	0	0	0	0	2
425:	1	0	0	0	0	1	0	0
433:	1	0	0	1	1	1	1	1
441:	0	0	1	0	0	0	0	1
449:	0	1	0	1	1	2	1	2
457:	2	3	1	2	1	3	1	4
465:	3	3	1	2	4	0	2	4
473:	6	10	3	3	6	3	1	5
481:	4	3	2	1	2	2	5	2
489:	3	6	3	4	2	2	2	3
497:	2	0	1	1	3	0	0	0
505:	1	0	3	0	2	0	0	1
513:	0	1	0	0	1	2	1	3
521:	1	1	3	0	0	0	3	0
529:	0	1	1	1	3	1	1	1
537:	1	2	3	0	0	1	2	0
545:	0	0	1	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	0	0	0	0	1
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:	1	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	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:	1	0	0	0	0	0	0	0
793:	0	0	0	1	0	1	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 14

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

Apex-Alpha™

Sample Description: FB AT PZ-100-KS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-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 56374
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:29:55 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: 0.2012 +/- 0.0162
Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
Chem. Recovery Factor: 1.1022 +/- 0.0906

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		5.791	0.98	294.85	1.02	0.00E+000	2.9
TH-228		5.299	-0.68	304.44	0.68	0.00E+000	0.0
TH-229	T	4.907	183.00	14.53	0.00	0.00E+000	8.1
TH-230		4.615	12.66	55.94	0.34	0.00E+000	2.9
TH-232		3.949	0.00	1960.0	0.00	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	0.982	5850.00*	1.33E-002 +/- 3.92E-002	8.53E-002 +/- 1.34E-002
TH-228	0.949	5400.00*	-9.17E-003 +/- 2.80E-002	7.61E-002 +/- 1.20E-002
TH-229	0.994	4872.00*	2.42E+000 +/- 3.81E-001	7.93E-002 +/- 1.25E-002
TH-230	0.983	4672.00*	1.67E-001 +/- 9.71E-002	6.31E-002 +/- 9.93E-003
TH-232	0.988	3997.00*	0.00E+000 +/- 3.65E-002	7.89E-002 +/- 1.24E-002

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US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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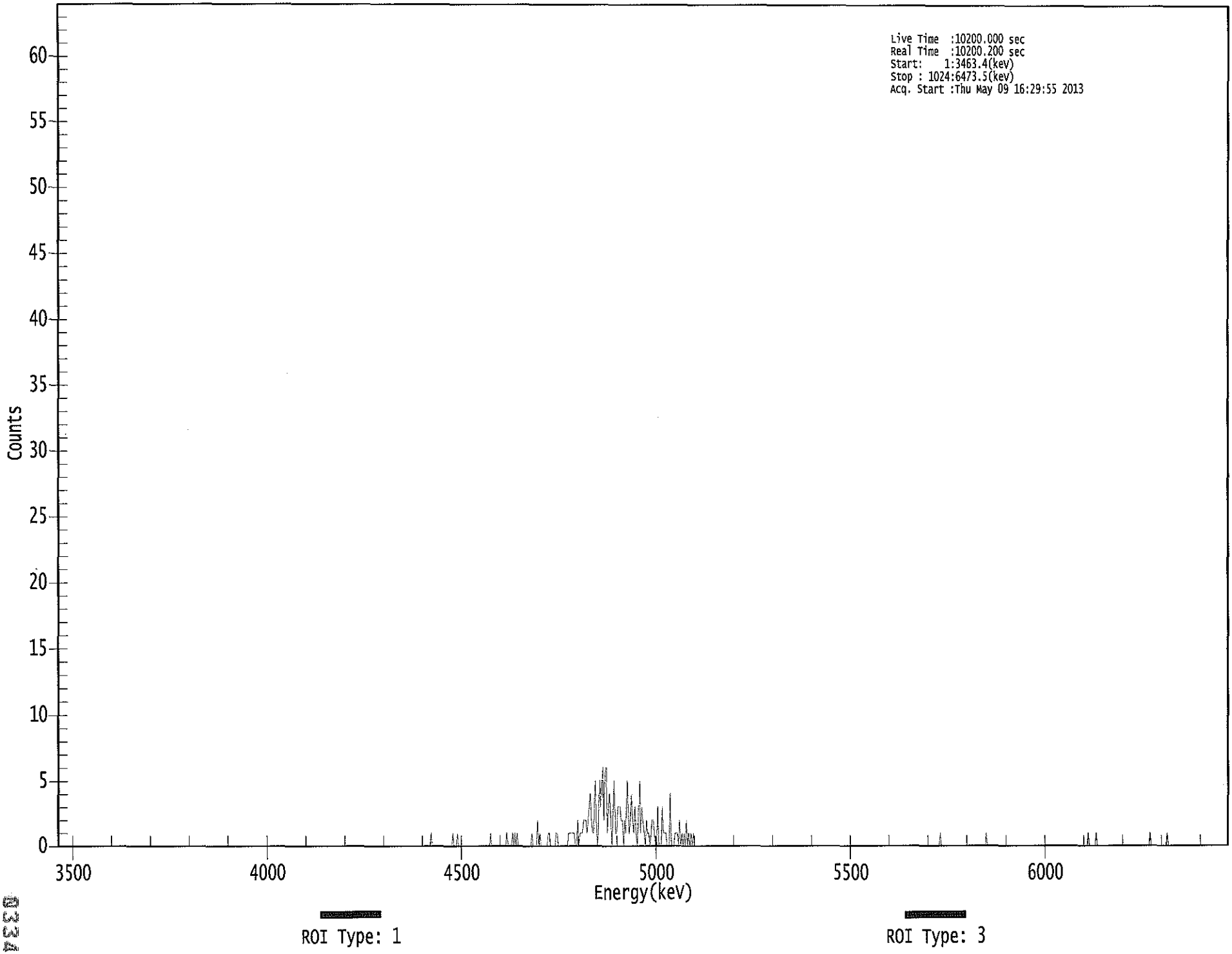

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 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	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	1	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	1	0	0	0	1	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 15

Channel								
377:	0	0	1	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	1	0	1
401:	0	1	0	0	0	0	0	0
409:	0	0	0	0	0	0	1	0
417:	0	0	0	2	0	1	0	0
425:	0	0	0	0	1	1	0	0
433:	0	0	0	1	1	0	0	0
441:	0	0	0	0	0	0	1	1
449:	1	1	1	1	0	0	2	0
457:	1	1	1	2	2	2	1	2
465:	3	4	2	1	1	5	3	0
473:	1	5	3	5	6	2	6	6
481:	1	3	4	2	0	3	5	1
489:	1	3	3	3	2	2	0	2
497:	1	5	3	1	2	4	2	1
505:	3	1	0	2	5	1	3	2
513:	1	0	2	1	1	0	1	2
521:	2	1	0	0	3	0	0	0
529:	3	1	1	1	0	0	0	4
537:	0	0	0	1	1	1	0	2
545:	0	1	0	1	0	2	0	1
553:	0	1	0	1	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	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	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	1	0	0	0
905:	0	0	0	1	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	1	0	0	0	0	0
961:	0	0	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	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-KS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 16
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_037
Chamber Serial Number: 04026478A
Detector Serial Number: 91133
Env. Background: System Bkgd 56375
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:29:57 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: 0.1748 +/- 0.0149
Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
Chem. Recovery Factor: 0.9805 +/- 0.0855

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		5.853	4.83	91.00	0.17	0.00E+000	2.9
TH-228		5.315	5.49	88.08	0.51	0.00E+000	2.9
TH-229	T	4.861	158.83	15.56	0.17	0.00E+000	5.9
TH-230		4.645	25.66	38.99	0.34	0.00E+000	4.4
TH-232		3.988	2.00	169.74	0.00	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	1.000	5850.00*	7.52E-002 +/- 6.96E-002	6.50E-002 +/- 1.09E-002
TH-228	0.963	5400.00*	8.52E-002 +/- 7.64E-002	8.15E-002 +/- 1.36E-002
TH-229	0.999	4872.00*	2.42E+000 +/- 4.04E-001	6.36E-002 +/- 1.06E-002
TH-230	0.996	4672.00*	3.90E-001 +/- 1.65E-001	7.26E-002 +/- 1.21E-002
TH-232	1.000	3997.00*	3.03E-002 +/- 5.17E-002	9.09E-002 +/- 1.52E-002

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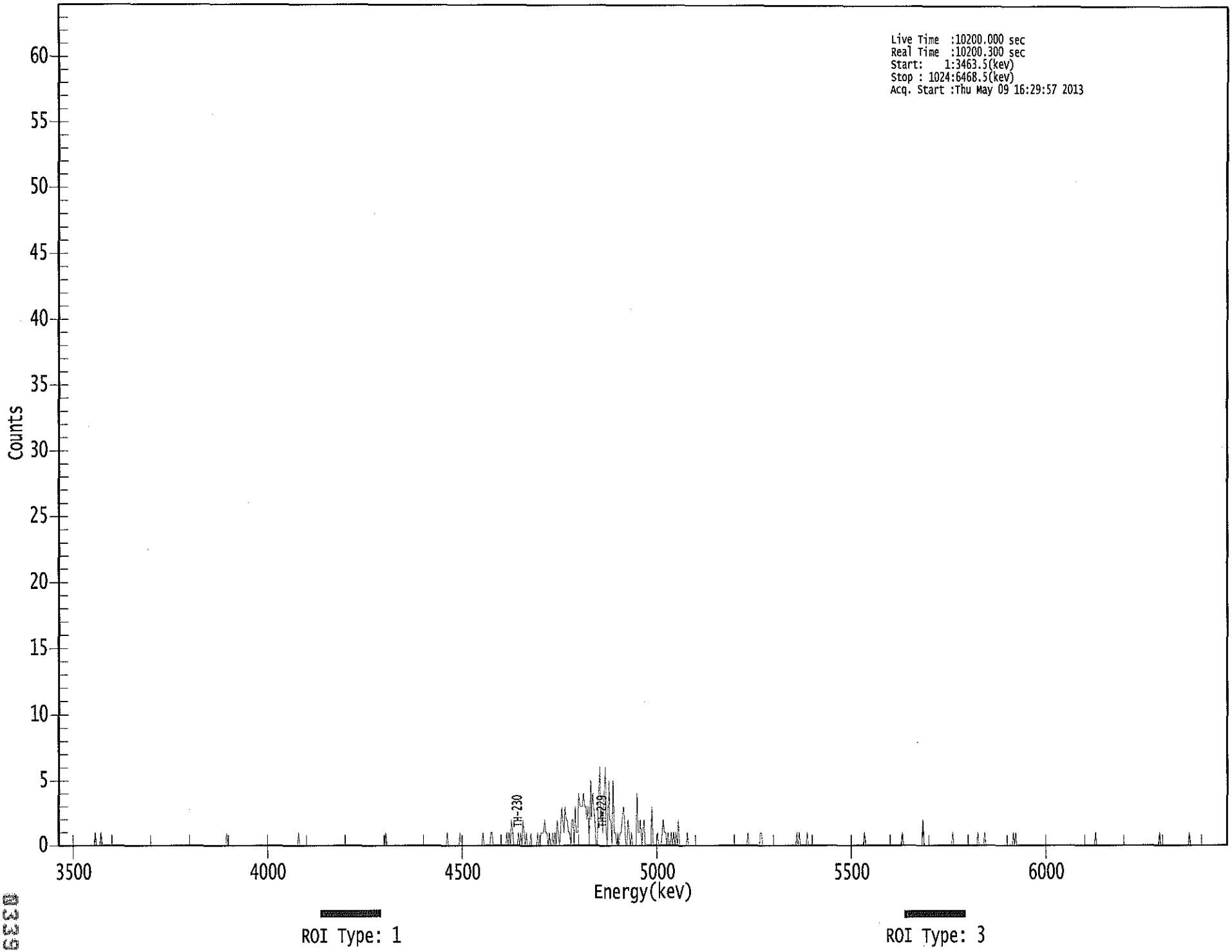
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057580.CNF



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

Sample Title: 16

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	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:	1	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	1	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	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	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	1	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	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	1
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: 16

Channel								
377:	0	0	1	1	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	1	0	2	1	0	0
401:	0	0	1	0	1	0	2	1
409:	0	1	0	0	0	1	0	0
417:	0	0	0	1	0	0	1	1
425:	1	2	1	1	0	1	0	0
433:	1	0	1	0	2	1	0	1
441:	3	2	1	3	2	2	1	1
449:	0	2	2	0	3	1	1	4
457:	3	3	3	4	3	3	2	3
465:	0	5	2	4	3	2	0	0
473:	4	6	2	3	1	4	6	1
481:	0	5	2	2	0	5	1	1
489:	0	1	0	1	1	2	3	2
497:	0	0	2	1	0	1	0	0
505:	0	0	4	1	1	2	0	1
513:	2	0	0	0	0	0	0	3
521:	0	0	0	0	1	0	0	0
529:	1	2	1	1	0	1	0	0
537:	1	0	1	0	1	0	2	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	0	0
609:	0	0	0	0	0	0	1	1
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:	1	0	0	0	0	0	0	1
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	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	0	0	0	0	0
737:	0	0	1	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	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	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	1	0	0	0

Sample Title: 16

Channel								
809:	0	0	1	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	1	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:	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	1	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	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	1	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description: PZ-100-KS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 17
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 56376
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:30:07 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: 0.1866 +/- 0.0155
Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
Chem. Recovery Factor: 0.9823 +/- 0.0832

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		5.731	0.49	416.98	0.51	0.00E+000	3.0
TH-228		5.355	1.15	249.59	0.85	0.00E+000	3.0
TH-229	T	4.882	170.00	15.08	0.00	0.00E+000	3.7
TH-230		4.536	5.83	82.55	0.17	0.00E+000	3.0
TH-232		3.946	-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	0.929	5850.00*	7.15E-003 +/- 2.98E-002	7.66E-002 +/- 1.24E-002
TH-228	0.990	5400.00*	1.67E-002 +/- 4.18E-002	8.70E-002 +/- 1.41E-002
TH-229	0.999	4872.00*	2.43E+000 +/- 3.94E-001	8.55E-002 +/- 1.39E-002
TH-230	0.908	4672.00*	8.29E-002 +/- 6.98E-002	5.94E-002 +/- 9.65E-003
TH-232	0.987	3997.00*	-2.41E-003 +/- 2.82E-002	5.92E-002 +/- 9.63E-003

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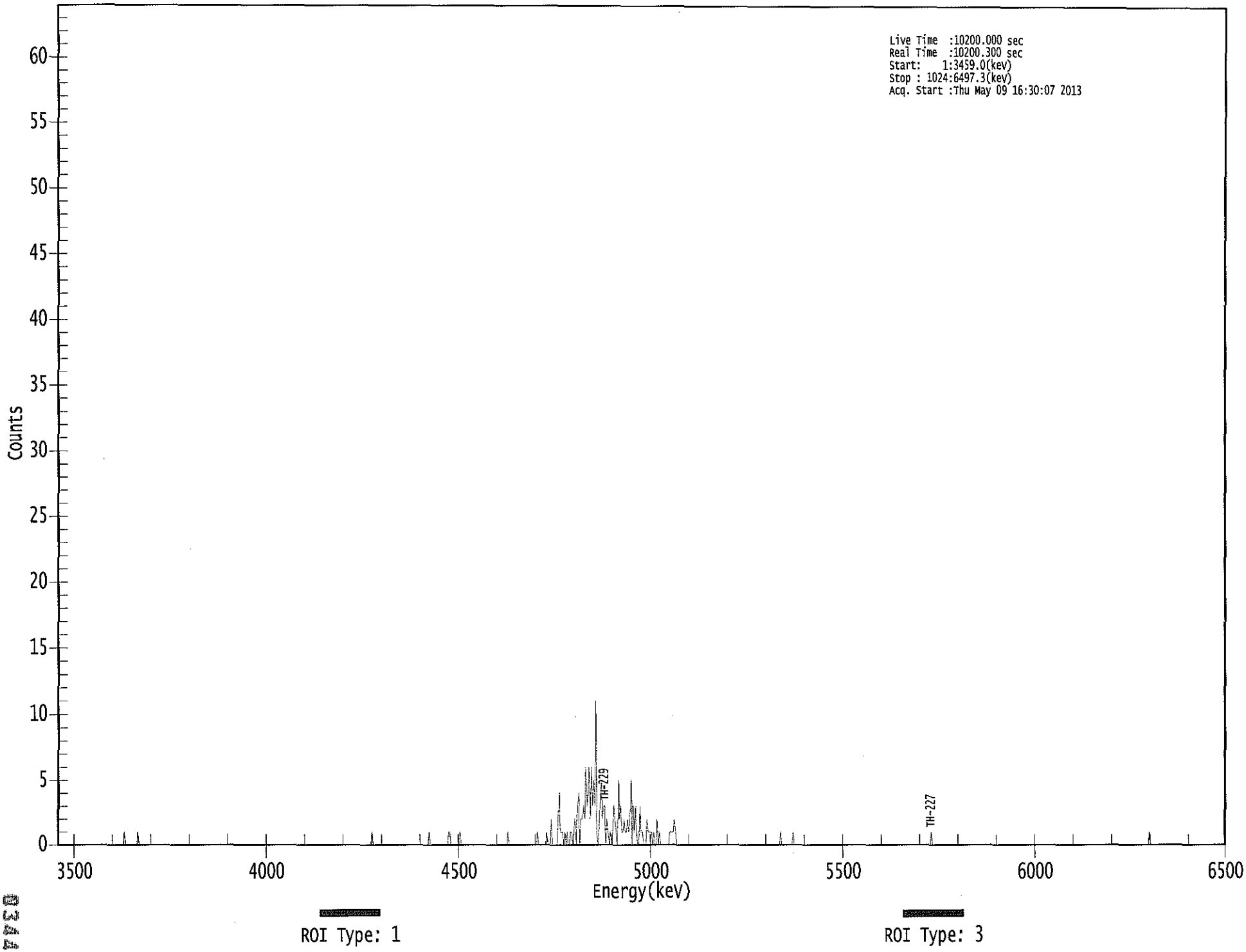
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057584.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	1	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	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	1	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	1	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	1	1
345:	0	0	0	0	0	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: 17

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	1	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	1	0	0	0
425:	0	0	0	0	1	0	0	0
433:	2	0	0	0	0	0	2	4
441:	1	1	1	0	1	0	1	0
449:	0	1	1	0	1	2	0	3
457:	4	0	2	2	3	2	6	3
465:	4	6	2	6	3	5	3	11
473:	1	0	1	4	5	2	3	3
481:	0	2	1	0	1	0	1	3
489:	2	1	0	5	2	3	1	1
497:	2	1	1	2	1	2	5	0
505:	3	1	3	1	0	0	3	1
513:	1	0	0	0	2	1	1	1
521:	1	0	1	0	0	2	0	1
529:	0	0	0	0	0	0	0	0
537:	1	1	1	1	2	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	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	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	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	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	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	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: S-53 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 18
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 56377
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:30:03 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: 0.1400 +/- 0.0133
Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
Chem. Recovery Factor: 0.7077 +/- 0.0686

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	56.49	26.22	0.51	0.00E+000	3.0
TH-228		5.362	1029.15	6.11	0.85	0.00E+000	34.3
TH-229	T	4.884	124.00	17.67	0.00	0.00E+000	3.0
TH-230		4.622	1032.47	6.11	1.53	0.00E+000	74.6
TH-232		3.948	1006.43	6.19	3.57	0.00E+000	11.5

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*	1.10E+000 +/- 3.54E-001	1.02E-001 +/- 1.91E-002
TH-228	0.992	5400.00*	1.99E+001 +/- 3.92E+000	1.16E-001 +/- 2.17E-002
TH-229	0.999	4872.00*	2.36E+000 +/- 4.41E-001	1.14E-001 +/- 2.13E-002
TH-230	0.987	4672.00*	1.96E+001 +/- 3.85E+000	1.35E-001 +/- 2.52E-002
TH-232	0.987	3997.00*	1.90E+001 +/- 3.75E+000	1.78E-001 +/- 3.34E-002

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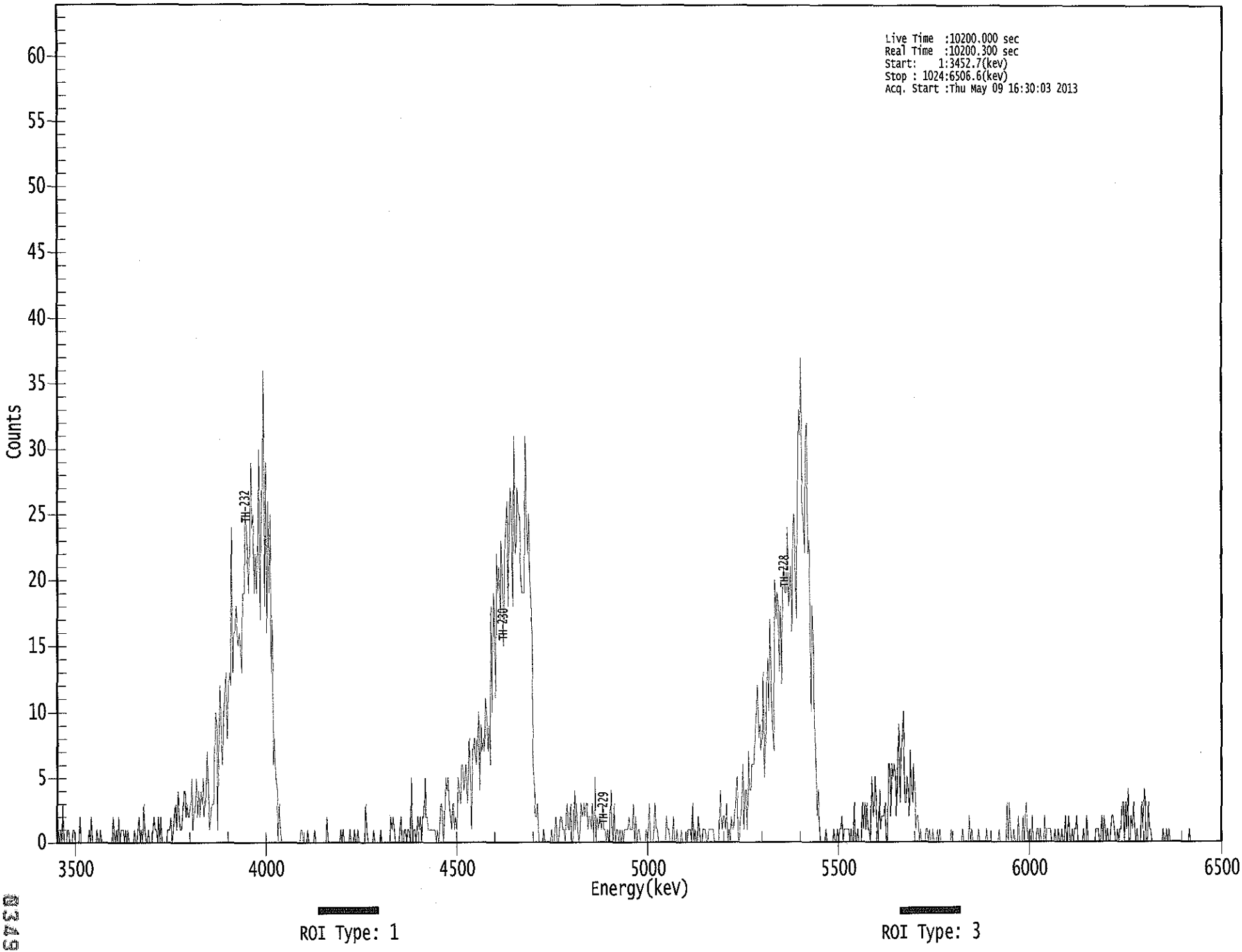
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057585.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:	1	1	0	1	0	3	0	0
9:	0	1	1	0	0	0	1	1
17:	0	0	0	0	2	0	0	0
25:	0	0	0	0	1	0	2	0
33:	0	0	0	1	0	0	1	0
41:	0	0	0	0	0	0	0	0
49:	0	2	1	0	1	0	2	0
57:	1	1	1	0	1	0	1	0
65:	0	0	0	0	1	0	0	1
73:	2	0	1	0	3	1	0	0
81:	1	0	0	0	1	2	1	1
89:	0	2	0	2	0	0	0	0
97:	0	1	1	1	2	0	1	2
105:	3	1	4	2	1	1	2	4
113:	4	2	3	2	2	3	5	1
121:	2	3	5	2	4	2	4	3
129:	5	2	3	5	7	3	1	2
137:	3	3	6	10	9	1	9	12
145:	8	6	10	11	13	8	11	13
153:	12	24	13	16	16	18	16	15
161:	16	15	13	19	19	25	24	22
169:	19	23	29	24	25	19	22	19
177:	23	30	17	24	28	36	18	29
185:	16	26	19	25	13	17	6	8
193:	5	4	0	3	1	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	1	1
217:	0	0	0	0	1	0	0	0
225:	0	0	1	0	0	0	0	0
233:	0	0	0	0	0	2	0	0
241:	0	0	0	0	0	0	0	0
249:	0	1	0	1	0	0	0	0
257:	0	1	0	0	0	1	0	0
265:	1	0	0	0	0	0	0	3
273:	1	0	0	0	0	0	1	0
281:	0	0	0	0	1	0	0	0
289:	0	0	0	0	0	2	1	2
297:	1	0	0	0	0	1	2	0
305:	0	1	1	0	1	1	0	5
313:	0	1	1	0	1	2	1	2
321:	0	2	2	5	2	2	1	1
329:	1	1	1	1	1	0	1	0
337:	1	3	3	0	1	5	4	5
345:	3	2	1	3	3	1	2	1
353:	5	4	3	6	6	4	5	6
361:	3	5	8	5	1	7	8	7

369:	6	8	10	4	9	7	8	7

Sample Title: 18

Channel								
377:	11	10	7	9	6	18	10	19
385:	17	11	22	19	21	17	23	20
393:	15	23	24	26	18	25	27	24
401:	18	31	22	23	27	25	25	20
409:	19	19	19	31	25	22	25	20
417:	18	16	6	4	2	2	3	0
425:	0	0	0	1	0	0	0	0
433:	0	0	1	0	0	1	2	0
441:	0	1	2	2	1	1	0	2
449:	3	1	1	3	0	0	4	1
457:	3	1	0	1	3	2	3	2
465:	3	3	1	2	2	1	3	0
473:	5	0	2	1	2	2	1	3
481:	1	1	0	1	0	1	4	1
489:	0	3	0	1	1	0	1	0
497:	1	0	1	1	1	1	2	1
505:	1	1	3	0	2	0	1	1
513:	0	0	0	0	0	1	0	1
521:	3	0	0	0	1	3	1	1
529:	0	0	0	0	0	0	0	2
537:	1	1	0	0	0	2	0	0
545:	1	0	0	0	1	0	0	0
553:	0	0	1	1	1	0	3	0
561:	1	0	0	2	1	0	0	1
569:	1	1	0	0	1	1	1	1
577:	1	0	0	0	0	0	4	2
585:	1	2	2	1	3	0	1	0
593:	2	1	1	2	4	5	0	0
601:	2	4	6	1	4	4	1	7
609:	4	4	6	6	6	9	10	12
617:	8	9	7	8	13	5	7	12
625:	14	10	17	11	9	7	20	17
633:	19	18	13	18	12	20	21	19
641:	19	24	18	19	21	16	24	25
649:	21	17	26	33	31	37	25	25
657:	22	30	32	22	23	16	10	18
665:	15	8	7	2	4	2	0	0
673:	0	0	0	1	0	0	0	0
681:	0	0	1	0	0	1	0	1
689:	1	2	0	1	1	1	1	1
697:	0	1	0	0	3	0	0	1
705:	0	0	0	3	1	3	1	3
713:	1	1	0	5	3	2	5	3
721:	1	0	4	1	2	2	2	3
729:	0	0	6	6	2	6	5	6
737:	5	2	6	9	3	7	8	10
745:	3	3	5	4	2	7	4	3
753:	6	4	1	2	2	0	1	0
761:	0	0	0	1	1	0	1	0
769:	0	1	0	0	0	1	0	1
777:	0	0	0	0	0	0	0	0
785:	0	1	0	0	0	0	0	0
793:	0	0	0	1	0	0	0	0

801:	0	2	0	1	0	0	0	0

Sample Title: 18

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

Apex-Alpha™

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Sample Description: S-53 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000575
Batch Identification: 1304132A-TH
Sample Identification: 19
Sample Geometry: Shelf 2
Procedure Description: Th iso

Detector Name: Alpha_042
Chamber Serial Number: 05026930B
Detector Serial Number: 84185
Env. Background: System Bkgd 56378
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 4/16/2013 7:22:02 AM
Acquisition Date/Time: 5/9/2013 4:30:05 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.237 mL
Effective Efficiency: 0.1887 +/- 0.0156
Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
Chem. Recovery Factor: 1.0222 +/- 0.0864

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		5.782	5.83	82.55	0.17	0.00E+000	4.5
TH-228		5.356	2.15	161.66	0.85	0.00E+000	3.0
TH-229	T	4.887	170.66	15.02	0.34	0.00E+000	6.5
TH-230		4.596	15.66	50.15	0.34	0.00E+000	4.5
TH-232		3.982	7.66	72.63	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)
TH-227	0.976	5850.00*	8.41E-002 +/- 7.08E-002	6.02E-002 +/- 9.76E-003
TH-228	0.990	5400.00*	3.09E-002 +/- 5.02E-002	8.61E-002 +/- 1.39E-002
TH-229	0.999	4872.00*	2.41E+000 +/- 3.90E-001	6.75E-002 +/- 1.09E-002
TH-230	0.971	4672.00*	2.20E-001 +/- 1.16E-001	6.73E-002 +/- 1.09E-002
TH-232	0.999	3997.00*	1.08E-001 +/- 8.00E-002	6.71E-002 +/- 1.09E-002

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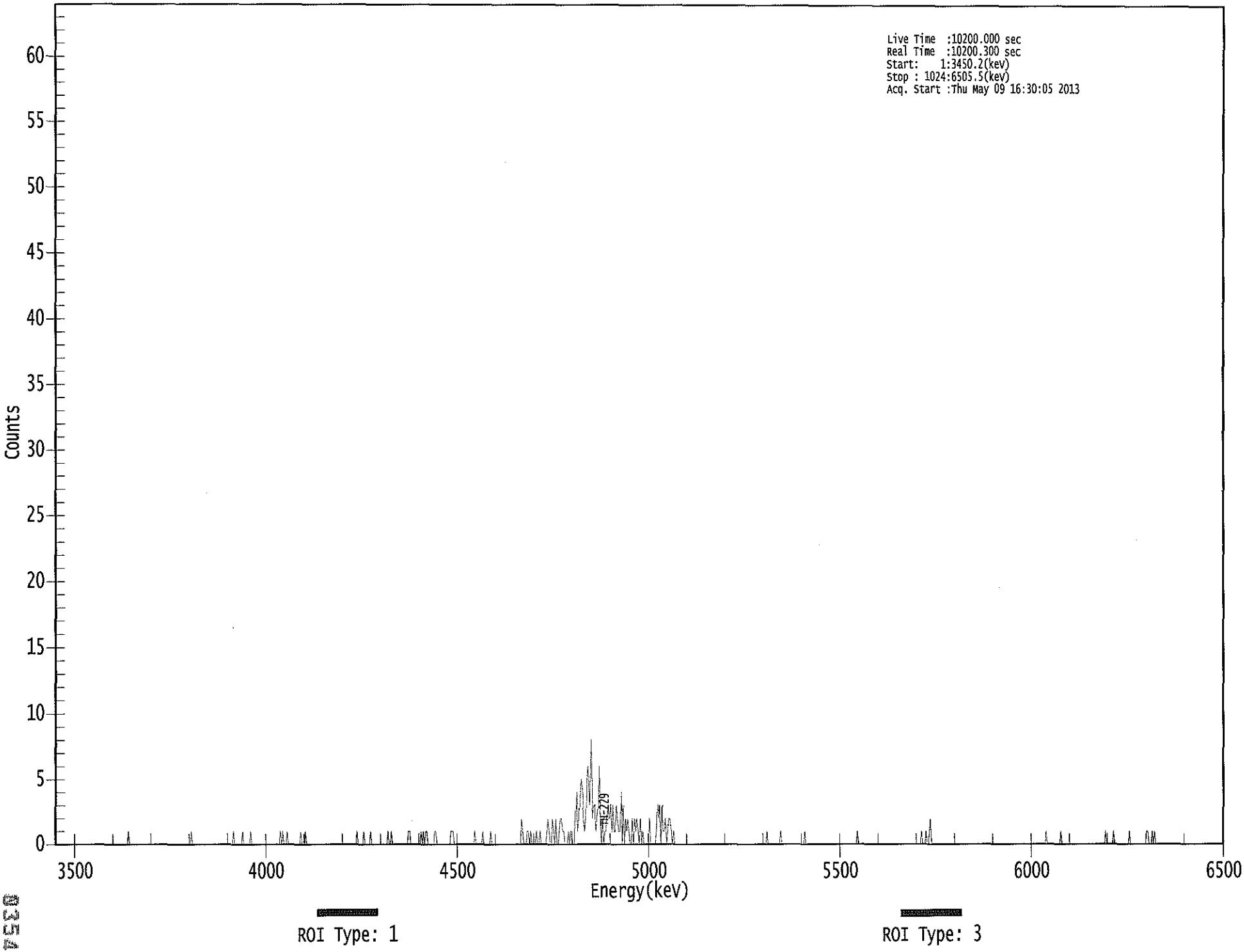
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000057586.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	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	1
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	1	0	0	0
161:	0	0	0	0	1	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	1	0	1
201:	0	0	0	1	0	0	0	0
209:	0	0	0	0	0	0	0	1
217:	0	0	0	1	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	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	1	0
273:	0	0	0	0	1	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	1	0	0	1	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	1	1	0
313:	0	0	0	0	0	0	0	0
321:	1	0	1	0	1	1	0	0
329:	0	0	0	0	1	1	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	1	1	1	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	1

369:	0	0	0	0	0	0	1	0

Sample Title: 19

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	0
409:	2	1	0	0	0	1	1	0
417:	1	0	0	0	0	1	0	0
425:	1	0	0	0	0	0	1	2
433:	1	0	0	2	1	0	2	0
441:	0	1	2	2	1	1	0	0
449:	0	1	0	1	1	0	0	2
457:	4	1	2	4	5	4	2	1
465:	2	5	6	3	5	8	2	3
473:	3	1	2	3	6	2	0	2
481:	0	1	1	3	2	2	3	1
489:	3	1	1	3	2	1	1	4
497:	0	3	0	2	1	2	1	0
505:	0	2	0	2	1	2	1	0
513:	2	0	1	0	0	0	0	0
521:	2	0	0	0	0	0	1	3
529:	2	3	0	3	1	1	2	0
537:	1	2	2	1	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	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	1
625:	0	0	0	0	0	0	0	0
633:	0	0	0	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	1	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	1	0
761:	0	0	1	0	0	1	2	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 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	1	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	1	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	1
921:	0	0	0	0	0	0	1	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	1	1	0	0	0
961:	1	0	1	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	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

5/9/2013 5:53:04 AM

Apex-Alpha™

QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 5/9/2013
Time : 5:53:04 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	5/9/2013 5:34:02 AM
Alpha_004	21f	ALL	Passed	5/9/2013 5:34:02 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	5/9/2013 5:34:03 AM
Alpha_011	21f	ALL	Passed	5/9/2013 5:34:04 AM
Alpha_012	21f	ALL	Not Done	
Alpha_013	21f	ALL	Passed	5/9/2013 5:34:05 AM
Alpha_014	21f	ALL	Passed	5/9/2013 5:34:06 AM
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	5/9/2013 5:34:07 AM
Alpha_019	AIM730	ALL	Not Done	
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	5/9/2013 5:34:08 AM
Alpha_023	AIM730	ALL	Not Done	
Alpha_024	AIM730	ALL	Passed	5/9/2013 5:34:08 AM
Alpha_025	AIM730	ALL	Passed	5/9/2013 5:34:09 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	5/9/2013 5:34:10 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	5/9/2013 5:34:11 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Not Done	
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:12 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:13 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:15 AM
Alpha_036	Alpha Analyst100DC	ALL	Not Done	
Alpha_037	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:16 AM
Alpha_038	Alpha Analyst100DC	ALL	Not Done	
Alpha_039	Alpha Analyst100DC	ALL	Not Done	
Alpha_040	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:18 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:20 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:21 AM

Review of QA Results - Pulser Check

5/9/2013 5:53:04 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Not Done	
Alpha_044	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:23 AM
Alpha_045	Alpha Analyst100DC	ALL	Not Done	
Alpha_046	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:25 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:27 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	5/9/2013 5:34:29 AM

APPROVED BY: C

APPROVAL DATE: 5/9/13

****
***** 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

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

SECTION X

ANALYTICAL DATA (RADIUM-226)

US EPA ARCHIVE DOCUMENT

Work Order	13-04132
Analysis Code	Ra226
Run	1
Date Received	4/18/2013
Lab Deadline	5/9/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EPA 903.0 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	1007.586
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/18/13 00:00	1.0000E+00
02	MBL	BLANK		04/18/13 00:00	1.5000E+00
03	DUP	FB at PZ-100-KS TOT	39	04/16/13 08:40	1.5000E+00
04	TRG	D-14 TOT	38	04/12/13 11:05	1.5000E+00
05	TRG	D-14 DIS	38	04/12/13 11:05	1.5000E+00
06	TRG	PZ-112-AS TOT	45	04/12/13 11:18	1.5000E+00
07	TRG	PZ-112-AS DIS	45	04/12/13 11:18	1.5000E+00
08	TRG	PZ-202-SS TOT	46	04/12/13 12:32	1.5000E+00
09	TRG	PZ-202-SS DIS	46	04/12/13 12:32	1.5000E+00
10	TRG	DUP07 TOT	40	04/12/13 00:00	1.5000E+00
11	TRG	DUP07 DIS	40	04/12/13 00:00	1.5000E+00
12	TRG	PZ-106-KS TOT	36	04/15/13 15:59	1.5000E+00
13	TRG	PZ-106-KS DIS	36	04/15/13 15:59	1.5000E+00
14	DO	FB at PZ-100-KS TOT	39	04/16/13 08:40	1.5000E+00
15	TRG	FB at PZ-100-KS DIS	39	04/16/13 08:40	1.5000E+00
16	TRG	PZ-100-KS TOT	37	04/16/13 08:50	1.5000E+00
17	TRG	PZ-100-KS DIS	37	04/16/13 08:50	1.5000E+00
18	TRG	S-53 TOT	41	04/16/13 09:00	1.0000E+00
19	TRG	S-53 DIS	41	04/16/13 09:00	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.

0552

13-04132
Ra226
Run 1

US EPA ARCHIVE DOCUMENT

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	0.9178	924.8	376.7	90.43		0.0226	0.0291	0.0065		90.43	2.34	1.00
02	MBL	0.9119	918.8	435.6	105.25		0.0228	0.0293	0.0065		105.25	2.34	1.00
03	DUP	0.9044	911.3	367.4	89.51		0.0221	0.0280	0.0059		89.51	2.12	1.00
04	TRG	0.8976	904.4	342.7	84.12		0.0224	0.0289	0.0065		84.12	2.34	1.00
05	TRG	0.8990	905.8	388.6	95.24		0.0224	0.0300	0.0076		95.24	2.66	1.00
06	TRG	0.9014	908.2	398.8	97.48		0.0226	0.0389	0.0163		97.48	8.24	1.00
07	TRG	0.8989	905.7	413.1	101.25		0.0221	0.0326	0.0105		101.25	3.44	1.00
08	TRG	0.9009	907.7	354.5	86.70		0.0221	0.0289	0.0068		86.70	2.44	1.00
09	TRG	0.9009	907.7	371.2	90.78		0.0223	0.0297	0.0074		90.78	2.61	1.00
10	TRG	0.9017	908.5	297.1	72.60		0.0223	0.0309	0.0086		72.60	2.91	1.00
11	TRG	0.8997	906.5	375.3	91.91		0.0222	0.0330	0.0108		91.91	3.54	1.00
12	TRG	0.9013	908.1	389.2	95.14		0.0223	0.0305	0.0082		95.14	2.82	1.00
13	TRG	0.8996	906.4	390.1	95.54		0.0223	0.0308	0.0085		95.54	2.89	1.00
14	DO	0.9002	907.0	347.7	85.10		0.0227	0.0288	0.0061		85.10	2.20	1.00
15	TRG	0.9008	907.6	393.1	96.15		0.0220	0.0286	0.0066		96.15	2.37	1.00
16	TRG	0.9023	909.1	338.0	82.53		0.0226	0.0296	0.0070		82.53	2.50	1.00
17	TRG	0.8744	881.0	401.5	101.17		0.0226	0.0298	0.0072		101.17	2.55	1.00
18	TRG	0.9038	910.7	55.5	13.52		0.0230	0.0231	0.0001		13.52	-3.53	1.00
19	TRG	0.9067	913.6	402.8	97.88		0.0221	0.0282	0.0061		97.88	2.20	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.

13-04132
Ra226
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
02	MBL			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
03	DUP			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
04	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
05	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
06	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
07	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
08	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
09	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
10	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
11	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
12	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
13	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
14	DO			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
15	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
16	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
17	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
18	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	LWALKER		
19	TRG			05/03/13 12:34	JBARNARD	05/14/13 12:52	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.

US EPA ARCHIVE DOCUMENT

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Eberline Services
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-Ra226-1

Printed: 5/16/2013 10:19 AM

Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-04132
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	1.04E+01	1.25E+00	2.33E-01	1.03E+01	101.03	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	2.73E-02	7.47E-02	1.54E-01					OK	OK
03	RA-226	DUP	FB at PZ-100-KS TOT	pCi/l	4.56E-02	7.37E-02	1.27E-01				INV	OK	
04	RA-226	TRG	D-14 TOT	pCi/l	1.97E+00	4.55E-01	1.66E-01					OK	
05	RA-226	TRG	D-14 DIS	pCi/l	7.92E-01	3.00E-01	2.19E-01					OK	
06	RA-226	TRG	PZ-112-AS TOT	pCi/l	9.47E-01	3.83E-01	1.66E-01					OK	
07	RA-226	TRG	PZ-112-AS DIS	pCi/l	7.42E-01	3.09E-01	1.57E-01					OK	
08	RA-226	TRG	PZ-202-SS TOT	pCi/l	8.53E-01	3.04E-01	1.54E-01					OK	
09	RA-226	TRG	PZ-202-SS DIS	pCi/l	3.81E-01	2.03E-01	1.69E-01					OK	
10	RA-226	TRG	DUP07 TOT	pCi/l	4.11E+00	8.08E-01	2.08E-01					OK	
11	RA-226	TRG	DUP07 DIS	pCi/l	2.31E+00	6.01E-01	2.07E-01					OK	
12	RA-226	TRG	PZ-106-KS TOT	pCi/l	3.77E-01	2.04E-01	1.60E-01					OK	
13	RA-226	TRG	PZ-106-KS DIS	pCi/l	3.23E-01	1.92E-01	1.48E-01					OK	
14	RA-226	DO	FB at PZ-100-KS TOT	pCi/l	3.00E-03	6.89E-02	1.75E-01					OK	
15	RA-226	TRG	FB at PZ-100-KS DIS	pCi/l	-4.01E-03	4.69E-02	9.84E-02					OK	
16	RA-226	TRG	PZ-100-KS TOT	pCi/l	1.64E-01	1.36E-01	1.17E-01					OK	
17	RA-226	TRG	PZ-100-KS DIS	pCi/l	2.60E-01	1.65E-01	1.42E-01					OK	
18	RA-226	TRG	S-53 TOT	pCi/l	1.45E-01	3.12E-01	6.18E-01					OK	
19	RA-226	TRG	S-53 DIS	pCi/l	8.44E-01	3.28E-01	1.36E-01					OK	

US EPA ARCHIVE DOCUMENT

Run: 1
Analysis Code: Ra226
Eberline Services Work Order: 13-04132
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	RA-226	LCS	04/18/13 00:00	1.00E+00	90.43	0.00	90.43		5/14/2013 12:52	
02	RA-226	MBL	04/18/13 00:00	1.50E+00	100.00	0.00	105.25		5/14/2013 12:52	
03	RA-226	DUP	04/16/13 08:40	1.50E+00	89.51	0.00	89.51		5/14/2013 12:52	
04	RA-226	TRG	04/12/13 11:05	1.50E+00	84.12	0.00	84.12		5/14/2013 12:52	
05	RA-226	TRG	04/12/13 11:05	1.50E+00	95.24	0.00	95.24		5/14/2013 12:52	
06	RA-226	TRG	04/12/13 11:18	1.50E+00	97.48	0.00	97.48		5/14/2013 12:52	
07	RA-226	TRG	04/12/13 11:18	1.50E+00	100.00	0.00	101.25		5/14/2013 12:52	
08	RA-226	TRG	04/12/13 12:32	1.50E+00	86.70	0.00	86.70		5/14/2013 12:52	
09	RA-226	TRG	04/12/13 12:32	1.50E+00	90.78	0.00	90.78		5/14/2013 12:52	
10	RA-226	TRG	04/12/13 00:00	1.50E+00	72.60	0.00	72.60		5/14/2013 12:52	
11	RA-226	TRG	04/12/13 00:00	1.50E+00	91.91	0.00	91.91		5/14/2013 12:52	
12	RA-226	TRG	04/15/13 15:59	1.50E+00	95.14	0.00	95.14		5/14/2013 12:52	
13	RA-226	TRG	04/15/13 15:59	1.50E+00	95.54	0.00	95.54		5/14/2013 12:52	
14	RA-226	DO	04/16/13 08:40	1.50E+00	85.10	0.00	85.10		5/14/2013 12:52	
15	RA-226	TRG	04/16/13 08:40	1.50E+00	96.15	0.00	96.15		5/14/2013 12:52	
16	RA-226	TRG	04/16/13 08:50	1.50E+00	82.53	0.00	82.53		5/14/2013 12:52	
17	RA-226	TRG	04/16/13 08:50	1.50E+00	100.00	0.00	101.17		5/14/2013 12:52	
18	RA-226	TRG	04/16/13 09:00	1.00E+00	13.52	0.00	13.52		5/14/2013 12:52	
19	RA-226	TRG	04/16/13 09:00	1.00E+00	97.88	0.00	97.88		5/14/2013 12:52	

0056

US EPA ARCHIVE DOCUMENT

Work Order: 13-04132-Ra226-1

Run	Analysis Code	Eberline Services Work Order	Client
1	Ra226	13-04132	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	05/15/13 16:51		A_Spec	Alpha_004	170.02	2.94 E+02	7.00 E-03	19.4
02	RA-226	MBL	05/15/13 16:51		A_Spec	Alpha_010	170.02	1.30 E+00	1.00 E-02	19.7
03	RA-226	DUP	05/15/13 16:51		A_Spec	Alpha_011	170	2.15 E+00	5.00 E-03	19.7
04	RA-226	TRG	05/15/13 16:51		A_Spec	Alpha_013	170	7.50 E+01	6.00 E-03	18.7
05	RA-226	TRG	05/15/13 16:51		A_Spec	Alpha_014	170	2.96 E+01	1.40 E-02	18.5
06	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_033	170	2.38 E+01	1.00 E-03	18.2
07	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_034	170	2.27 E+01	2.00 E-03	18.6
08	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_035	170	3.13 E+01	4.00 E-03	18.3
09	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_036	170	1.48 E+01	7.00 E-03	19.8
10	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_037	170	1.03 E+02	3.00 E-03	17.8
11	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_038	170	5.85 E+01	3.00 E-03	17.2
12	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_039	170	1.41 E+01	5.00 E-03	19.7
13	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_040	170	1.15 E+01	3.00 E-03	19
14	RA-226	DO	05/15/13 16:52		A_Spec	Alpha_041	170	1.30 E-01	1.10 E-02	19.8
15	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_042	170	-1.70 E-01	1.00 E-03	18.5
16	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_044	170	5.83 E+00	1.00 E-03	19
17	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_045	170	1.03 E+01	4.00 E-03	17.9
18	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_046	170	1.32 E+00	4.00 E-03	17.9
19	RA-226	TRG	05/15/13 16:52		A_Spec	Alpha_047	170	2.58 E+01	1.00 E-03	18.2

2959

Count Room Report
Client: Engineering Management Su

13-04132-Ra226-1 (pCi/l) in WA
Tracer ID: Ba-6a

2.5

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/18/13 00:00	1.0000	0.9178	924.7624	376.7000	90.43	2.34	1.00
02	MBL	BLANK	04/18/13 00:00	1.5000	0.9119	918.8177	435.6000	105.25	2.34	1.00
03	DUP	FB at PZ-100-KS TOT	04/16/13 08:40	1.5000	0.9044	911.2608	367.4000	89.51	2.12	1.00
04	TRG	D-14 TOT	04/12/13 11:05	1.5000	0.8976	904.4092	342.7000	84.12	2.34	1.00
05	TRG	D-14 DIS	04/12/13 11:05	1.5000	0.8990	905.8198	388.6000	95.24	2.66	1.00
06	TRG	PZ-112-AS TOT	04/12/13 11:18	1.5000	0.9014	908.2380	398.8000	97.48	4.0 ~~3.24~~	1.00
07	TRG	PZ-112-AS DIS	04/12/13 11:18	1.5000	0.8989	905.7191	413.1000	101.25	3.44	1.00
08	TRG	PZ-202-SS TOT	04/12/13 12:32	1.5000	0.9009	907.7342	354.5000	86.70	2.44	1.00
09	TRG	PZ-202-SS DIS	04/12/13 12:32	1.5000	0.9009	907.7342	371.2000	90.78	2.61	1.00
10	TRG	DUP07 TOT	04/12/13 00:00	1.5000	0.9017	908.5403	297.1000	72.60	2.91	1.00
11	TRG	DUP07 DIS	04/12/13 00:00	1.5000	0.8997	906.5251	375.3000	91.91	3.54	1.00
12	TRG	PZ-106-KS TOT	04/15/13 15:59	1.5000	0.9013	908.1373	389.2000	95.14	2.82	1.00
13	TRG	PZ-106-KS DIS	04/15/13 15:59	1.5000	0.8996	906.4244	390.1000	95.54	2.89	1.00
14	DO	FB at PZ-100-KS TOT	04/16/13 08:40	1.5000	0.9002	907.0289	347.7000	85.10	2.20	1.00
15	TRG	FB at PZ-100-KS DIS	04/16/13 08:40	1.5000	0.9008	907.6335	393.1000	96.15	2.37	1.00
16	TRG	PZ-100-KS TOT	04/16/13 08:50	1.5000	0.9023	909.1448	338.0000	82.53	2.50	1.00
17	TRG	PZ-100-KS DIS	04/16/13 08:50	1.5000	0.8744	881.0332	401.5000	101.17	2.55	1.00
18	TRG	S-53 TOT	04/16/13 09:00	1.0000	0.9038	910.6562	55.4800	13.52	~~3.53~~	1.00
19	TRG	S-53 DIS	04/16/13 09:00	1.0000	0.9067	913.5782	402.8000	97.88	2.20	1.00

#4-14

0358

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-04132	1	Ra226	5/3/2013 12:33	JBARNARD		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Ra-226	Ra-5b	44.071	5/3/2013	0.500	0.5176				10.28	0.473	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	1007.586	5/3/2013	0.9178	1.0100
02	Ba-133	Ba-6a	1007.586	5/3/2013	0.9119	1.0100
03	Ba-133	Ba-6a	1007.586	5/3/2013	0.9044	1.0100
04	Ba-133	Ba-6a	1007.586	5/3/2013	0.8976	1.0100
05	Ba-133	Ba-6a	1007.586	5/3/2013	0.8990	1.0100
06	Ba-133	Ba-6a	1007.586	5/3/2013	0.9014	1.0100
07	Ba-133	Ba-6a	1007.586	5/3/2013	0.8989	1.0100
08	Ba-133	Ba-6a	1007.586	5/3/2013	0.9009	1.0100
09	Ba-133	Ba-6a	1007.586	5/3/2013	0.9009	1.0100
10	Ba-133	Ba-6a	1007.586	5/3/2013	0.9017	1.0100
11	Ba-133	Ba-6a	1007.586	5/3/2013	0.8997	1.0100
12	Ba-133	Ba-6a	1007.586	5/3/2013	0.9013	1.0100
13	Ba-133	Ba-6a	1007.586	5/3/2013	0.8996	1.0100
14	Ba-133	Ba-6a	1007.586	5/3/2013	0.9002	1.0100
15	Ba-133	Ba-6a	1007.586	5/3/2013	0.9008	1.0100
16	Ba-133	Ba-6a	1007.586	5/3/2013	0.9023	1.0100
17	Ba-133	Ba-6a	1007.586	5/3/2013	0.8744	1.0100
18	Ba-133	Ba-6a	1007.586	5/3/2013	0.9038	1.0100
19	Ba-133	Ba-6a	1007.586	5/3/2013	0.9067	1.0100

Balance Printer Tapes

Tracer

0.9178 g
0.9119 g
-0.9044 g
-0.8976 g
-0.8990 g
-0.9014 g
-0.8989 g
-0.9009 g
-0.9009 g
-0.9017 g
-0.8997 g
-0.9013 g
-0.8996 g
-0.9002 g
-0.9008 g
-0.9023 g
-0.8744 g
-0.9038 g

-0.9067 g

LCS

0.5176 g
0.5121 g

Matrix Spike

US EPA ARCHIVE DOCUMENT

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Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04132	1	Ra226	liters	5/9/2013	JBARNARD

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.5000E+00	1.5000E+00				
03	FB at PZ-100-KS TOT	DUP					1.5000E+00	1.5000E+00				
04	D-14 TOT	TRG					1.5000E+00	1.5000E+00				
05	D-14 DIS	TRG					1.5000E+00	1.5000E+00				
06	PZ-112-AS TOT	TRG					1.5000E+00	1.5000E+00				
07	PZ-112-AS DIS	TRG					1.5000E+00	1.5000E+00				
08	PZ-202-SS TOT	TRG					1.5000E+00	1.5000E+00				
09	PZ-202-SS DIS	TRG					1.5000E+00	1.5000E+00				
10	DUP07 TOT	TRG					1.5000E+00	1.5000E+00				
11	DUP07 DIS	TRG					1.5000E+00	1.5000E+00				
12	PZ-106-KS TOT	TRG					1.5000E+00	1.5000E+00				
13	PZ-106-KS DIS	TRG					1.5000E+00	1.5000E+00				
14	FB at PZ-100-KS TOT	DO					1.5000E+00	1.5000E+00				
15	FB at PZ-100-KS DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-100-KS TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-100-KS DIS	TRG					1.5000E+00	1.5000E+00				
18	S-53 TOT	TRG					1.0000E+00	1.0000E+00				
19	S-53 DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: _____ Date: 5/3/13

S3

US EPA ARCHIVE DOCUMENT

Eberline Services - Oak Ridge
Version 1.0 9/1999

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-04132	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	0.0291	0.0065	
02	BLANK	MBL		0.0228	0.0293	0.0065	
03	DUP	DUP		0.0221	0.0280	0.0059	
04	D-14 TOT	TRG		0.0224	0.0289	0.0065	
05	D-14 DIS	TRG		0.0224	0.0300	0.0076	
06	PZ-112-AS TOT	TRG		0.0226	0.0389	0.0163	
07	PZ-112-AS DIS	TRG		0.0221	0.0326	0.0105	
08	PZ-202-SS TOT	TRG		0.0221	0.0289	0.0068	
09	PZ-202-SS DIS	TRG		0.0223	0.0297	0.0074	
10	DUP07 TOT	TRG		0.0223	0.0309	0.0086	
11	DUP07 DIS	TRG		0.0222	0.0330	0.0108	
12	PZ-106-KS TOT	TRG		0.0223	0.0305	0.0082	
13	PZ-106-KS DIS	TRG		0.0223	0.0308	0.0085	
14	FB at PZ-100-KS TOT	DO		0.0227	0.0288	0.0061	
15	FB at PZ-100-KS DIS	TRG		0.0220	0.0286	0.0066	
16	PZ-100-KS TOT	TRG		0.0226	0.0296	0.0070	
17	PZ-100-KS DIS	TRG		0.0226	0.0298	0.0072	
18	S-53 TOT	TRG		0.0230	0.0231	0.0001	
19	S-53 DIS	TRG		0.0221	0.0282	0.0061	

Technician: L. Walker Date: 5/14/13

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Apex-Alpha™

Sample Description: SPIKE
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000582
Batch Identification: 1304132A-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 56971
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.340E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/15/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:51:46 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9043 +/- 0.0000
Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
Effective Efficiency: 0.1755 +/- 0.0032

Control Certificate Name: Ra226_Ra-5b
Chem. Recov. of Control: RA-226 0.431755 +/- 0.029464
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	459.45	9.17	2.55	0.00E+000	5.0
RA-226	4.693	293.81	11.46	1.19	0.00E+000	9.8

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.970	5685.50*	1.76E+001 +/- 7.60E+002	3.22E-001 +/- 1.39E+001
RA-226	0.989	4785.00*	1.04E+001 +/- 1.25E+000	2.33E-001 +/- 8.38E-003

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5/16/13

US EPA ARCHIVE DOCUMENT

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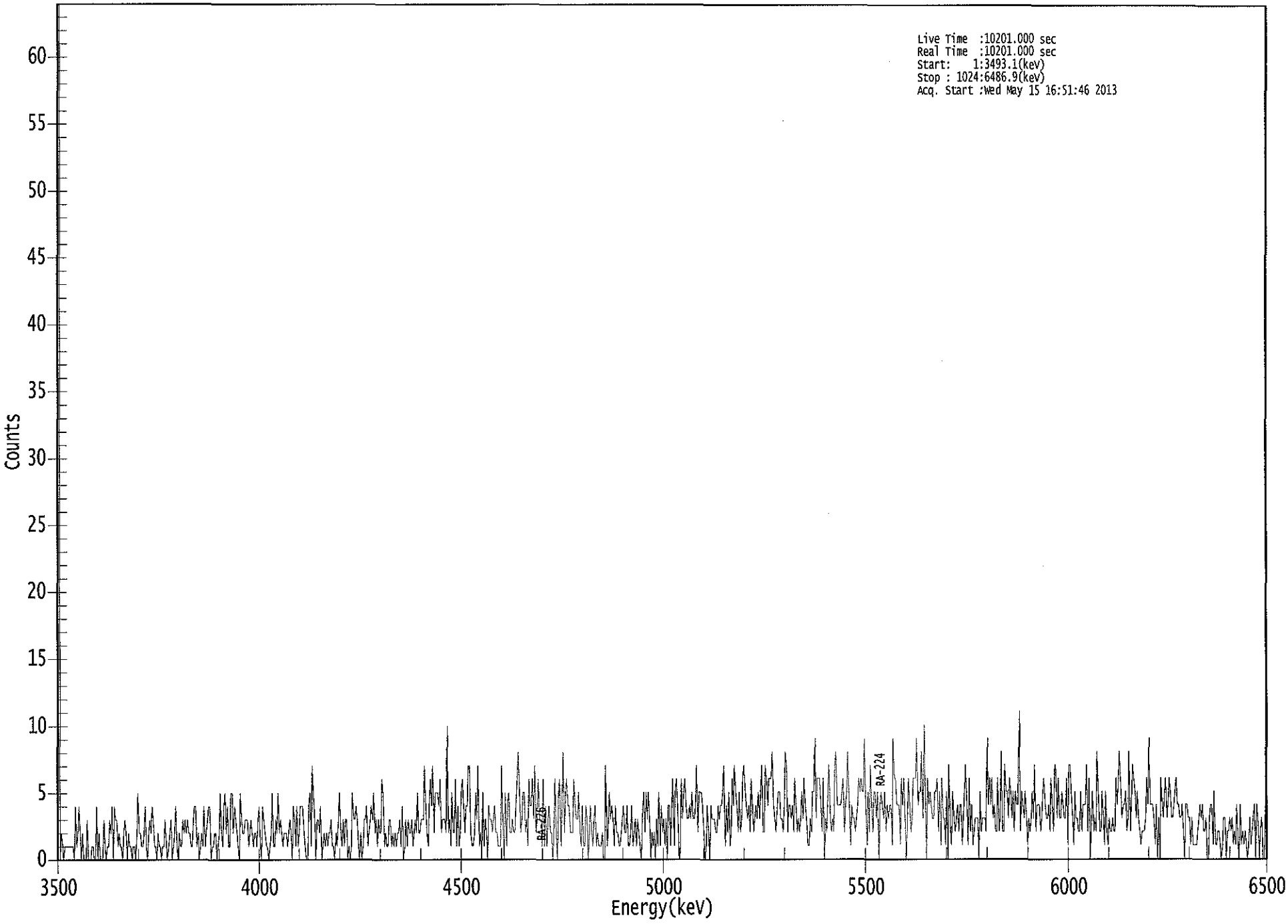

5228

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

Sample Title: 01

Elapsed Live time: 10201
Elapsed Real Time: 10201

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

369:	2	3	4	2	2	1	1	1

Sample Title: 01

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

801:	2	7	5	5	3	6	5	3

Sample Title: 01

Channel								
809:	5	2	5	4	4	11	2	5
817:	4	3	5	3	1	3	2	3
825:	5	3	7	2	4	4	4	2
833:	3	5	6	4	3	3	4	2
841:	6	4	2	7	7	3	6	3
849:	3	5	4	3	3	6	1	7
857:	7	5	3	1	5	3	3	2
865:	2	5	2	4	4	4	7	2
873:	6	0	3	5	2	3	2	8
881:	5	2	2	5	3	1	5	2
889:	1	3	2	2	3	2	2	6
897:	4	6	8	5	3	4	4	5
905:	2	3	8	2	4	7	6	5
913:	3	5	3	2	1	2	2	2
921:	3	6	4	9	4	4	4	3
929:	1	4	0	3	0	6	4	3
937:	5	6	3	4	6	5	3	3
945:	4	5	6	4	4	3	3	4
953:	2	0	4	4	3	3	1	3
961:	1	1	1	1	2	3	4	3
969:	4	2	2	3	0	0	3	4
977:	4	1	5	1	1	2	2	1
985:	0	1	3	3	0	2	2	3
993:	2	3	1	2	1	4	1	0
1001:	4	1	2	1	2	1	0	1
1009:	3	1	2	3	4	0	4	3
1017:	0	2	3	0	0	3	5	2

Apex-Alpha™

Sample Description: BLANK
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-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 56972
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.340E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/15/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:51:43 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
Effective Efficiency: 0.1967 +/- 0.0036

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	5.464	0.24	1972.2	4.76	0.00E+000	2.9
RA-226	4.543	1.30	273.47	1.70	0.00E+000	2.9

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.938	5685.50*	5.46E-003 +/- 2.59E-001	2.39E-001 +/- 1.03E+001
RA-226	0.926	4785.00*	2.73E-002 +/- 7.47E-002	1.54E-001 +/- 5.52E-003

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5/16/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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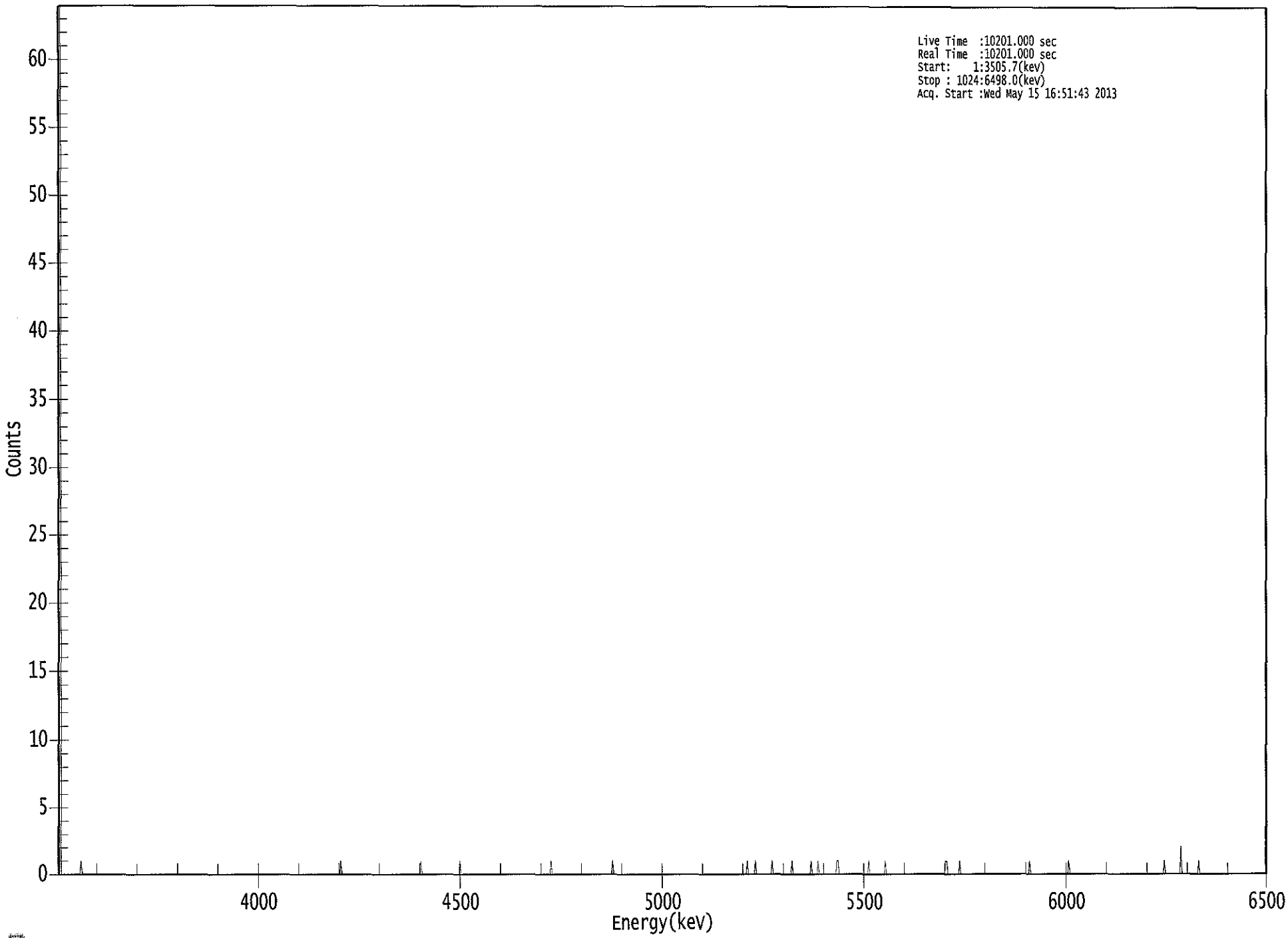

****
***** S P E C T R A L D A T A R E P O R T *****
****

Sample Title: 02

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	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	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	1	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	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	1	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	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	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	1
585:	0	0	0	0	0	0	1	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	1	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	1	0	0
641:	0	0	0	1	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	1	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	1	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	1
753:	1	0	0	0	0	0	0	0
761:	0	0	0	1	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 02

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	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	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:	1	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	2	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	1	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description: FB AT PZ-100-KS TOT DUP
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-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 56973
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.120E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:51:43 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8951 +/- 0.0000
Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
Effective Efficiency: 0.1766 +/- 0.0037

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	5.465	-3.25	79.15	4.25	0.00E+000	2.7
RA-226	4.677	2.15	161.66	0.85	0.00E+000	2.7

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.938	5685.50*	-9.04E-002 +/- 2.73E+001	2.79E-001 +/- 8.44E+001
RA-226	0.985	4785.00*	4.56E-002 +/- 7.37E-002	1.27E-001 +/- 5.24E-003

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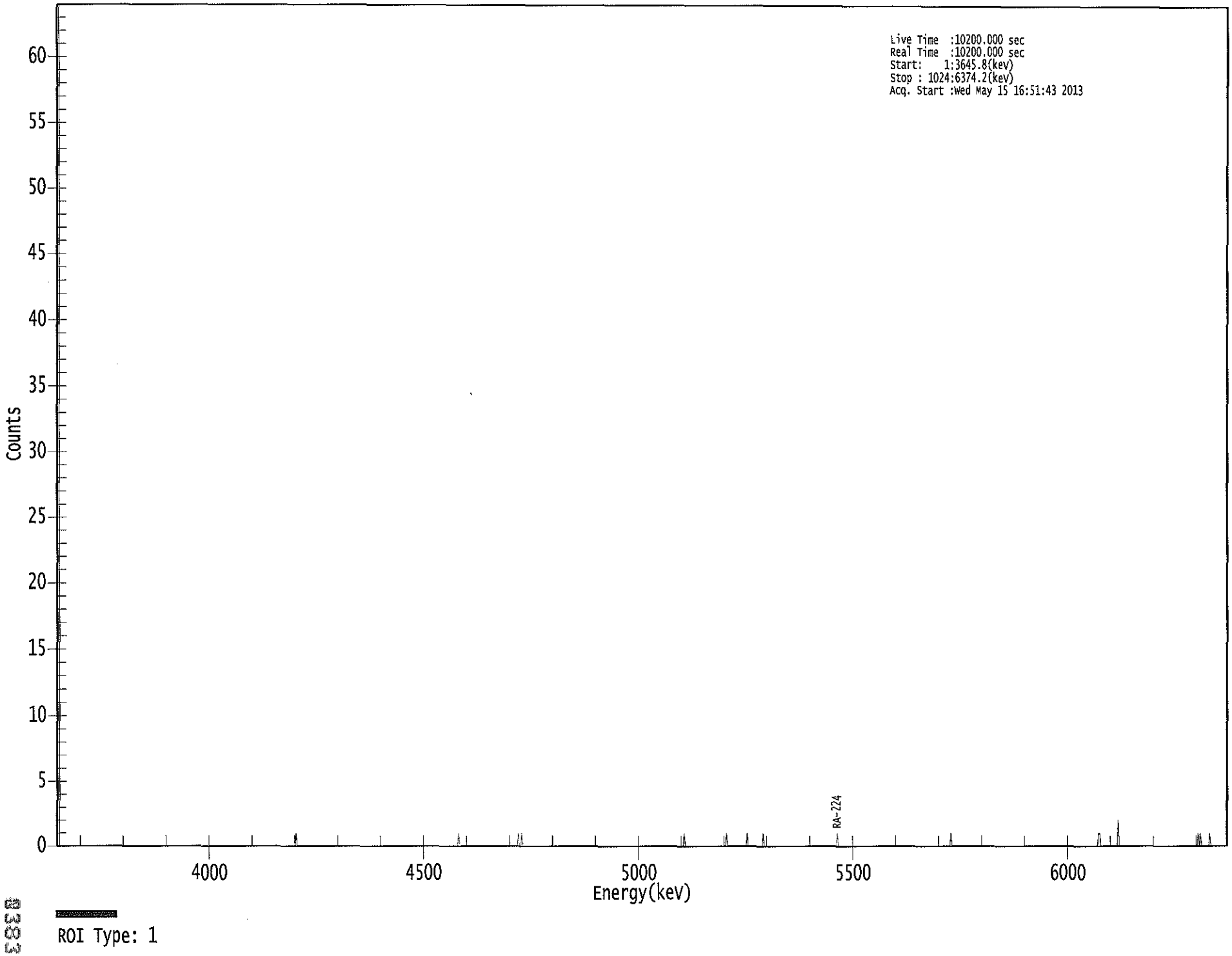
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058157.CNF



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

Sample Title: 03

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	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	1	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	1
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	1	0	0	1	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	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	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	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	1	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	1	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	1	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	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 03

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	1	1
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	2
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	1	0	1
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

Apex-Alpha™

C

Sample Description: D-14 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 04
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_013
Chamber Serial Number:
Detector Serial Number: 13
Env. Background: System Bkgd 56974
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.340E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:51:44 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8412 +/- 0.0000
Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
Effective Efficiency: 0.1572 +/- 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	5.497	16.94	52.41	3.06	0.00E+000	2.8
RA-226	4.616	74.98	22.81	1.02	0.00E+000	2.8

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.954	5685.50*	5.84E-001 +/- 1.77E+002	3.08E-001 +/- 9.31E+001
RA-226	0.963	4785.00*	1.97E+000 +/- 4.55E-001	1.66E-001 +/- 6.00E-003

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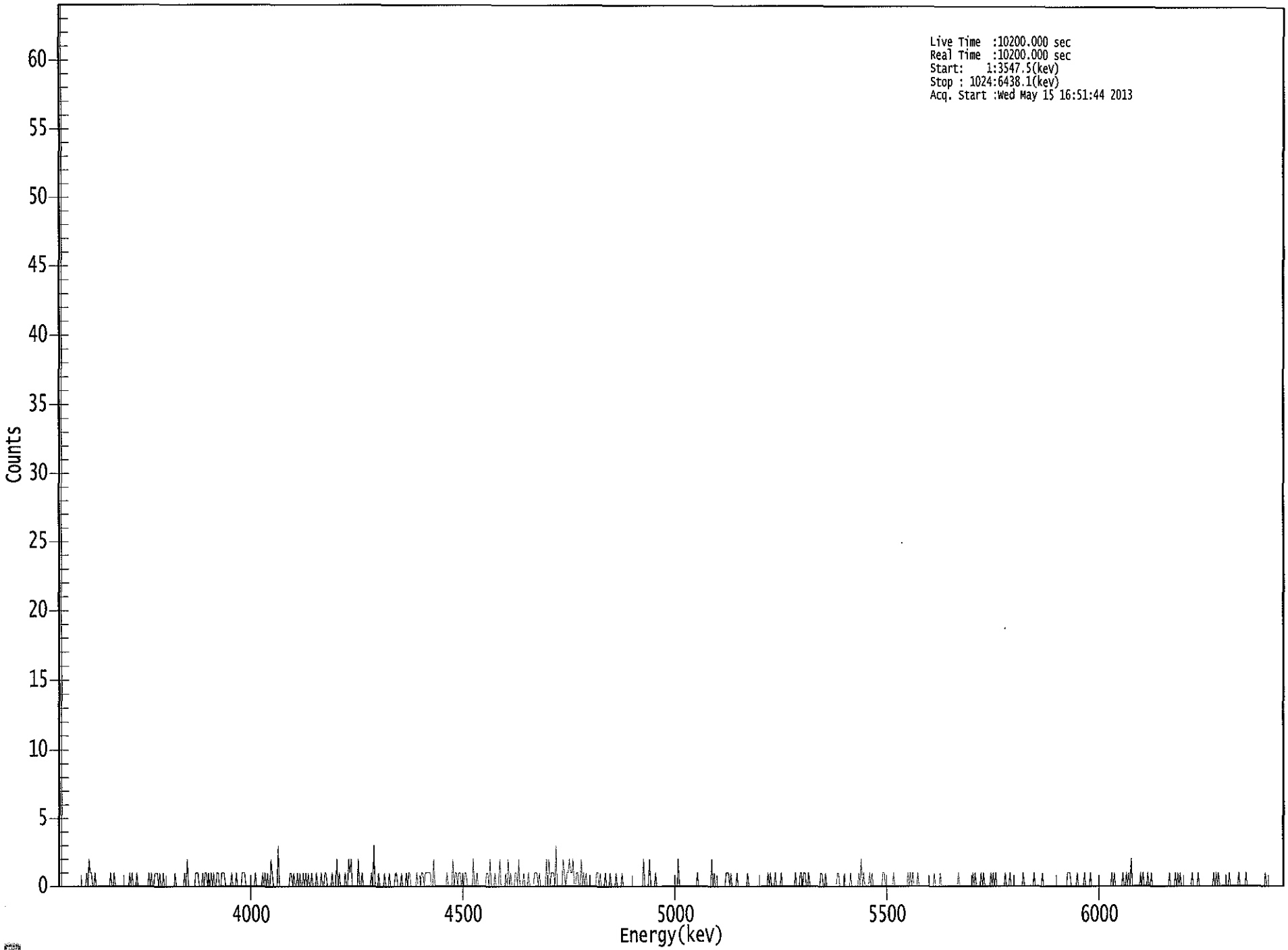
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058158.CNF



ROI Type: 1

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

369:	2	0	0	0	0	1	0	2

Sample Title: 04

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

801:	0	0	0	0	0	1	0	0

Sample Title: 04

Channel								
809:	0	0	0	0	0	0	1	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	1	1	1	0	0	0
849:	0	0	1	0	0	0	0	0
857:	1	0	0	0	0	1	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	1
881:	0	1	0	0	0	0	0	0
889:	1	0	0	1	0	1	0	2
897:	0	0	0	0	0	0	0	1
905:	0	1	0	0	0	1	0	0
913:	1	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	1
929:	0	0	0	0	1	0	1	0
937:	1	0	0	0	0	0	0	0
945:	0	0	1	0	0	0	0	1
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	1	0	1	0
969:	1	0	0	0	0	0	0	0
977:	0	1	0	0	0	0	0	0
985:	0	1	0	0	0	0	0	1
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

Apex-Alpha™

Sample Description: D-14 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 05
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_014
Chamber Serial Number:
Detector Serial Number: 14
Env. Background: System Bkgd 56975
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.660E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:51:45 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9524 +/- 0.0000
Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
Effective Efficiency: 0.1758 +/- 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	5.547	7.26	92.09	3.74	0.00E+000	2.9
RA-226	4.639	29.62	37.67	2.38	0.00E+000	2.9

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.975	5685.50*	2.55E-001 +/- 7.70E+001	3.36E-001 +/- 1.02E+002
RA-226	0.973	4785.00*	7.92E-001 +/- 3.00E-001	2.19E-001 +/- 7.96E-003

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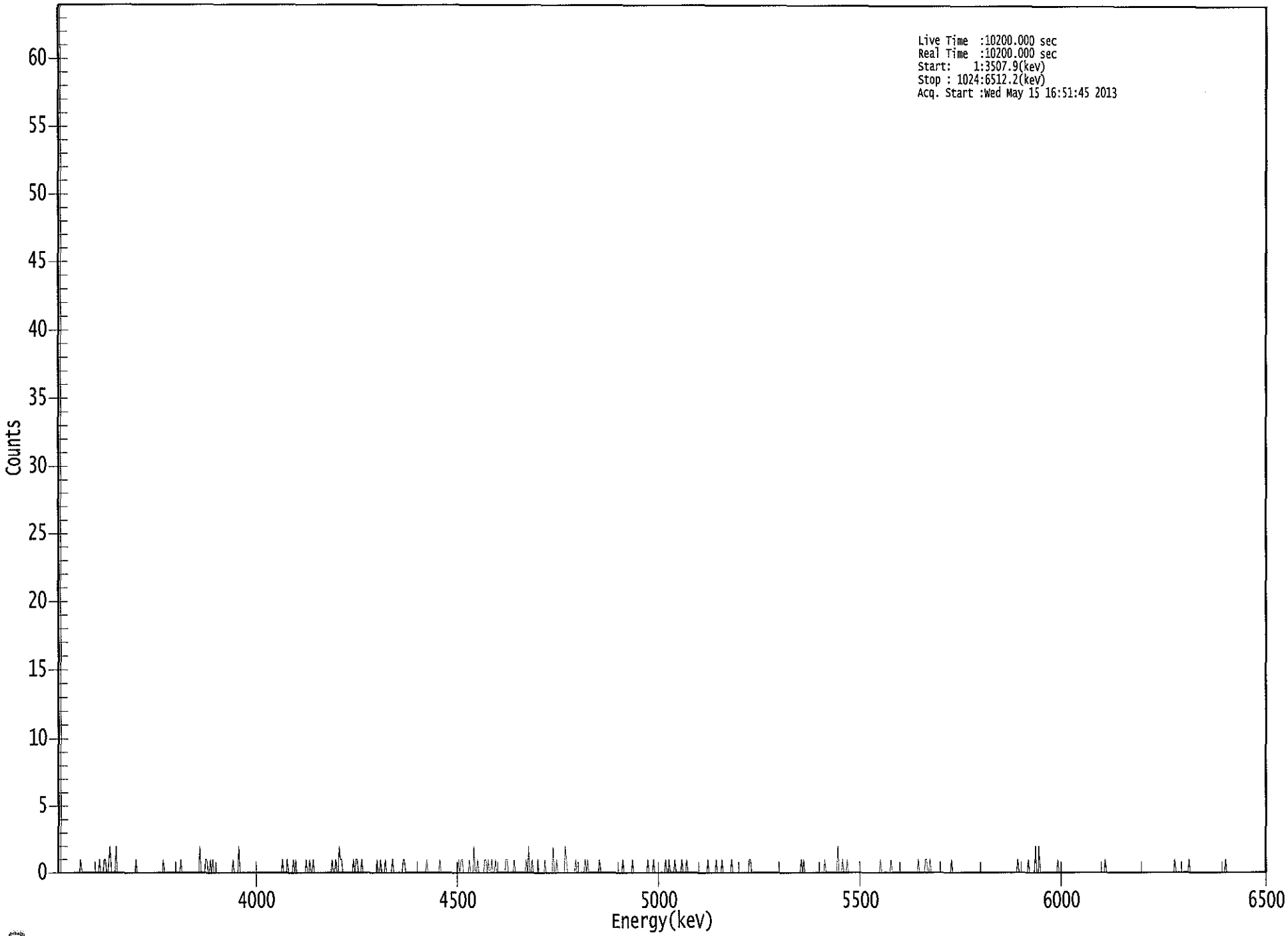
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058154.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	1	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	1	0	0	0	1
41:	1	0	0	1	2	0	0	0
49:	0	2	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	1	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	1	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	1	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	2	0	0	0	0	1	1	0
129:	0	1	0	1	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	1	0	0	0
153:	0	2	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	1	0
193:	0	0	1	0	0	0	0	1
201:	0	1	0	0	0	0	0	0
209:	0	0	1	0	0	1	0	0
217:	1	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	1	0	0	1	0	0	2	1
241:	1	0	0	0	0	0	0	0
249:	0	0	1	0	1	1	0	0
257:	0	1	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	0	0	1	0	0	0	0
289:	0	0	0	0	1	1	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	0	0	1	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	1	0	1	1	0
345:	0	0	0	0	1	0	0	0
353:	2	0	0	1	0	0	0	0
361:	0	1	1	0	1	0	0	1

369:	0	0	1	0	0	0	0	0

Sample Title: 05

Channel								
377:	0	0	0	1	1	0	0	0
385:	0	0	1	0	0	0	0	0
393:	0	0	0	0	1	0	2	0
401:	0	1	0	0	0	0	1	0
409:	0	0	0	0	1	0	0	0
417:	0	0	0	2	0	0	1	0
425:	0	0	0	0	0	2	1	0
433:	0	0	0	0	0	0	1	0
441:	0	0	0	0	0	0	1	0
449:	1	0	0	0	0	0	0	0
457:	0	0	1	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	1	0
481:	0	0	0	0	0	0	1	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	1	0	0	0	0
505:	1	0	0	0	0	0	0	0
513:	0	0	1	0	0	1	0	0
521:	0	0	1	0	0	0	0	0
529:	1	0	0	0	1	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	1	0
553:	0	0	0	0	0	1	0	0
561:	0	0	1	0	0	0	0	0
569:	0	0	1	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	1	1	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	1	0	1
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	1	0	0	0	0	0	0
657:	0	0	0	0	2	0	0	0
665:	1	0	0	0	1	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	1	0	0	0	0	0	0	0
705:	0	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:	1	0	0	0	0	0	1	1
737:	0	0	1	0	0	0	0	0
745:	0	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	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 05

Channel								
809:	0	0	0	0	1	0	0	0
817:	0	0	0	0	0	1	0	0
825:	0	0	0	2	0	0	2	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	1	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	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	1	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	0	0	0	0	0
977:	0	0	0	0	0	0	0	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: PZ-112-AS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 06
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_033
Chamber Serial Number: 04026479A
Detector Serial Number: 91132
Env. Background: System Bkgd 56982
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 4.000E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:11 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9748 +/- 0.0000
Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
Effective Efficiency: 0.1779 +/- 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	5.425	2.98	134.36	1.02	0.00E+000	3.0
RA-226	4.621	23.83	40.32	0.17	0.00E+000	4.5

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.914	5685.50*	1.55E-001 +/- 4.70E+001	3.28E-001 +/- 9.93E+001
RA-226	0.965	4785.00*	9.47E-001 +/- 3.83E-001	1.66E-001 +/- 5.71E-003

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US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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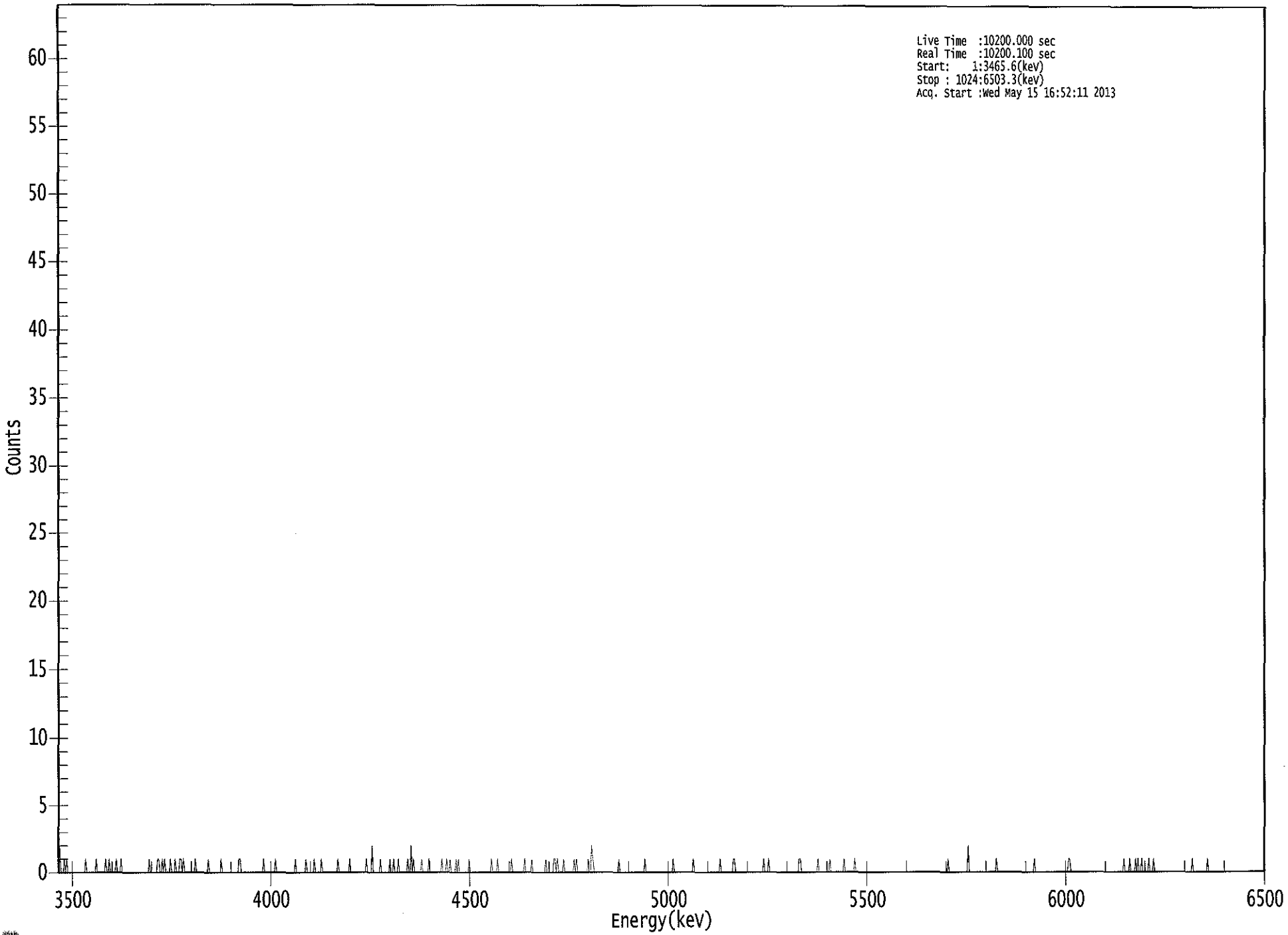

0515

****
***** 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:	1	2	0	0	0	1	0	1
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	1
25:	0	0	0	0	0	0	0	0
33:	1	0	0	0	0	0	0	0
41:	1	0	0	1	0	0	0	0
49:	0	1	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	1	0	0
81:	0	0	0	0	1	1	0	0
89:	1	0	1	0	0	0	0	1
97:	0	0	0	1	0	0	0	1
105:	1	0	1	0	0	0	0	0
113:	0	0	0	0	1	0	0	0
121:	0	0	0	0	0	0	0	1
129:	0	0	0	0	0	0	0	0
137:	0	0	1	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	1	1	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	0
177:	0	0	0	0	0	0	0	0
185:	1	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	1	0	0	0	0	0
217:	0	1	0	0	0	0	0	1
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	1	0	0
241:	0	0	0	0	0	0	0	1
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	1	0	0
265:	0	0	2	0	0	0	0	0
273:	0	1	0	0	0	0	0	0
281:	0	1	0	0	1	0	0	0
289:	1	0	0	0	0	0	0	0
297:	1	0	0	2	0	1	0	0
305:	0	0	0	0	1	0	0	0
313:	0	0	1	0	0	0	0	0
321:	0	0	0	0	0	1	0	0
329:	0	1	0	0	1	0	0	0
337:	0	1	0	1	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	1

369:	0	0	0	0	1	0	0	0

Sample Title: 06

Channel								
377:	0	0	0	0	0	0	0	0
385:	1	0	0	0	0	0	0	0
393:	0	0	0	1	0	0	0	0
401:	0	1	0	0	0	0	0	0
409:	0	0	0	0	0	1	0	0
417:	0	0	0	0	1	1	0	1
425:	0	0	0	0	1	0	0	0
433:	0	0	0	0	0	1	0	1
441:	0	0	0	0	0	0	0	0
449:	0	1	0	0	2	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	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	1	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	1	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	1	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	1	0	0	0	0	0	0
569:	0	0	0	0	1	1	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	1	0
601:	0	0	1	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	1	1	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	1	0	0	0
649:	0	0	0	0	0	0	1	0
657:	0	0	0	0	0	0	0	0
665:	0	0	1	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	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	2	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	1	0	0	0	0

801:	0	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	1	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	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:	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	0	0	0	1	0	0	0
913:	0	1	0	1	0	0	1	0
921:	0	0	0	0	1	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	1	0	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	1

Apex-Alpha™

C
Filter

Sample Description: PZ-112-AS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 07
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_034
Chamber Serial Number: 04026479B
Detector Serial Number: 91136
Env. Background: System Bkgd 56983
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.440E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:12 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
Effective Efficiency: 0.1856 +/- 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	5.495	3.66	107.87	0.34	0.00E+000	3.0
RA-226	4.618	22.66	41.53	0.34	0.00E+000	4.5

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.953	5685.50*	1.57E-001 +/- 4.75E+001	2.05E-001 +/- 6.21E+001
RA-226	0.964	4785.00*	7.42E-001 +/- 3.09E-001	1.57E-001 +/- 5.34E-003

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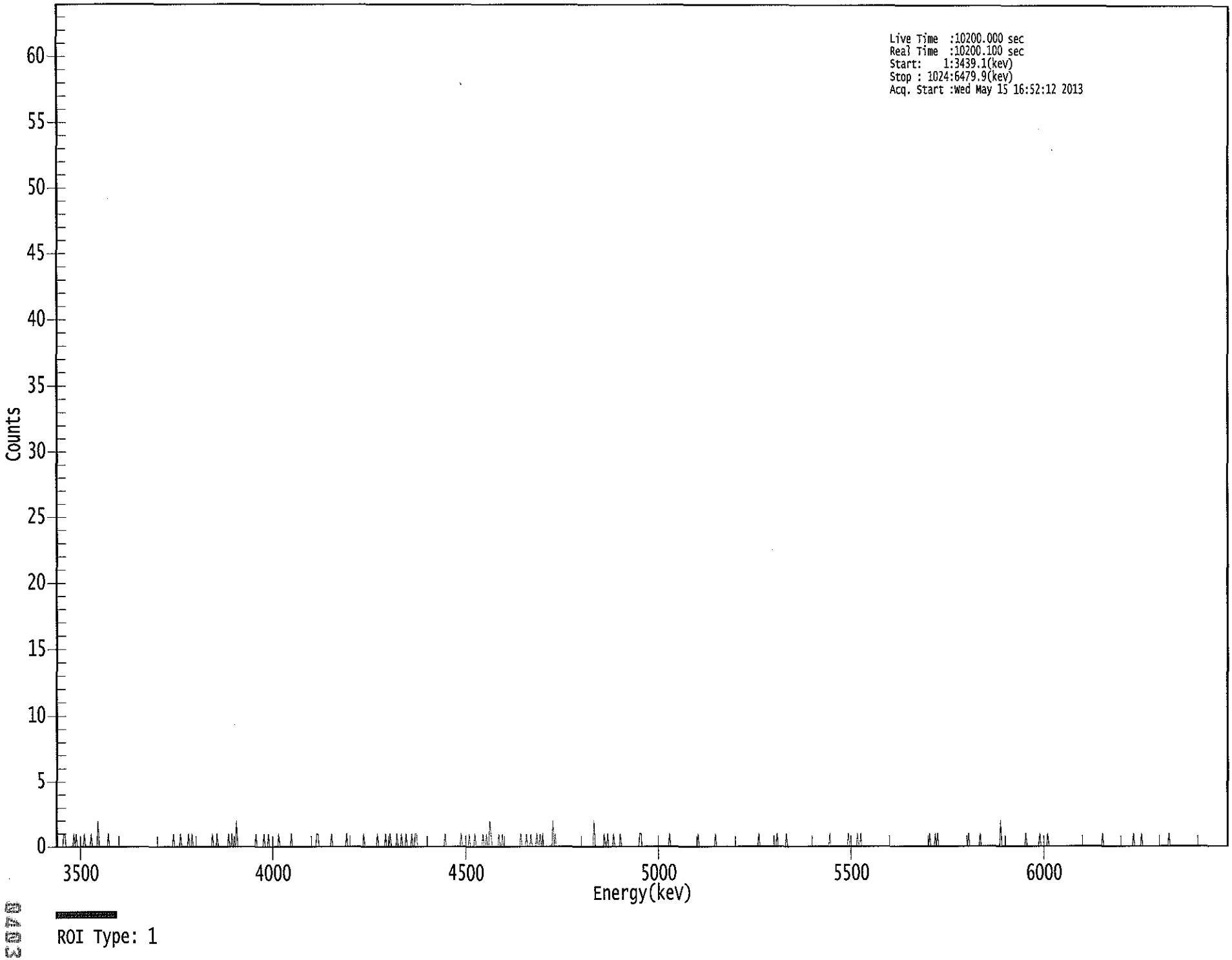
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058164.CNF



5078

****
***** 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:	0	0	0	0	0	0	1	1
9:	0	0	0	0	0	0	0	1
17:	0	1	0	0	0	0	0	0
25:	1	0	0	0	0	0	1	0
33:	0	0	0	0	2	0	0	0
41:	0	0	0	0	0	1	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	1	0
105:	0	0	0	0	1	0	0	0
113:	0	0	0	1	0	0	1	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	1	0	0	0	1	0	0	0
145:	0	0	0	0	0	0	1	0
153:	0	1	0	0	0	2	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	0
177:	0	0	0	0	0	1	0	0
185:	0	1	0	0	0	0	0	0
193:	0	0	1	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	1	1	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	1	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:	1	0	0	0	0	0	0	1
289:	0	0	0	1	0	0	0	0
297:	0	1	0	0	0	1	0	0
305:	0	1	0	0	0	0	1	0
313:	0	1	1	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	1	0	0	0	0	0	0
361:	1	0	0	0	0	1	0	0

369:	0	0	0	0	1	0	0	1

Sample Title: 07

Channel								
377:	0	0	2	1	0	0	0	0
385:	0	0	1	0	0	1	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	1	0	0
409:	0	0	1	0	0	0	1	0
417:	0	0	0	1	0	0	1	0
425:	1	0	0	0	0	0	0	0
433:	0	2	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	0	0	0
465:	0	0	0	0	0	2	0	0
473:	0	0	0	0	0	0	1	0
481:	0	1	0	0	0	0	1	0
489:	0	0	0	0	1	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	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	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:	1	0	0	0	0	0	0	0
569:	0	0	0	0	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	1	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	1	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	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	1	0	0	1	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	1	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	1	0	0	0

801:	0	0	0	0	0	0	1	0

Sample Title: 07

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	2	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	1	0
849:	0	0	0	0	0	0	0	0
857:	0	0	1	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	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	1	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	1	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	1	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-202-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 08
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_035
Chamber Serial Number: 04026477A
Detector Serial Number: 58771
Env. Background: System Bkgd 56984
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.440E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:14 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8670 +/- 0.0000
Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
Effective Efficiency: 0.1583 +/- 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	5.503	5.00	96.02	0.00	0.00E+000	2.9
RA-226	4.633	31.32	35.46	0.68	0.00E+000	2.9

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.957	5685.50*	1.79E-001 +/- 5.40E+001	2.14E-001 +/- 6.48E+001
RA-226	0.970	4785.00*	8.53E-001 +/- 3.04E-001	1.54E-001 +/- 5.26E-003

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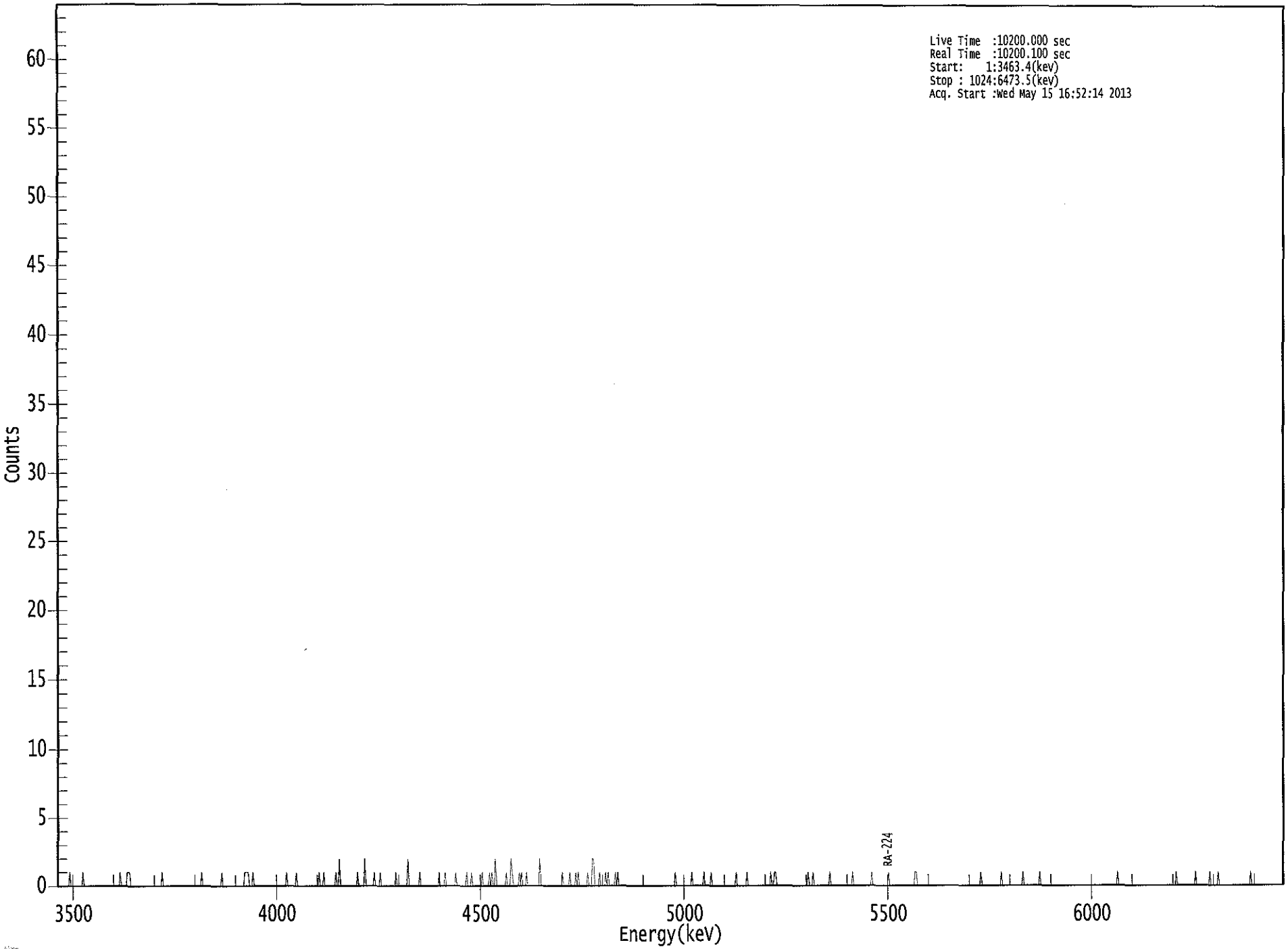
5/16/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058165.CNF



0000058165

****
***** 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:	0	0	0	0	0	0	0	0
9:	0	0	1	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	1	0	0	0
57:	0	0	1	1	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	1
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	1	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	1	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	1	1	1	1
161:	0	0	0	1	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	1
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	1	0	0	0	1	0
225:	0	0	0	0	0	0	0	0
233:	1	0	0	2	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	1	0	0	0	0	0
257:	2	0	0	0	0	0	0	0
265:	1	0	0	0	0	1	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	2	0	0	0
297:	0	0	0	0	0	0	1	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	1	0
321:	0	0	0	1	0	0	0	0
329:	0	0	0	0	1	0	0	0
337:	0	0	0	0	0	1	0	0
345:	0	1	0	0	0	0	0	0
353:	0	0	1	0	0	0	0	0
361:	1	0	1	0	0	2	0	0

369:	0	0	0	0	0	0	1	0

Sample Title: 08

Channel								
377:	0	0	2	1	0	0	0	0
385:	0	1	0	1	0	0	0	1
393:	0	0	0	0	0	0	0	0
401:	0	0	2	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	1	0	0
425:	0	0	0	1	0	0	0	0
433:	1	0	1	0	0	0	0	0
441:	0	0	1	0	0	0	2	2
449:	0	0	0	0	1	0	0	0
457:	0	1	0	1	0	0	0	0
465:	0	1	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	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	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	1	0	0	0	0	0	0
537:	0	0	0	1	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	1	0
569:	0	0	0	0	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	1	0	0	1	1
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	1	0	0	0	1	0
633:	0	0	0	0	0	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	1
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	1
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	1	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	1	1	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	1	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	0	0	0	0	1	0	0

Sample Title: 08

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	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	1	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	1	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	1	0	0
953:	0	0	0	0	0	0	0	0
961:	0	1	0	0	0	0	0	0
969:	1	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	1	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

Sample Description: PZ-202-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 09
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_036
Chamber Serial Number: 04026477B
Detector Serial Number: 84167
Env. Background: System Bkgd 55749
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.610E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:16 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9078 +/- 0.0000
Counting Efficiency: 0.1975 +/- 0.0034 on 4/20/2013 2:01:29 PM
Effective Efficiency: 0.1793 +/- 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	5.515	2.32	149.12	0.68	0.00E+000	3.0
RA-226	4.599	14.81	53.27	1.19	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*	7.82E-002 +/- 2.37E+001	1.90E-001 +/- 5.75E+001
RA-226	0.956	4785.00*	3.81E-001 +/- 2.03E-001	1.69E-001 +/- 5.75E-003

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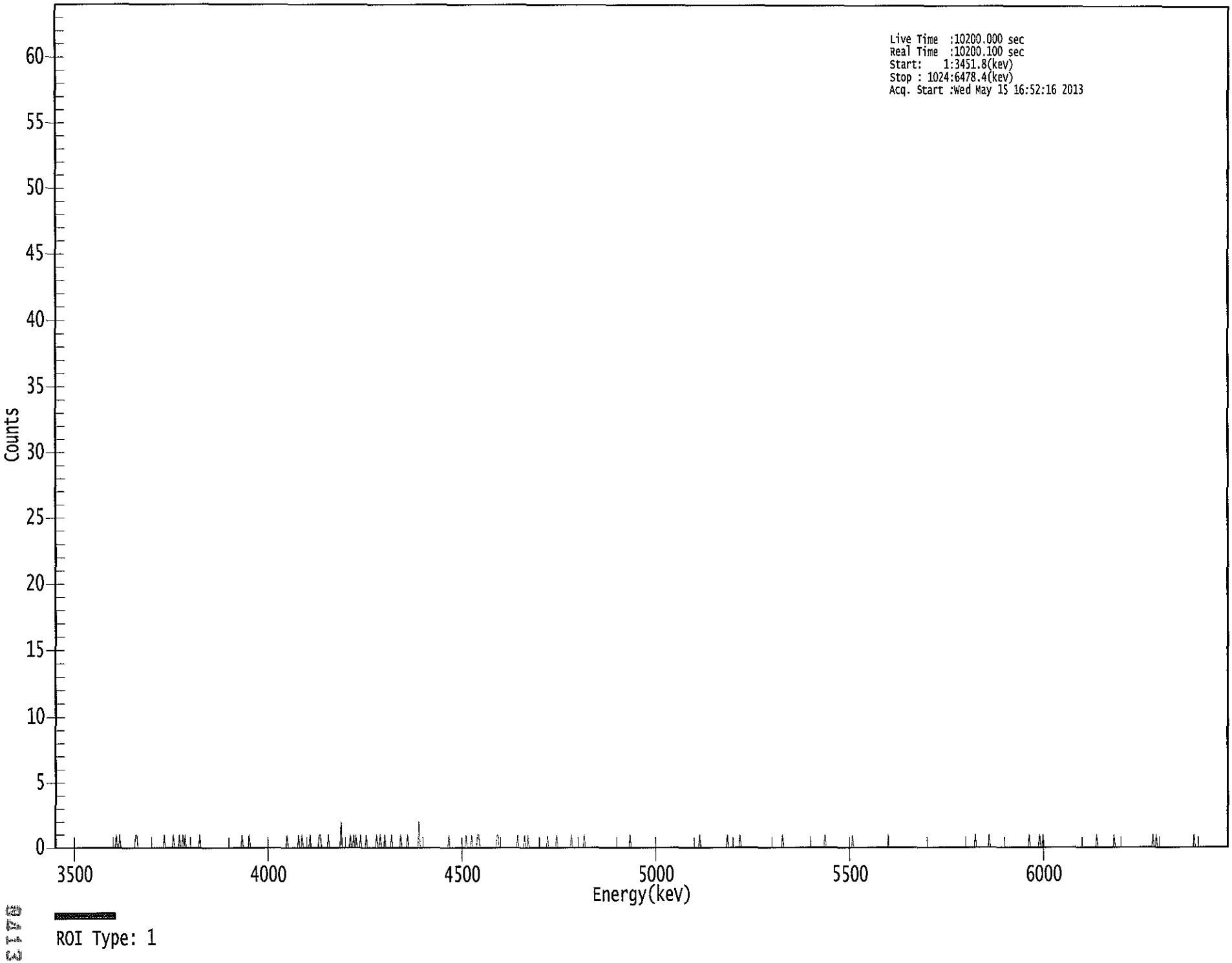
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058166.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:	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	1	0	0
57:	1	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	1	1
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	1
97:	0	0	0	0	0	0	0	1
105:	0	0	0	0	1	0	0	1
113:	0	1	0	0	0	0	0	0
121:	0	0	0	0	0	0	1	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	1	0	0	0	0
169:	0	1	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	1	0	0	0	0	0
209:	0	0	0	0	1	0	0	1
217:	0	0	0	0	0	0	1	0
225:	0	0	0	0	0	0	1	1
233:	0	0	0	0	0	0	1	0
241:	0	0	0	0	0	0	0	0
249:	0	2	0	0	0	0	0	0
257:	0	1	0	0	1	0	1	0
265:	0	0	1	0	0	0	0	1
273:	0	0	0	0	0	0	0	0
281:	1	0	0	1	0	0	0	1
289:	0	0	0	0	0	1	0	0
297:	0	0	0	0	0	1	0	0
305:	0	0	0	1	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	0	0	0	0
337:	0	0	0	0	0	0	0	1
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	1	0
361:	0	0	0	1	0	0	0	0

369:	1	1	0	0	0	0	0	0

Sample Title: 09

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	1	1	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	1	0	0	0	0
409:	0	1	0	0	1	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	0	1	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	1	0	0	0	0	0
457:	0	0	0	0	0	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	0	0	0	0	0	0	0
497:	0	0	0	0	0	1	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	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	1	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	1	0	0	0	0	0
593:	0	0	0	0	0	1	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	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	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	1
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	1	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	1	0	0	0	0	0

Sample Title: 09

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	1	0	0	0	0	0	0
857:	0	0	1	0	0	1	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	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	0	0	0	0	0
953:	0	0	0	0	0	1	0	0
961:	1	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	1	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description: DUP07 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 10
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_037
Chamber Serial Number: 04026478A
Detector Serial Number: 91133
Env. Background: System Bkgd 56985
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.910E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:17 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.7260 +/- 0.0000
Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
Effective Efficiency: 0.1294 +/- 0.0024

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	5.536	16.66	48.59	0.34	0.00E+000	2.9
RA-226	4.594	103.49	19.32	0.51	0.00E+000	2.9

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	8.68E-001 +/- 2.62E+002	2.49E-001 +/- 7.53E+001
RA-226	0.953	4785.00*	4.11E+000 +/- 8.08E-001	2.08E-001 +/- 7.59E-003

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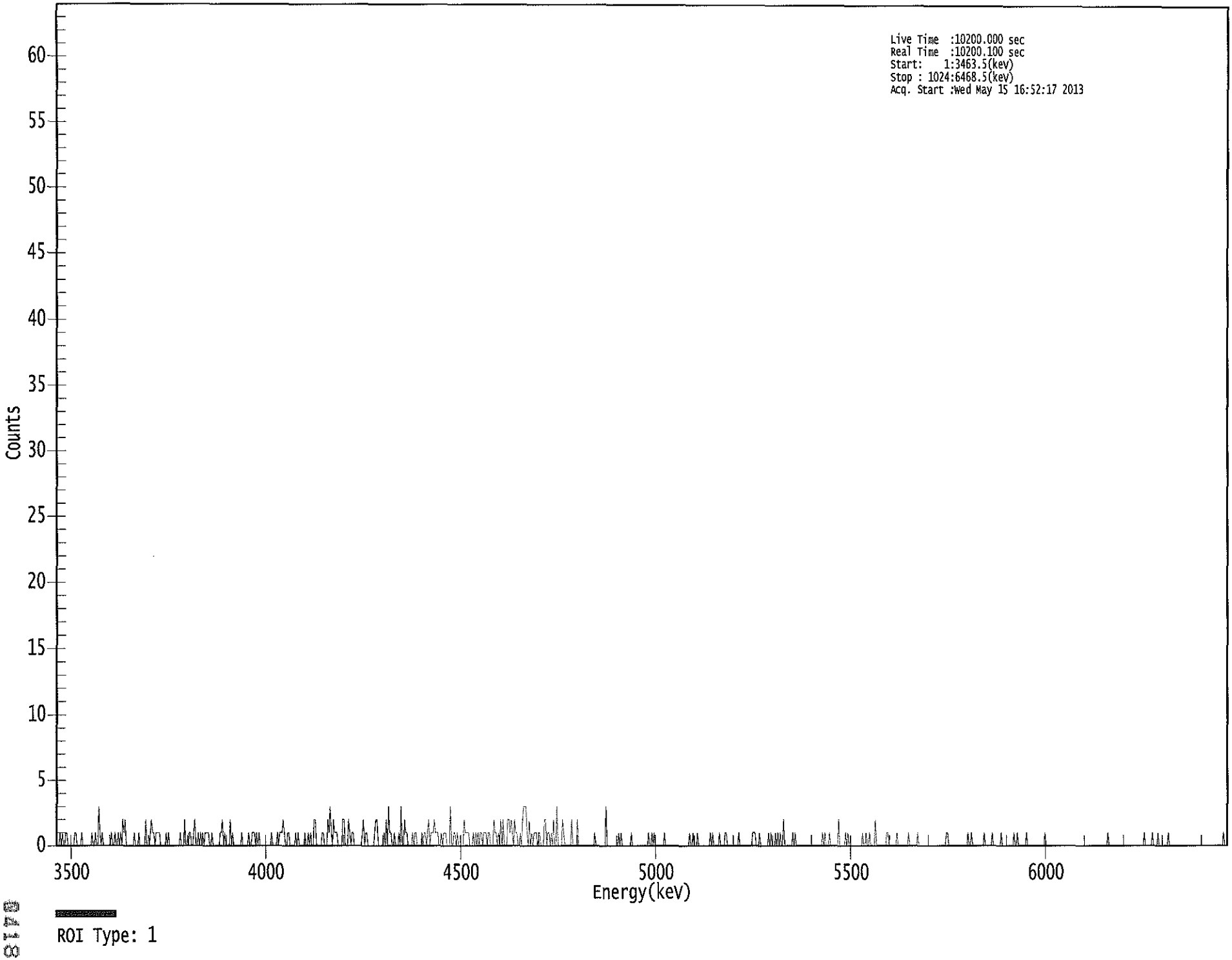
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058162.CNF



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

Sample Title: 10

Elapsed Live time: 10200
Elapsed Real Time: 10200

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

369:	1	0	1	1	0	1	1	1

Sample Title: 10

Channel								
377:	0	1	1	0	0	0	2	1
385:	1	0	1	0	2	0	2	0
393:	0	0	2	2	1	2	1	0
401:	2	1	1	0	0	1	0	2
409:	3	3	3	1	0	2	0	1
417:	0	1	1	1	0	1	1	0
425:	0	0	2	2	0	1	1	0
433:	1	0	2	0	0	3	0	0
441:	0	0	2	1	0	0	0	0
449:	0	0	2	0	0	0	0	2
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	1	0
473:	0	0	0	0	0	0	0	0
481:	3	0	0	0	0	0	0	0
489:	0	0	0	1	0	1	0	0
497:	0	0	0	0	0	0	1	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	1	0	0
521:	1	0	1	0	0	0	0	0
529:	0	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	1	0	0	1	0	0	0
561:	1	0	0	0	0	0	0	0
569:	0	0	0	1	0	1	0	0
577:	0	0	0	1	0	0	0	0
585:	1	1	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:	1	1	1	0	0	0	1	0
617:	0	0	0	0	0	0	1	0
625:	1	0	0	0	1	0	1	0
633:	1	0	0	2	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	1	0	1
673:	0	0	0	1	0	0	0	0
681:	0	0	0	2	0	0	0	0
689:	0	1	0	1	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	1	0	0	1	0	0	1	0
713:	0	0	0	2	0	0	0	0
721:	0	0	0	0	0	1	1	0
729:	0	0	0	0	0	0	1	0
737:	0	0	0	0	0	0	0	0
745:	1	0	0	0	0	0	0	0
753:	1	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	1	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	1	0	0	1

801:	0	0	0	0	0	0	0	0

Sample Title: 10

Channel								
809:	0	0	1	0	0	0	0	0
817:	0	1	0	0	0	0	0	0
825:	0	1	0	0	0	0	0	0
833:	0	0	0	0	1	0	0	1
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	1
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	1	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	0
953:	0	0	0	0	0	1	0	0
961:	0	0	1	0	0	0	0	0
969:	0	0	0	1	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	1	0	0	0	0

Apex-Alpha™

Sample Description: DUP07 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 11
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_038
Chamber Serial Number: 04026478B
Detector Serial Number: 91134
Env. Background: System Bkgd 55208
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 3.540E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:19 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9191 +/- 0.0000
Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
Effective Efficiency: 0.1582 +/- 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	5.510	12.66	55.94	0.34	0.00E+000	5.9
RA-226	4.606	58.49	25.76	0.51	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.960	5685.50*	6.56E-001 +/- 1.99E+002	2.48E-001 +/- 7.50E+001
RA-226	0.959	4785.00*	2.31E+000 +/- 6.01E-001	2.07E-001 +/- 7.14E-003

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0422

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

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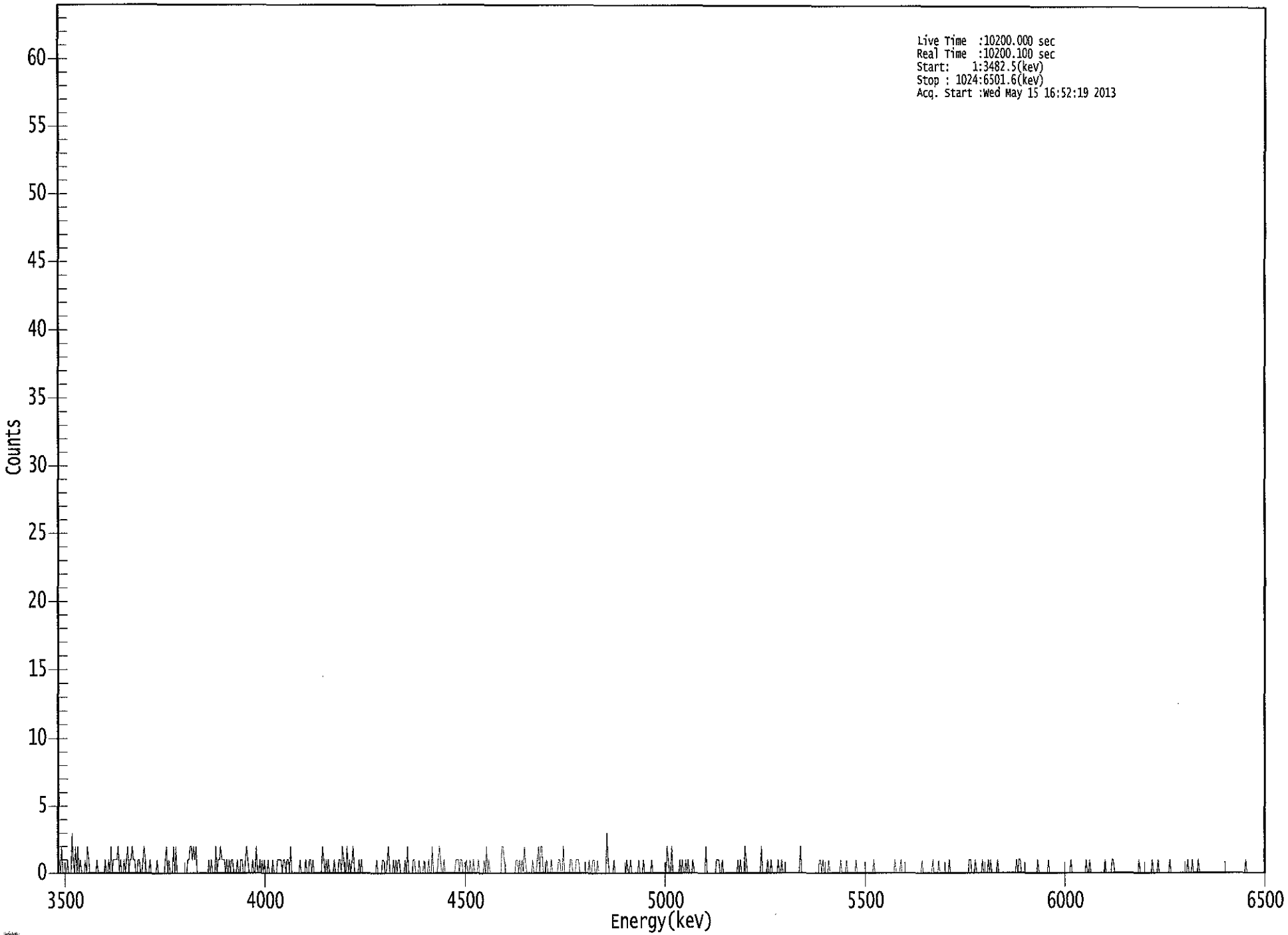


SEP 2015

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

369:	0	0	0	0	0	0	0	0

Sample Title: 11

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

801:	0	0	0	0	0	0	0	0

Sample Title: 11

Channel								
809:	0	0	0	0	1	0	1	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	1
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	1
873:	0	0	1	0	0	0	0	0
881:	0	0	0	0	0	0	0	1
889:	0	0	0	0	0	1	1	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	1
929:	0	0	0	0	1	0	0	0
937:	0	0	0	0	0	0	1	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	1	0	0
961:	0	1	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	1	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

Apex-Alpha™

Sample Description: PZ-106-KS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 12
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_039
Chamber Serial Number: 06027396A
Detector Serial Number: 83109
Env. Background: System Bkgd 55751
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.820E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:20 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9514 +/- 0.0000
Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
Effective Efficiency: 0.1870 +/- 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	5.423	0.64	457.45	1.36	0.00E+000	3.0
RA-226	4.616	14.15	53.90	0.85	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

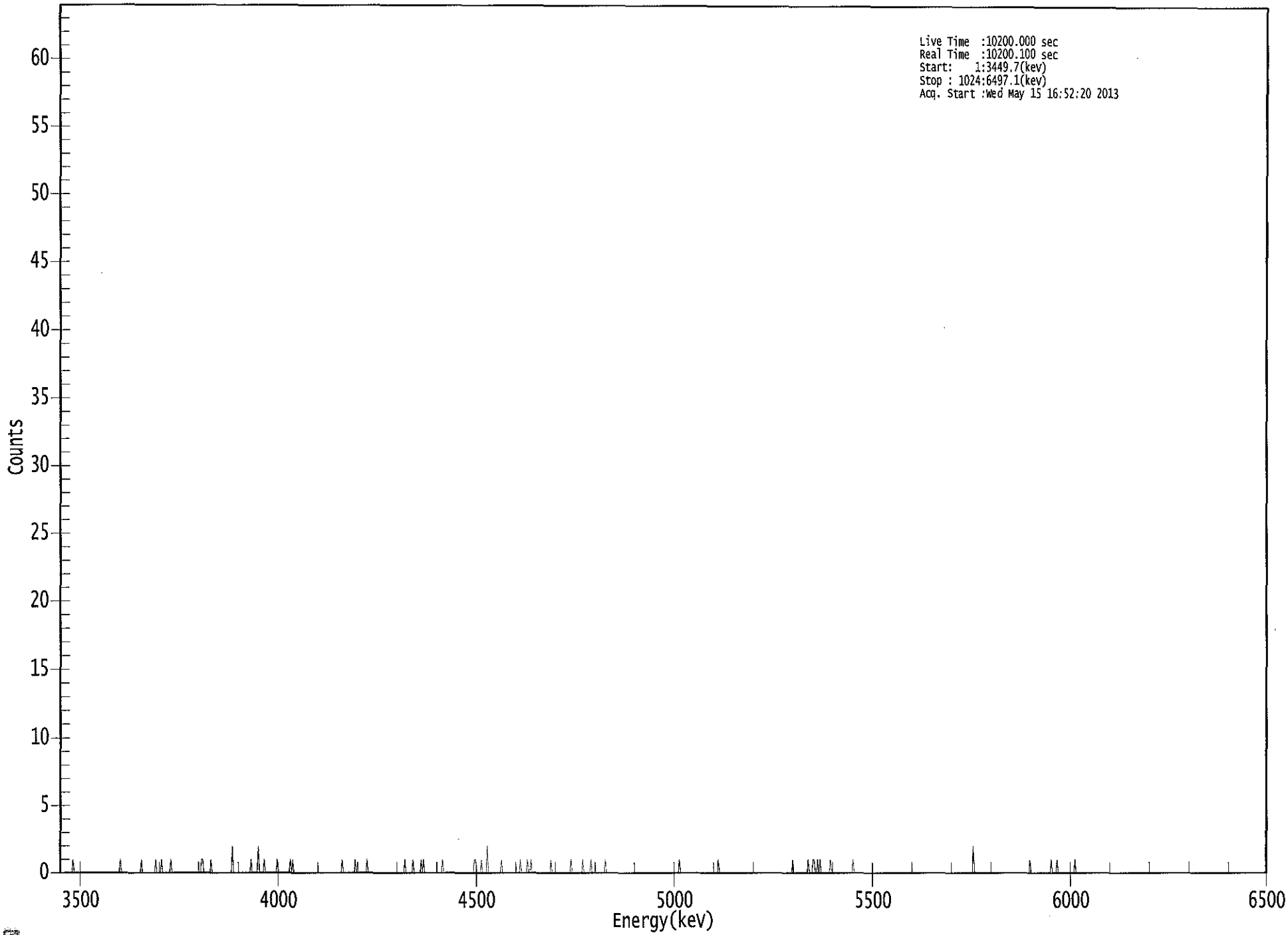
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.914	5685.50*	2.24E-002 +/- 6.77E+000	2.40E-001 +/- 7.25E+001
RA-226	0.963	4785.00*	3.77E-001 +/- 2.04E-001	1.60E-001 +/- 5.42E-003

ACp
5/16/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058167.CNF



8228

****
***** 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: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	1	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	1	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	1	0	0	0	0	1	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:	1	1	0	0	0	0	0	0
129:	1	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	2	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	1	0	0	0	0	0
169:	2	0	0	0	0	1	0	0
177:	0	0	0	0	0	0	0	0
185:	1	0	0	0	0	0	0	0
193:	0	0	0	1	0	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	1
241:	0	0	0	0	0	0	0	0
249:	0	0	1	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	1	0	0	0
297:	0	0	0	1	0	0	0	0
305:	0	0	1	0	1	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	1	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	1
353:	1	0	0	0	0	1	0	0
361:	0	0	2	0	0	0	0	0

369:	0	0	0	0	0	0	1	0

Sample Title: 12

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	1	0
393:	0	0	0	0	1	0	0	1
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	0	0	0	0	0	0	0
433:	0	1	0	0	0	0	0	0
441:	0	0	0	1	0	0	0	0
449:	0	0	1	0	0	0	0	0
457:	0	0	0	0	0	0	1	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	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	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	1	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	1	0	0	0	1	1
641:	0	0	1	0	1	0	0	0
649:	0	0	0	0	0	1	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	1	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	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	2	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	1	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	1	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	1	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	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-106-KS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 13
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_040
Chamber Serial Number: 06027396B
Detector Serial Number: 91135
Env. Background: System Bkgd 56986
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.890E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:22 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9554 +/- 0.0000
Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
Effective Efficiency: 0.1815 +/- 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	5.470	1.83	152.56	0.17	0.00E+000	3.0
RA-226	4.620	11.49	59.30	0.51	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.941	5685.50*	6.75E-002 +/- 2.04E+001	1.54E-001 +/- 4.66E+001
RA-226	0.965	4785.00*	3.23E-001 +/- 1.92E-001	1.48E-001 +/- 5.02E-003

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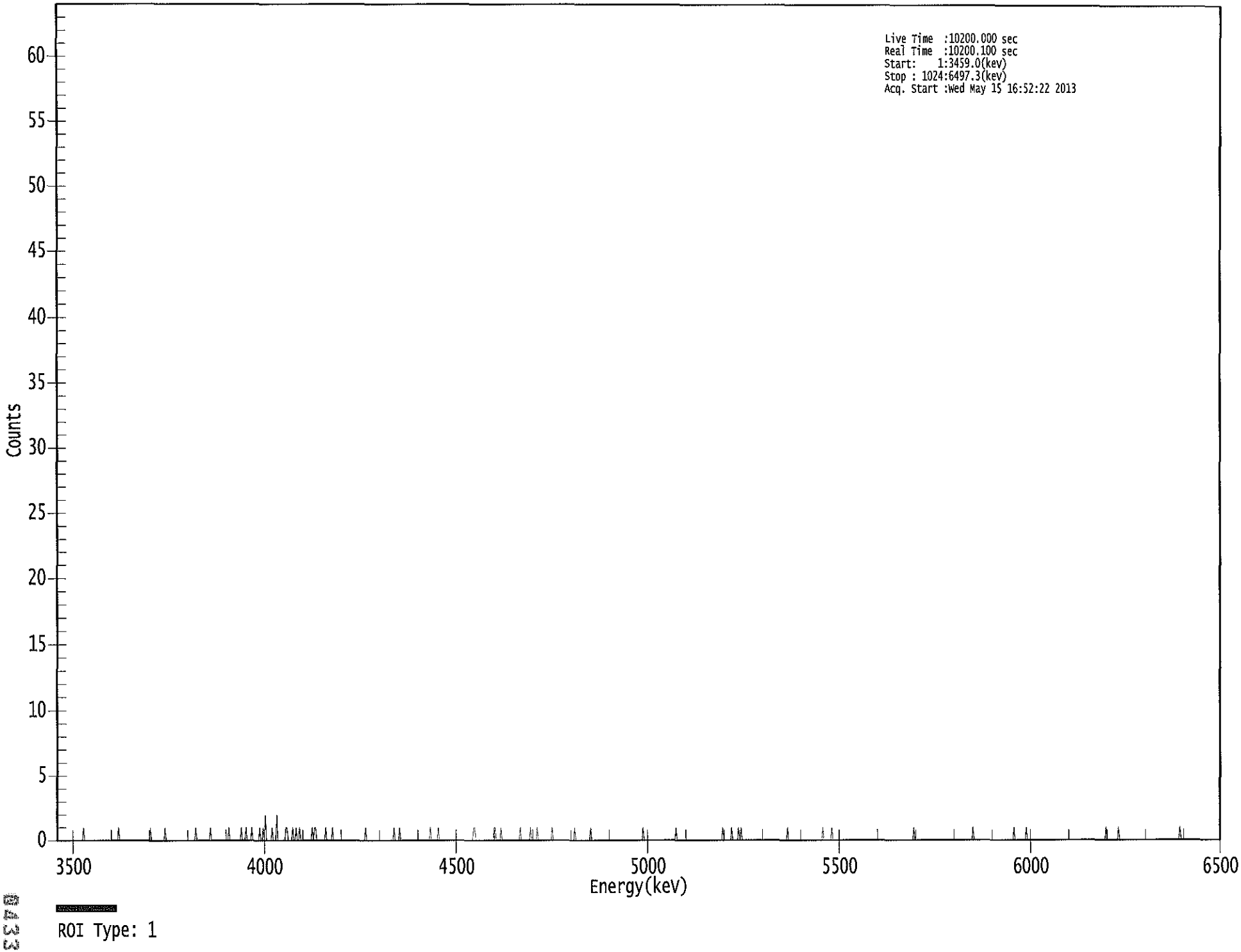
5/16/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058168.CNF



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

Sample Title: 13

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel								
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	1
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	1	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	1	0	0	0	0	0
89:	0	0	0	0	0	0	0	1
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	1	0	0	0	0	0
129:	0	0	0	0	0	0	0	1
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	1
153:	0	0	0	0	0	0	0	0
161:	0	0	1	0	0	0	1	0
169:	0	0	0	1	0	0	0	0
177:	0	0	1	0	0	1	0	2
185:	0	0	0	0	0	1	0	0
193:	0	2	0	0	0	0	0	0
201:	0	1	1	0	0	0	0	1
209:	0	0	1	0	0	1	0	0
217:	0	0	0	0	0	0	0	0
225:	1	0	1	1	0	0	0	0
233:	0	0	0	0	1	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	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:	1	0	0	0	0	1	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	1	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	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	1	1

369:	0	0	0	0	0	0	0	0

Sample Title: 13

Channel								
377:	0	0	0	0	0	0	0	0
385:	1	1	0	0	0	0	1	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	1
409:	0	0	0	0	0	0	0	0
417:	1	0	0	0	0	0	1	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	1	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	1
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	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	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	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:	1	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	1	0	0	0	0	0	0
593:	0	1	0	0	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	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	1	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	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	1	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	1	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	1	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:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	1	0	0	0	0	0
929:	0	0	0	0	0	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	1	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
5/14

Sample Description: FB AT PZ-100-KS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 14
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_041
Chamber Serial Number: 05026930A
Detector Serial Number: 91087
Env. Background: System Bkgd 56987
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.200E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:24 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8510 +/- 0.0000
Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
Effective Efficiency: 0.1684 +/- 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	5.399	0.15	1397.8	0.85	0.00E+000	3.0
RA-226	4.659	0.13	2295.4	1.87	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.898	5685.50*	4.54E-003 +/- 1.38E+000	1.81E-001 +/- 5.48E+001
RA-226	0.979	4785.00*	3.00E-003 +/- 6.89E-002	1.75E-001 +/- 5.92E-003

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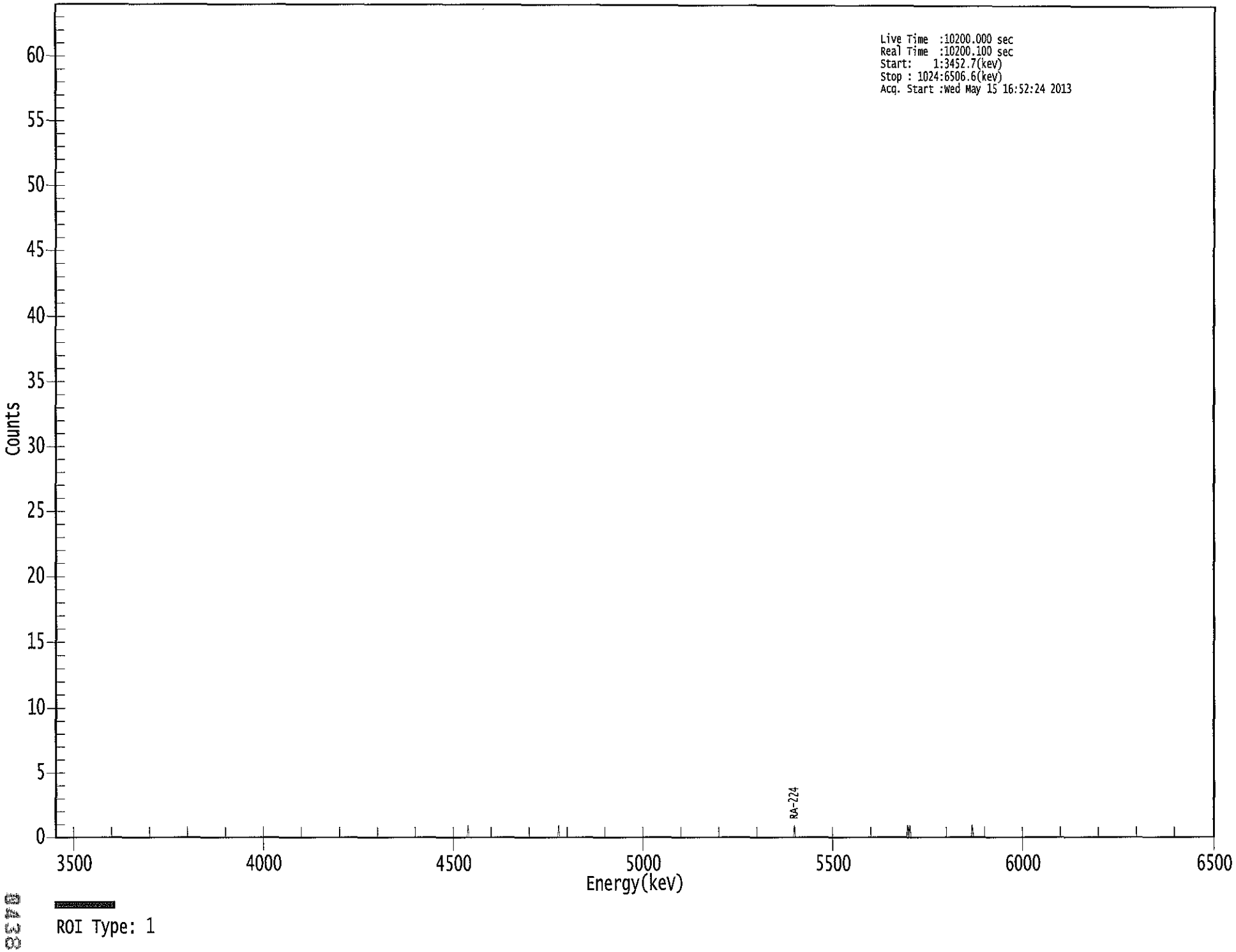
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058170.CNF



SR8

****
***** 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	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	1	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 14

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	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	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	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	1	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	1	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: 14

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	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 AT PZ-100-KS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 15
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_042
Chamber Serial Number: 05026930B
Detector Serial Number: 84185
Env. Background: System Bkgd 56988
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.370E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:25 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9615 +/- 0.0000
Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
Effective Efficiency: 0.1775 +/- 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	5.529	-0.51	400.63	0.51	0.00E+000	0.0
RA-226	4.603	-0.17	1169.4	0.17	0.00E+000	0.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	-1.58E-002 +/- 4.77E+000	1.62E-001 +/- 4.91E+001
RA-226	0.958	4785.00*	-4.01E-003 +/- 4.69E-002	9.84E-002 +/- 3.35E-003

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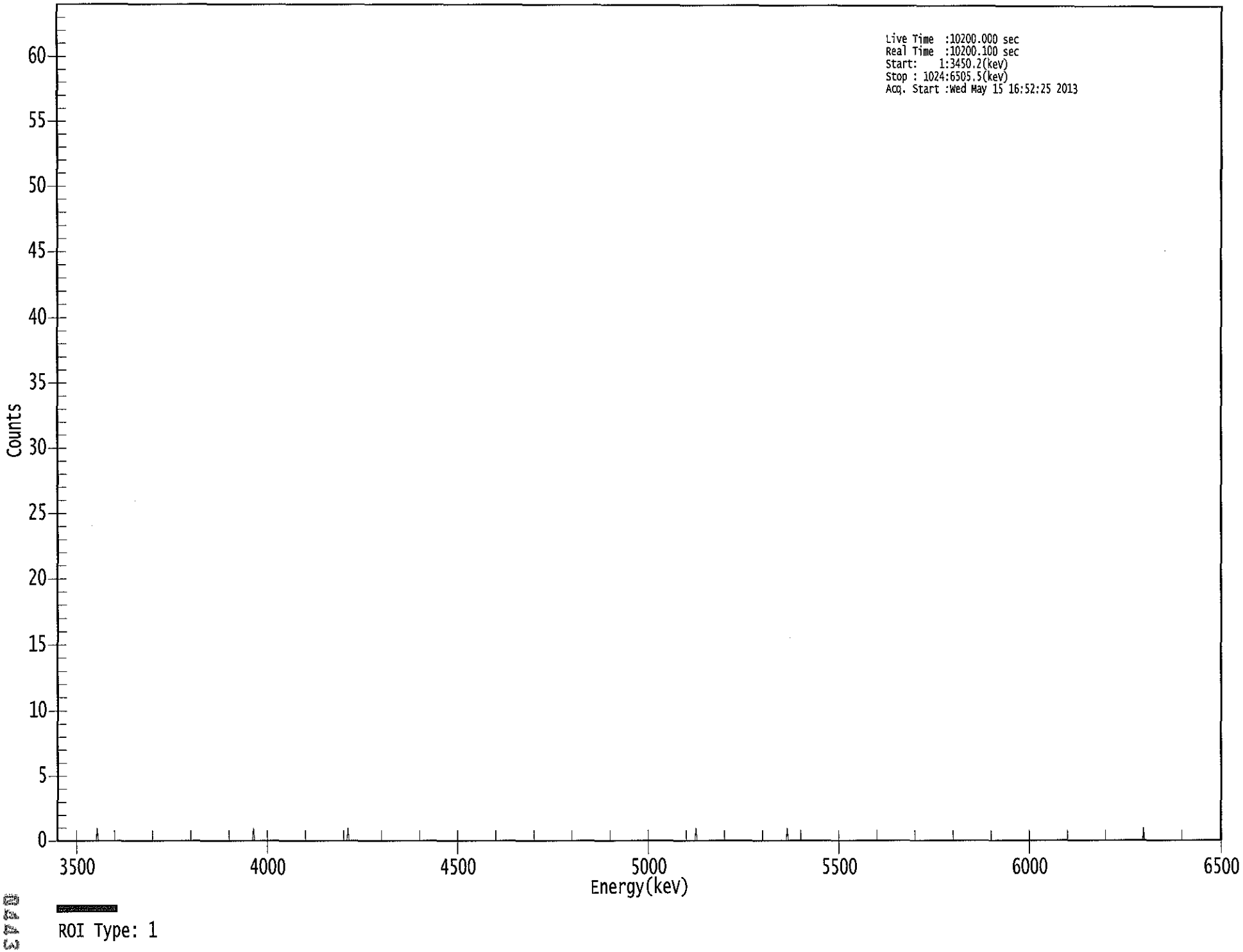
5/16/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058171.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	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	1	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	1	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	1
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	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: 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	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:	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	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	1	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	1	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 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	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™

Sample Description: PZ-100-KS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 16
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_044
Chamber Serial Number: 04026481B
Detector Serial Number: 84168
Env. Background: System Bkgd 56989
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.500E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:27 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8253 +/- 0.0000
Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
Effective Efficiency: 0.1569 +/- 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	5.485	1.32	215.97	0.68	0.00E+000	3.0
RA-226	4.606	5.83	82.55	0.17	0.00E+000	3.0

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.948	5685.50*	4.87E-002 +/- 1.47E+001	2.08E-001 +/- 6.30E+001
RA-226	0.959	4785.00*	1.64E-001 +/- 1.36E-001	1.17E-001 +/- 4.01E-003

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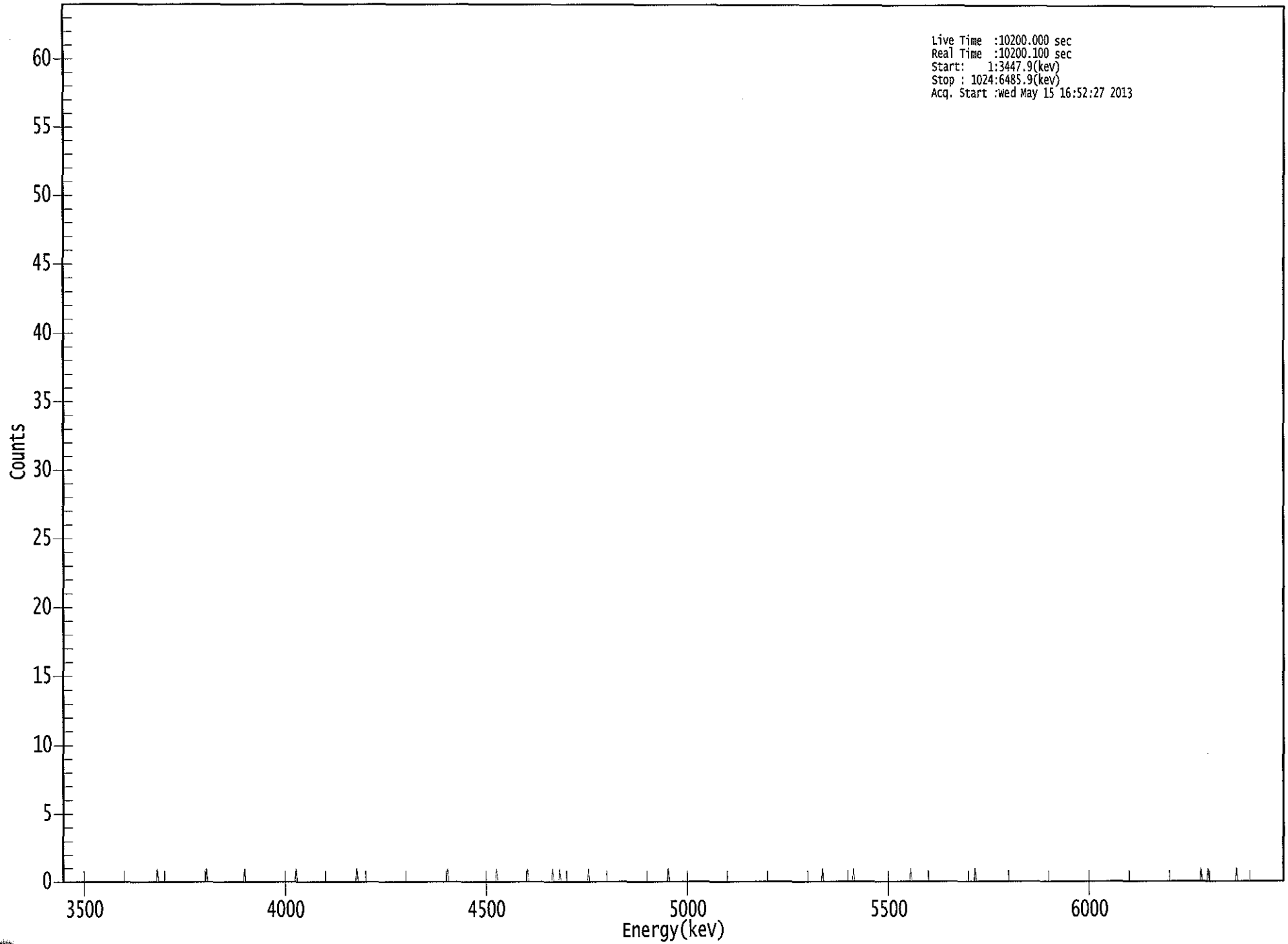
0447

US EPA ARCHIVE DOCUMENT

0000058169.CNF



DRAFT

****
***** 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	1
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	1	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	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	1	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	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	1	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	1	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 16

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	1	0	0	0	0	0
417:	1	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:	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	0	0	0	0	0	0	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	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	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	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	1	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	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:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 16

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	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	1	0	0	0	0	0	1
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	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: PZ-100-KS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 17
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_045
Chamber Serial Number: 04026482A
Detector Serial Number: 91131
Env. Background: System Bkgd 46594
Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.550E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:29 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
Counting Efficiency: 0.1790 +/- 0.0032 on 12/29/2012 2:04:04 PM
Effective Efficiency: 0.1790 +/- 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	5.568	7.00	79.20	0.00	0.00E+000	3.0
RA-226	4.542	10.32	63.32	0.68	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*	2.31E-001 +/- 6.99E+001	1.98E-001 +/- 5.99E+001
RA-226	0.926	4785.00*	2.60E-001 +/- 1.65E-001	1.42E-001 +/- 5.00E-003

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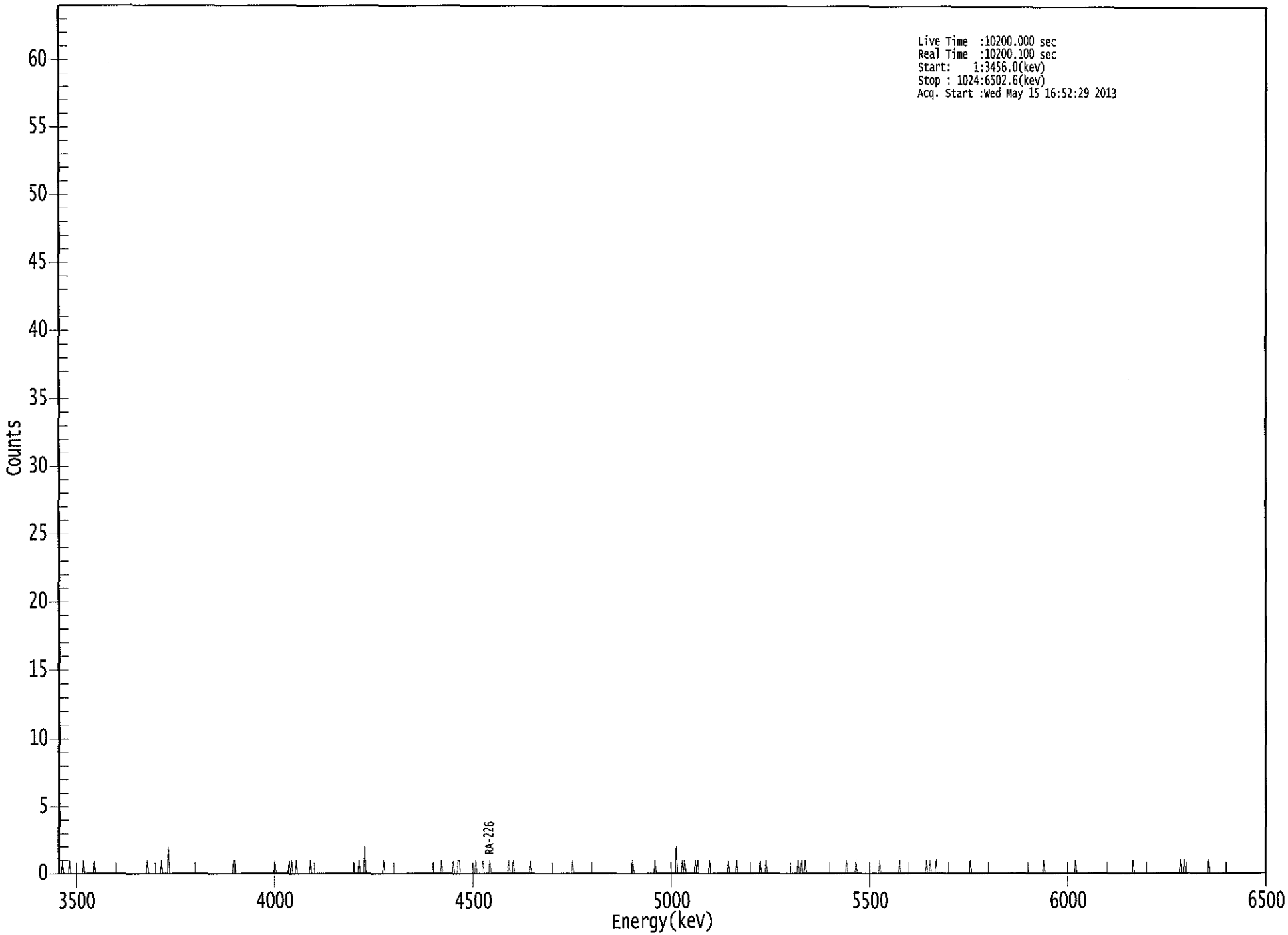
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058160.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	1	0	0	0	0
9:	0	1	0	0	0	0	0	0
17:	0	0	0	0	0	1	0	0
25:	0	0	0	0	0	0	1	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	1	0	0	0	0
81:	0	0	0	0	0	0	0	1
89:	0	0	0	0	0	2	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	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	1
185:	0	0	0	0	0	0	0	0
193:	0	0	0	1	0	1	0	0
201:	0	1	0	0	0	0	0	0
209:	0	0	0	0	0	1	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	1	0
257:	0	0	0	2	0	0	0	0
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	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	1	0	0	0
329:	0	0	0	0	0	0	1	0
337:	0	0	1	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	1	0	0	0	0	0	1
361:	0	0	0	0	0	1	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 17

Channel								
377:	0	0	0	0	0	1	0	0
385:	0	1	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	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	1	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	1	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	0	0	2	0	0	0	0
529:	1	0	1	0	0	0	0	0
537:	0	0	0	1	0	1	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	1
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	1	0	0	0	0	1
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	1	0	0	1	0	0
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	0	0	0	0	0	0
665:	0	0	0	1	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	1
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	1	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	1	0	0	0	0	1
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: 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	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	1	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	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	1	0
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	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™

C
5/16/13

Sample Description: S-53 TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 18
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_046
Chamber Serial Number: 04026482B
Detector Serial Number: 58762
Env. Background: System Bkgd 56990
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:31 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.1352 +/- 0.0000
Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
Effective Efficiency: 0.0242 +/- 0.0004

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	5.496	3.83	102.72	0.17	0.00E+000	3.0
RA-226	4.521	1.32	215.97	0.68	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*	5.50E-001 +/- 1.66E+002	6.00E-001 +/- 1.81E+002
RA-226	0.913	4785.00*	1.45E-001 +/- 3.12E-001	6.18E-001 +/- 2.13E-002

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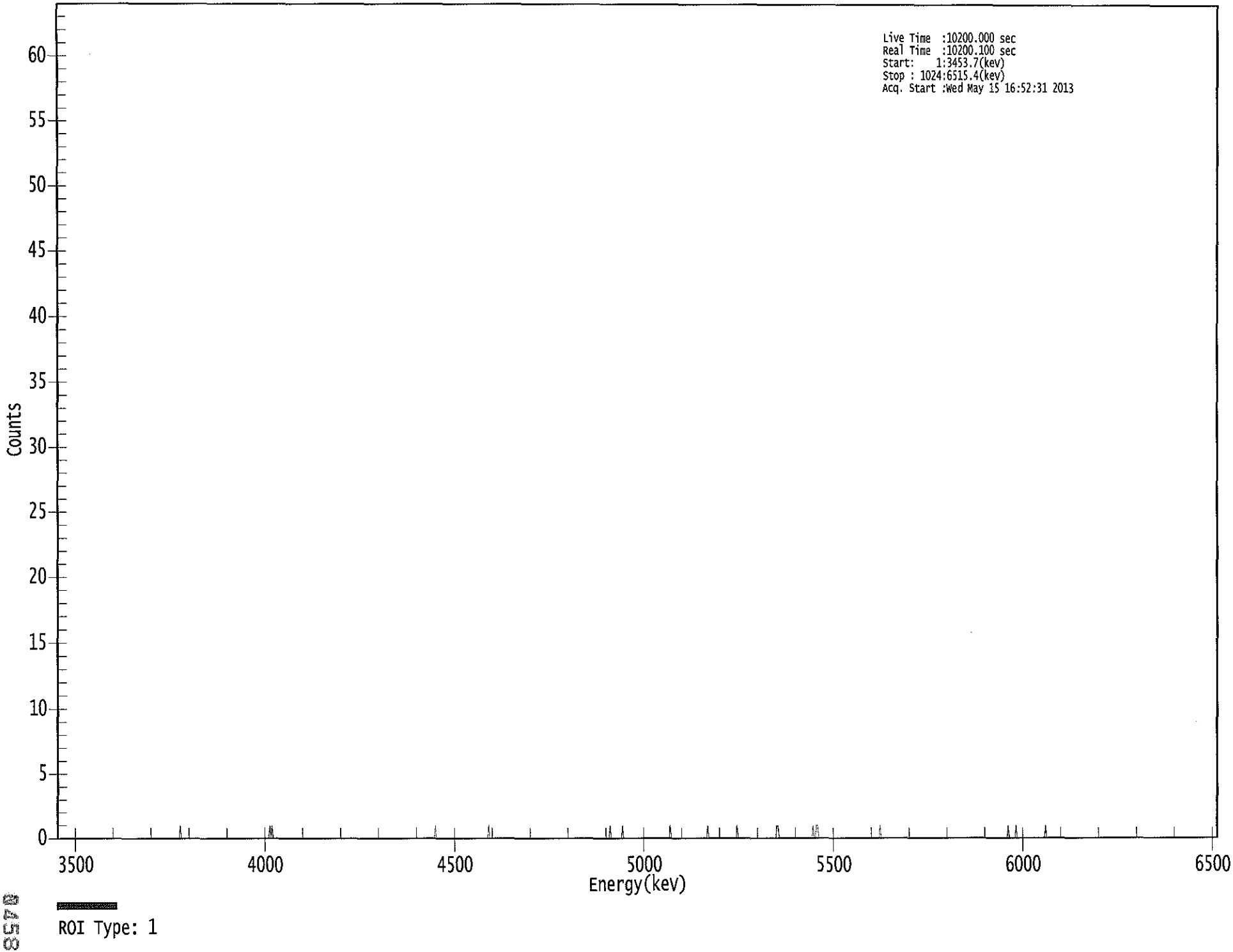
US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058159.CNF



858

****
***** 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	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	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	1	0	1	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	1	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369:	0	0	0	0	0	0	0	0

Sample Title: 18

Channel								
377:	0	0	0	0	1	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	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:	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	1
489:	0	0	0	0	0	0	0	0
497:	0	0	1	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	1	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	1	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	1
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	1	1	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	1	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	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	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801:	0	0	0	0	0	0	0	0

Sample Title: 18

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	1	0
841:	0	0	0	0	0	1	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	1
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™

C

Sample Description: S-53 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000581
Batch Identification: 1304132A-RA
Sample Identification: 19
Sample Geometry: Shelf 2
Procedure Description: Ra

Detector Name: Alpha_047
Chamber Serial Number: 02030596A
Detector Serial Number: 91086
Env. Background: System Bkgd 56991
Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
Generic Mult. Factor: 2.200E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 5/14/2013 12:52:18 PM
Acquisition Date/Time: 5/15/2013 4:52:33 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9788 +/- 0.0000
Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
Effective Efficiency: 0.1783 +/- 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	5.479	10.66	61.14	0.34	0.00E+000	2.9
RA-226	4.655	25.83	38.71	0.17	0.00E+000	2.9

NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.946	5685.50*	4.57E-001 +/- 1.38E+002	2.05E-001 +/- 6.20E+001
RA-226	0.978	4785.00*	8.44E-001 +/- 3.28E-001	1.36E-001 +/- 4.68E-003

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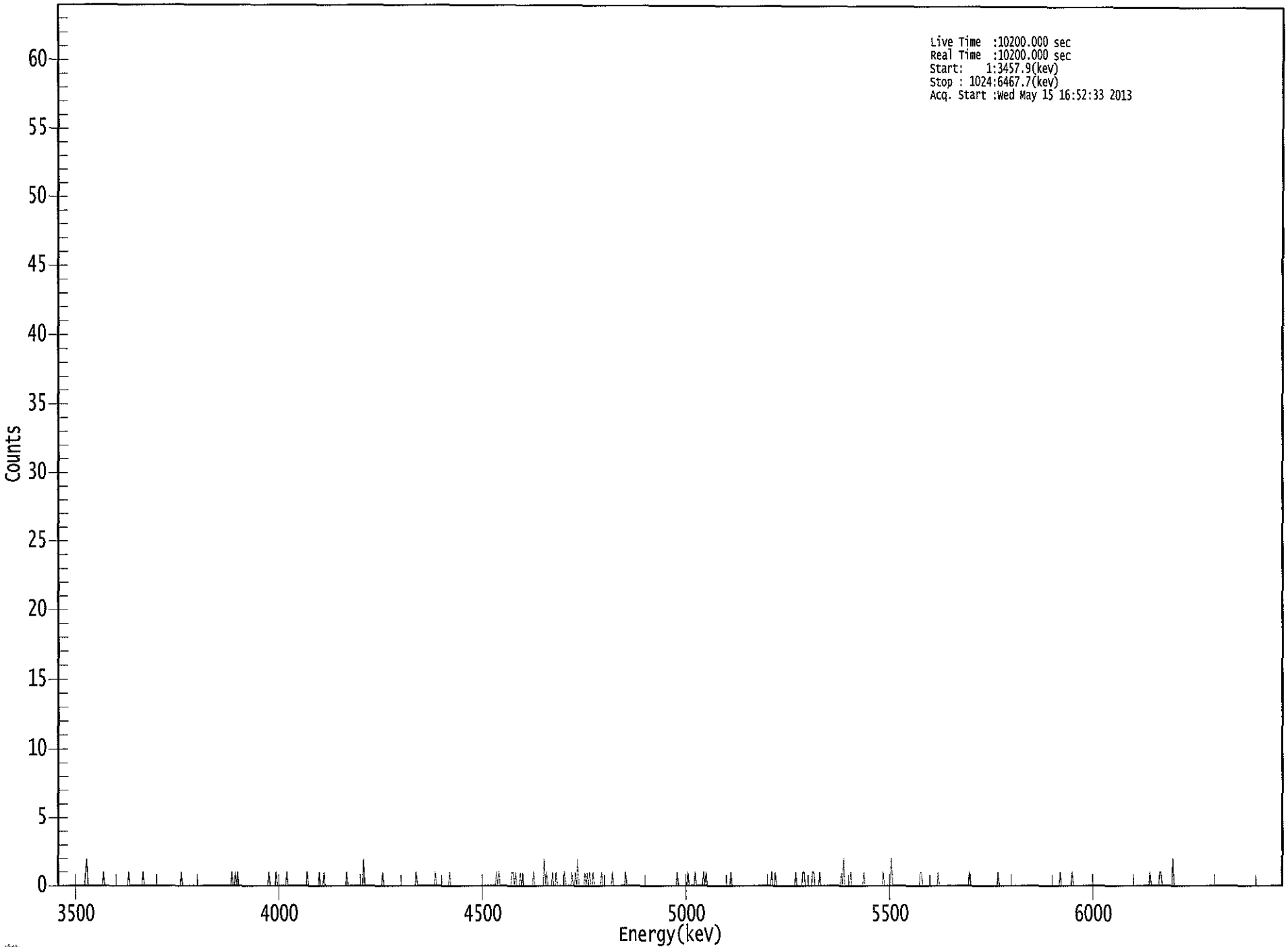
5/16/13

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

0000058172.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	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	1
25:	2	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	1	0	0	0	0
65:	0	0	0	0	0	0	0	1
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	1
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	1	0	0	1	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:	1	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
217:	0	0	1	0	0	0	1	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	1	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	2
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	0	0	0	0	0
297:	0	0	0	1	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	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	0	0	0	0
361:	0	0	0	0	0	0	1	0

369:	1	0	0	0	0	0	0	0

Sample Title: 19

Channel								
377:	0	0	0	1	1	0	1	0
385:	0	0	1	0	1	0	0	0
393:	0	0	0	0	0	1	0	0
401:	0	0	0	0	0	0	2	0
409:	1	0	0	0	0	1	0	0
417:	1	0	0	0	0	0	0	1
425:	0	0	0	0	0	1	0	0
433:	1	0	2	0	0	0	0	0
441:	1	0	1	0	1	0	0	1
449:	0	0	0	0	0	0	1	0
457:	0	0	0	0	0	0	0	1
465:	0	0	0	0	0	0	0	0
473:	0	0	1	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	1	0	0
521:	0	0	0	0	0	0	1	0
529:	0	0	0	0	1	0	0	0
537:	0	0	0	1	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	1	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	1	0	0	1
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	1	0	0	0	0	0	1	1
625:	0	0	0	0	0	0	1	1
633:	0	0	0	0	1	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	1	0
657:	2	0	0	0	0	0	1	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	1	0	0	0	0	0	0
697:	2	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	1	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	1
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	1	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	1	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	1	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:	1	0	0	0	0	0	0	0
921:	1	1	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	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

5/15/2013 5:50:13 AM

Apex-Alpha™

QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 5/15/2013
Time : 5:50:13 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_001	21f	ALL	Not Done	
Alpha_002	21f	ALL	Not Done	
Alpha_003	21f	ALL	Passed	5/15/2013 5:32:39 AM
Alpha_004	21f	ALL	Passed	5/15/2013 5:32:40 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	5/15/2013 5:32:41 AM
Alpha_011	21f	ALL	Passed	5/15/2013 5:32:42 AM
Alpha_012	21f	ALL	Not Done	
Alpha_013	21f	ALL	Passed	5/15/2013 5:32:43 AM
Alpha_014	21f	ALL	Passed	5/15/2013 5:32:43 AM
Alpha_015	21f	ALL	Not Done	
Alpha_016	21f	ALL	Not Done	
Alpha_017	AIM730	ALL	Not Done	
Alpha_018	AIM730	ALL	Passed	5/15/2013 5:32:44 AM
Alpha_019	AIM730	ALL	Passed	5/15/2013 5:32:45 AM
Alpha_020	AIM730	ALL	Not Done	
Alpha_021	AIM730	ALL	Not Done	
Alpha_022	AIM730	ALL	Passed	5/15/2013 5:32:46 AM
Alpha_023	AIM730	ALL	Not Done	
Alpha_024	AIM730	ALL	Passed	5/15/2013 5:32:47 AM
Alpha_025	AIM730	ALL	Passed	5/15/2013 5:32:47 AM
Alpha_026	AIM730	ALL	Not Done	
Alpha_027	AIM730	ALL	Passed	5/15/2013 5:32:48 AM
Alpha_028	AIM730	ALL	Not Done	
Alpha_029	AIM730	ALL	Passed	5/15/2013 5:32:49 AM
Alpha_030	AIM730	ALL	Not Done	
Alpha_031	AIM730	ALL	Not Done	
Alpha_032	AIM730	ALL	Not Done	
Alpha_033	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:32:50 AM
Alpha_034	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:32:52 AM
Alpha_035	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:32:53 AM
Alpha_036	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:32:55 AM
Alpha_037	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:32:57 AM
Alpha_038	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:32:58 AM
Alpha_039	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:33:00 AM
Alpha_040	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:33:03 AM
Alpha_041	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:33:05 AM
Alpha_042	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:33:07 AM

Review of QA Results - Pulser Check

5/15/2013 5:50:13 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha_043	Alpha Analyst100DC	ALL	Passed	5/11/2013 10:55:58 AM
Alpha_044	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:33:09 AM
Alpha_045	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:33:12 AM
Alpha_046	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:33:15 AM
Alpha_047	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:33:18 AM
Alpha_048	Alpha Analyst100DC	ALL	Passed	5/15/2013 5:33:20 AM

APPROVED BY: _____

APPROVAL DATE: 5/15/13

****
***** 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

US EPA ARCHIVE DOCUMENT

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SECTION XI

ANALYTICAL DATA (RADIUM-228)

US EPA ARCHIVE DOCUMENT

13-04132
Ra228
Run 1

Work Order	13-04132
Analysis Code	Ra228
Run	1
Date Received	4/18/2013
Lab Deadline	5/9/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	l
Matrix	WA
Method	EPA 904.0 Modified
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	1007.586
Carrier	Yttirum
Carrier Conc (mg/ml)	34

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/18/13 00:00	1.0000E+00
02	MBL	BLANK		04/18/13 00:00	1.5000E+00
03	DUP	FB at PZ-100-KS TOT	39	04/16/13 08:40	1.5000E+00
04	TRG	D-14 TOT	38	04/12/13 11:05	1.5000E+00
05	TRG	D-14 DIS	38	04/12/13 11:05	1.5000E+00
06	TRG	PZ-112-AS TOT	45	04/12/13 11:18	1.5000E+00
07	TRG	PZ-112-AS DIS	45	04/12/13 11:18	1.5000E+00
08	TRG	PZ-202-SS TOT	46	04/12/13 12:32	1.5000E+00
09	TRG	PZ-202-SS DIS	46	04/12/13 12:32	1.5000E+00
10	TRG	DUP07 TOT	40	04/12/13 00:00	1.5000E+00
11	TRG	DUP07 DIS	40	04/12/13 00:00	1.5000E+00
12	TRG	PZ-106-KS TOT	36	04/15/13 15:59	1.5000E+00
13	TRG	PZ-106-KS DIS	36	04/15/13 15:59	1.5000E+00
14	DO	FB at PZ-100-KS TOT	39	04/16/13 08:40	1.5000E+00
15	TRG	FB at PZ-100-KS DIS	39	04/16/13 08:40	1.5000E+00
16	TRG	PZ-100-KS TOT	37	04/16/13 08:50	1.5000E+00
17	TRG	PZ-100-KS DIS	37	04/16/13 08:50	1.5000E+00
18	TRG	S-53 TOT	41	04/16/13 09:00	1.0000E+00
19	TRG	S-53 DIS	41	04/16/13 09:00	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.

US EPA ARCHIVE DOCUMENT

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	0.9178	924.8	376.7	90.43	2.000	0.0934	0.1485	0.0551	81.03	73.28	1.00	1.00
02	MBL	0.9119	918.8	435.6	105.25	2.000	0.0936	0.1493	0.0557	81.91	86.21	1.00	1.00
03	DUP	0.9044	911.3	367.4	89.51	2.000	0.0939	0.1499	0.0560	82.35	73.71	1.00	1.00
04	TRG	0.8976	904.4	342.7	84.12	2.000	0.0934	0.1474	0.0540	79.41	66.80	1.00	1.00
05	TRG	0.8990	905.8	388.6	95.24	2.000	0.0935	0.1477	0.0542	79.71	75.91	1.00	1.00
06	TRG	0.9014	908.2	398.8	97.48	2.000	0.0937	0.1483	0.0546	80.29	78.27	1.00	1.00
07	TRG	0.8989	905.7	413.1	101.25	2.000	0.0934	0.1488	0.0554	81.47	82.49	1.00	1.00
08	TRG	0.9009	907.7	354.5	86.70	2.000	0.0937	0.1496	0.0559	82.21	71.27	1.00	1.00
09	TRG	0.9009	907.7	371.2	90.78	2.000	0.0938	0.1501	0.0563	82.79	75.16	1.00	1.00
10	TRG	0.9017	908.5	297.1	72.60	2.000	0.0933	0.1495	0.0562	82.65	60.00	1.00	1.00
11	TRG	0.8997	906.5	375.3	91.91	2.000	0.0941	0.1508	0.0567	83.38	76.63	1.00	1.00
12	TRG	0.9013	908.1	389.2	95.14	2.000	0.0940	0.1511	0.0571	83.97	79.89	1.00	1.00
13	TRG	0.8996	906.4	390.1	95.54	2.000	0.0937	0.1507	0.0570	83.82	80.09	1.00	1.00
14	DO	0.9002	907.0	347.7	85.10	2.000	0.0940	0.1515	0.0575	84.56	71.96	1.00	1.00
15	TRG	0.9008	907.6	393.1	96.15	2.000	0.0938	0.1507	0.0569	83.68	80.45	1.00	1.00
16	TRG	0.9023	909.1	338.0	82.53	2.000	0.0935	0.1501	0.0566	83.24	68.70	1.00	1.00
17	TRG	0.8744	881.0	401.5	101.17	2.000	0.0913	0.1488	0.0575	84.56	85.55	1.00	1.00
18	TRG	0.9038	910.7	55.5	13.52	2.000	0.0968	0.1545	0.0577	84.85	11.48	1.00	1.00
19	TRG	0.9067	913.6	402.8	97.88	2.000	0.0969	0.1538	0.0569	83.68	81.90	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.

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
02	MBL			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
03	DUP			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
04	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
05	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
06	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
07	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
08	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
09	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
10	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
11	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
12	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
13	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
14	DO			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
15	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
16	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
17	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
18	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	TSMITH
19	TRG			05/03/13 12:33	JBARNARD	05/14/13 12:53	LWALKER	05/21/13 10:00	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.

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Eberline Services
Oak Ridge Laboratory

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-Ra228-1

Client	Eberline Services Work Order	Analysis Code	Run
Engineering Management Support, Inc.	13-04132	Ra228	1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-228	LCS	LCS	pCi/l	9.46E+00	2.03E+00	2.04E+00	8.96E+00	105.56	OK		INV	
02	RA-228	MBL	BLANK	pCi/l	3.86E-01	3.43E-01	6.89E-01					OK	OK
03	RA-228	DUP	FB at PZ-100-KS TOT	pCi/l	5.71E-01	3.82E-01	7.45E-01				NA	OK	
04	RA-228	TRG	D-14 TOT	pCi/l	1.74E+00	5.54E-01	9.99E-01					OK	
05	RA-228	TRG	D-14 DIS	pCi/l	1.39E+00	4.48E-01	7.96E-01					OK	
06	RA-228	TRG	PZ-112-AS TOT	pCi/l	2.24E+00	5.01E-01	8.36E-01					OK	
07	RA-228	TRG	PZ-112-AS DIS	pCi/l	1.05E+00	4.40E-01	8.25E-01					OK	
08	RA-228	TRG	PZ-202-SS TOT	pCi/l	6.91E-01	4.42E-01	8.64E-01					OK	
09	RA-228	TRG	PZ-202-SS DIS	pCi/l	8.63E-01	4.15E-01	7.84E-01					OK	
10	RA-228	TRG	DUP07 TOT	pCi/l	1.80E+00	6.47E-01	1.20E+00					OK	
11	RA-228	TRG	DUP07 DIS	pCi/l	2.47E+00	5.58E-01	9.48E-01					OK	
12	RA-228	TRG	PZ-106-KS TOT	pCi/l	3.15E-01	4.31E-01	8.86E-01					OK	
13	RA-228	TRG	PZ-106-KS DIS	pCi/l	4.33E-01	4.27E-01	8.65E-01					OK	
14	RA-228	DO	FB at PZ-100-KS TOT	pCi/l	1.92E-01	4.49E-01	9.40E-01					OK	
15	RA-228	TRG	FB at PZ-100-KS DIS	pCi/l	5.61E-01	3.92E-01	7.71E-01					OK	
16	RA-228	TRG	PZ-100-KS TOT	pCi/l	8.41E-01	5.35E-01	1.05E+00					OK	
17	RA-228	TRG	PZ-100-KS DIS	pCi/l	9.55E-01	3.77E-01	6.91E-01					OK	
18	RA-228	TRG	S-53 TOT	pCi/l	-2.53E+00	4.71E+00	1.03E+01					INV	
19	RA-228	TRG	S-53 DIS	pCi/l	1.46E+00	6.15E-01	1.15E+00					OK	

US EPA ARCHIVE DOCUMENT

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-Ra228-1

Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-04132
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	RA-228	LCS	04/18/13 00:00	1.00E+00	90.43	81.03	73.28	1.00	5/14/2013 12:53	5/21/2013 10:00
02	RA-228	MBL	04/18/13 00:00	1.50E+00	105.25	81.91	86.21	1.00	5/14/2013 12:53	5/21/2013 10:00
03	RA-228	DUP	04/16/13 08:40	1.50E+00	89.51	82.35	73.71	1.00	5/14/2013 12:53	5/21/2013 10:00
04	RA-228	TRG	04/12/13 11:05	1.50E+00	84.12	79.41	66.80	1.00	5/14/2013 12:53	5/21/2013 10:00
05	RA-228	TRG	04/12/13 11:05	1.50E+00	95.24	79.71	75.91	1.00	5/14/2013 12:53	5/21/2013 10:00
06	RA-228	TRG	04/12/13 11:18	1.50E+00	97.48	80.29	78.27	1.00	5/14/2013 12:53	5/21/2013 10:00
07	RA-228	TRG	04/12/13 11:18	1.50E+00	101.25	81.47	82.49	1.00	5/14/2013 12:53	5/21/2013 10:00
08	RA-228	TRG	04/12/13 12:32	1.50E+00	86.70	82.21	71.27	1.00	5/14/2013 12:53	5/21/2013 10:00
09	RA-228	TRG	04/12/13 12:32	1.50E+00	90.78	82.79	75.16	1.00	5/14/2013 12:53	5/21/2013 10:00
10	RA-228	TRG	04/12/13 00:00	1.50E+00	72.60	82.65	60.00	1.00	5/14/2013 12:53	5/21/2013 10:00
11	RA-228	TRG	04/12/13 00:00	1.50E+00	91.91	83.38	76.63	1.00	5/14/2013 12:53	5/21/2013 10:00
12	RA-228	TRG	04/15/13 15:59	1.50E+00	95.14	83.97	79.89	1.00	5/14/2013 12:53	5/21/2013 10:00
13	RA-228	TRG	04/15/13 15:59	1.50E+00	95.54	83.82	80.09	1.00	5/14/2013 12:53	5/21/2013 10:00
14	RA-228	DO	04/16/13 08:40	1.50E+00	85.10	84.56	71.96	1.00	5/14/2013 12:53	5/21/2013 10:00
15	RA-228	TRG	04/16/13 08:40	1.50E+00	96.15	83.68	80.45	1.00	5/14/2013 12:53	5/21/2013 10:00
16	RA-228	TRG	04/16/13 08:50	1.50E+00	82.53	83.24	68.70	1.00	5/14/2013 12:53	5/21/2013 10:00
17	RA-228	TRG	04/16/13 08:50	1.50E+00	101.17	84.56	85.55	1.00	5/14/2013 12:53	5/21/2013 10:00
18	RA-228	TRG	04/16/13 09:00	1.00E+00	13.52	84.85	11.48	1.00	5/14/2013 12:53	5/21/2013 10:00
19	RA-228	TRG	04/16/13 09:00	1.00E+00	97.88	83.68	81.90	1.00	5/14/2013 12:53	5/21/2013 10:00

US EPA ARCHIVE DOCUMENT

Preliminary Data Report & Analytical Calculations

Work Order: 13-04132-Ra228-1

Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-04132
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	05/21/13 13:47		LB4110A	B1	30	177	1.4	0.4626
02	RA-228	MBL	05/21/13 13:46		LB4110R	A1	120	159	1.016666667	0.4776
03	RA-228	DUP	05/21/13 13:46		LB4110R	A2	120	146	0.833333333	0.4699
04	RA-228	TRG	05/21/13 13:46		LB4110R	A3	120	288	1.316666667	0.4809
05	RA-228	TRG	05/21/13 13:46		LB4110R	A4	120	240	1.033333333	0.4732
06	RA-228	TRG	05/21/13 13:46		LB4110R	B1	120	342	1.233333333	0.4754
07	RA-228	TRG	05/21/13 13:46		LB4110R	B2	120	248	1.283333333	0.4658
08	RA-228	TRG	05/21/13 13:46		LB4110R	B3	120	182	1.066666667	0.4713
09	RA-228	TRG	05/21/13 13:46		LB4110R	B4	120	192	1	0.4773
10	RA-228	TRG	05/21/13 13:46		LB4110R	C1	120	294	1.466666667	0.4705
11	RA-228	TRG	05/21/13 13:46		LB4110R	C2	120	384	1.483333333	0.4676
12	RA-228	TRG	05/21/13 13:46		LB4110R	C3	120	191	1.366666667	0.4614
13	RA-228	TRG	05/21/13 13:46		LB4110R	C4	120	202	1.366666667	0.4714
14	RA-228	DO	05/21/13 13:47		LB4110A	C1	120	167	1.266666667	0.4667
15	RA-228	TRG	05/21/13 13:47		LB4110A	C2	120	170	1.016666667	0.4578
16	RA-228	TRG	05/21/13 13:47		LB4110A	C3	120	241	1.483333333	0.4699
17	RA-228	TRG	05/21/13 13:47		LB4110A	C4	120	205	0.966666667	0.4692
18	RA-228	TRG	05/21/13 13:47		LB4110A	D2	120	189	1.75	0.4682
19	RA-228	TRG	05/21/13 13:47		LB4110A	D4	120	222	1.116666667	0.4741

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Count Room Report
Client: Engineering Management Su

13-04132-Ra228-1 (pCi/l) in WA
Tracer ID: Ba-6a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/18/13 00:00	1.0000	0.9178	924.7624	376.7000	90.43	1.00	1.00
02	MBL	BLANK	04/18/13 00:00	1.5000	0.9119	918.8177	435.6000	105.25	1.00	1.00
03	DUP	FB at PZ-100-KS TOT	04/16/13 08:40	1.5000	0.9044	911.2608	367.4000	89.51	1.00	1.00
04	TRG	D-14 TOT	04/12/13 11:05	1.5000	0.8976	904.4092	342.7000	84.12	1.00	1.00
05	TRG	D-14 DIS	04/12/13 11:05	1.5000	0.8990	905.8198	388.6000	95.24	1.00	1.00
06	TRG	PZ-112-AS TOT	04/12/13 11:18	1.5000	0.9014	908.2380	398.8000	97.48	1.00	1.00
07	TRG	PZ-112-AS DIS	04/12/13 11:18	1.5000	0.8989	905.7191	413.1000	101.25	1.00	1.00
08	TRG	PZ-202-SS TOT	04/12/13 12:32	1.5000	0.9009	907.7342	354.5000	86.70	1.00	1.00
09	TRG	PZ-202-SS DIS	04/12/13 12:32	1.5000	0.9009	907.7342	371.2000	90.78	1.00	1.00
10	TRG	DUP07 TOT	04/12/13 00:00	1.5000	0.9017	908.5403	297.1000	72.60	1.00	1.00
11	TRG	DUP07 DIS	04/12/13 00:00	1.5000	0.8997	906.5251	375.3000	91.91	1.00	1.00
12	TRG	PZ-106-KS TOT	04/15/13 15:59	1.5000	0.9013	908.1373	389.2000	95.14	1.00	1.00
13	TRG	PZ-106-KS DIS	04/15/13 15:59	1.5000	0.8996	906.4244	390.1000	95.54	1.00	1.00
14	DO	FB at PZ-100-KS TOT	04/16/13 08:40	1.5000	0.9002	907.0289	347.7000	85.10	1.00	1.00
15	TRG	FB at PZ-100-KS DIS	04/16/13 08:40	1.5000	0.9008	907.6335	393.1000	96.15	1.00	1.00
16	TRG	PZ-100-KS TOT	04/16/13 08:50	1.5000	0.9023	909.1448	338.0000	82.53	1.00	1.00
17	TRG	PZ-100-KS DIS	04/16/13 08:50	1.5000	0.8744	881.0332	401.5000	101.17	1.00	1.00
18	TRG	S-53 TOT	04/16/13 09:00	1.0000	0.9038	910.6562	55.4800	13.52	1.00	1.00
19	TRG	S-53 DIS	04/16/13 09:00	1.0000	0.9067	913.5782	402.8000	97.88	1.00	1.00

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Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-04132	1	Ra228	5/3/2013 12:30	JBARNARD		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Ra-228	Ra-11	38.839	5/3/2013	0.510	0.5121				8.96	0.457	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	1007.586	5/3/2013	0.9178	1.0100
02	Ba-133	Ba-6a	1007.586	5/3/2013	0.9119	1.0100
03	Ba-133	Ba-6a	1007.586	5/3/2013	0.9044	1.0100
04	Ba-133	Ba-6a	1007.586	5/3/2013	0.8976	1.0100
05	Ba-133	Ba-6a	1007.586	5/3/2013	0.8990	1.0100
06	Ba-133	Ba-6a	1007.586	5/3/2013	0.9014	1.0100
07	Ba-133	Ba-6a	1007.586	5/3/2013	0.8989	1.0100
08	Ba-133	Ba-6a	1007.586	5/3/2013	0.9009	1.0100
09	Ba-133	Ba-6a	1007.586	5/3/2013	0.9009	1.0100
10	Ba-133	Ba-6a	1007.586	5/3/2013	0.9017	1.0100
11	Ba-133	Ba-6a	1007.586	5/3/2013	0.8997	1.0100
12	Ba-133	Ba-6a	1007.586	5/3/2013	0.9013	1.0100
13	Ba-133	Ba-6a	1007.586	5/3/2013	0.8996	1.0100
14	Ba-133	Ba-6a	1007.586	5/3/2013	0.9002	1.0100
15	Ba-133	Ba-6a	1007.586	5/3/2013	0.9008	1.0100
16	Ba-133	Ba-6a	1007.586	5/3/2013	0.9023	1.0100
17	Ba-133	Ba-6a	1007.586	5/3/2013	0.8744	1.0100
18	Ba-133	Ba-6a	1007.586	5/3/2013	0.9038	1.0100
19	Ba-133	Ba-6a	1007.586	5/3/2013	0.9067	1.0100

Balance Printer Tapes

Tracer	LCS

Matrix Spike

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Eberline Analytical
Oak Ridge Laboratory

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04132	1	Ra228	liters	5/9/2013	JBARNARD

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					1.5000E+00	1.5000E+00				
03	FB at PZ-100-KS TOT	DUP					1.5000E+00	1.5000E+00				
04	D-14 TOT	TRG					1.5000E+00	1.5000E+00				
05	D-14 DIS	TRG					1.5000E+00	1.5000E+00				
06	PZ-112-AS TOT	TRG					1.5000E+00	1.5000E+00				
07	PZ-112-AS DIS	TRG					1.5000E+00	1.5000E+00				
08	PZ-202-SS TOT	TRG					1.5000E+00	1.5000E+00				
09	PZ-202-SS DIS	TRG					1.5000E+00	1.5000E+00				
10	DUP07 TOT	TRG					1.5000E+00	1.5000E+00				
11	DUP07 DIS	TRG					1.5000E+00	1.5000E+00				
12	PZ-106-KS TOT	TRG					1.5000E+00	1.5000E+00				
13	PZ-106-KS DIS	TRG					1.5000E+00	1.5000E+00				
14	FB at PZ-100-KS TOT	DO					1.5000E+00	1.5000E+00				
15	FB at PZ-100-KS DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-100-KS TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-100-KS DIS	TRG					1.5000E+00	1.5000E+00				
18	S-53 TOT	TRG					1.0000E+00	1.0000E+00				
19	S-53 DIS	TRG					1.0000E+00	1.0000E+00				

Comments	

Technician: _____ Date: 5/3/13

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US EPA ARCHIVE DOCUMENT

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-04132	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	0.0934	0.1485	0.0551	81.03
02	BLANK	MBL	2.0000	0.0936	0.1493	0.0557	81.91
03	DUP	DUP	2.0000	0.0939	0.1499	0.0560	82.35
04	D-14 TOT	TRG	2.0000	0.0934	0.1474	0.0540	79.41
05	D-14 DIS	TRG	2.0000	0.0935	0.1477	0.0542	79.71
06	PZ-112-AS TOT	TRG	2.0000	0.0937	0.1483	0.0546	80.29
07	PZ-112-AS DIS	TRG	2.0000	0.0934	0.1488	0.0554	81.47
08	PZ-202-SS TOT	TRG	2.0000	0.0937	0.1496	0.0559	82.21
09	PZ-202-SS DIS	TRG	2.0000	0.0938	0.1501	0.0563	82.79
10	DUP07 TOT	TRG	2.0000	0.0933	0.1495	0.0562	82.65
11	DUP07 DIS	TRG	2.0000	0.0941	0.1508	0.0567	83.38
12	PZ-106-KS TOT	TRG	2.0000	0.0940	0.1511	0.0571	83.97
13	PZ-106-KS DIS	TRG	2.0000	0.0937	0.1507	0.0570	83.82
14	FB at PZ-100-KS TOT	DO	2.0000	0.0940	0.1515	0.0575	84.56
15	FB at PZ-100-KS DIS	TRG	2.0000	0.0938	0.1507	0.0569	83.68
16	PZ-100-KS TOT	TRG	2.0000	0.0935	0.1501	0.0566	83.24
17	PZ-100-KS DIS	TRG	2.0000	0.0913	0.1488	0.0575	84.56
18	S-53 TOT	TRG	2.0000	0.0968	0.1545	0.0577	84.85
19	S-53 DIS	TRG	2.0000	0.0969	0.1538	0.0569	83.68

Technician: _____ Date: 5/21/13

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US EPA ARCHIVE DOCUMENT

A 5/21/13 KB

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
B1	1304132-01	3	177	30	1400	5/21/13 14:17

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US EPA ARCHIVE DOCUMENT

R 5/21/13 KB

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1304132-10	15	294	120	1400	5/21/13 15:46
A1	1304132-02	23	159	120	1400	5/21/13 15:46
C2	1304132-11	17	384	120	1400	5/21/13 15:46
C3	1304132-12	11	191	120	1400	5/21/13 15:46
A2	1304132-03	15	146	120	1400	5/21/13 15:46
A3	1304132-04	16	288	120	1400	5/21/13 15:46
C4	1304132-13	17	202	120	1400	5/21/13 15:46
A4	1304132-05	9	240	120	1400	5/21/13 15:46
B1	1304132-06	17	342	120	1400	5/21/13 15:46
B2	1304132-07	12	248	120	1400	5/21/13 15:46
B3	1304132-08	9	182	120	1400	5/21/13 15:46
B4	1304132-09	16	192	120	1400	5/21/13 15:46

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US EPA ARCHIVE DOCUMENT

A 5/21/13 103

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1304132-14	8	167	120	1400	5/21/13 15:47
C2	1304132-15	22	170	120	1400	5/21/13 15:47
C3	1304132-16	21	241	120	1400	5/21/13 15:47
C4	1304132-17	9	205	120	1400	5/21/13 15:47
D2	1304132-18	19	189	120	1400	5/21/13 15:47
D4	1304132-19	19	222	120	1400	5/21/13 15:47

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US EPA ARCHIVE DOCUMENT

GPC Detector Report
(ALL Backgrounds)

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	5/21/2013	3.33E-02	P	-2.17E+01	2.92E-01	2.23E+01
LB4110A - A2	Alpha	11/18/2007	5/21/2013	3.33E-02	P	-1.85E+01	2.61E-01	1.90E+01
LB4110A - A3	Alpha	11/18/2007	5/21/2013	0.00E+00	P	-1.80E+01	2.22E-01	1.84E+01
LB4110A - A4	Alpha	11/18/2007	5/21/2013	6.67E-02	P	-1.91E+01	2.44E-01	1.96E+01
LB4110A - B1	Alpha	11/18/2007	5/21/2013	5.00E-02	P	-9.87E-02	7.52E-02	2.49E-01
LB4110A - B2	Alpha	11/18/2007	5/21/2013	0.00E+00	P	-7.93E-02	7.27E-02	2.25E-01
LB4110A - B3	Alpha	11/18/2007	5/21/2013	3.33E-02	P	-6.38E-02	5.33E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	5/21/2013	8.33E-02	P	-1.43E-01	7.92E-02	3.01E-01
LB4110A - C1	Alpha	11/18/2007	5/21/2013	1.67E-02	P	-1.52E-01	8.91E-02	3.30E-01
LB4110A - C2	Alpha	11/18/2007	5/21/2013	3.33E-02	P	-1.79E-01	8.82E-02	3.56E-01
LB4110A - C3	Alpha	11/18/2007	5/21/2013	1.67E-01	P	-1.75E-01	1.01E-01	3.78E-01
LB4110A - C4	Alpha	11/18/2007	5/21/2013	5.00E-02	P	-6.32E-02	6.88E-02	2.01E-01
LB4110A - D1	Alpha	11/18/2007	5/21/2013	1.67E-02	P	-5.37E-02	8.39E-02	2.21E-01
LB4110A - D2	Alpha	11/18/2007	5/21/2013	1.17E-01	P	-7.08E-02	6.07E-02	1.92E-01
LB4110A - D3	Alpha	11/18/2007	5/21/2013	6.67E-02	P	-4.78E-02	7.17E-02	1.91E-01
LB4110A - D4	Alpha	11/18/2007	5/21/2013	5.00E-02	P	-5.73E-02	7.08E-02	1.99E-01
LB4110R - A1	Alpha	11/24/2006	5/21/2013	1.17E-01	P	-1.00E-01	1.01E-01	3.03E-01
LB4110R - A2	Alpha	11/24/2006	5/21/2013	0.00E+00	P	-8.99E-02	7.74E-02	2.45E-01
LB4110R - A3	Alpha	11/24/2006	5/21/2013	1.17E-01	P	-7.43E-02	7.71E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	5/21/2013	5.00E-02	P	-5.30E-02	7.15E-02	1.96E-01
LB4110R - B1	Alpha	11/24/2006	5/21/2013	0.00E+00	P	-9.57E-02	6.19E-02	2.19E-01
LB4110R - B2	Alpha	11/24/2006	5/21/2013	1.67E-02	P	-6.95E-02	6.41E-02	1.98E-01
LB4110R - B3	Alpha	11/24/2006	5/21/2013	1.33E-01	P	-6.52E-02	7.01E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	5/21/2013	3.33E-02	P	-6.46E-02	7.08E-02	2.06E-01
LB4110R - C1	Alpha	11/24/2006	5/21/2013	6.67E-02	P	-7.78E-02	7.43E-02	2.26E-01
LB4110R - C2	Alpha	11/24/2006	5/21/2013	5.00E-02	P	-7.54E-02	7.20E-02	2.19E-01
LB4110R - C3	Alpha	11/24/2006	5/21/2013	1.33E-01	P	-8.88E-02	8.47E-02	2.58E-01
LB4110R - C4	Alpha	11/24/2006	5/21/2013	3.33E-02	P	-6.21E-02	8.20E-02	2.26E-01
LB4110R - D1	Alpha	11/24/2006	5/21/2013	0.00E+00	P	-9.98E-02	7.26E-02	2.45E-01
LB4110R - D2	Alpha	11/24/2006	5/21/2013	0.00E+00	P	-7.40E-02	7.20E-02	2.18E-01
LB4110R - D3	Alpha	11/24/2006	5/21/2013	0.00E+00	P	-7.93E-02	7.18E-02	2.23E-01
LB4110R - D4	Alpha	11/24/2006	5/21/2013	0.00E+00	P	-7.08E-02	7.67E-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

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US EPA ARCHIVE DOCUMENT

Eberline Analytical
Oak Ridge Laboratory

GPC Detector Report
(ALL Backgrounds)

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	5/21/2013	8.35E+00	P	-2.95E+02	7.63E+00	3.10E+02
LB4110A - A2	Beta	11/18/2007	5/21/2013	3.42E+00	P	-3.10E+01	2.55E+00	3.61E+01
LB4110A - A3	Beta	11/18/2007	5/21/2013	1.42E+00	P	-5.12E+01	2.66E+00	5.65E+01
LB4110A - A4	Beta	11/18/2007	5/21/2013	6.62E+00	P	-3.32E+01	3.05E+00	3.93E+01
LB4110A - B1	Beta	11/18/2007	5/21/2013	1.40E+00	P	-1.04E+01	3.25E+00	1.69E+01
LB4110A - B2	Beta	11/18/2007	5/21/2013	1.17E+00	P	-7.53E+00	1.98E+00	1.15E+01
LB4110A - B3	Beta	11/18/2007	5/21/2013	1.20E+00	P	1.08E-01	1.36E+00	2.62E+00
LB4110A - B4	Beta	11/18/2007	5/21/2013	1.35E+00	P	-7.58E+00	1.97E+00	1.15E+01
LB4110A - C1	Beta	11/18/2007	5/21/2013	1.27E+00	P	-5.49E+00	2.15E+00	9.79E+00
LB4110A - C2	Beta	11/18/2007	5/21/2013	1.02E+00	P	3.80E-01	1.27E+00	2.16E+00
LB4110A - C3	Beta	11/18/2007	5/21/2013	1.48E+00	P	4.71E-01	1.47E+00	2.46E+00
LB4110A - C4	Beta	11/18/2007	5/21/2013	9.67E-01	P	-1.77E+00	2.13E+00	6.04E+00
LB4110A - D1	Beta	11/18/2007	5/21/2013	1.97E+00	P	-2.37E+00	2.58E+00	7.54E+00
LB4110A - D2	Beta	11/18/2007	5/21/2013	1.75E+00	P	-6.75E-01	1.57E+00	3.81E+00
LB4110A - D3	Beta	11/18/2007	5/21/2013	4.22E+00	P	1.23E+00	4.47E+00	7.71E+00
LB4110A - D4	Beta	11/18/2007	5/21/2013	1.12E+00	P	-4.48E-01	1.37E+00	3.20E+00
LB4110R - A1	Beta	11/24/2006	5/21/2013	1.02E+00	P	-6.18E+01	3.76E+00	6.93E+01
LB4110R - A2	Beta	11/24/2006	5/21/2013	8.33E-01	P	-4.91E+01	2.05E+00	5.32E+01
LB4110R - A3	Beta	11/24/2006	5/21/2013	1.32E+00	P	-4.55E+01	2.79E+00	5.10E+01
LB4110R - A4	Beta	11/24/2006	5/21/2013	1.03E+00	P	-4.54E+01	2.02E+00	4.94E+01
LB4110R - B1	Beta	11/24/2006	5/21/2013	1.23E+00	P	-4.78E+01	2.05E+00	5.18E+01
LB4110R - B2	Beta	11/24/2006	5/21/2013	1.28E+00	P	-4.77E+01	2.08E+00	5.19E+01
LB4110R - B3	Beta	11/24/2006	5/21/2013	1.07E+00	P	-4.75E+01	2.70E+00	5.29E+01
LB4110R - B4	Beta	11/24/2006	5/21/2013	1.00E+00	P	-4.78E+01	1.95E+00	5.17E+01
LB4110R - C1	Beta	11/24/2006	5/21/2013	1.47E+00	P	-4.76E+01	3.02E+00	5.37E+01
LB4110R - C2	Beta	11/24/2006	5/21/2013	1.48E+00	P	-4.76E+01	2.75E+00	5.31E+01
LB4110R - C3	Beta	11/24/2006	5/21/2013	1.37E+00	P	-4.81E+01	2.55E+00	5.32E+01
LB4110R - C4	Beta	11/24/2006	5/21/2013	1.37E+00	P	-5.42E+01	2.98E+00	6.02E+01
LB4110R - D1	Beta	11/24/2006	5/21/2013	0.00E+00	P	-4.50E+01	5.75E+00	5.65E+01
LB4110R - D2	Beta	11/24/2006	5/21/2013	0.00E+00	P	-4.85E+01	1.94E+00	5.24E+01
LB4110R - D3	Beta	11/24/2006	5/21/2013	0.00E+00	P	-5.19E+01	5.72E+00	6.33E+01
LB4110R - D4	Beta	11/24/2006	5/21/2013	0.00E+00	P	-4.82E+01	2.31E+00	5.28E+01
LB5100 - 1	Beta	7/10/2006	10/26/2007	4.52E+00	F	-3.19E-01	1.58E+00	3.48E+00

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GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	5/21/2013	0.2407	P	-0.0180	0.2148	0.4477
LB4110A - A2	Alpha	11/18/2007	5/21/2013	0.2090	P	-0.0555	0.1728	0.4010
LB4110A - A3	Alpha	11/18/2007	5/21/2013	0.2113	P	-0.0790	0.1617	0.4024
LB4110A - A4	Alpha	11/18/2007	5/21/2013	0.2174	P	-0.0575	0.1806	0.4186
LB4110A - B1	Alpha	11/18/2007	5/21/2013	0.2079	P	0.1943	0.2246	0.2549
LB4110A - B2	Alpha	11/18/2007	5/21/2013	0.2133	P	0.1929	0.2217	0.2506
LB4110A - B3	Alpha	11/18/2007	5/21/2013	0.2391	P	0.1296	0.2326	0.3356
LB4110A - B4	Alpha	11/18/2007	5/21/2013	0.2257	P	0.2090	0.2367	0.2643
LB4110A - C1	Alpha	11/18/2007	5/21/2013	0.2212	P	0.1974	0.2208	0.2443
LB4110A - C2	Alpha	11/18/2007	5/21/2013	0.2223	P	0.1967	0.2252	0.2537
LB4110A - C3	Alpha	11/18/2007	5/21/2013	0.2506	P	0.2229	0.2494	0.2759
LB4110A - C4	Alpha	11/18/2007	5/21/2013	0.2231	P	0.1966	0.2257	0.2549
LB4110A - D1	Alpha	11/18/2007	5/21/2013	0.2207	P	0.2035	0.2333	0.2632
LB4110A - D2	Alpha	11/18/2007	5/21/2013	0.2472	P	0.2277	0.2584	0.2890
LB4110A - D3	Alpha	11/18/2007	5/21/2013	0.2540	P	0.2314	0.2638	0.2963
LB4110A - D4	Alpha	11/18/2007	5/21/2013	0.1852	P	0.1649	0.1998	0.2346
LB4110R - A1	Alpha	11/24/2006	5/21/2013	0.2363	P	0.2032	0.2389	0.2746
LB4110R - A2	Alpha	11/24/2006	5/21/2013	0.2145	P	0.1899	0.2206	0.2513
LB4110R - A3	Alpha	11/24/2006	5/21/2013	0.2240	P	0.1964	0.2249	0.2533
LB4110R - A4	Alpha	11/24/2006	5/21/2013	0.2363	P	0.2160	0.2457	0.2754
LB4110R - B1	Alpha	11/24/2006	5/21/2013	0.2259	P	0.1878	0.2261	0.2644
LB4110R - B2	Alpha	11/24/2006	5/21/2013	0.2119	P	0.1801	0.2175	0.2549
LB4110R - B3	Alpha	11/24/2006	5/21/2013	0.2502	P	0.2068	0.2440	0.2813
LB4110R - B4	Alpha	11/24/2006	5/21/2013	0.2235	P	0.1937	0.2319	0.2701
LB4110R - C1	Alpha	11/24/2006	5/21/2013	0.2069	P	0.1861	0.2153	0.2444
LB4110R - C2	Alpha	11/24/2006	5/21/2013	0.2172	P	0.1963	0.2248	0.2533
LB4110R - C3	Alpha	11/24/2006	5/21/2013	0.2366	P	0.2064	0.2397	0.2730
LB4110R - C4	Alpha	11/24/2006	5/21/2013	0.2077	P	0.1858	0.2229	0.2599
LB4110R - D1	Alpha	11/24/2006	5/21/2013	0.0000	F	0.0333	0.2063	0.3792
LB4110R - D2	Alpha	11/24/2006	5/21/2013	0.0000	F	0.0386	0.2346	0.4305
LB4110R - D3	Alpha	11/24/2006	5/21/2013	0.0000	F	0.0380	0.2304	0.4229
LB4110R - D4	Alpha	11/24/2006	5/21/2013	0.0000	F	0.0290	0.1857	0.3425
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

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GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	5/21/2013	0.5635	P	0.2044	0.5628	0.9211
LB4110A - A2	Beta	11/18/2007	5/21/2013	0.4916	P	0.1552	0.4635	0.7717
LB4110A - A3	Beta	11/18/2007	5/21/2013	0.4676	P	0.0827	0.4571	0.8316
LB4110A - A4	Beta	11/18/2007	5/21/2013	0.5159	P	0.1351	0.4879	0.8408
LB4110A - B1	Beta	11/18/2007	5/21/2013	0.4882	P	0.4637	0.5305	0.5973
LB4110A - B2	Beta	11/18/2007	5/21/2013	0.5089	P	0.4639	0.5276	0.5912
LB4110A - B3	Beta	11/18/2007	5/21/2013	0.5311	P	0.3197	0.5321	0.7445
LB4110A - B4	Beta	11/18/2007	5/21/2013	0.5309	P	0.4921	0.5545	0.6169
LB4110A - C1	Beta	11/18/2007	5/21/2013	0.5021	P	0.4503	0.5027	0.5551
LB4110A - C2	Beta	11/18/2007	5/21/2013	0.5044	P	0.4281	0.5011	0.5741
LB4110A - C3	Beta	11/18/2007	5/21/2013	0.6050	P	0.5279	0.5902	0.6526
LB4110A - C4	Beta	11/18/2007	5/21/2013	0.5113	P	0.4569	0.5250	0.5931
LB4110A - D1	Beta	11/18/2007	5/21/2013	0.5316	P	0.4797	0.5541	0.6286
LB4110A - D2	Beta	11/18/2007	5/21/2013	0.5406	P	0.4901	0.5885	0.6870
LB4110A - D3	Beta	11/18/2007	5/21/2013	0.6012	P	0.5369	0.6155	0.6941
LB4110A - D4	Beta	11/18/2007	5/21/2013	0.4371	P	0.3861	0.4733	0.5604
LB4110R - A1	Beta	11/24/2006	5/21/2013	0.5604	P	0.4815	0.5679	0.6544
LB4110R - A2	Beta	11/24/2006	5/21/2013	0.5050	P	0.4210	0.5089	0.5967
LB4110R - A3	Beta	11/24/2006	5/21/2013	0.5267	P	0.4581	0.5397	0.6213
LB4110R - A4	Beta	11/24/2006	5/21/2013	0.5984	P	0.5102	0.5918	0.6734
LB4110R - B1	Beta	11/24/2006	5/21/2013	0.5258	P	0.4536	0.5427	0.6318
LB4110R - B2	Beta	11/24/2006	5/21/2013	0.5117	P	0.4314	0.5202	0.6090
LB4110R - B3	Beta	11/24/2006	5/21/2013	0.6073	P	0.5018	0.5914	0.6809
LB4110R - B4	Beta	11/24/2006	5/21/2013	0.5306	P	0.4623	0.5499	0.6375
LB4110R - C1	Beta	11/24/2006	5/21/2013	0.4629	P	0.4239	0.5031	0.5824
LB4110R - C2	Beta	11/24/2006	5/21/2013	0.5144	P	0.4504	0.5292	0.6080
LB4110R - C3	Beta	11/24/2006	5/21/2013	0.5572	P	0.4815	0.5712	0.6610
LB4110R - C4	Beta	11/24/2006	5/21/2013	0.4979	P	0.4323	0.5264	0.6204
LB4110R - D1	Beta	11/24/2006	5/21/2013	0.0000	F	0.0787	0.4933	0.9078
LB4110R - D2	Beta	11/24/2006	5/21/2013	0.0000	F	0.0891	0.5543	1.0194
LB4110R - D3	Beta	11/24/2006	5/21/2013	0.0000	F	0.0865	0.5383	0.9901
LB4110R - D4	Beta	11/24/2006	5/21/2013	0.0000	F	0.0678	0.4431	0.8184
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

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SECTION XII

BARIUM-133 ANALYTICAL TRACER DATA

VAX/VMS Peak Search Report Generated 15-MAY-2013 07:34:06.78

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413201_GE1_BAFIL_191542.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : SPIKE
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 07:18:51
Sample ID : 1304132-01 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 00:15:00.30 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	30.84	2253	84	1.51	31.07	27	13	2.50E+00	2.2	4.49E+01
2	2	35.06	540	58	1.68	35.29	27	13	6.00E-01	4.9	
3	5	61.85	294	95	1.99	62.08	58	12	3.26E-01	7.7	4.70E+00
4	5	66.02	128	85	2.06	66.25	58	12	1.42E-01	16.0	
5	0	81.36	812	157	1.92	81.59	77	10	9.03E-01	4.6	
6	0	92.72	68	71	1.36	92.95	90	6	7.54E-02	23.1	
7	0	102.16	23	69	1.96	102.39	100	7	2.58E-02	62.6	
8	2	112.02	231	37	1.81	112.25	106	16	2.57E-01	7.7	4.73E+00
9	2	116.46	32	39	1.82	116.68	106	16	3.60E-02	36.2	
10	0	146.79	23	93	2.84	147.01	145	9	2.59E-02	77.2	
11	0	161.43	29	49	1.51	161.66	158	6	3.25E-02	42.5	
12	0	191.48	17	55	1.08	191.71	191	5	1.89E-02	69.8	
13	0	276.70	90	14	1.37	276.92	273	8	9.98E-02	12.8	
14	2	303.12	177	22	1.65	303.33	299	15	1.97E-01	8.3	6.02E+00
15	2	307.44	49	22	2.01	307.65	299	15	5.43E-02	20.7	
16	4	333.94	89	15	1.81	334.16	329	14	9.93E-02	12.7	1.96E+00
17	4	338.21	18	21	2.45	338.42	329	14	1.99E-02	56.7	
18	0	356.47	585	33	1.86	356.68	351	11	6.50E-01	4.6	
19	3	384.20	168	13	2.27	384.40	381	15	1.87E-01	10.3	1.85E+01
20	3	387.30	255	9	1.65	387.51	381	15	2.84E-01	7.2	
21	3	391.73	56	8	1.80	391.93	381	15	6.22E-02	17.2	
22	3	414.92	37	14	2.29	415.13	409	19	4.07E-02	25.4	1.94E+00
23	3	418.35	31	12	1.94	418.56	409	19	3.48E-02	28.9	
24	3	421.62	9	12	1.90	421.83	409	19	1.01E-02	89.7	
25	0	437.46	114	14	1.93	437.67	432	11	1.27E-01	11.3	
26	0	468.21	23	5	2.02	468.41	465	6	2.61E-02	25.1	
27	0	510.97	19	10	1.93	511.17	507	8	2.09E-02	37.2	
28	0	584.28	14	9	5.49	584.47	580	11	1.55E-02	48.5	
29	0	610.89	8	4	3.09	611.08	608	7	8.89E-03	53.2	

Sample ID : 1304132-01 Acquisition date : 15-MAY-2013 07:18:51

Total number of lines in spectrum	29	
Number of unidentified lines	25	
Number of lines tentatively identified by NID	4	13.79%

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	3.766E+02	3.767E+02	0.724E+02	19.22	
	Total Activity :		3.766E+02	3.767E+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	3.958E+02	3.958E+02	0.639E+02	16.14	
	Total Activity :		3.958E+02	3.958E+02			
	Grand Total Activity :		7.725E+02	7.725E+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*	1.963E+01	3.766E+02	3.767E+02	19.22	OK
	302.84	17.80	4.915E+00	6.083E+02	6.083E+02	33.65	OK
	356.01	60.00	6.963E+00	4.204E+02	4.204E+02	17.68	OK

Final Mean for 3 Valid Peaks = 3.767E+02+/- 7.238E+01 (19.22%)

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	3.958E+02	3.958E+02	16.14	OK

Final Mean for 1 Valid Peaks = 3.958E+02+/- 6.388E+01 (16.14%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.767E+02	7.238E+01	2.066E+01	3.391E+00	18.235
TH-234	3.958E+02	6.388E+01	6.030E+01	1.932E+00	6.564

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-4.096E+00		1.303E+01	1.983E+01	6.191E+00	-0.207
CD-109	-3.509E+01		1.464E+02	1.974E+02	2.554E+01	-0.178
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	1.337E+01		2.158E+00	4.401E+00	8.271E-02	3.039
NP-237	4.321E+01		3.633E+01	6.058E+01	7.375E+00	0.713
AM-241	9.571E+00		3.399E+00	6.671E+00	1.565E-01	1.435

VAX/VMS Peak Search Report Generated 15-MAY-2013 07:52:23.95

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413202_GE1_BAFIL_191544.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : BLANK
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 07:37:09
Sample ID : 1304132-02 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 00:15:00.29 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	27.90	39	71	1.51	28.14	27	13	4.35E-02	32.5	6.94E+01
2	3	30.91	2103	79	1.40	31.15	27	13	2.34E+00	2.3	
3	3	34.89	596	86	1.85	35.13	27	13	6.62E-01	5.9	
4	0	52.56	69	100	2.92	52.80	50	8	7.67E-02	27.5	
5	2	61.96	259	75	1.61	62.19	58	11	2.88E-01	7.9	3.60E+00
6	2	66.01	139	69	1.74	66.24	58	11	1.55E-01	12.5	
7	0	81.17	939	108	1.94	81.40	76	10	1.04E+00	3.9	
8	0	92.27	17	108	1.56	92.50	90	7	1.94E-02	101.0	
9	0	111.85	182	107	1.38	112.08	108	7	2.02E-01	12.0	
10	0	116.53	28	76	3.80	116.76	116	5	3.09E-02	51.5	
11	0	162.06	40	79	1.31	162.28	159	8	4.47E-02	41.2	
12	0	185.58	15	78	1.09	185.80	185	6	1.67E-02	96.6	
13	0	277.04	50	45	1.45	277.26	272	9	5.57E-02	28.0	
14	2	303.02	172	22	1.56	303.24	300	11	1.91E-01	8.2	2.03E+01
15	2	307.77	38	29	2.01	307.99	300	11	4.22E-02	24.8	
16	0	334.89	52	38	1.71	335.10	331	7	5.77E-02	23.9	
17	0	338.53	28	15	1.38	338.74	338	4	3.13E-02	28.9	
18	0	356.41	594	23	1.87	356.62	353	7	6.60E-01	4.3	
19	0	376.35	24	6	1.59	376.55	373	7	2.64E-02	27.3	
20	3	384.09	140	23	2.27	384.29	381	10	1.55E-01	13.0	2.49E+01
21	3	387.31	215	37	1.72	387.51	381	10	2.39E-01	8.4	
22	0	391.82	46	25	1.21	392.03	391	5	5.06E-02	23.5	
23	1	414.90	56	6	1.77	415.10	411	16	6.25E-02	15.3	2.05E+00
24	1	418.62	35	5	1.90	418.83	411	16	3.89E-02	24.6	
25	1	421.97	10	4	1.90	422.17	411	16	1.09E-02	70.5	
26	0	437.55	108	9	1.82	437.76	434	9	1.20E-01	11.0	
27	0	446.02	6	3	2.07	446.23	443	6	6.54E-03	62.4	
28	3	468.38	26	11	2.33	468.58	465	15	2.84E-02	28.0	1.62E+00
29	3	472.90	8	6	2.34	473.11	465	15	8.52E-03	79.6	
30	0	512.12	19	11	2.73	512.32	509	11	2.11E-02	40.9	
31	0	727.32	8	0	1.00	727.50	725	6	8.89E-03	35.4	

Sample ID : 1304132-02 Acquisition date : 15-MAY-2013 07:37:09

Total number of lines in spectrum	31	
Number of unidentified lines	27	
Number of lines tentatively identified by NID	4	12.90%

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	4.356E+02	4.356E+02	0.809E+02	18.58	
	Total Activity :		4.356E+02	4.356E+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	3.491E+02	3.491E+02	0.583E+02	16.70	
	Total Activity :		3.491E+02	3.491E+02			
	Grand Total Activity :		7.847E+02	7.847E+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*	1.963E+01	4.356E+02	4.356E+02	18.58	OK
	302.84	17.80	4.915E+00	5.912E+02	5.912E+02	33.55	OK
	356.01	60.00	6.963E+00	4.270E+02	4.271E+02	17.44	OK

Final Mean for 3 Valid Peaks = 4.356E+02+/- 8.092E+01 (18.58%)

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	3.491E+02	3.491E+02	16.70	OK

Final Mean for 1 Valid Peaks = 3.491E+02+/- 5.832E+01 (16.70%)

Flag: "*" = Keyline

Sample ID : 1304132-02 Acquisition date : 15-MAY-2013 07:37:09

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.356E+02	8.092E+01	1.752E+01	2.876E+00	24.865
TH-234	3.491E+02	5.832E+01	5.724E+01	1.834E+00	6.099

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.956E+00		1.389E+01	2.120E+01	6.617E+00	-0.187
CD-109	1.407E+01		1.558E+02	2.205E+02	2.853E+01	0.064
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.618E+00		1.775E+00	3.646E+00	6.851E-02	2.364
NP-237	9.374E+00		4.031E+01	5.861E+01	7.136E+00	0.160
AM-241	9.766E+00		3.465E+00	6.546E+00	1.536E-01	1.492

VAX/VMS Peak Search Report Generated 15-MAY-2013 08:17:34.78

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413203_GE1_BAFIL_191548.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : FB AT PZ-100-KS TOT
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 08:02:19
Sample ID : 1304132-03 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 00:15:00.28 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	4	30.84	2075	69	1.50	31.07	27	13	2.31E+00	2.2	3.47E+01
2	4	35.15	469	56	1.69	35.38	27	13	5.22E-01	5.4	
3	0	53.10	119	59	2.68	53.33	50	8	1.32E-01	14.4	
4	1	61.89	244	46	1.58	62.12	58	11	2.71E-01	8.1	7.97E+00
5	1	65.63	103	52	1.58	65.86	58	11	1.14E-01	17.2	
6	0	81.16	792	152	1.96	81.39	77	10	8.80E-01	4.6	
7	0	92.83	52	70	1.50	93.06	90	7	5.78E-02	30.1	
8	0	100.22	27	82	5.27	100.45	97	8	2.97E-02	61.8	
9	0	111.83	177	130	1.45	112.05	108	8	1.97E-01	13.5	
10	0	132.48	32	55	3.33	132.71	129	9	3.60E-02	44.5	
11	0	221.68	17	58	2.28	221.90	218	8	1.87E-02	83.2	
12	0	276.69	56	25	1.27	276.90	273	7	6.17E-02	20.0	
13	0	303.16	129	22	1.69	303.38	300	6	1.43E-01	10.5	
14	3	333.95	57	18	1.76	334.16	330	14	6.32E-02	17.6	4.21E+00
15	3	338.34	33	15	2.23	338.55	330	14	3.62E-02	33.2	
16	0	356.37	521	25	1.92	356.58	352	9	5.79E-01	4.7	
17	2	384.10	134	12	1.66	384.31	382	20	1.49E-01	9.4	8.78E+00
18	2	387.00	231	9	2.05	387.20	382	20	2.57E-01	8.1	
19	2	391.71	61	2	1.97	391.92	382	20	6.82E-02	15.2	
20	1	415.97	28	2	1.90	416.17	411	19	3.15E-02	28.5	5.59E+00
21	1	425.62	9	0	1.90	425.83	411	19	1.01E-02	53.3	
22	0	437.54	85	15	1.98	437.75	432	9	9.41E-02	13.7	
23	0	468.31	29	6	1.90	468.51	464	11	3.17E-02	24.6	
24	0	511.50	23	0	2.47	511.70	508	8	2.56E-02	20.9	
25	0	617.38	7	0	1.12	617.57	614	6	7.78E-03	37.8	

Sample ID : 1304132-03 Acquisition date : 15-MAY-2013 08:02:19

Total number of lines in spectrum	25	
Number of unidentified lines	20	
Number of lines tentatively identified by NID	5	20.00%

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	3.674E+02	3.674E+02	0.706E+02	19.22	
	Total Activity :		3.674E+02	3.674E+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	3.292E+02	3.292E+02	0.560E+02	17.01	
	Total Activity :		3.292E+02	3.292E+02			
	Grand Total Activity :		6.966E+02	6.966E+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*	1.963E+01	3.674E+02	3.674E+02	19.22	OK
	302.84	17.80	4.915E+00	4.424E+02	4.425E+02	36.05	OK
	356.01	60.00	6.963E+00	3.747E+02	3.747E+02	17.84	OK

Final Mean for 3 Valid Peaks = 3.674E+02+/- 7.063E+01 (19.22%)

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	3.292E+02	3.292E+02	17.01	OK

Final Mean for 1 Valid Peaks = 3.292E+02+/- 5.598E+01 (17.01%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.674E+02	7.063E+01	1.843E+01	3.025E+00	19.935
TH-234	3.292E+02	5.598E+01	5.051E+01	1.618E+00	6.518

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	3.312E+00		1.141E+01	2.041E+01	6.372E+00	0.162
CD-109	-3.051E+01		1.555E+02	2.108E+02	2.727E+01	-0.145
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	1.212E+01		2.142E+00	4.325E+00	8.128E-02	2.802
NP-237	2.457E+01		4.238E+01	6.409E+01	7.803E+00	0.383
AM-241	9.798E+00		3.194E+00	6.221E+00	1.459E-01	1.575

VAX/VMS Peak Search Report Generated 15-MAY-2013 08:37:59.04

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413204_GE1_BAFIL_191551.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : D-14 TOT
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 08:22:42
Sample ID : 1304132-04 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 00:15:00.26 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	27.90	41	49	1.51	28.14	27	13	4.59E-02	27.4	4.56E+01
2	3	30.91	1706	61	1.39	31.14	27	13	1.90E+00	2.5	
3	3	34.95	442	81	1.85	35.18	27	13	4.91E-01	7.2	
4	0	53.05	63	84	3.12	53.29	50	8	7.00E-02	28.2	
5	2	61.80	234	61	1.73	62.03	58	12	2.60E-01	8.4	2.01E+00
6	2	66.07	89	77	1.74	66.30	58	12	9.86E-02	18.6	
7	0	81.21	739	110	1.93	81.44	76	11	8.21E-01	4.6	
8	0	92.85	34	75	1.11	93.08	89	6	3.78E-02	43.7	
9	2	111.89	145	47	1.81	112.11	108	13	1.61E-01	11.5	5.17E+00
10	2	114.92	25	51	1.65	115.15	108	13	2.75E-02	59.3	
11	0	160.66	34	95	1.77	160.88	156	10	3.78E-02	56.8	
12	0	277.00	22	35	1.14	277.21	276	6	2.44E-02	48.9	
13	0	303.31	120	29	1.91	303.52	299	7	1.34E-01	11.7	
14	0	334.33	47	34	1.29	334.54	331	7	5.23E-02	25.1	
15	0	356.38	517	21	1.86	356.59	353	7	5.74E-01	4.6	
16	1	383.88	125	13	1.88	384.09	380	17	1.39E-01	10.4	2.01E+01
17	1	386.96	187	8	1.88	387.17	380	17	2.08E-01	9.7	
18	1	391.62	37	4	1.88	391.83	380	17	4.08E-02	21.9	
19	3	415.36	32	14	2.29	415.57	410	12	3.55E-02	30.4	7.65E-01
20	3	418.41	23	14	2.30	418.62	410	12	2.56E-02	42.9	
21	0	437.65	80	15	1.83	437.86	433	10	8.93E-02	14.3	
22	0	468.54	19	11	2.17	468.75	466	6	2.07E-02	36.3	
23	0	511.59	23	2	2.13	511.79	508	10	2.58E-02	24.1	

Sample ID : 1304132-04 Acquisition date : 15-MAY-2013 08:22:42

Total number of lines in spectrum	23	
Number of unidentified lines	19	
Number of lines tentatively identified by NID	4	17.39%

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	3.427E+02	3.427E+02	0.659E+02	19.23	
	Total Activity :		3.427E+02	3.427E+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	3.159E+02	3.159E+02	0.552E+02	17.47	
	Total Activity :		3.159E+02	3.159E+02			
	Grand Total Activity :		6.586E+02	6.586E+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*	1.963E+01	3.427E+02	3.427E+02	19.23	OK
	302.84	17.80	4.915E+00	4.132E+02	4.132E+02	37.44	OK
	356.01	60.00	6.963E+00	3.716E+02	3.716E+02	17.77	OK

Final Mean for 3 Valid Peaks = 3.427E+02+/- 6.591E+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*	5.865E+01	3.159E+02	3.159E+02	17.47	OK

Final Mean for 1 Valid Peaks = 3.159E+02+/- 5.519E+01 (17.47%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.427E+02	6.591E+01	1.655E+01	2.717E+00	20.709
TH-234	3.159E+02	5.519E+01	6.226E+01	1.995E+00	5.074

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.842E-01		1.293E+01	2.070E+01	6.463E+00	0.009
CD-109	-1.754E+01		1.477E+02	2.032E+02	2.628E+01	-0.086
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.562E+00		1.678E+00	3.450E+00	6.483E-02	2.192
NP-237	2.705E+00		4.145E+01	5.866E+01	7.142E+00	0.046
AM-241	7.357E+00		3.525E+00	6.379E+00	1.496E-01	1.153

VAX/VMS Peak Search Report Generated 15-MAY-2013 07:53:17.73

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413205_GE2_BAFIL_191545.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : D-14 DIS
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 07:37:39
Sample ID : 1304132-05 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	30.91	1868	103	1.38	31.02	26	15	2.08E+00	2.4	4.04E+00
2	3	35.17	435	122	1.53	35.28	26	15	4.84E-01	6.1	
3	0	53.23	62	162	1.92	53.35	50	8	6.86E-02	38.9	
4	2	61.81	188	68	1.60	61.92	58	14	2.09E-01	9.9	1.92E+00
5	2	65.95	102	63	1.61	66.07	58	14	1.13E-01	15.5	
6	0	81.01	768	118	1.34	81.12	77	8	8.53E-01	4.4	
7	0	111.56	162	99	1.34	111.68	108	8	1.80E-01	13.2	
8	1	143.03	21	40	1.60	143.15	140	12	2.37E-02	48.8	1.83E+00
9	1	148.74	21	37	1.61	148.85	140	12	2.36E-02	49.1	
10	0	161.18	37	77	2.72	161.29	158	8	4.12E-02	44.0	
11	0	276.37	53	28	1.92	276.48	273	8	5.91E-02	21.7	
12	0	303.26	132	53	1.51	303.37	299	8	1.47E-01	12.9	
13	3	330.89	10	8	1.65	331.00	329	17	1.06E-02	73.4	6.75E+00
14	3	338.11	22	13	2.20	338.21	329	17	2.47E-02	38.5	
15	1	352.03	10	7	1.83	352.13	350	13	1.07E-02	43.8	9.16E-01
16	1	356.01	511	7	1.50	356.12	350	13	5.68E-01	4.4	
17	3	383.87	104	7	2.12	383.97	380	16	1.16E-01	11.9	6.16E+00
18	3	386.99	175	8	1.86	387.10	380	16	1.94E-01	9.4	
19	3	391.45	43	10	2.26	391.56	380	16	4.75E-02	23.5	
20	0	415.67	33	18	1.59	415.77	413	8	3.68E-02	27.5	
21	0	437.12	97	8	1.60	437.23	432	10	1.08E-01	11.4	
22	4	467.59	15	3	2.57	467.70	464	13	1.72E-02	33.6	6.56E-01
23	4	471.90	7	1	2.12	472.00	464	13	7.92E-03	54.8	
24	0	511.72	20	6	3.98	511.82	508	11	2.17E-02	32.5	
25	0	826.35	9	0	3.24	826.44	823	7	1.00E-02	33.3	

Sample ID : 1304132-05 Acquisition date : 15-MAY-2013 07:37:39

Total number of lines in spectrum	25	
Number of unidentified lines	21	
Number of lines tentatively identified by NID	4	16.00%

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	3.886E+02	3.886E+02	0.760E+02	19.54	
	Total Activity :		3.886E+02	3.886E+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	6.447E+02	6.447E+02	1.409E+02	21.86	
	Total Activity :		6.447E+02	6.447E+02			
	Grand Total Activity :		1.033E+03	1.033E+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	3.886E+02	3.886E+02	19.54	OK
	302.84	17.80	7.560E+00	2.949E+02	2.949E+02	39.44	OK
	356.01	60.00	7.170E+00	3.566E+02	3.566E+02	17.56	OK

Final Mean for 3 Valid Peaks = 3.886E+02+/- 7.595E+01 (19.54%)

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	6.447E+02	6.447E+02	21.86	OK

Final Mean for 1 Valid Peaks = 6.447E+02+/- 1.409E+02 (21.86%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.886E+02	7.595E+01	1.883E+01	3.206E+00	20.636
TH-234	6.447E+02	1.409E+02	1.269E+02	1.049E+01	5.080

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.927E+00		5.359E+00	9.895E+00	1.520E+00	0.296
CD-109	-6.646E+01		1.121E+02	1.695E+02	1.947E+01	-0.392
PA-231	3.166E+01		5.736E+00	1.077E+01	2.050E-01	2.940
PA-234	2.909E+00		1.695E+00	3.081E+00	6.355E-02	0.944
NP-237	2.389E+01		2.896E+01	5.193E+01	5.863E+00	0.460
AM-241	2.156E+01		9.534E+00	1.806E+01	1.397E+00	1.194

VAX/VMS Peak Search Report Generated 15-MAY-2013 08:18:19.49

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413206_GE2_BAFIL_191549.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-112-AS TOT
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 08:02:58
Sample ID : 1304132-06 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 00:15:00.30 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	30.92	1928	121	1.32	31.04	26	16	2.14E+00	2.4	3.22E+00
2	2	35.09	431	107	1.53	35.20	26	16	4.79E-01	6.4	
3	0	52.20	59	140	2.20	52.32	50	8	6.52E-02	37.8	
4	0	61.53	161	140	1.28	61.65	58	7	1.79E-01	14.5	
5	0	65.97	91	56	1.39	66.09	65	4	1.01E-01	16.1	
6	1	80.92	788	55	1.50	81.03	76	11	8.76E-01	3.8	1.20E+01
7	1	84.02	18	51	1.50	84.14	76	11	2.04E-02	97.6	
8	0	91.62	26	84	1.71	91.73	89	8	2.89E-02	64.1	
9	1	111.83	153	64	1.51	111.94	108	12	1.70E-01	11.2	1.14E+00
10	1	116.03	16	66	1.56	116.14	108	12	1.77E-02	79.3	
11	0	161.00	42	62	1.55	161.11	157	8	4.66E-02	36.3	
12	2	183.20	13	20	1.82	183.32	182	9	1.44E-02	54.3	1.41E+00
13	2	185.87	42	35	1.82	185.98	182	9	4.66E-02	28.1	
14	0	276.94	66	32	1.83	277.05	272	11	7.29E-02	20.9	
15	3	302.77	137	9	1.55	302.88	299	28	1.53E-01	9.1	1.18E+00
16	3	306.91	29	10	2.16	307.02	299	28	3.22E-02	29.4	
17	3	312.45	12	11	2.17	312.56	299	28	1.38E-02	56.5	
18	2	333.71	68	18	1.91	333.81	329	12	7.60E-02	15.8	1.31E+00
19	2	337.92	25	16	2.00	338.03	329	12	2.80E-02	34.6	
20	0	356.02	501	34	1.36	356.13	352	8	5.57E-01	4.9	
21	1	383.72	94	22	1.86	383.83	381	9	1.04E-01	14.8	2.49E+00
22	1	386.83	155	33	1.52	386.94	381	9	1.72E-01	9.8	
23	0	391.32	34	16	1.48	391.42	390	6	3.80E-02	27.8	
24	2	414.53	39	5	2.07	414.64	411	10	4.33E-02	18.7	3.46E+00
25	2	418.03	16	8	2.08	418.14	411	10	1.78E-02	48.0	
26	0	424.25	8	11	1.47	424.36	422	7	9.01E-03	81.4	
27	0	437.10	85	6	1.37	437.20	433	8	9.44E-02	11.9	
28	0	510.93	31	4	2.22	511.03	507	8	3.44E-02	21.2	

Sample ID : 1304132-06 Acquisition date : 15-MAY-2013 08:02:58

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	3.988E+02	3.988E+02	0.760E+02	19.07	
	Total Activity :		3.988E+02	3.988E+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	5.509E+02	5.509E+02	1.680E+02	30.50	
AM-241	432.20Y	1.00	5.462E+01	5.462E+01	1.658E+01	30.36	
	Total Activity :		6.056E+02	6.056E+02			
	Grand Total Activity :		1.004E+03	1.004E+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	3.988E+02	3.988E+02	19.07	OK
	302.84	17.80	7.560E+00	3.064E+02	3.065E+02	35.03	OK
	356.01	60.00	7.170E+00	3.497E+02	3.497E+02	18.04	OK

Final Mean for 3 Valid Peaks = 3.988E+02+/- 7.604E+01 (19.07%)

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	5.509E+02	5.509E+02	30.50	OK

Final Mean for 1 Valid Peaks = 5.509E+02+/- 1.680E+02 (30.50%)

AM-241	59.54	35.90*	2.461E+01	5.462E+01	5.462E+01	30.36	OK

Final Mean for 1 Valid Peaks = 5.462E+01+/- 1.658E+01 (30.36%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.988E+02	7.604E+01	1.915E+01	3.261E+00	20.824
TH-234	5.509E+02	1.680E+02	1.619E+02	1.338E+01	3.403
AM-241	5.462E+01	1.658E+01	1.550E+01	1.200E+00	3.522

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.361E-01		5.700E+00	9.353E+00	1.436E+00	0.047
CD-109	1.530E+01		1.129E+02	1.668E+02	1.915E+01	0.092
PA-231	3.205E+01		5.855E+00	1.096E+01	2.087E-01	2.924
PA-234	2.337E+00		1.832E+00	3.221E+00	6.644E-02	0.726
NP-237	6.440E+00		3.292E+01	4.907E+01	5.541E+00	0.131

VAX/VMS Peak Search Report Generated 15-MAY-2013 08:38:34.51

C
Slm

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413207_GE2_BAFIL_191552.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-112-AS DIS
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 08:23:20
Sample ID : 1304132-07 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 00:15:00.31 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	27.89	39	152	1.66	28.00	26	14	4.38E-02	61.7	1.34E+01
2	3	30.94	2030	107	1.37	31.05	26	14	2.26E+00	2.3	
3	3	35.04	512	108	1.68	35.16	26	14	5.69E-01	5.6	
4	0	46.15	37	156	1.62	46.26	43	7	4.12E-02	58.4	
5	0	53.02	76	159	2.48	53.14	50	8	8.48E-02	30.9	
6	0	61.70	154	157	1.24	61.81	59	6	1.71E-01	15.1	
7	1	65.76	83	50	1.47	65.87	65	9	9.22E-02	14.3	2.38E+00
8	1	71.02	21	56	1.48	71.13	65	9	2.35E-02	59.9	
9	2	77.17	29	40	1.64	77.28	76	10	3.21E-02	32.4	2.69E+00
10	2	81.04	816	50	1.38	81.15	76	10	9.07E-01	3.7	
11	0	111.59	174	108	1.38	111.71	108	7	1.93E-01	12.5	
12	0	161.10	21	136	1.48	161.21	156	10	2.37E-02	104.5	
13	0	186.17	35	62	1.91	186.28	183	7	3.88E-02	40.9	
14	0	238.78	28	36	2.17	238.89	235	9	3.11E-02	43.0	
15	0	276.52	57	41	1.72	276.63	273	9	6.28E-02	24.3	
16	0	296.02	22	17	3.23	296.12	292	9	2.44E-02	40.6	
17	0	302.84	159	23	1.37	302.95	300	6	1.77E-01	9.2	
18	0	329.97	2	10	1.51	330.08	328	4	2.41E-03	221.3	
19	0	333.72	56	17	1.69	333.82	331	6	6.21E-02	17.7	
20	0	355.99	547	38	1.47	356.09	351	10	6.08E-01	4.8	
21	1	383.72	86	24	1.86	383.83	381	9	9.54E-02	15.9	1.01E+01
22	1	386.92	157	33	1.52	387.03	381	9	1.74E-01	9.7	
23	0	391.31	40	21	1.74	391.41	390	6	4.48E-02	25.5	
24	0	415.56	36	27	1.11	415.67	413	7	3.99E-02	29.1	
25	0	437.18	91	10	1.52	437.29	432	10	1.01E-01	12.3	
26	1	465.07	6	0	1.92	465.17	464	7	6.46E-03	33.3	1.62E-01
27	1	467.72	11	6	1.93	467.82	464	7	1.17E-02	49.1	
28	0	511.76	16	10	1.90	511.86	507	8	1.81E-02	41.6	
29	0	552.11	6	1	2.87	552.21	550	5	6.67E-03	48.8	
30	0	583.65	7	1	1.54	583.75	582	5	7.99E-03	43.0	
31	0	610.66	12	7	2.56	610.76	606	10	1.32E-02	51.5	
32	0	746.40	10	0	1.45	746.50	743	7	1.11E-02	31.6	

Sample ID : 1304132-07 Acquisition date : 15-MAY-2013 08:23:20

Total number of lines in spectrum	32	
Number of unidentified lines	28	
Number of lines tentatively identified by NID	4	12.50%

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	4.130E+02	4.131E+02	0.785E+02	19.00	
	Total Activity :		4.130E+02	4.131E+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	5.285E+02	5.285E+02	1.670E+02	31.59	
	Total Activity :		5.285E+02	5.285E+02			
	Grand Total Activity :		9.415E+02	9.416E+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	4.130E+02	4.131E+02	19.00	OK
	302.84	17.80	7.560E+00	3.554E+02	3.554E+02	35.13	OK
	356.01	60.00	7.170E+00	3.822E+02	3.822E+02	17.89	OK

Final Mean for 3 Valid Peaks = 4.131E+02+/- 7.849E+01 (19.00%)

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	5.285E+02	5.285E+02	31.59	OK

Final Mean for 1 Valid Peaks = 5.285E+02+/- 1.670E+02 (31.59%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.131E+02	7.849E+01	1.915E+01	3.261E+00	21.568
TH-234	5.285E+02	1.670E+02	1.879E+02	1.552E+01	2.813

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	3.882E-02		5.484E+00	9.625E+00	1.478E+00	0.004
CD-109	2.885E+01		1.077E+02	1.810E+02	2.078E+01	0.159
PA-231	2.604E+01		5.613E+00	1.047E+01	1.993E-01	2.488
PA-234	3.428E+00		1.843E+00	3.335E+00	6.878E-02	1.028
NP-237	-4.662E+00		3.251E+01	5.206E+01	5.878E+00	-0.090
AM-241	1.915E+01		1.151E+01	1.905E+01	1.474E+00	1.005

VAX/VMS Peak Search Report Generated 15-MAY-2013 08:18:55.77

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413208_GE3_BAFIL_191550.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-202-SS TOT
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 08:03:34
Sample ID : 1304132-08 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 00:15:03.76 0.4%
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	30.72	1858	124	1.37	31.04	27	15	2.06E+00	2.4	9.19E+00
2	1	34.81	415	83	1.45	35.13	27	15	4.61E-01	6.2	
3	1	61.76	230	92	1.51	62.08	58	16	2.56E-01	9.2	4.12E+00
4	1	65.79	102	80	1.52	66.11	58	16	1.13E-01	17.8	
5	1	80.82	740	86	1.54	81.14	77	15	8.22E-01	4.2	6.88E+00
6	1	83.68	15	67	1.41	84.00	77	15	1.72E-02	127.5	
7	0	92.64	51	99	1.95	92.96	91	7	5.62E-02	35.1	
8	1	111.72	178	56	1.59	112.03	108	13	1.98E-01	10.1	3.79E+00
9	1	115.83	45	52	1.60	116.15	108	13	5.02E-02	29.3	
10	0	134.27	18	55	1.98	134.59	132	7	2.04E-02	70.8	
11	0	143.44	25	96	1.41	143.75	140	9	2.81E-02	72.7	
12	0	161.29	35	82	1.23	161.61	159	7	3.90E-02	46.1	
13	0	276.71	38	42	1.29	277.01	273	8	4.24E-02	33.5	
14	0	302.97	120	26	1.36	303.27	300	7	1.34E-01	11.4	
15	1	333.80	56	28	1.83	334.11	330	11	6.27E-02	18.9	4.20E+00
16	1	337.79	25	16	1.83	338.10	330	11	2.77E-02	36.6	
17	0	356.14	484	14	1.82	356.44	354	8	5.37E-01	4.8	
18	0	364.64	16	6	2.83	364.94	362	6	1.83E-02	33.8	
19	1	383.56	109	9	1.85	383.86	380	17	1.21E-01	11.5	9.57E+00
20	1	386.87	187	7	1.87	387.17	380	17	2.08E-01	9.3	
21	1	391.53	57	6	1.88	391.83	380	17	6.36E-02	16.0	
22	3	414.92	36	11	2.29	415.23	409	18	4.04E-02	24.0	2.15E+00
23	3	418.27	32	6	2.01	418.57	409	18	3.56E-02	24.2	
24	3	422.82	15	4	2.30	423.12	409	18	1.71E-02	42.3	
25	0	436.95	104	14	1.94	437.25	432	11	1.16E-01	12.0	
26	0	467.47	31	0	2.58	467.77	464	7	3.44E-02	18.0	
27	0	510.25	16	4	2.94	510.55	508	7	1.73E-02	32.8	

Sample ID : 1304132-08 Acquisition date : 15-MAY-2013 08:03:34

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	3.545E+02	3.545E+02	0.633E+02	17.86	
	Total Activity :		3.545E+02	3.545E+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	6.871E+02	6.871E+02	1.344E+02	19.56	
	Total Activity :		6.871E+02	6.871E+02			
	Grand Total Activity :		1.042E+03	1.042E+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	3.545E+02	3.545E+02	17.86	OK
	302.84	17.80	6.222E+00	3.262E+02	3.262E+02	30.76	OK
	356.01	60.00	5.860E+00	4.130E+02	4.130E+02	16.64	OK

Final Mean for 3 Valid Peaks = 3.545E+02+/- 6.331E+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	6.871E+02	6.871E+02	19.56	OK

Final Mean for 1 Valid Peaks = 6.871E+02+/- 1.344E+02 (19.56%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.545E+02	6.331E+01	2.051E+01	3.137E+00	17.284
TH-234	6.871E+02	1.344E+02	1.356E+02	7.284E+00	5.067

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	9.883E-01		5.915E+00	9.774E+00	1.117E+00	0.101
CD-109	-7.760E+01		1.212E+02	1.805E+02	1.488E+01	-0.430
PA-231	9.020E+00		2.870E+00	5.617E+00	7.988E-02	1.606
PA-234	3.754E+00		1.804E+00	3.402E+00	4.839E-02	1.104
NP-237	-1.287E+01		3.564E+01	5.490E+01	4.438E+00	-0.234
AM-241	3.111E+01		9.839E+00	1.940E+01	9.536E-01	1.604

VAX/VMS Peak Search Report Generated 15-MAY-2013 08:39:36.24

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413209_GE3_BAFIL_191553.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-202-SS DIS
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 08:23:53
Sample ID : 1304132-09 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 00:15:03.61 0.4%
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	30.70	1965	75	1.40	31.02	26	14	2.18E+00	2.3	7.05E+00
2	2	34.95	491	80	1.54	35.27	26	14	5.45E-01	5.3	
3	2	53.40	49	68	1.64	53.72	49	24	5.43E-02	33.7	3.94E+00
4	2	61.60	275	81	1.66	61.92	49	24	3.06E-01	8.0	
5	2	65.58	107	93	1.67	65.90	49	24	1.18E-01	17.8	
6	1	80.82	775	82	1.54	81.14	76	12	8.61E-01	4.1	7.97E+00
7	1	83.68	27	61	1.41	84.00	76	12	2.96E-02	75.0	
8	3	111.80	232	54	1.64	112.11	107	16	2.58E-01	8.1	8.36E-01
9	3	115.91	83	53	1.93	116.22	107	16	9.18E-02	20.6	
10	0	161.11	22	72	2.66	161.43	159	7	2.47E-02	66.2	
11	0	242.45	6	64	2.00	242.76	237	9	6.99E-03	234.0	
12	0	270.32	12	31	3.81	270.63	266	8	1.36E-02	82.7	
13	0	276.71	69	30	1.96	277.01	273	10	7.67E-02	19.1	
14	3	302.74	119	16	1.54	303.05	299	14	1.32E-01	10.3	2.23E+00
15	3	307.26	31	26	2.19	307.56	299	14	3.41E-02	36.3	
16	1	333.53	99	6	1.83	333.83	330	16	1.09E-01	10.8	3.59E+00
17	1	337.86	37	9	1.83	338.17	330	16	4.12E-02	21.6	
18	2	351.53	13	3	1.84	351.83	351	12	1.46E-02	27.7	1.97E+00
19	2	356.01	537	9	1.48	356.31	351	12	5.97E-01	4.3	
20	0	364.53	22	10	1.88	364.84	362	6	2.41E-02	31.8	
21	1	383.83	109	17	1.87	384.13	381	17	1.21E-01	12.3	3.77E+00
22	1	386.87	237	15	1.87	387.17	381	17	2.64E-01	8.1	
23	1	390.87	39	13	1.88	391.17	381	17	4.36E-02	31.8	
24	3	414.96	50	11	2.29	415.27	412	15	5.57E-02	19.8	5.77E+00
25	3	418.26	36	11	2.29	418.56	412	15	4.04E-02	28.7	
26	3	422.21	11	11	2.30	422.51	412	15	1.21E-02	64.6	
27	0	437.14	105	2	1.86	437.44	434	7	1.17E-01	10.0	
28	0	468.01	25	9	1.71	468.31	465	8	2.78E-02	28.3	
29	0	511.75	28	2	3.41	512.04	508	10	3.12E-02	21.5	

Sample ID : 1304132-09 Acquisition date : 15-MAY-2013 08:23:53

Total number of lines in spectrum	29	
Number of unidentified lines	25	
Number of lines tentatively identified by NID	4	13.79%

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	3.712E+02	3.712E+02	0.660E+02	17.77	
	Total Activity :		3.712E+02	3.712E+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	8.206E+02	8.206E+02	1.422E+02	17.33	
	Total Activity :		8.206E+02	8.206E+02			
	Grand Total Activity :		1.192E+03	1.192E+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	3.712E+02	3.712E+02	17.77	OK
	302.84	17.80	6.222E+00	3.230E+02	3.230E+02	29.12	OK
	356.01	60.00	5.860E+00	4.586E+02	4.587E+02	16.17	OK

Final Mean for 3 Valid Peaks = 3.712E+02+/- 6.596E+01 (17.77%)

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	8.206E+02	8.206E+02	17.33	OK

Final Mean for 1 Valid Peaks = 8.206E+02+/- 1.422E+02 (17.33%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.712E+02	6.596E+01	2.122E+01	3.246E+00	17.491
TH-234	8.206E+02	1.422E+02	1.325E+02	7.114E+00	6.195

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.862E+00		5.951E+00	9.203E+00	1.051E+00	-0.202
CD-109	-1.657E+01		1.207E+02	1.906E+02	1.572E+01	-0.087
PA-231	1.900E+00		1.783E+00	3.405E+00	4.842E-02	0.558
PA-234	3.980E+00		1.489E+00	2.849E+00	4.052E-02	1.397
NP-237	2.658E+01		3.408E+01	5.890E+01	4.762E+00	0.451
AM-241	3.895E+01		1.026E+01	2.048E+01	1.007E+00	1.902

VAX/VMS Peak Search Report Generated 15-MAY-2013 08:59:37.92

C
5/15/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413210_GE3_BAFIL_191556.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : DUP07 TOT
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 08:44:17
Sample ID : 1304132-10 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 00:15:03.46 0.4%
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	30.76	1561	62	1.38	31.08	26	13	1.73E+00	2.6	4.95E+00
2	2	34.96	380	48	1.59	35.28	26	13	4.22E-01	6.2	
3	0	51.86	28	119	2.55	52.18	50	7	3.13E-02	66.2	
4	1	61.78	197	109	1.51	62.10	58	12	2.19E-01	10.4	6.73E+00
5	1	65.63	64	113	1.52	65.95	58	12	7.15E-02	27.8	
6	1	80.82	620	78	1.54	81.14	76	13	6.89E-01	4.6	6.01E+00
7	1	83.68	17	56	1.41	84.00	76	13	1.85E-02	108.7	
8	1	111.66	156	42	1.59	111.98	107	14	1.74E-01	10.4	3.01E+00
9	1	116.83	35	27	1.60	117.15	107	14	3.84E-02	33.3	
10	0	160.41	25	35	1.53	160.72	158	5	2.78E-02	40.7	
11	0	187.48	24	76	3.01	187.79	182	10	2.68E-02	71.1	
12	1	276.65	58	12	1.78	276.96	274	12	6.43E-02	15.3	3.14E+00
13	1	281.85	10	16	1.78	282.16	274	12	1.07E-02	66.4	
14	2	302.98	98	13	1.82	303.29	298	28	1.09E-01	11.9	1.41E+00
15	2	307.01	20	14	1.99	307.31	298	28	2.22E-02	49.6	
16	0	334.01	42	30	1.31	334.31	330	7	4.70E-02	26.7	
17	0	338.10	30	10	1.26	338.41	337	5	3.32E-02	26.4	
18	3	351.34	17	2	2.03	351.65	351	11	1.94E-02	21.5	3.83E+00
19	3	356.04	401	5	1.56	356.34	351	11	4.46E-01	5.1	
20	1	383.53	87	20	1.87	383.83	381	10	9.68E-02	15.8	2.83E+01
21	1	386.85	139	51	1.87	387.15	381	10	1.55E-01	12.6	
22	1	414.87	30	3	1.89	415.17	411	18	3.31E-02	22.4	5.41E+00
23	1	419.70	16	3	1.73	420.00	411	18	1.73E-02	41.3	
24	1	425.84	8	3	1.90	426.14	411	18	9.07E-03	55.4	
25	0	436.95	78	4	1.72	437.25	433	8	8.67E-02	12.2	
26	0	468.44	20	5	1.71	468.73	465	6	2.26E-02	27.7	
27	0	512.94	29	0	2.75	513.24	509	11	3.22E-02	18.6	
28	0	610.07	14	5	1.10	610.36	606	9	1.51E-02	42.9	
29	0	1022.61	6	2	2.55	1022.88	1017	8	6.39E-03	60.2	

Sample ID : 1304132-10 Acquisition date : 15-MAY-2013 08:44:17

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	2.970E+02	2.971E+02	0.544E+02	18.31	
	Total Activity :		2.970E+02	2.971E+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	2.049E+03	2.049E+03	0.610E+03	29.77	
TH-234	4.47E+09Y	1.00	5.875E+02	5.875E+02	1.287E+02	21.91	
	Total Activity :		2.637E+03	2.637E+03			
	Grand Total Activity :		2.934E+03	2.934E+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	2.970E+02	2.971E+02	18.31	OK
	302.84	17.80	6.222E+00	2.648E+02	2.648E+02	31.44	OK
	356.01	60.00	5.860E+00	3.429E+02	3.429E+02	16.98	OK

Final Mean for 3 Valid Peaks = 2.971E+02+/- 5.440E+01 (18.31%)

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	2.831E+02	2.831E+02	134.04	OK
	302.67	2.30	6.224E+00	2.049E+03	2.049E+03	29.77	OK

Final Mean for 2 Valid Peaks = 2.049E+03+/- 6.101E+02 (29.77%)

TH-234	63.29	3.80*	2.648E+01	5.875E+02	5.875E+02	21.91	OK

Final Mean for 1 Valid Peaks = 5.875E+02+/- 1.287E+02 (21.91%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	2.971E+02	5.440E+01	2.042E+01	3.123E+00	14.546
PA-231	2.049E+03	6.101E+02	3.260E+00	4.636E-02	628.547
TH-234	5.875E+02	1.287E+02	1.508E+02	8.098E+00	3.897

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.089E+00		5.253E+00	8.843E+00	1.010E+00	0.123
CD-109	-2.781E+01		1.198E+02	1.874E+02	1.545E+01	-0.148
PA-234	2.401E+00		1.296E+00	2.429E+00	3.454E-02	0.988
NP-237	5.877E+00		3.420E+01	5.586E+01	4.516E+00	0.105
AM-241	1.310E+01		9.957E+00	1.728E+01	8.496E-01	0.758

VAX/VMS Peak Search Report Generated 15-MAY-2013 08:57:37.85

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413211_GE1_BAFIL_191554.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : DUP07 DIS
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 08:42:25
Sample ID : 1304132-11 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 00:15:00.28 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	3	30.82	2113	75	1.52	31.05	27	13	2.35E+00	2.2	3.36E+01
2	3	35.12	462	44	1.62	35.35	27	13	5.13E-01	5.3	
3	0	51.79	44	94	2.23	52.02	49	8	4.93E-02	40.7	
4	1	58.77	18	61	1.57	59.00	57	13	1.97E-02	81.7	6.79E+00
5	1	61.91	247	74	1.58	62.14	57	13	2.74E-01	8.6	
6	1	65.63	92	88	1.58	65.86	57	13	1.02E-01	20.7	
7	0	81.30	809	145	1.89	81.53	77	10	8.99E-01	4.5	
8	0	93.62	28	100	1.15	93.85	91	7	3.11E-02	62.1	
9	2	111.93	237	33	1.81	112.16	108	14	2.63E-01	7.6	4.49E+00
10	2	116.09	53	25	1.81	116.31	108	14	5.93E-02	22.3	
11	3	142.93	14	37	2.03	143.15	141	11	1.52E-02	66.0	2.06E+00
12	3	146.28	23	54	2.04	146.51	141	11	2.60E-02	57.1	
13	0	161.38	37	54	1.31	161.60	159	6	4.15E-02	34.9	
14	0	186.38	20	79	1.08	186.60	183	7	2.18E-02	78.6	
15	0	276.66	65	36	1.25	276.88	273	8	7.27E-02	20.1	
16	5	303.19	166	15	1.82	303.41	299	18	1.85E-01	8.3	3.44E+00
17	5	308.29	36	12	2.60	308.51	299	18	4.03E-02	28.6	
18	5	312.22	12	8	2.43	312.44	299	18	1.29E-02	71.4	
19	2	334.14	93	14	2.03	334.35	331	12	1.03E-01	12.0	5.16E-01
20	2	337.81	24	8	2.03	338.02	331	12	2.67E-02	40.5	
21	0	345.08	11	12	2.23	345.29	342	7	1.18E-02	62.8	
22	0	356.38	606	24	1.88	356.59	351	10	6.73E-01	4.3	
23	1	376.96	11	12	1.87	377.17	374	21	1.21E-02	56.0	1.25E+01
24	1	383.96	105	10	1.88	384.17	374	21	1.17E-01	11.1	
25	1	386.96	211	6	1.88	387.17	374	21	2.35E-01	8.6	
26	1	391.62	50	1	1.88	391.83	374	21	5.58E-02	18.3	
27	1	414.97	37	20	1.89	415.17	412	12	4.15E-02	24.5	4.23E+00
28	1	418.77	25	19	1.90	418.98	412	12	2.80E-02	36.8	
29	0	437.43	96	5	1.94	437.64	433	9	1.06E-01	11.0	
30	0	468.14	33	6	2.52	468.34	464	11	3.64E-02	22.5	
31	0	511.46	29	10	2.74	511.66	507	10	3.22E-02	27.6	
32	0	556.54	7	2	2.40	556.74	553	7	8.09E-03	47.7	
33	0	610.18	7	5	1.36	610.37	608	6	7.92E-03	60.8	

Sample ID : 1304132-11 Acquisition date : 15-MAY-2013 08:42:25

Total number of lines in spectrum	33	
Number of unidentified lines	28	
Number of lines tentatively identified by NID	5	15.15%

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	3.752E+02	3.753E+02	0.719E+02	19.16	
	Total Activity :		3.752E+02	3.753E+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	3.324E+02	3.324E+02	0.596E+02	17.94	
AM-241	432.20Y	1.00	1.848E+00	1.848E+00	3.020E+00	163.42	
	Total Activity :		3.343E+02	3.343E+02			
	Grand Total Activity :		7.095E+02	7.095E+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*	1.963E+01	3.752E+02	3.753E+02	19.16	OK
	302.84	17.80	4.915E+00	5.707E+02	5.708E+02	33.57	OK
	356.01	60.00	6.963E+00	4.353E+02	4.353E+02	17.47	OK

Final Mean for 3 Valid Peaks = 3.753E+02+/- 7.189E+01 (19.16%)

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	3.324E+02	3.324E+02	17.94	OK

Final Mean for 1 Valid Peaks = 3.324E+02+/- 5.964E+01 (17.94%)

AM-241	59.54	35.90*	8.010E+01	1.848E+00	1.848E+00	163.42	OK

Final Mean for 1 Valid Peaks = 1.848E+00+/- 3.020E+00 (163.42%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.753E+02	7.189E+01	1.813E+01	2.976E+00	20.697
TH-234	3.324E+02	5.964E+01	5.509E+01	1.765E+00	6.034
AM-241	1.848E+00	3.020E+00	4.262E+00	9.998E-02	0.434

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.676E+00		1.182E+01	1.959E+01	6.115E+00	0.137
CD-109	8.576E+01		1.408E+02	2.161E+02	2.796E+01	0.397
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	1.122E+01		1.857E+00	3.899E+00	7.327E-02	2.877
NP-237	-1.153E+01		4.123E+01	5.522E+01	6.722E+00	-0.209

VAX/VMS Peak Search Report Generated 15-MAY-2013 09:16:35.90

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413212_GE1_BAFIL_191558.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-106-KS TOT
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 09:01:17
Sample ID : 1304132-12 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 00:15:00.28 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	30.83	2058	69	1.48	31.06	27	13	2.29E+00	2.2	3.66E+01
2	2	35.06	576	67	1.68	35.29	27	13	6.40E-01	4.7	
3	0	53.06	57	115	1.87	53.29	49	9	6.38E-02	36.1	
4	2	61.89	262	75	1.73	62.12	58	13	2.91E-01	8.0	4.08E+00
5	2	65.76	112	86	1.74	65.99	58	13	1.25E-01	16.7	
6	0	81.21	839	147	1.92	81.44	77	10	9.33E-01	4.4	
7	0	93.15	22	100	1.41	93.38	90	7	2.39E-02	80.4	
8	2	111.98	245	54	1.81	112.21	107	14	2.72E-01	8.0	2.65E+00
9	2	116.09	35	57	1.81	116.31	107	14	3.92E-02	38.4	
10	0	161.02	24	76	1.61	161.25	158	7	2.65E-02	63.8	
11	0	185.11	20	69	1.39	185.33	182	7	2.22E-02	72.2	
12	0	219.77	13	48	1.63	219.99	216	7	1.40E-02	94.9	
13	0	276.96	62	40	1.16	277.18	273	8	6.89E-02	21.8	
14	1	302.95	154	18	1.64	303.17	299	12	1.71E-01	9.0	5.90E+00
15	1	307.62	29	18	1.82	307.83	299	12	3.19E-02	28.3	
16	1	324.95	13	11	1.84	325.17	321	21	1.40E-02	45.0	3.31E+00
17	1	333.96	99	6	1.84	334.17	321	21	1.10E-01	10.6	
18	1	337.96	24	2	1.84	338.17	321	21	2.70E-02	33.5	
19	0	356.36	567	17	1.90	356.57	354	7	6.30E-01	4.4	
20	0	364.75	31	10	3.80	364.96	362	7	3.46E-02	24.7	
21	3	383.92	120	11	2.05	384.13	381	17	1.34E-01	10.2	2.51E+01
22	3	387.04	270	7	1.86	387.25	381	17	2.99E-01	7.1	
23	3	391.56	46	4	2.25	391.77	381	17	5.11E-02	28.0	
24	2	414.82	43	11	2.08	415.03	411	15	4.81E-02	18.7	3.39E+00
25	2	418.16	29	10	2.09	418.36	411	15	3.25E-02	32.4	
26	2	422.16	12	9	2.09	422.36	411	15	1.33E-02	59.6	
27	0	437.36	106	8	1.89	437.56	432	10	1.18E-01	10.9	
28	0	467.87	32	6	1.75	468.07	464	8	3.55E-02	22.1	
29	0	510.89	22	2	1.89	511.08	507	7	2.39E-02	23.7	

Sample ID : 1304132-12 Acquisition date : 15-MAY-2013 09:01:17

Total number of lines in spectrum	29	
Number of unidentified lines	25	
Number of lines tentatively identified by NID	4	13.79%

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	3.892E+02	3.892E+02	0.741E+02	19.04	
	Total Activity :		3.892E+02	3.892E+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	3.530E+02	3.530E+02	0.590E+02	16.72	
	Total Activity :		3.530E+02	3.530E+02			
	Grand Total Activity :		7.422E+02	7.422E+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*	1.963E+01	3.892E+02	3.892E+02	19.04	OK
	302.84	17.80	4.915E+00	5.296E+02	5.296E+02	34.39	OK
	356.01	60.00	6.963E+00	4.079E+02	4.079E+02	17.49	OK

Final Mean for 3 Valid Peaks = 3.892E+02+/- 7.409E+01 (19.04%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.530E+02	3.530E+02	16.72	OK

Final Mean for 1 Valid Peaks = 3.530E+02+/- 5.901E+01 (16.72%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.892E+02	7.409E+01	1.752E+01	2.876E+00	22.218
TH-234	3.530E+02	5.901E+01	5.509E+01	1.765E+00	6.408

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.231E+00		1.415E+01	2.176E+01	6.792E+00	-0.149
CD-109	-5.681E+01		1.622E+02	2.141E+02	2.770E+01	-0.265
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.735E+00		1.760E+00	3.690E+00	6.935E-02	2.638
NP-237	6.202E+00		4.253E+01	6.076E+01	7.397E+00	0.102
AM-241	1.020E+01		3.406E+00	6.517E+00	1.529E-01	1.565

VAX/VMS Peak Search Report Generated 15-MAY-2013 09:39:41.43

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413213_GE1_BAFIL_191561.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-106-KS DIS
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 09:24:26
Sample ID : 1304132-13 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 00:15:00.28 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	4	30.86	2045	63	1.42	31.09	27	14	2.27E+00	2.3	1.87E+01
2	4	35.09	490	47	1.61	35.32	27	14	5.44E-01	5.1	
3	4	38.31	29	32	1.86	38.54	27	14	3.19E-02	39.6	
4	0	52.23	72	101	2.06	52.46	49	8	8.01E-02	26.8	
5	1	61.88	234	78	1.58	62.11	58	13	2.60E-01	9.0	2.67E+00
6	1	65.84	109	89	1.58	66.07	58	13	1.21E-01	16.4	
7	0	81.22	841	135	1.92	81.45	77	9	9.35E-01	4.3	
8	1	92.73	33	48	1.62	92.95	90	11	3.66E-02	37.8	3.10E-01
9	1	95.64	18	52	1.62	95.87	90	11	1.95E-02	72.6	
10	3	111.98	214	58	1.82	112.20	108	12	2.38E-01	8.6	1.68E+00
11	3	116.27	33	69	2.00	116.50	108	12	3.68E-02	44.6	
12	0	161.23	16	82	1.04	161.46	157	7	1.74E-02	99.5	
13	0	186.83	25	52	1.19	187.05	184	6	2.80E-02	49.1	
14	0	276.78	53	41	1.25	277.00	273	8	5.90E-02	25.1	
15	0	303.05	160	15	1.63	303.27	301	5	1.78E-01	8.6	
16	0	333.79	103	26	1.48	334.00	330	7	1.14E-01	12.9	
17	0	338.70	19	29	1.26	338.91	338	5	2.07E-02	51.0	
18	0	356.31	566	11	1.95	356.52	352	9	6.29E-01	4.3	
19	0	377.03	16	12	2.54	377.24	375	5	1.76E-02	40.9	
20	2	384.02	136	21	2.06	384.23	381	18	1.52E-01	10.1	6.64E+00
21	2	387.15	211	16	1.83	387.36	381	18	2.34E-01	8.0	
22	2	391.43	48	18	2.07	391.64	381	18	5.32E-02	21.5	
23	4	414.69	38	13	2.08	414.90	411	14	4.18E-02	22.4	8.28E+00
24	4	418.02	30	13	2.52	418.23	411	14	3.29E-02	36.1	
25	4	420.99	10	10	2.53	421.20	411	14	1.16E-02	87.5	
26	0	437.37	136	8	1.98	437.57	433	11	1.51E-01	9.5	
27	0	468.04	31	5	2.43	468.25	463	9	3.39E-02	22.0	
28	0	473.26	8	3	1.00	473.47	472	5	8.33E-03	48.3	
29	0	511.41	22	4	2.78	511.61	508	8	2.44E-02	26.5	
30	0	701.52	9	2	2.50	701.70	698	7	1.04E-02	40.2	

Sample ID : 1304132-13 Acquisition date : 15-MAY-2013 09:24:26

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	3.901E+02	3.901E+02	0.738E+02	18.92	
	Total Activity :		3.901E+02	3.901E+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	3.151E+02	3.151E+02	0.589E+02	18.71	
	Total Activity :		3.151E+02	3.151E+02			

Grand Total Activity : 7.051E+02 7.052E+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*	1.963E+01	3.901E+02	3.901E+02	18.92	OK
	302.84	17.80	4.915E+00	5.508E+02	5.508E+02	33.96	OK
	356.01	60.00	6.963E+00	4.067E+02	4.067E+02	17.46	OK

Final Mean for 3 Valid Peaks = 3.901E+02+/- 7.379E+01 (18.92%)

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	3.151E+02	3.151E+02	18.71	OK

Final Mean for 1 Valid Peaks = 3.151E+02+/- 5.895E+01 (18.71%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.901E+02	7.379E+01	1.736E+01	2.850E+00	22.471
TH-234	3.151E+02	5.895E+01	6.226E+01	1.995E+00	5.061

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.688E+01		1.402E+01	2.399E+01	7.490E+00	0.704
CD-109	-1.526E+01		1.417E+02	1.958E+02	2.533E+01	-0.078
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.145E+00		1.765E+00	3.605E+00	6.775E-02	2.259
NP-237	1.261E+01		3.973E+01	5.856E+01	7.129E+00	0.215
AM-241	7.586E+00		3.540E+00	6.421E+00	1.506E-01	1.181

VAX/VMS Peak Search Report Generated 15-MAY-2013 08:58:39.50

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413214_GE2_BAFIL_191555.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : FB AT PZ-100-KS TOT
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 08:43:21
Sample ID : 1304132-14 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 00:15:00.30 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	30.86	1926	109	1.41	30.98	26	15	2.14E+00	2.4	6.48E+00
2	2	35.15	472	125	1.53	35.27	26	15	5.25E-01	5.9	
3	0	52.56	73	171	1.62	52.67	49	8	8.12E-02	33.4	
4	2	61.88	181	76	1.60	62.00	58	12	2.01E-01	10.5	1.06E+01
5	2	65.69	72	71	1.61	65.80	58	12	7.99E-02	23.3	
6	0	81.04	687	126	1.28	81.15	77	8	7.63E-01	4.7	
7	0	92.75	48	81	1.42	92.87	88	8	5.28E-02	36.0	
8	0	111.69	161	108	1.35	111.80	108	7	1.79E-01	13.3	
9	0	116.12	44	65	1.59	116.23	115	6	4.85E-02	33.6	
10	0	161.76	56	66	2.26	161.87	158	11	6.22E-02	31.1	
11	0	276.83	86	19	2.01	276.94	272	10	9.52E-02	14.5	
12	0	302.84	148	14	1.33	302.95	300	6	1.65E-01	9.1	
13	0	307.34	23	21	1.96	307.45	306	6	2.55E-02	37.3	
14	0	333.91	43	35	1.78	334.02	330	7	4.80E-02	27.3	
15	0	339.28	29	20	1.85	339.38	337	7	3.21E-02	32.6	
16	0	356.02	445	26	1.33	356.12	352	8	4.94E-01	5.1	
17	0	364.82	13	14	1.82	364.92	361	7	1.44E-02	55.2	
18	0	377.05	14	12	1.91	377.16	374	6	1.52E-02	48.4	
19	3	383.83	97	16	1.60	383.93	382	15	1.08E-01	13.6	3.11E+00
20	3	386.84	179	16	1.93	386.94	382	15	1.99E-01	9.4	
21	3	390.92	38	13	1.96	391.03	382	15	4.22E-02	26.4	
22	0	437.17	73	15	1.62	437.27	433	7	8.10E-02	14.7	
23	0	450.42	7	2	1.15	450.53	447	6	7.22E-03	49.3	
24	0	468.05	23	13	1.46	468.16	464	9	2.51E-02	36.1	
25	0	512.11	18	10	2.13	512.21	507	11	1.98E-02	42.9	
26	0	522.74	8	2	1.27	522.84	520	7	8.44E-03	52.8	
27	0	595.84	7	6	1.24	595.94	592	8	8.21E-03	67.7	
28	0	636.99	6	5	2.13	637.09	633	7	6.67E-03	74.9	
29	0	1062.05	7	0	2.70	1062.14	1058	7	7.78E-03	37.8	

Sample ID : 1304132-14 Acquisition date : 15-MAY-2013 08:43:21

Total number of lines in spectrum	29	
Number of unidentified lines	25	
Number of lines tentatively identified by NID	4	13.79%

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	3.477E+02	3.477E+02	0.692E+02	19.90	
	Total Activity :		3.477E+02	3.477E+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	6.218E+02	6.218E+02	1.427E+02	22.95	
	Total Activity :		6.218E+02	6.218E+02			
	Grand Total Activity :		9.695E+02	9.695E+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	3.477E+02	3.477E+02	19.90	OK
	302.84	17.80	7.560E+00	3.312E+02	3.312E+02	35.00	OK
	356.01	60.00	7.170E+00	3.106E+02	3.106E+02	18.31	OK

Final Mean for 3 Valid Peaks = 3.477E+02+/- 6.920E+01 (19.90%)

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	6.218E+02	6.218E+02	22.95	OK

Final Mean for 1 Valid Peaks = 6.218E+02+/- 1.427E+02 (22.95%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.477E+02	6.920E+01	1.899E+01	3.234E+00	18.307
TH-234	6.218E+02	1.427E+02	1.492E+02	1.233E+01	4.168

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.739E+00		5.646E+00	9.531E+00	1.464E+00	0.183
CD-109	-4.884E+01		1.229E+02	1.654E+02	1.899E+01	-0.295
PA-231	2.913E+01		5.702E+00	1.067E+01	2.032E-01	2.730
PA-234	4.279E+00		1.795E+00	3.344E+00	6.897E-02	1.280
NP-237	-2.186E+01		3.713E+01	4.831E+01	5.455E+00	-0.453
AM-241	1.838E+01		1.047E+01	1.899E+01	1.469E+00	0.968

VAX/VMS Peak Search Report Generated 15-MAY-2013 09:17:14.13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413215_GE2_BAFIL_191559.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : FB AT PZ-100-KS DIS
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 09:01:56
Sample ID : 1304132-15 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 00:15:00.31 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	1	30.89	2026	119	1.38	31.01	26	15	2.25E+00	2.4	6.19E+00
2	1	35.01	433	104	1.39	35.13	26	15	4.81E-01	6.1	
3	7	45.52	40	186	2.51	45.64	42	16	4.47E-02	57.7	1.93E+00
4	7	52.47	84	143	2.55	52.59	42	16	9.38E-02	28.3	
5	0	61.65	178	123	1.23	61.76	59	6	1.97E-01	12.4	
6	0	65.93	81	69	1.28	66.05	65	4	8.98E-02	18.6	
7	0	80.90	777	110	1.30	81.01	77	8	8.63E-01	4.3	
8	0	91.75	49	95	3.13	91.87	88	9	5.45E-02	38.5	
9	1	111.88	181	58	1.55	112.00	108	15	2.01E-01	9.7	1.34E+00
10	1	115.75	36	48	1.56	115.86	108	15	4.05E-02	35.1	
11	0	185.32	44	56	1.66	185.43	182	7	4.89E-02	32.0	
12	2	276.56	67	13	1.93	276.66	271	20	7.49E-02	15.6	1.99E+00
13	2	280.23	9	9	1.94	280.34	271	20	1.01E-02	96.1	
14	2	283.23	9	8	1.94	283.34	271	20	1.05E-02	71.7	
15	2	303.01	184	12	1.66	303.12	297	14	2.04E-01	7.7	7.74E+00
16	2	306.55	32	17	1.97	306.66	297	14	3.58E-02	31.3	
17	2	333.55	70	16	1.99	333.65	328	15	7.78E-02	15.7	1.29E+00
18	2	337.92	38	21	1.97	338.03	328	15	4.27E-02	24.8	
19	0	356.02	535	23	1.41	356.13	352	9	5.95E-01	4.6	
20	1	383.80	134	23	1.86	383.90	372	18	1.49E-01	10.9	2.34E+00
21	1	386.84	146	29	1.54	386.95	372	18	1.63E-01	10.1	
22	0	391.25	54	16	2.09	391.36	390	5	6.01E-02	18.2	
23	9	414.04	25	4	2.15	414.15	409	16	2.80E-02	25.4	3.23E+00
24	9	418.48	30	10	2.70	418.58	409	16	3.37E-02	28.9	
25	9	422.23	8	9	2.15	422.33	409	16	8.76E-03	79.2	
26	1	433.72	8	1	1.90	433.83	433	7	8.93E-03	32.9	9.44E+00
27	1	436.95	94	5	1.66	437.05	433	7	1.05E-01	11.3	
28	1	463.94	6	4	1.92	464.05	462	13	6.27E-03	58.8	7.59E-01
29	1	468.07	25	4	1.93	468.18	462	13	2.72E-02	24.7	
30	0	511.08	36	8	1.92	511.18	506	11	4.00E-02	22.7	
31	0	610.63	13	5	1.65	610.73	606	10	1.44E-02	42.5	
32	0	699.37	8	1	1.27	699.47	697	6	8.77E-03	42.5	

Sample ID : 1304132-15 Acquisition date : 15-MAY-2013 09:01:56

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	3.931E+02	3.931E+02	0.766E+02	19.47	
	Total Activity :		3.931E+02	3.931E+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	3.170E+03	3.170E+03	1.015E+03	32.03	
TH-234	4.47E+09Y	1.00	6.091E+02	6.091E+02	1.608E+02	26.40	
	Total Activity :		3.779E+03	3.779E+03			

Grand Total Activity : 4.173E+03 4.173E+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	3.931E+02	3.931E+02	19.47	OK
	302.84	17.80	7.560E+00	4.097E+02	4.098E+02	33.59	OK
	356.01	60.00	7.170E+00	3.736E+02	3.736E+02	17.73	OK

Final Mean for 3 Valid Peaks = 3.931E+02+/- 7.656E+01 (19.47%)

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	7.750E+00	2.291E+02	2.291E+02	145.94	OK
	302.67	2.30	7.562E+00	3.170E+03	3.170E+03	32.03	OK

Final Mean for 2 Valid Peaks = 3.170E+03+/- 1.015E+03 (32.03%)

TH-234	63.29	3.80*	2.305E+01	6.091E+02	6.091E+02	26.40	OK

Final Mean for 1 Valid Peaks = 6.091E+02+/- 1.608E+02 (26.40%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.931E+02	7.656E+01	1.800E+01	3.065E+00	21.838
PA-231	3.170E+03	1.015E+03	1.068E+01	2.033E-01	296.928
TH-234	6.091E+02	1.608E+02	1.652E+02	1.365E+01	3.688

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.561E+00		6.066E+00	9.275E+00	1.424E+00	-0.276
CD-109	-2.606E+01		1.222E+02	1.697E+02	1.948E+01	-0.154
PA-234	2.979E+00		1.801E+00	3.236E+00	6.676E-02	0.920
NP-237	-1.106E+01		3.515E+01	4.804E+01	5.424E+00	-0.230
AM-241	2.183E+01		1.060E+01	1.835E+01	1.420E+00	1.189

VAX/VMS Peak Search Report Generated 15-MAY-2013 09:18:06.10

C
Filter

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413216_GE3_BAFIL_191560.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-100-KS TOT
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 09:02:47
Sample ID : 1304132-16 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 00:15:03.81 0.4%
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	1889	76	1.49	31.06	26	15	2.10E+00	2.4	1.07E+01
2	3	35.01	538	81	1.60	35.33	26	15	5.98E-01	5.0	
3	5	52.51	58	98	2.18	52.83	49	21	6.43E-02	31.4	4.34E+00
4	5	56.68	20	54	1.36	57.00	49	21	2.18E-02	59.3	
5	5	61.59	326	74	1.90	61.91	49	21	3.62E-01	7.0	
6	5	65.76	148	77	2.22	66.08	49	21	1.64E-01	14.0	
7	0	70.98	28	68	1.18	71.30	70	5	3.11E-02	47.5	
8	1	80.82	705	66	1.54	81.14	76	12	7.84E-01	4.4	1.11E+01
9	1	83.68	26	43	1.41	84.00	76	12	2.85E-02	78.6	
10	0	92.82	54	110	1.87	93.14	89	9	5.95E-02	37.9	
11	5	111.73	225	56	1.57	112.04	108	12	2.50E-01	8.3	7.98E-01
12	5	116.00	64	62	2.34	116.31	108	12	7.12E-02	27.5	
13	0	160.54	61	52	1.64	160.85	157	8	6.74E-02	24.3	
14	0	276.77	65	47	2.05	277.08	272	11	7.21E-02	24.3	
15	3	302.85	133	24	1.57	303.16	297	23	1.48E-01	10.1	2.79E+00
16	3	307.15	39	24	2.19	307.46	297	23	4.29E-02	32.2	
17	3	312.99	14	20	2.19	313.29	297	23	1.55E-02	66.5	
18	3	333.68	64	22	1.77	333.99	329	14	7.07E-02	16.5	3.17E+00
19	3	338.00	23	34	2.22	338.30	329	14	2.50E-02	46.3	
20	0	356.03	456	19	1.77	356.33	351	9	5.07E-01	5.0	
21	0	371.45	12	30	2.05	371.75	366	7	1.29E-02	86.0	
22	6	383.68	74	14	1.84	383.99	381	17	8.18E-02	17.1	6.88E+00
23	6	386.94	200	9	1.83	387.24	381	17	2.22E-01	8.8	
24	6	391.55	41	7	2.01	391.86	381	17	4.56E-02	20.5	
25	1	414.53	38	12	1.89	414.83	411	13	4.19E-02	21.8	2.21E+00
26	1	417.87	14	15	1.90	418.17	411	13	1.51E-02	66.9	
27	0	437.19	84	15	1.71	437.49	434	8	9.37E-02	13.6	
28	0	468.04	19	10	1.21	468.34	465	7	2.16E-02	34.3	
29	0	510.89	20	2	2.19	511.19	507	8	2.23E-02	25.4	

Sample ID : 1304132-16 Acquisition date : 15-MAY-2013 09:02:47

Total number of lines in spectrum	29	
Number of unidentified lines	25	
Number of lines tentatively identified by NID	4	13.79%

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	3.380E+02	3.380E+02	0.612E+02	18.10	
	Total Activity :		3.380E+02	3.380E+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	9.730E+02	9.730E+02	1.505E+02	15.47	
	Total Activity :		9.730E+02	9.730E+02			
	Grand Total Activity :		1.311E+03	1.311E+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	3.380E+02	3.380E+02	18.10	OK
	302.84	17.80	6.222E+00	3.600E+02	3.601E+02	28.82	OK
	356.01	60.00	5.860E+00	3.897E+02	3.897E+02	16.89	OK

Final Mean for 3 Valid Peaks = 3.380E+02+/- 6.117E+01 (18.10%)

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	9.730E+02	9.730E+02	15.47	OK

Final Mean for 1 Valid Peaks = 9.730E+02+/- 1.505E+02 (15.47%)

Flag: "*" = Keyline

Sample ID : 1304132-16 Acquisition date : 15-MAY-2013 09:02:47

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.380E+02	6.117E+01	1.809E+01	2.767E+00	18.679
TH-234	9.730E+02	1.505E+02	1.231E+02	6.610E+00	7.906

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.832E+00		5.954E+00	9.215E+00	1.053E+00	-0.199
CD-109	7.956E+01		1.103E+02	1.755E+02	1.447E+01	0.453
PA-231	2.916E+00		1.690E+00	3.378E+00	4.804E-02	0.863
PA-234	2.581E+00		1.463E+00	2.674E+00	3.803E-02	0.965
NP-237	2.831E+01		3.229E+01	5.230E+01	4.228E+00	0.541
AM-241	4.189E+01		1.047E+01	2.042E+01	1.004E+00	2.052

VAX/VMS Peak Search Report Generated 15-MAY-2013 09:40:34.39

C Silva

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413217_GE3_BAFIL_191562.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-100-KS DIS
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 09:25:11
Sample ID : 1304132-17 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 00:15:03.76 0.4%
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	34	44	1.43	28.13	27	13	3.78E-02	26.3	2.21E+01
2	3	30.77	1884	76	1.36	31.09	27	13	2.09E+00	2.4	
3	3	34.85	470	76	1.75	35.17	27	13	5.23E-01	5.3	
4	0	53.61	42	108	2.51	53.93	50	7	4.64E-02	44.1	
5	0	61.56	269	149	1.38	61.88	58	7	2.99E-01	9.7	
6	0	65.43	60	153	1.42	65.75	65	6	6.69E-02	35.2	
7	0	80.87	838	147	1.64	81.19	76	10	9.31E-01	4.4	
8	0	92.20	33	67	1.28	92.52	90	6	3.64E-02	43.3	
9	2	111.66	204	48	1.75	111.97	107	14	2.27E-01	8.8	3.64E+00
10	2	116.38	36	36	1.76	116.69	107	14	4.06E-02	33.5	
11	0	128.48	22	42	2.19	128.79	126	6	2.40E-02	52.2	
12	0	142.65	17	72	1.38	142.96	140	7	1.84E-02	88.4	
13	0	166.15	26	55	1.49	166.46	164	7	2.86E-02	51.5	
14	0	186.44	23	66	1.41	186.75	185	6	2.58E-02	60.0	
15	0	277.26	51	38	1.75	277.57	273	9	5.62E-02	26.2	
16	0	302.77	127	21	1.52	303.07	300	6	1.42E-01	10.5	
17	0	309.46	7	55	0.97	309.77	307	7	8.06E-03	174.3	
18	7	333.60	79	18	2.67	333.90	328	15	8.81E-02	15.2	4.56E+00
19	7	338.38	24	12	1.98	338.68	328	15	2.65E-02	33.8	
20	0	356.11	472	29	1.88	356.41	352	10	5.24E-01	5.1	
21	3	383.61	92	12	1.83	383.91	380	16	1.03E-01	12.3	1.04E+01
22	3	386.89	218	12	1.92	387.19	380	16	2.42E-01	8.2	
23	3	391.24	37	9	1.88	391.55	380	16	4.16E-02	22.5	
24	1	414.87	31	10	1.89	415.17	409	17	3.49E-02	24.1	1.70E+00
25	1	418.53	25	8	1.90	418.83	409	17	2.79E-02	31.0	
26	1	421.87	20	7	1.90	422.17	409	17	2.20E-02	37.2	
27	2	432.33	6	0	2.10	432.64	432	11	7.01E-03	0.0	1.08E+00
28	2	437.06	89	3	2.10	437.36	432	11	9.94E-02	11.8	
29	0	467.88	24	4	2.04	468.18	464	7	2.69E-02	24.2	
30	1	509.75	7	1	1.96	510.05	507	13	8.10E-03	53.6	9.39E-01
31	1	512.52	14	2	1.96	512.82	507	13	1.59E-02	34.4	
32	1	516.67	5	3	1.97	516.97	507	13	5.25E-03	67.8	

Sample ID : 1304132-17 Acquisition date : 15-MAY-2013 09:25:11

Total number of lines in spectrum	32	
Number of unidentified lines	28	
Number of lines tentatively identified by NID	4	12.50%

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	4.015E+02	4.015E+02	0.726E+02	18.08	
	Total Activity :		4.015E+02	4.015E+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	8.024E+02	8.024E+02	1.651E+02	20.58	
	Total Activity :		8.024E+02	8.024E+02			
	Grand Total Activity :		1.204E+03	1.204E+03			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Acquisition date : 15-MAY-2013 09:25:11

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	4.015E+02	4.015E+02	18.08	OK
	302.84	17.80	6.222E+00	3.453E+02	3.453E+02	29.44	OK
	356.01	60.00	5.860E+00	4.028E+02	4.028E+02	17.02	OK

Final Mean for 3 Valid Peaks = 4.015E+02+/- 7.261E+01 (18.08%)

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	8.024E+02	8.024E+02	20.58	OK

Final Mean for 1 Valid Peaks = 8.024E+02+/- 1.651E+02 (20.58%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.015E+02	7.261E+01	1.794E+01	2.743E+00	22.382
TH-234	8.024E+02	1.651E+02	1.584E+02	8.510E+00	5.064

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.372E-01		6.377E+00	8.928E+00	1.020E+00	-0.071
CD-109	-7.644E+01		1.321E+02	1.704E+02	1.405E+01	-0.449
PA-231	3.265E+00		1.600E+00	3.284E+00	4.671E-02	0.994
PA-234	3.252E+00		1.383E+00	2.735E+00	3.890E-02	1.189
NP-237	1.582E+01		3.415E+01	5.201E+01	4.204E+00	0.304
AM-241	3.406E+01		1.130E+01	1.979E+01	9.729E-01	1.721

VAX/VMS Peak Search Report Generated 15-MAY-2013 09:55:58.77

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413218_GE1_BAFIL_191565.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : S-53 TOT
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 09:40:44
Sample ID : 1304132-18 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 00:15:00.10 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	0	47.22	20	17	1.62	47.45	44	6	2.23E-02	39.9	
2	0	63.13	41	19	1.47	63.36	60	8	4.57E-02	23.8	
3	0	93.00	57	22	1.24	93.23	90	7	6.32E-02	19.2	
4	0	186.02	21	14	1.20	186.24	182	7	2.33E-02	36.7	
5	0	225.45	12	3	2.21	225.67	223	6	1.33E-02	36.8	
6	0	240.48	9	14	2.01	240.69	235	7	1.02E-02	75.3	
7	0	264.89	17	13	4.62	265.10	260	12	1.89E-02	47.7	
8	0	382.67	8	3	2.83	382.87	380	6	8.89E-03	49.2	
9	0	409.04	12	0	2.11	409.25	406	8	1.33E-02	28.9	
10	0	511.67	28	6	2.67	511.87	506	12	3.10E-02	25.8	
11	0	545.57	6	2	1.70	545.77	543	5	6.53E-03	56.8	

Sample ID : 1304132-18 Acquisition date : 15-MAY-2013 09:40:44

Total number of lines in spectrum	11	
Number of unidentified lines	10	
Number of lines tentatively identified by NID	1	9.09%

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	5.548E+01	5.548E+01	2.656E+01	47.87	
	Total Activity :		5.548E+01	5.548E+01			
	Grand Total Activity :		5.548E+01	5.548E+01			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Acquisition date : 15-MAY-2013 09:40:44

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	5.548E+01	5.548E+01	47.87	OK

Final Mean for 1 Valid Peaks = 5.548E+01+/- 2.656E+01 (47.87%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
TH-234	5.548E+01	2.656E+01	2.796E+01	8.959E-01	1.984

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.588E+00		7.020E+00	1.192E+01	3.721E+00	-0.217
CD-109	-3.046E+01		8.145E+01	1.261E+02	1.631E+01	-0.242
BA-133	-3.346E+00		7.160E+00	1.193E+01	1.958E+00	-0.280
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	4.664E+00		1.198E+00	2.591E+00	4.869E-02	1.800
NP-237	1.363E+01		2.092E+01	3.920E+01	4.773E+00	0.348
AM-241	2.092E-01		1.324E+00	2.327E+00	5.458E-02	0.090

VAX/VMS Peak Search Report Generated 15-MAY-2013 09:56:36.05

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413219_GE3_BAFIL_191566.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : S-53 DIS
Deposition Date :
Sample Date : 15-MAY-2013 00:00:00 Acquisition date : 15-MAY-2013 09:41:18
Sample ID : 1304132-19 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 00:15:03.64 0.4%
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	2079	96	1.41	31.06	26	15	2.31E+00	2.3	9.77E+00
2	2	34.94	482	89	1.58	35.26	26	15	5.35E-01	5.5	
3	0	52.63	112	123	2.16	52.95	48	10	1.25E-01	20.7	
4	2	61.62	236	64	1.66	61.94	58	17	2.62E-01	8.6	3.95E+00
5	2	65.75	128	68	1.67	66.07	58	17	1.42E-01	13.3	
6	2	69.97	17	69	1.68	70.29	58	17	1.94E-02	76.5	
7	2	80.96	840	78	1.70	81.27	78	9	9.34E-01	3.7	1.70E+01
8	2	83.68	15	57	1.41	84.00	78	9	1.64E-02	138.4	
9	0	91.96	36	90	3.19	92.28	90	8	4.05E-02	47.6	
10	2	111.75	227	44	1.75	112.06	107	13	2.52E-01	8.0	2.97E+00
11	2	115.99	45	26	1.76	116.30	107	13	4.96E-02	25.9	
12	0	238.88	14	38	1.74	239.19	234	7	1.57E-02	77.2	
13	0	276.14	67	21	1.62	276.45	273	6	7.43E-02	16.3	
14	0	303.27	104	56	1.36	303.57	300	7	1.16E-01	15.3	
15	3	333.76	58	14	1.76	334.07	329	14	6.45E-02	16.5	4.16E+00
16	3	338.10	34	15	2.22	338.40	329	14	3.78E-02	28.1	
17	0	356.05	483	19	1.83	356.35	352	8	5.37E-01	4.8	
18	0	376.67	21	16	1.66	376.98	373	8	2.32E-02	39.9	
19	4	383.59	85	13	1.87	383.89	381	14	9.40E-02	14.6	5.35E+00
20	4	386.91	204	7	1.93	387.21	381	14	2.27E-01	8.6	
21	4	391.40	51	1	2.09	391.70	381	14	5.69E-02	16.6	
22	1	414.66	27	13	1.89	414.96	412	17	2.99E-02	27.7	2.39E+00
23	1	417.87	21	10	1.90	418.17	412	17	2.29E-02	41.1	
24	1	422.53	11	7	1.90	422.83	412	17	1.20E-02	57.6	
25	0	437.13	75	15	1.86	437.43	433	7	8.34E-02	14.3	
26	0	467.63	36	4	1.36	467.93	464	7	3.94E-02	18.9	
27	0	510.61	11	0	2.11	510.91	508	7	1.22E-02	30.2	
28	0	574.81	10	0	2.32	575.10	572	7	1.11E-02	31.6	
29	0	610.05	7	1	1.39	610.34	607	6	7.29E-03	48.8	

Sample ID : 1304132-19 Acquisition date : 15-MAY-2013 09:41:18

Total number of lines in spectrum 29
Number of unidentified lines 25
Number of lines tentatively identified by NID 4 13.79%

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	4.028E+02	4.028E+02	0.704E+02	17.48	
Total Activity :			4.028E+02	4.028E+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	7.039E+02	7.039E+02	1.293E+02	18.37	
Total Activity :			7.039E+02	7.039E+02			

Grand Total Activity : 1.107E+03 1.107E+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	4.028E+02	4.028E+02	17.48	OK
	302.84	17.80	6.222E+00	2.832E+02	2.832E+02	36.86	OK
	356.01	60.00	5.860E+00	4.128E+02	4.128E+02	16.68	OK

Final Mean for 3 Valid Peaks = 4.028E+02+/- 7.042E+01 (17.48%)

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	7.039E+02	7.039E+02	18.37	OK

Final Mean for 1 Valid Peaks = 7.039E+02+/- 1.293E+02 (18.37%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.028E+02	7.042E+01	2.042E+01	3.123E+00	19.726
TH-234	7.039E+02	1.293E+02	1.207E+02	6.485E+00	5.829

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.321E+00		5.396E+00	9.319E+00	1.065E+00	0.249
CD-109	-6.569E+01		1.328E+02	1.738E+02	1.433E+01	-0.378
PA-231	2.922E+00		1.520E+00	3.128E+00	4.449E-02	0.934
PA-234	3.116E+00		1.430E+00	2.686E+00	3.820E-02	1.160
NP-237	4.262E-01		3.707E+01	5.259E+01	4.251E+00	0.008
AM-241	3.204E+01		9.650E+00	1.864E+01	9.166E-01	1.719