

US EPA ARCHIVE DOCUMENT

ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

**STANDARD LEVEL IV
REPORT OF ANALYSIS**

WORK ORDER #13-04131-OR

May 22, 2013

**EBERLINE ANALYTICAL/OAK RIDGE LABORATORY
OAK RIDGE, TN**

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**Eberline Services – Oak Ridge Laboratory
LABORATORY DATA SUPPORT CHECKLIST**

MP-001-3

13-04131

Eberline Services Work Order # _____

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

Date for Partial	Initials	Date	Initials	Checklist Items
		4/18/13	KC	Sample Log-In
		5-16-13	JG	Data Compilation
		5-17-13	MLT	First Technical Data Review
		5/17/13	USA	Second Technical Data Review
		5/21/13	A	Data Entry/Electronic Deliverable
		5/21/13	E	Case Narrative
		5/21/13	KBS	Electronic Deliverable Proof
		5/22/13	USA	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		5/22/13	USA	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:

Laboratory Manager

5/22/13

Date

Copy No. _____

Radiochemistry Services

US EPA ARCHIVE DOCUMENT

SECTION I
CHAIN OF CUSTODY
&
pH CHECK SHEET

REC'D APR 18 2013

13-04131

Chain of Custody Record

Nº 1604

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830
(865) 481-0683 Phone • (865) 483-4821 Fax



Project Name: <u>West Lake OU-1</u>	Project Number:
Send Report To: <u>Paul Rosasco</u>	Sampler (Print Name): <u>John D Reagan</u>
Address:	Sampler (Print Name):
	Shipment Method: <u>Carrier</u>
	Airbill Number: _____
Phone:	Laboratory Receiving:
Fax:	

Analysis Requested
 Diss U-238 U-235 U-234
 Diss RA-226 RA-228
 Tot Th-232, 230, 228
 Tot U-238, 235, 234
 Tot RA-226, 228
 Tot Th-232, 230, 228

Page 1 of 2
 Lab to filter for dissolved parameters.

Purchase Order #: _____

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Analysis Requested										Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)								
4,5 PZ-208-SS	4/12/13	0910	Aqueous	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
6,7 PZ-101-SS		0915	↑	↑	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	↑
8,9 MW-1204		0926			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10,11 PZ-113-SS		0940			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
12,13 I-53		1005			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
14,15 PZ-113-AS		1035			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
16,17 PZ-107-SS		1040			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
18,19 PZ-116-SS		1046			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
D-14		1105			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PZ-112-AS		1118			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PZ-202-SS		1232			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dip 03	4/12/13	-			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PZ-106-RS	4/15/13	1559			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
FR PZ-100-125	4/16/13	0840			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PZ-100-RS		0850			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
S-53		0900	↓	↓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
I-65	4/16/13	1047	Aqueous	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1

Relinquished by: (Signature) <i>[Signature]</i>	Received by: (Signature) <i>[Signature]</i>	Date: <u>4/17/13</u>	Time: <u>0800</u>	Sample Custodian Remarks (Completed By Laboratory):			
Relinquished by: (Signature) <i>[Signature]</i>	Received by: (Signature) <i>[Signature]</i>	Date: <u>4/18/13</u>	Time: <u>800</u>	QA/QC Level	Turnaround	Sample Receipt	
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:	Level I <input type="checkbox"/>	Routine <input type="checkbox"/>	Total # Containers Received?	
				Level II <input type="checkbox"/>	24 Hour <input type="checkbox"/>	COC Seals Present?	
				Level III <input type="checkbox"/>	1 Week <input type="checkbox"/>	COC Seals Intact?	
				Other <input type="checkbox"/>	Other _____	Received Containers Intact?	
						Temperature?	



EBERLINE
SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-04131

Lab Deadline

5/9/2013

Analysis

UISO - Level 4

Sample Matrix

Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fxns 04, 06, 08, 10, 12, 14, 16, & 18 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED</p>	04	37	MM1.1
	05	37	MM1.1
	06	43	MM1.1
	07	43	MM1.1
	08	42	MM1.1
	09	42	MM1.1
	10	39	MM1.1
	11	39	MM1.1
	12	36	MM1.1
	13	36	MM1.1
	14	41	MM1.1
	15	41	MM1.1
	16	45	MM1.1
	17	45	MM1.1
	18	40	MM1.1
	19	40	MM1.1

US EPA ARCHIVE DOCUMENT

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	4/30/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	5/1/13 0930
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	0930 PM 5/1/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	0925 TCM 5/8/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	0925 J 5/1/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	5/1/2013
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		



Internal Chain of Custody

Work Order #	13-04131
Lab Deadline	5/9/2013
Analysis	ThISO - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fxns 04, 06, 08, 10, 12, 14, 16, & 18 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED</p>	04	37	MM1.1
	05	37	MM1.1
	06	43	MM1.1
	07	43	MM1.1
	08	42	MM1.1
	09	42	MM1.1
	10	39	MM1.1
	11	39	MM1.1
	12	36	MM1.1
	13	36	MM1.1
	14	41	MM1.1
	15	41	MM1.1
	16	45	MM1.1
	17	45	MM1.1
	18	40	MM1.1
	19	40	MM1.1

US EPA ARCHIVE DOCUMENT

	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		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		



Internal Chain of Custody

Work Order #	13-04131
Lab Deadline	5/9/2013
Analysis	Ra226 - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fxns 04, 06, 08, 10, 12, 14, 16, & 18 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED</p>	04	37	MM1.1
	05	37	MM1.1
	06	43	MM1.1
	07	43	MM1.1
	08	42	MM1.1
	09	42	MM1.1
	10	39	MM1.1
	11	39	MM1.1
	12	36	MM1.1
	13	36	MM1.1
	14	41	MM1.1
	15	41	MM1.1
	16	45	MM1.1
	17	45	MM1.1
	18	40	MM1.1
	19	40	MM1.1

	Location (circle one)						Initials	Date
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	<u>Prep</u>	Separations	Count Room			
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room			
Received by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>			
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	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			

US EPA ARCHIVE DOCUMENT



Internal Chain of Custody

Work Order #	13-04131
Lab Deadline	5/9/2013
Analysis	Ra228 - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fxns 04, 06, 08, 10, 12, 14, 16, & 18 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED</p>	04	37	MM1.1
	05	37	MM1.1
	06	43	MM1.1
	07	43	MM1.1
	08	42	MM1.1
	09	42	MM1.1
	10	39	MM1.1
	11	39	MM1.1
	12	36	MM1.1
	13	36	MM1.1
	14	41	MM1.1
	15	41	MM1.1
	16	45	MM1.1
	17	45	MM1.1
	18	40	MM1.1
	19	40	MM1.1

US EPA ARCHIVE DOCUMENT

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	4/30/13 0000
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	5/1/13 0930
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	5-13 0930
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	5-10-13 0210
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	5/10/13 1205
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	5/12/13 0205
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	5/13/13 1248
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	5-16-13 0914
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	5/16/13 0814
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	[Signature]	5/16/13 1105
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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SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order

13-04131

Received By

KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	MM1.1		
02	BLANK	0		WA	MM1.1		
03	DUP	0		WA	MM1.1		
04	PZ-208-SS TOT /	1		WA	MM1.1	9.50	37
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	37
05	PZ-208-SS DIS /	1		WA	MM1.1	0.00	37
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1				37
06	PZ-101-SS TOT /	1		WA	MM1.1	9.50	43
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	43
07	PZ-101-SS DIS /	1		WA	MM1.1	0.00	43
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1				43
08	MW-1204 TOT /	1		WA	MM1.1	9.50	42
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	42
09	MW-1204 DIS /	1		WA	MM1.1	0.00	42
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1				42
10	PZ-113-SS TOT /	1		WA	MM1.1	9.50	39
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	39
11	PZ-113-SS DIS /	1		WA	MM1.1	0.00	39
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1				39
12	I-73 TOT /	1		WA	MM1.1	9.50	36
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	36
13	I-73 DIS /	1		WA	MM1.1	0.00	36
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1				36
14	PZ-113-AS TOT /	1		WA	MM1.1	9.50	41
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	41
15	PZ-113-AS DIS /	1		WA	MM1.1	0.00	41
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1				41
16	PZ-107-SS TOT /	1		WA	MM1.1	9.50	45
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	45
17	PZ-107-SS DIS /	1		WA	MM1.1	0.00	45
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1				45
18	PZ-116-SS TOT /	1		WA	MM1.1	9.50	40
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	40
19	PZ-116-SS DIS /	1		WA	MM1.1	0.00	40
			Container Number:	pH Orig	pH Final	Volume (L)	CPM
			1				40

*Eye
04/18/13*

Received by: Kristen Coulston

Date: 4/18/13

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SECTION II
SAMPLE ACKNOWLEDGEMENT



Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 13-04131

SAMPLE MATRIX/MATRICES:

(CIRCLE ONE OR BOTH)

AQUEOUS NON-AQUEOUS

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

WERE SAMPLES:

Received in good condition?	<input checked="" type="radio"/> Y	N	
If aqueous, properly preserved	<input checked="" type="radio"/> Y	N	N/A

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	<input checked="" type="radio"/> Y	N
Unbroken on outside of package?	<input checked="" type="radio"/> Y	N
Present on samples?	<input checked="" type="radio"/> Y	N
Unbroken on samples?	<input checked="" type="radio"/> Y	N
Was chain of custody present upon sample receipt?	<input checked="" type="radio"/> Y	N

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

REMARKS: _____

SIGNATURE: Kristen Carlsten DATE: 4/18/13

US EPA ARCHIVE DOCUMENT

**SECTION III
CASE NARRATIVE**



EBS-OR-35585

May 22, 2013

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

CASE NARRATIVE
Work Order # 13-04131-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.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
PZ-208-SS TOT	13-04131-04	I-73 TOT	13-04131-12
PZ-208-SS DIS	13-04131-05	I-73 DIS	13-04131-13
PZ-101-SS TOT	13-04131-06	PZ-113-AS TOT	13-04131-14
PZ-101-SS DIS	13-04131-07	PZ-113-AS DIS	13-04131-15
MW-1204 TOT	13-04131-08	PZ-107-SS TOT	13-04131-16
MW-1204 DIS	13-04131-09	PZ-107-SS DIS	13-04131-17
PZ-113-SS TOT	13-04131-10	PZ-116-SS TOT	13-04131-18
PZ-113-SS DIS	13-04131-11	PZ-116-SS DIS	13-04131-19

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 removing a representative aliquot followed by mixed acid digestions and dilutions as appropriate. Uranium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using energy specific regions of interest for Uranium-234, Uranium-235 and Uranium-238. Chemical recovery was determined by the use of a Uranium-232 tracer. Activity of the Uranium-232 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was slightly low for the sample duplicate and fraction -06 (Client ID: PZ-101-SS TOT). Chemical recovery was acceptable for all other samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 and Uranium-235 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-238 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-234 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

ISOTOPIC THORIUM

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

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

RADIUM-226

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

Samples demonstrated acceptable results for all Radium-226 analyses. Chemical recovery was acceptable for all samples. The Radium-226 method blank demonstrated acceptable results. Results for the Radium-226 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-226 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

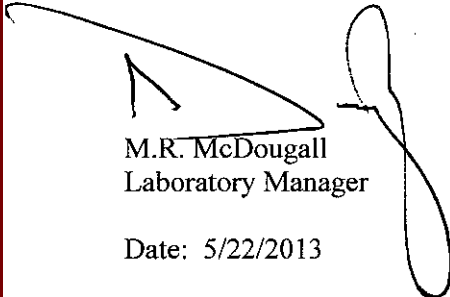
RADIUM-228

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

Samples demonstrated acceptable results for all Radium-228 analyses. Percent mean recovery was slightly low for sample fraction -08 (Client ID: MW-1204 TOT). In this case the radiometric and gravimetric recoveries were acceptable. Chemical recovery was acceptable for all other samples. The Radium-228 method blank demonstrated acceptable results. Results for the Radium-228 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

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



M.R. McDougall
Laboratory Manager

Date: 5/22/2013

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit <http://www.eberlineservices.com/client.htm> to provide us with feedback on our services.

**SECTION IV
ANALYTICAL RESULTS SUMMARY**

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

Project: West Lake OU-1
 SDG: 1304131
 Received: 04/18/2013
 Matrix: Water

Final Report of Analysis
 Date: 5/22/2013
 Page 1 of 5

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Analysis Date/Time</u>	<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Error</u>	<u>MDA</u>	<u>Qualifier</u>	<u>Units</u>
LCS13-04131-01	13-04131-01	05/13/2013 06:12:25	Radium-226	E903.0	10.68	1.27	0.23		pCi/l
LCS13-04131-01	13-04131-01	05/16/2013 09:28:02	Radium-228	E904.0	10.91	1.01	1.13		pCi/l
LCS13-04131-01	13-04131-01	05/07/2013 16:54:55	Thorium-228	HASL 300, 4.5.2	4.78	0.71	0.11		pCi/l
LCS13-04131-01	13-04131-01	05/07/2013 16:54:55	Thorium-230	HASL 300, 4.5.2	5.00	0.73	0.07		pCi/l
LCS13-04131-01	13-04131-01	05/07/2013 16:54:55	Thorium-232	HASL 300, 4.5.2	4.91	0.72	0.07		pCi/l
LCS13-04131-01	13-04131-01	05/08/2013 12:45:35	Uranium-234	HASL 300, 4.5.2	7.23	0.99	0.07		pCi/l
LCS13-04131-01	13-04131-01	05/08/2013 12:45:35	Uranium-235	HASL 300, 4.5.2	0.58	0.20	0.09		pCi/l
LCS13-04131-01	13-04131-01	05/08/2013 12:45:35	Uranium-238	HASL 300, 4.5.2	7.82	1.06	0.08		pCi/l
BLANK13-04131-02	13-04131-02	05/13/2013 06:12:26	Radium-226	E903.0	-0.02	0.05	0.16	U	pCi/l
BLANK13-04131-02	13-04131-02	05/16/2013 09:28:02	Radium-228	E904.0	0.84	0.39	0.72	J	pCi/l
BLANK13-04131-02	13-04131-02	05/07/2013 16:54:56	Thorium-228	HASL 300, 4.5.2	-0.02	0.04	0.11	U	pCi/l
BLANK13-04131-02	13-04131-02	05/07/2013 16:54:56	Thorium-230	HASL 300, 4.5.2	0.14	0.08	0.05		pCi/l
BLANK13-04131-02	13-04131-02	05/07/2013 16:54:56	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.06	U	pCi/l
BLANK13-04131-02	13-04131-02	05/08/2013 12:45:36	Uranium-234	HASL 300, 4.5.2	0.04	0.04	0.05	U	pCi/l
BLANK13-04131-02	13-04131-02	05/08/2013 12:45:36	Uranium-235	HASL 300, 4.5.2	0.01	0.03	0.07	U	pCi/l
BLANK13-04131-02	13-04131-02	05/08/2013 12:45:36	Uranium-238	HASL 300, 4.5.2	0.02	0.04	0.05	U	pCi/l
PZ-208-SS TOT DUP	13-04131-03	05/13/2013 06:12:21	Radium-226	E903.0	0.75	0.27	0.18		pCi/l
PZ-208-SS TOT DUP	13-04131-03	05/16/2013 09:28:02	Radium-228	E904.0	1.11	0.52	1.00	J	pCi/l
PZ-101-SS TOT DUP	13-04131-03	05/07/2013 16:54:57	Thorium-228	HASL 300, 4.5.2	0.12	0.09	0.11	J	pCi/l
PZ-101-SS TOT DUP	13-04131-03	05/07/2013 16:54:57	Thorium-230	HASL 300, 4.5.2	0.14	0.09	0.07	J	pCi/l
PZ-101-SS TOT DUP	13-04131-03	05/07/2013 16:54:57	Thorium-232	HASL 300, 4.5.2	0.03	0.04	0.05	U	pCi/l
PZ-101-SS TOT DUP	13-04131-03	05/08/2013 12:48:21	Uranium-234	HASL 300, 4.5.2	0.52	0.42	0.44	J	pCi/l
PZ-101-SS TOT DUP	13-04131-03	05/08/2013 12:48:21	Uranium-235	HASL 300, 4.5.2	0.30	0.33	0.40	U	pCi/l
PZ-101-SS TOT DUP	13-04131-03	05/08/2013 12:48:21	Uranium-238	HASL 300, 4.5.2	0.53	0.46	0.60	J	pCi/l
PZ-208-SS TOT	13-04131-04	05/13/2013 06:12:22	Radium-226	E903.0	1.14	0.33	0.14		pCi/l
PZ-208-SS TOT	13-04131-04	05/16/2013 09:28:02	Radium-228	E904.0	1.31	0.55	1.05	J	pCi/l
PZ-208-SS TOT	13-04131-04	05/07/2013 16:54:58	Thorium-228	HASL 300, 4.5.2	0.34	0.15	0.13		pCi/l
PZ-208-SS TOT	13-04131-04	05/07/2013 16:54:58	Thorium-230	HASL 300, 4.5.2	0.36	0.14	0.08		pCi/l
PZ-208-SS TOT	13-04131-04	05/07/2013 16:54:58	Thorium-232	HASL 300, 4.5.2	0.36	0.14	0.09		pCi/l
PZ-208-SS TOT	13-04131-04	05/08/2013 12:48:22	Uranium-234	HASL 300, 4.5.2	1.94	0.38	0.07		pCi/l
PZ-208-SS TOT	13-04131-04	05/08/2013 12:48:22	Uranium-235	HASL 300, 4.5.2	0.11	0.08	0.07	J	pCi/l
PZ-208-SS TOT	13-04131-04	05/08/2013 12:48:22	Uranium-238	HASL 300, 4.5.2	1.36	0.30	0.06		pCi/l



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Project: West Lake OU-1
 SDG: 1304131
 Received: 04/18/2013
 Matrix: Water

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PZ-208-SS DIS	13-04131-05	05/13/2013 06:12:23	Radium-226	E903.0	1.06	0.32	0.15		pCi/l
PZ-208-SS DIS	13-04131-05	05/16/2013 09:28:02	Radium-228	E904.0	1.19	0.49	0.91	J	pCi/l
PZ-208-SS DIS	13-04131-05	05/07/2013 16:55:26	Thorium-228	HASL 300, 4.5.2	0.07	0.10	0.18	U	pCi/l
PZ-208-SS DIS	13-04131-05	05/07/2013 16:55:26	Thorium-230	HASL 300, 4.5.2	0.27	0.15	0.11		pCi/l
PZ-208-SS DIS	13-04131-05	05/07/2013 16:55:26	Thorium-232	HASL 300, 4.5.2	-0.01	0.04	0.13	U	pCi/l
PZ-208-SS DIS	13-04131-05	05/08/2013 12:48:19	Uranium-234	HASL 300, 4.5.2	1.69	0.38	0.09		pCi/l
PZ-208-SS DIS	13-04131-05	05/08/2013 12:48:19	Uranium-235	HASL 300, 4.5.2	0.09	0.09	0.09	U	pCi/l
PZ-208-SS DIS	13-04131-05	05/08/2013 12:48:19	Uranium-238	HASL 300, 4.5.2	1.23	0.31	0.07		pCi/l
PZ-101-SS TOT	13-04131-06	05/13/2013 06:12:24	Radium-226	E903.0	21.89	1.80	0.25		pCi/l
PZ-101-SS TOT	13-04131-06	05/16/2013 09:28:02	Radium-228	E904.0	2.12	0.52	0.89		pCi/l
PZ-101-SS TOT	13-04131-06	05/07/2013 16:55:27	Thorium-228	HASL 300, 4.5.2	0.05	0.10	0.18	U	pCi/l
PZ-101-SS TOT	13-04131-06	05/07/2013 16:55:27	Thorium-230	HASL 300, 4.5.2	0.33	0.18	0.14		pCi/l
PZ-101-SS TOT	13-04131-06	05/07/2013 16:55:27	Thorium-232	HASL 300, 4.5.2	0.08	0.09	0.13	U	pCi/l
PZ-101-SS TOT	13-04131-06	05/08/2013 12:48:16	Uranium-234	HASL 300, 4.5.2	0.73	0.44	0.34	J	pCi/l
PZ-101-SS TOT	13-04131-06	05/08/2013 12:48:16	Uranium-235	HASL 300, 4.5.2	0.17	0.24	0.37	U	pCi/l
PZ-101-SS TOT	13-04131-06	05/08/2013 12:48:16	Uranium-238	HASL 300, 4.5.2	0.55	0.37	0.23	J	pCi/l
PZ-101-SS DIS	13-04131-07	05/13/2013 06:13:01	Radium-226	E903.0	23.28	1.79	0.12		pCi/l
PZ-101-SS DIS	13-04131-07	05/16/2013 09:28:02	Radium-228	E904.0	2.49	0.58	1.00		pCi/l
PZ-101-SS DIS	13-04131-07	05/07/2013 16:55:29	Thorium-228	HASL 300, 4.5.2	0.01	0.05	0.11	U	pCi/l
PZ-101-SS DIS	13-04131-07	05/07/2013 16:55:29	Thorium-230	HASL 300, 4.5.2	0.15	0.10	0.08	J	pCi/l
PZ-101-SS DIS	13-04131-07	05/07/2013 16:55:29	Thorium-232	HASL 300, 4.5.2	0.00	0.03	0.07	U	pCi/l
PZ-101-SS DIS	13-04131-07	05/08/2013 12:48:17	Uranium-234	HASL 300, 4.5.2	1.29	0.57	0.27		pCi/l
PZ-101-SS DIS	13-04131-07	05/08/2013 12:48:17	Uranium-235	HASL 300, 4.5.2	0.13	0.21	0.38	U	pCi/l
PZ-101-SS DIS	13-04131-07	05/08/2013 12:48:17	Uranium-238	HASL 300, 4.5.2	0.44	0.31	0.24	J	pCi/l
MW-1204 TOT	13-04131-08	05/13/2013 06:13:03	Radium-226	E903.0	3.34	0.82	0.25		pCi/l
MW-1204 TOT	13-04131-08	05/16/2013 09:28:02	Radium-228	E904.0	2.93	1.16	2.13	J	pCi/l
MW-1204 TOT	13-04131-08	05/07/2013 16:55:30	Thorium-228	HASL 300, 4.5.2	0.08	0.07	0.09	J	pCi/l
MW-1204 TOT	13-04131-08	05/07/2013 16:55:30	Thorium-230	HASL 300, 4.5.2	0.12	0.08	0.08	J	pCi/l
MW-1204 TOT	13-04131-08	05/07/2013 16:55:30	Thorium-232	HASL 300, 4.5.2	0.01	0.02	0.05	U	pCi/l
MW-1204 TOT	13-04131-08	05/08/2013 15:54:14	Uranium-234	HASL 300, 4.5.2	0.06	0.07	0.11	U	pCi/l
MW-1204 TOT	13-04131-08	05/08/2013 15:54:14	Uranium-235	HASL 300, 4.5.2	0.01	0.05	0.12	U	pCi/l
MW-1204 TOT	13-04131-08	05/08/2013 15:54:14	Uranium-238	HASL 300, 4.5.2	0.06	0.07	0.10	U	pCi/l

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Project: West Lake OU-1
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MW-1204 DIS	13-04131-09	05/13/2013 06:13:04	Radium-226	E903.0	2.90	0.55	0.15		pCi/l
MW-1204 DIS	13-04131-09	05/16/2013 09:28:02	Radium-228	E904.0	1.96	0.58	1.05		pCi/l
MW-1204 DIS	13-04131-09	05/07/2013 16:55:31	Thorium-228	HASL 300, 4.5.2	0.06	0.07	0.11	U	pCi/l
MW-1204 DIS	13-04131-09	05/07/2013 16:55:31	Thorium-230	HASL 300, 4.5.2	0.14	0.09	0.06	J	pCi/l
MW-1204 DIS	13-04131-09	05/07/2013 16:55:31	Thorium-232	HASL 300, 4.5.2	0.02	0.03	0.06	U	pCi/l
MW-1204 DIS	13-04131-09	05/08/2013 15:54:15	Uranium-234	HASL 300, 4.5.2	0.05	0.08	0.15	U	pCi/l
MW-1204 DIS	13-04131-09	05/08/2013 15:54:15	Uranium-235	HASL 300, 4.5.2	0.07	0.09	0.12	U	pCi/l
MW-1204 DIS	13-04131-09	05/08/2013 15:54:15	Uranium-238	HASL 300, 4.5.2	0.05	0.07	0.12	U	pCi/l
PZ-113-SS TOT	13-04131-10	05/13/2013 06:13:06	Radium-226	E903.0	4.92	0.73	0.17		pCi/l
PZ-113-SS TOT	13-04131-10	05/16/2013 09:28:02	Radium-228	E904.0	2.04	0.70	1.28		pCi/l
PZ-113-SS TOT	13-04131-10	05/07/2013 16:55:32	Thorium-228	HASL 300, 4.5.2	1.09	0.30	0.10		pCi/l
PZ-113-SS TOT	13-04131-10	05/07/2013 16:55:32	Thorium-230	HASL 300, 4.5.2	2.37	0.52	0.08		pCi/l
PZ-113-SS TOT	13-04131-10	05/07/2013 16:55:32	Thorium-232	HASL 300, 4.5.2	0.87	0.25	0.06		pCi/l
PZ-113-SS TOT	13-04131-10	05/08/2013 15:54:09	Uranium-234	HASL 300, 4.5.2	2.60	0.44	0.08		pCi/l
PZ-113-SS TOT	13-04131-10	05/08/2013 15:54:09	Uranium-235	HASL 300, 4.5.2	0.29	0.13	0.08		pCi/l
PZ-113-SS TOT	13-04131-10	05/08/2013 15:54:09	Uranium-238	HASL 300, 4.5.2	1.76	0.34	0.07		pCi/l
PZ-113-SS DIS	13-04131-11	05/13/2013 06:13:07	Radium-226	E903.0	2.48	0.53	0.15		pCi/l
PZ-113-SS DIS	13-04131-11	05/16/2013 09:28:02	Radium-228	E904.0	1.60	0.54	0.97		pCi/l
PZ-113-SS DIS	13-04131-11	05/07/2013 17:45:00	Thorium-228	HASL 300, 4.5.2	0.09	0.08	0.08	J	pCi/l
PZ-113-SS DIS	13-04131-11	05/07/2013 17:45:00	Thorium-230	HASL 300, 4.5.2	0.18	0.10	0.06		pCi/l
PZ-113-SS DIS	13-04131-11	05/07/2013 17:45:00	Thorium-232	HASL 300, 4.5.2	0.03	0.05	0.08	U	pCi/l
PZ-113-SS DIS	13-04131-11	05/08/2013 15:54:10	Uranium-234	HASL 300, 4.5.2	1.83	0.35	0.06		pCi/l
PZ-113-SS DIS	13-04131-11	05/08/2013 15:54:10	Uranium-235	HASL 300, 4.5.2	0.10	0.08	0.08	J	pCi/l
PZ-113-SS DIS	13-04131-11	05/08/2013 15:54:10	Uranium-238	HASL 300, 4.5.2	1.21	0.27	0.05		pCi/l
I-73 TOT	13-04131-12	05/13/2013 06:13:09	Radium-226	E903.0	1.79	0.49	0.18		pCi/l
I-73 TOT	13-04131-12	05/16/2013 09:32:59	Radium-228	E904.0	2.55	0.69	1.24		pCi/l
I-73 TOT	13-04131-12	05/07/2013 17:45:03	Thorium-228	HASL 300, 4.5.2	0.41	0.21	0.10		pCi/l
I-73 TOT	13-04131-12	05/07/2013 17:45:03	Thorium-230	HASL 300, 4.5.2	0.55	0.25	0.11		pCi/l
I-73 TOT	13-04131-12	05/07/2013 17:45:03	Thorium-232	HASL 300, 4.5.2	0.45	0.22	0.09		pCi/l
I-73 TOT	13-04131-12	05/08/2013 15:54:11	Uranium-234	HASL 300, 4.5.2	1.50	0.36	0.07		pCi/l
I-73 TOT	13-04131-12	05/08/2013 15:54:11	Uranium-235	HASL 300, 4.5.2	0.29	0.16	0.09		pCi/l
I-73 TOT	13-04131-12	05/08/2013 15:54:11	Uranium-238	HASL 300, 4.5.2	1.64	0.38	0.11		pCi/l



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I-73 DIS	13-04131-13	05/13/2013 06:13:11	Radium-226	E903.0	1.04	0.35	0.17		pCi/l
I-73 DIS	13-04131-13	05/16/2013 09:32:59	Radium-228	E904.0	1.03	0.52	1.01	J	pCi/l
I-73 DIS	13-04131-13	05/07/2013 17:44:56	Thorium-228	HASL 300, 4.5.2	0.02	0.04	0.08	U	pCi/l
I-73 DIS	13-04131-13	05/07/2013 17:44:56	Thorium-230	HASL 300, 4.5.2	0.13	0.09	0.06	J	pCi/l
I-73 DIS	13-04131-13	05/07/2013 17:44:56	Thorium-232	HASL 300, 4.5.2	0.01	0.04	0.08	U	pCi/l
I-73 DIS	13-04131-13	05/08/2013 15:54:12	Uranium-234	HASL 300, 4.5.2	0.99	0.35	0.19		pCi/l
I-73 DIS	13-04131-13	05/08/2013 15:54:12	Uranium-235	HASL 300, 4.5.2	0.36	0.22	0.16	J	pCi/l
I-73 DIS	13-04131-13	05/08/2013 15:54:12	Uranium-238	HASL 300, 4.5.2	0.65	0.27	0.16		pCi/l
PZ-113-AS TOT	13-04131-14	05/13/2013 06:13:12	Radium-226	E903.0	0.61	0.26	0.14		pCi/l
PZ-113-AS TOT	13-04131-14	05/16/2013 09:32:59	Radium-228	E904.0	2.36	0.56	0.94		pCi/l
PZ-113-AS TOT	13-04131-14	05/07/2013 17:44:58	Thorium-228	HASL 300, 4.5.2	0.10	0.07	0.07	J	pCi/l
PZ-113-AS TOT	13-04131-14	05/07/2013 17:44:58	Thorium-230	HASL 300, 4.5.2	0.23	0.11	0.06		pCi/l
PZ-113-AS TOT	13-04131-14	05/07/2013 17:44:58	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.08	U	pCi/l
PZ-113-AS TOT	13-04131-14	05/08/2013 15:54:43	Uranium-234	HASL 300, 4.5.2	0.92	0.27	0.07		pCi/l
PZ-113-AS TOT	13-04131-14	05/08/2013 15:54:43	Uranium-235	HASL 300, 4.5.2	0.22	0.14	0.12	J	pCi/l
PZ-113-AS TOT	13-04131-14	05/08/2013 15:54:43	Uranium-238	HASL 300, 4.5.2	0.79	0.24	0.10		pCi/l
PZ-113-AS DIS	13-04131-15	05/13/2013 06:13:14	Radium-226	E903.0	0.49	0.24	0.21		pCi/l
PZ-113-AS DIS	13-04131-15	05/16/2013 09:32:59	Radium-228	E904.0	1.34	0.53	0.98	J	pCi/l
PZ-113-AS DIS	13-04131-15	05/07/2013 17:45:16	Thorium-228	HASL 300, 4.5.2	0.01	0.04	0.07	U	pCi/l
PZ-113-AS DIS	13-04131-15	05/07/2013 17:45:16	Thorium-230	HASL 300, 4.5.2	0.16	0.09	0.05		pCi/l
PZ-113-AS DIS	13-04131-15	05/07/2013 17:45:16	Thorium-232	HASL 300, 4.5.2	0.02	0.03	0.05	U	pCi/l
PZ-113-AS DIS	13-04131-15	05/08/2013 15:54:45	Uranium-234	HASL 300, 4.5.2	0.61	0.20	0.07		pCi/l
PZ-113-AS DIS	13-04131-15	05/08/2013 15:54:45	Uranium-235	HASL 300, 4.5.2	0.07	0.08	0.11	U	pCi/l
PZ-113-AS DIS	13-04131-15	05/08/2013 15:54:45	Uranium-238	HASL 300, 4.5.2	0.48	0.17	0.09		pCi/l
PZ-107-SS TOT	13-04131-16	05/13/2013 06:13:15	Radium-226	E903.0	7.72	1.13	0.17		pCi/l
PZ-107-SS TOT	13-04131-16	05/16/2013 09:32:59	Radium-228	E904.0	3.36	1.02	1.81		pCi/l
PZ-107-SS TOT	13-04131-16	05/07/2013 17:45:10	Thorium-228	HASL 300, 4.5.2	1.01	0.27	0.08		pCi/l
PZ-107-SS TOT	13-04131-16	05/07/2013 17:45:10	Thorium-230	HASL 300, 4.5.2	0.78	0.23	0.09		pCi/l
PZ-107-SS TOT	13-04131-16	05/07/2013 17:45:10	Thorium-232	HASL 300, 4.5.2	1.11	0.29	0.12		pCi/l
PZ-107-SS TOT	13-04131-16	05/08/2013 15:54:52	Uranium-234	HASL 300, 4.5.2	1.68	0.35	0.08		pCi/l
PZ-107-SS TOT	13-04131-16	05/08/2013 15:54:52	Uranium-235	HASL 300, 4.5.2	0.16	0.10	0.07	J	pCi/l
PZ-107-SS TOT	13-04131-16	05/08/2013 15:54:52	Uranium-238	HASL 300, 4.5.2	1.27	0.29	0.07		pCi/l

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

Project: West Lake OU-1
 SDG: 1304131
 Received: 04/18/2013
 Matrix: Water

Final Report of Analysis
 Date: 5/22/2013
 Page 5 of 5

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Analysis Date/Time</u>	<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Error</u>	<u>MDA</u>	<u>Qualifier</u>	<u>Units</u>
PZ-107-SS DIS	13-04131-17	05/13/2013 06:13:17	Radium-226	E903.0	5.80	0.79	0.11		pCi/l
PZ-107-SS DIS	13-04131-17	05/16/2013 09:32:59	Radium-228	E904.0	1.88	0.49	0.84		pCi/l
PZ-107-SS DIS	13-04131-17	05/07/2013 17:45:13	Thorium-228	HASL 300, 4.5.2	0.00	0.03	0.08	U	pCi/l
PZ-107-SS DIS	13-04131-17	05/07/2013 17:45:13	Thorium-230	HASL 300, 4.5.2	0.11	0.08	0.06	J	pCi/l
PZ-107-SS DIS	13-04131-17	05/07/2013 17:45:13	Thorium-232	HASL 300, 4.5.2	0.00	0.03	0.06	U	pCi/l
PZ-107-SS DIS	13-04131-17	05/08/2013 15:54:48	Uranium-234	HASL 300, 4.5.2	1.64	0.39	0.12		pCi/l
PZ-107-SS DIS	13-04131-17	05/08/2013 15:54:48	Uranium-235	HASL 300, 4.5.2	0.19	0.13	0.10	J	pCi/l
PZ-107-SS DIS	13-04131-17	05/08/2013 15:54:48	Uranium-238	HASL 300, 4.5.2	1.05	0.30	0.16		pCi/l
PZ-116-SS TOT	13-04131-18	05/13/2013 06:13:19	Radium-226	E903.0	0.83	0.30	0.15		pCi/l
PZ-116-SS TOT	13-04131-18	05/16/2013 09:32:59	Radium-228	E904.0	0.76	0.42	0.81	J	pCi/l
PZ-116-SS TOT	13-04131-18	05/07/2013 17:45:05	Thorium-228	HASL 300, 4.5.2	0.03	0.04	0.06	U	pCi/l
PZ-116-SS TOT	13-04131-18	05/07/2013 17:45:05	Thorium-230	HASL 300, 4.5.2	0.15	0.10	0.08	J	pCi/l
PZ-116-SS TOT	13-04131-18	05/07/2013 17:45:05	Thorium-232	HASL 300, 4.5.2	0.03	0.05	0.09	U	pCi/l
PZ-116-SS TOT	13-04131-18	05/08/2013 15:54:50	Uranium-234	HASL 300, 4.5.2	5.69	0.79	0.06		pCi/l
PZ-116-SS TOT	13-04131-18	05/08/2013 15:54:50	Uranium-235	HASL 300, 4.5.2	0.41	0.16	0.06		pCi/l
PZ-116-SS TOT	13-04131-18	05/08/2013 15:54:50	Uranium-238	HASL 300, 4.5.2	1.62	0.32	0.06		pCi/l
PZ-116-SS DIS	13-04131-19	05/13/2013 06:13:21	Radium-226	E903.0	0.21	0.15	0.15	J	pCi/l
PZ-116-SS DIS	13-04131-19	05/16/2013 09:32:59	Radium-228	E904.0	1.29	0.38	0.66		pCi/l
PZ-116-SS DIS	13-04131-19	05/07/2013 17:45:08	Thorium-228	HASL 300, 4.5.2	0.03	0.05	0.07	U	pCi/l
PZ-116-SS DIS	13-04131-19	05/07/2013 17:45:08	Thorium-230	HASL 300, 4.5.2	0.08	0.08	0.07	U	pCi/l
PZ-116-SS DIS	13-04131-19	05/07/2013 17:45:08	Thorium-232	HASL 300, 4.5.2	0.02	0.05	0.10	U	pCi/l
PZ-116-SS DIS	13-04131-19	05/08/2013 15:54:47	Uranium-234	HASL 300, 4.5.2	5.29	0.72	0.05		pCi/l
PZ-116-SS DIS	13-04131-19	05/08/2013 15:54:47	Uranium-235	HASL 300, 4.5.2	0.40	0.15	0.06		pCi/l
PZ-116-SS DIS	13-04131-19	05/08/2013 15:54:47	Uranium-238	HASL 300, 4.5.2	1.78	0.33	0.07		pCi/l

**SECTION V
ANALYTICAL STANDARDS**

U-8

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

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 H ₂ O
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

- Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
- 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 ALIAS
 ERIC ALIAS
 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



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

SOLUTION REFERENCE # IPL 479-50 CURRENT DATE 9/6/2012 0:00
SOLUTION # U-8

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

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

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 HNO₃

Dilution Instructions: Dilution Solvent Used 1M HNO₃

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 [Signature]

Date: 9/26/2012 0:00

QC Approval [Signature]

Date: 9/26/12

US EPA ARCHIVE DOCUMENT



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Title: Radioactive Reference Standards Solutions & Records

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

Solution Reference # MP-009 IPL 479-50 Date 9/6/2012 0:00
Solution # U-8a

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

Radionuclide of Interest ^{234, 235, 238}U Reference Date 1/1/1995 0:00
Parent Solution Conc. 1.7786E+04 dpm/ml

Chemical Composition of Standard Solution
Uranly Nitrate in 1M HNO₃

Dilution Instructions: Dilution Solvent Used 1M HNO₃

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 4.0000 ml
Total Activity: 7.1182E+04 dpm Final Activity Concentration: 7.1182E+01 dpm/ml
Final Volume: 1000.00 ml

NOTES:

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

Isotopic Distribution as:
U-238 Atom % = 48.238 U-238 = 71.182 dpm/ml X 0.46249 = 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 [Signature]
QC Approval [Signature]

Date: 9/26/2012 0:00
Date: 9/26/12

US EPA ARCHIVE DOCUMENT

Tracer Solution for Environmental Analysis & Disequilibrium Studies

Product Description & Measurement Certificate

<i>Description</i>	Principal radionuclide: uranium 232 (U-232) Daughter Nuclide: Th-228	Product code: UDP10050 Batch Number: 92/232/67
<i>Measurement</i>	Reference date: Radioactive concentration U-232 which is equivalent to Mass of solution Volume of solution Total activity of U-232 which is equivalent to	01 March 2000 6.739E+03 becquerels per gram of solution 1.821E-01 microcuries per gram of solution 5.356 grams 5.035 millilitres 3.61E+04 becquerels 9.76E-01 microcuries
<i>Accuracy</i>	Method of measurement (see reverse of this certificate) Random uncertainty is: $\pm 0.7\%$ Systematic uncertainty: $\pm 0.5\%$ Overall uncertainty in the radioactive concentration quoted above: $\pm 1.7\%$ Overall uncertainty is defined on the reverse of this certificate.	
<i>Radionuclidic Purity</i>	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	
<i>Isotopic Purity</i>	The isotopic composition, expressed as atom per cent at the reference date . Not measured	
<i>Chemical Composition</i>	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'.	
<i>Physical Data</i>	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.	
<i>Remarks</i>	For safety information and notes to ensure correct usage by all persons handling this radioactive Tracer solution please read the instructions accompanying the package. AEA Technology operates a quality management system which has been independently audited and approved to ISO 9001.	

Approved
Signatory



Roger Wiltshire

Project Ref. AE2315

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

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MP-009

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

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

CURRENT DATE: 12/13/2012 0:00

SOLUTION REFERENCE #: AEA/Amersham 92/232/67 SOLUTION #: U-10

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

Radionuclide	²³² U	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

²³²U(NO₃)₆ in 2M HNO₃

Dilution Instructions: Dilution Solvent Used: 2M HNO₃

Dilute to a volume of 1000.00 milliliters

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

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

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

Expiration Date: December 7, 2013

Verified & Approved By: 

Date: 12/13/2012 0:00

QC Approval: 

Date: 12/13/12

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

Solution Reference #		MP-009	Date	12/7/2012 0:00
		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	Reference Date	3/1/2000 0:00
Parent Solution Conc.	2.167E+03 dpm/ml		

Chemical Composition of Standard Solution
²³²U(NO₃)₆ in 2M HNO₃

Dilution Instructions:	Dilution Solvent Used	2M HNO ₃
------------------------	-----------------------	---------------------


SECONDARY VOLUMETRIC DILUTION

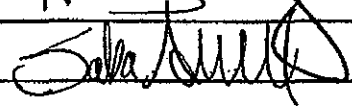
Vol. Parent Solution:	10.0000 ml	Final Activity Concentration:	2.1670E+01 dpm/ml
Total Activity:	2.1670E+04 dpm		
Final Volume:	1000.00 ml		

NOTES:

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

Expiration Date: December 7, 2013

Verified & Approved By 

QC Approval 

Date: 12/13/2012 0:00

Date: 12/13/12

US EPA ARCHIVE DOCUMENT

QA/QC REVIEWED

Date 10/14/91 Initials wt

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Received
OCT 14 1991
TMA/Eberline
Oak Ridge Lab

Radionuclide Th-230
Half Life: $(7.54 \pm 0.03) \times 10^4$ years
Catalog No.: 7230
Source No.: 388-116

Customer: TMA EBERLINE
P.O.No.: TT4944
Reference Date: November 1 1991 12:00 PST.
Contained Radioactivity: 1.036 μ Ci.

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 μ Ci/gram.

Method of Calibration

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

Uncertainty of Measurement

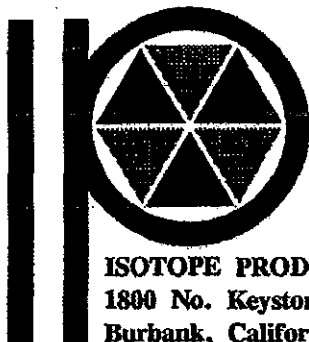
- a. Systematic uncertainty in instrument calibration: $\pm 2.0\%$
- b. Random uncertainty in assay: $\pm 0.5\%$
- c. Random uncertainty in weighing(s): $\pm 0.2\%$
- d. Total uncertainty at the 99% confidence level: $\pm 2.7\%$

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)



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[Signature]
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RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

Solution Reference # MP-009 IPL 388-116		Date 3/4/2013 0:00 Th-1b
Principal Radionuclide ²³⁰Th	Half Life, Years 7.540E+04	Half Life, Days 2.754E+07
Radionuclide of Interest ²³⁰Thorium	Parent Solution Conc. 2.30E+03 dpm/ml	Reference Date 11/1/1991 0:00
Chemical Composition of Standard Solution ²³⁰Th(NO₃)₄ in 0.1N HNO₃		

Dilution Instructions: Dilution Solvent Used **0.1N HNO₃**

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 10.0000 ml	Final Activity Concentration: 2.2999E+01 dpm/ml
Total Activity: 2.2999E+04 dpm	
Final Volume: 1000.00 ml	

NOTES:

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

Expiration Date: **March 4, 2014**

Recertified By 

Date: **3/21/2013 0:00**

Verified & Approved By 

Date: **3/21/13**

QC Approval 

Date: **3/21/13**

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

CURRENT DATE 3/4/2013 0:00

SOLUTION REFERENCE # IPL 388-116

SOLUTION # Th-1

Principal Radionuclide

Half Life, Years

Half Life, Days

²³⁰Th

7.540E+04

2.754E+07

Radionuclide ²³⁰Thorium

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

²³⁰Th(NO₃)₄ in 0.1N HNO₃

Dilution Instructions:

Dilution Solvent Used

0.1N HNO₃

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

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CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclide:	Th-232	Customer:	TMA EBERLINE
Half Life:	$(1.405 \pm 0.006) \times 10^{10}$ 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 μ Ci.
		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 μ Ci/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

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

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).



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Anna U. Khan

 QUALITY CONTROL

 Nov. 8, 1993
 Date Signed

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Title: Radioactive Reference Standards Solutions & Records

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

CURRENT DATE: 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(NO₃)₄ in H₂O

Dilution Instructions: Dilution Solvent Used 1% Nitric Acid

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 2.071E+02 dpm/ml
This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: October 9, 2013

Verified & Approved By 

Date: 10/9/2012 0:00

QC Approval 

Date: 11/12/12

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Title: Radioactive Reference Standards Solutions & Records

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

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

Date **11/9/2012 0:00**
Solution # **Th-8b**

Principal Radionuclide
²²⁸ & ²³² Th

Half Life, Years
1.405E+10

Half Life, Days
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(NO₃)₄ in 1% HNO₃

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**

US EPA ARCHIVE DOCUMENT



**Isotope Products
Laboratories**

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661-309-1010
Fax 661-257-8303

Th-18

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: 1.013 μCi 37.48 kBq (Th-229 only)

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.

Ann H. Khan
Quality Control

9-Jan-02
Date Signed

IPL Ref. No.: 867-54

ISO 9001 CERTIFIED

Medical Imaging Laboratory
24937 Avenue Tibbitts Valencia, California 91355

Industrial Gauging Laboratory
1800 North Keystone Street Burbank, California 91504



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

SOLUTION REFERENCE # IPL 867-54 CURRENT DATE 11/9/2012 0:00
SOLUTION # Th-18

Principal Radionuclide ²²⁸Th Half Life, Years 7.340E+03 Half Life, Days 2.681E+06

Radionuclide ²²⁸Th Reference Date 1/15/2002 0:00

Certified Activity 1.013E+00 μCi
Certified Concentration $\mu\text{Ci per gram}$

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
²²⁸Th(NO₃)₄ in 0.1M HNO₃

Dilution Instructions: Dilution Solvent Used 0.1M HNO₃

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

US EPA ARCHIVE DOCUMENT



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

Solution Reference # MP-009 IPL 867-54 Date 11/9/2012 0:00
Solution # Th-18a

Principal Radionuclide ²²⁸Th Half Life, Years 7.340E+03 Half Life, Days 2.681E+06

Radionuclide of Interest ²²⁸Th Reference Date 1/15/2002 0:00
Parent Solution Conc. 2.25E+03 dpm/ml

Chemical Composition of Standard Solution
TH(NO₃)₄ in 0.1M HNO₃

Dilution Instructions: Dilution Solvent Used 0.1M HNO₃

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 [Signature]

Date: 11/9/2012 0:00

QC Approval [Signature]

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



National Institute of Standards & Technology

Certificate

Standard Reference Material 4251C Barium-133 Radioactivity Standard

13a-6
(f 6a)

ORIGINAL

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



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	4.2562	Weight, Grams
Solution Net	5.0499	Weight, Grams
Total Activity in Ampoule	66.5577	μCi

Chemical Composition of Standard Solution
¹³³BaCl₂ in 1M HCl

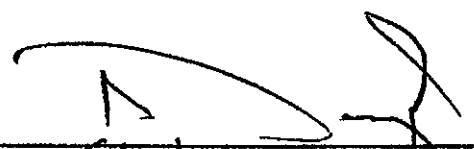
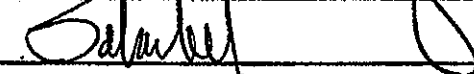
Dilution Instructions: Dilution Solvent Used: 1M HCl

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: 
QC Approval: 

Date: 9/27/12
Date: 9/27/12

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM

QCP-009

Rev. 8; 11/10/03

Title: Radioactive Reference Standards Solutions & Records

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

Solution Reference # QCP-009-1-A
NIST-SRM4251C

Date 9/20/12
Solution # Ba-6a

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

Radionuclide of Interest ¹³³Ba Reference Date 9/1/1993 0:00
Parent Solution Conc. 1.48E+05 dpm/ml

Chemical Composition of Standard Solution
¹³³BaCl₂ 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 Activity Concentration: 3.6950E+03 dpm/ml
Final Volume: 1000.00 ml

NOTES:

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

Expiration Date: September 20, 2013

Verified & Approved By [Signature]
QC Approval [Signature]

Date: 9/27/12
Date: 9/27/12

US EPA ARCHIVE DOCUMENT

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

Radionuclide: Ra-226
Half Life: 1600 ± 7 years
Catalog No.: 7226
Source No.: 453-26

Customer: TMA EBERLINE
P.O.No.: VH1888
Reference Date: February 1 1994 12:00 PST.
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).



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

Anna H. Kuen
QUALITY CONTROL

Feb. 3, 1994
Date Signed



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 # Ra-5

SOLUTION REFERENCE # IPL 453-26

Principal Radionuclide: ²²⁶Radium
Half Life, Years: 1.600E+03
Half Life, Days: 5.844E+05

Radionuclide: ²²⁶Radium
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
²²⁶Ra(NO₃)₂ in 1M HNO₃

Dilution Instructions: Dilution Solvent Used: 1M HNO₃

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: [Signature]

Date: 11/9/2012

QC Approval: [Signature]

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



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

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

Principal Radionuclide	Half Life, Years	Half Life, Days
<u>²²⁶Radium</u>	<u>1.600E+03</u>	<u>5.844E+05</u>

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

Chemical Composition of Standard Solution

²²⁶Ra(NO₃)₂ in 1M HNO₃

Dilution Instructions: Dilution Solvent Used 1M HNO₃

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 [Signature]

Date: 11/9/2012 0:00

QC Approval [Signature]

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



ANALYTICS

RA-11

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 μ g/g Ba carrier.

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

SOURCE PREPARED BY:

M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED:

[Signature] 11/7/01

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



QUALITY CONTROL PROGRAM
MP-009

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

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

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

Principal Radionuclide	Half Life, Years	Half Life, Days
<u>²²⁶Ra</u>	<u>5.750E+00</u>	<u>2.100E+03</u>

Radionuclide	<u>²²⁶Ra</u>	Reference Date	<u>11/7/2001 0:00</u>
Certified Activity	<u>6.986E-02</u> μ Ci		
Certified Concentration	μ Ci per gram		

Ampoule /Solution Gross	<u>9.4982</u>	Weight, Grams
Empty Ampoule	<u>4.4895</u>	Weight, Grams
Solution Net	<u>5.0087</u>	Weight, Grams
Total Activity in Ampoule	<u>0.0699</u>	μ Ci

Chemical Composition of Standard Solution

²²⁶Ra(NO₃)₂ in 0.5 M HCl


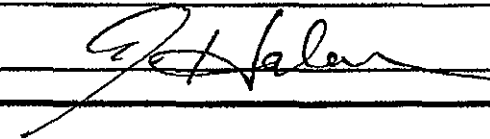
Dilution Instructions: Dilution Solvent Used 0.5 M HCl

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.0699 μ Ci 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
13-04131	UUISO	1	pCi	I	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	1.59	88.69%	15.49%	100.00%	3.60%	8.15E+00	2.94E-01	7.23E+00	1.12E+00	U-8a	3.52E+01	3.60E+00	5.14E-01
U-238	0.21	98.37%	15.31%	100.00%	3.60%	7.95E+00	2.86E-01	7.82E+00	1.20E+00	U-8a	3.44E+01	3.60E+00	5.14E-01

Matrix Spike

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

Replicate Sample

QC Summary

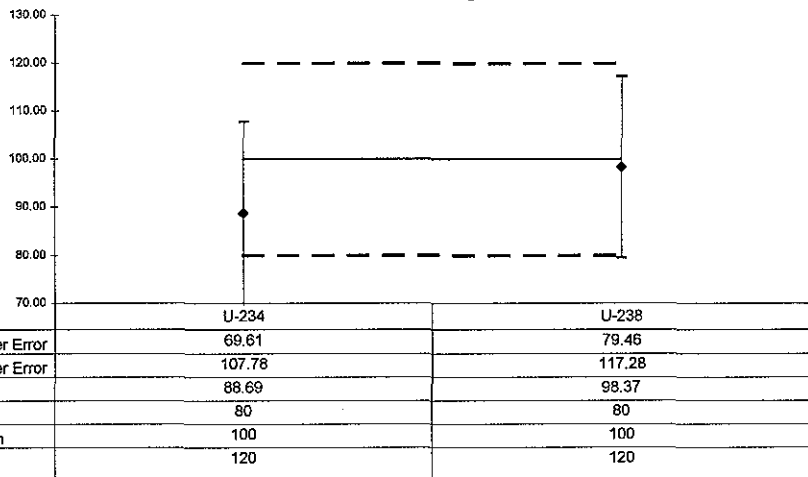
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
U-234	0.67	33.35	7.35E-01	4.46E-01	5.25E-01	4.19E-01	0.89	OK	OK			INV	OK
U-238	0.07	4.06	5.53E-01	3.70E-01	5.31E-01	4.63E-01	0.98	OK	OK			OK	OK
U-235	0.61	54.41	1.74E-01	2.43E-01	3.03E-01	3.35E-01		OK	OK			INV	OK

US EPA ARCHIVE DOCUMENT

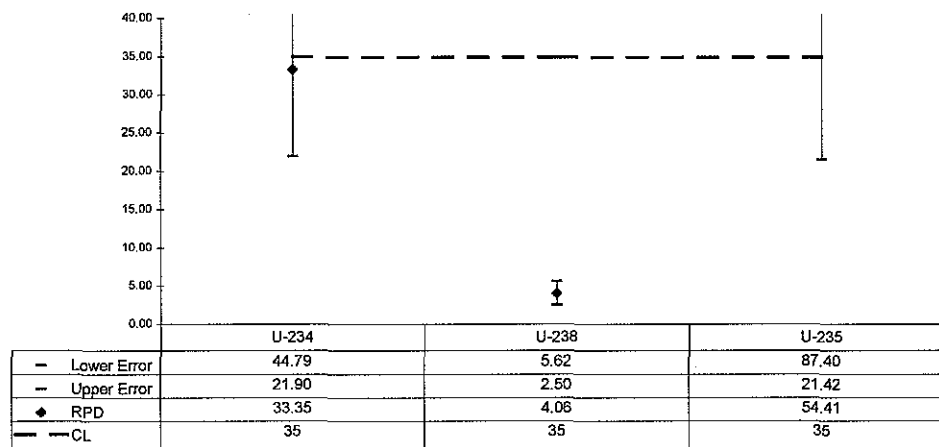
0049

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04131	UUISO	1	pCi	I	Engineering Management Support, Inc.

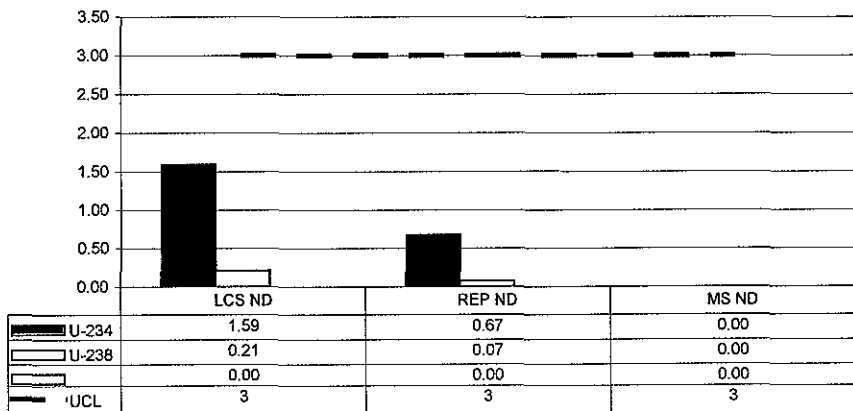
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04131	THISO	1	pCi	I	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	0.02	99.79%	17.56%	100.00%	3.60%	4.79E+00	1.72E-01	4.78E+00	8.40E-01	Th-8b	1.04E+02	3.60E+00	1.03E-01
TH-230	0.94	91.51%	19.18%	100.00%	2.70%	5.46E+00	1.47E-01	5.00E+00	9.59E-01	Th-1b	2.35E+01	2.70E+00	5.15E-01
TH-232	0.27	102.46%	17.15%	100.00%	3.60%	4.79E+00	1.72E-01	4.91E+00	8.42E-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

QC Summary

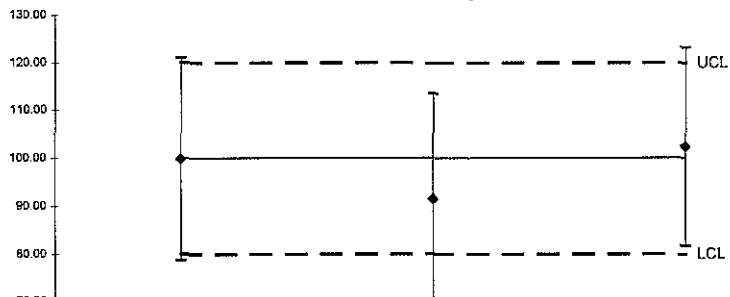
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
TH-228	0.99	81.60	4.89E-02	9.88E-02	1.16E-01	8.92E-02	1.00	OK	OK			NA	OK
TH-230	1.80	81.11	3.28E-01	1.86E-01	1.39E-01	8.78E-02	0.92	OK	OK			NA	OK
TH-232	0.92	82.58	8.32E-02	9.49E-02	3.46E-02	4.21E-02	1.02	OK	OK			NA	OK

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

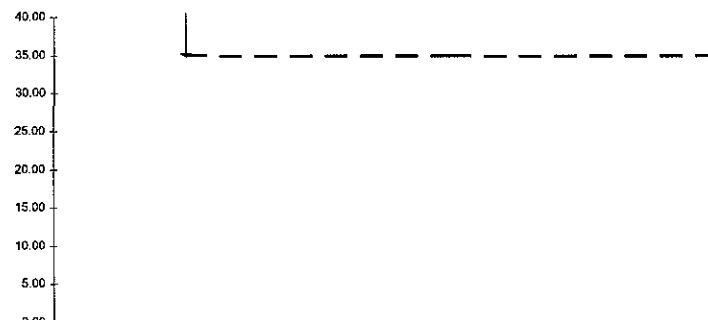
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04131	ThISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



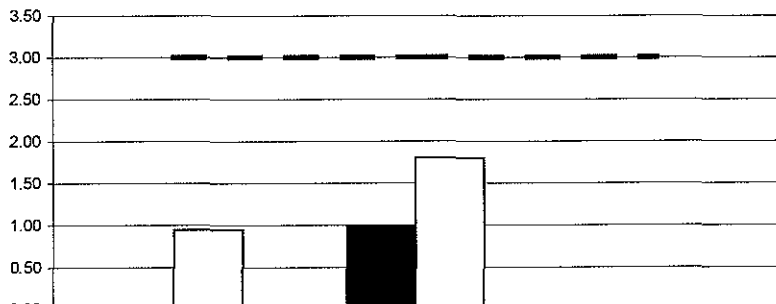
	TH-228	TH-230	TH-232
- Lower Error	78.62	69.63	81.71
- Upper Error	120.95	113.40	123.21
◆ %R	99.79	91.51	102.46
- LCL	80	80	80
- Mean	100	100	100
- UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
- Lower Error	128.03	104.97	130.62
- Upper Error	35.17	57.24	34.55
◆ RPD	81.60	81.11	82.58
- CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
■ TH-228	0.02	0.99	0.00
□ TH-230	0.94	1.80	0.00
- UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04131	Ra226	1	pCi	I	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	0.30	103.92%	24.26%	100.00%	4.60%	1.03E+01	4.73E-01	1.07E+01	2.59E+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

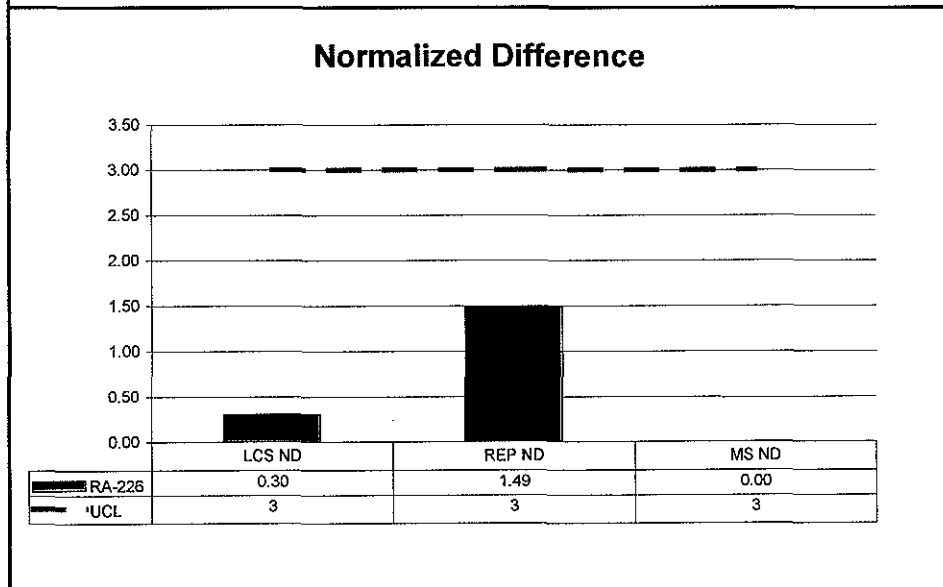
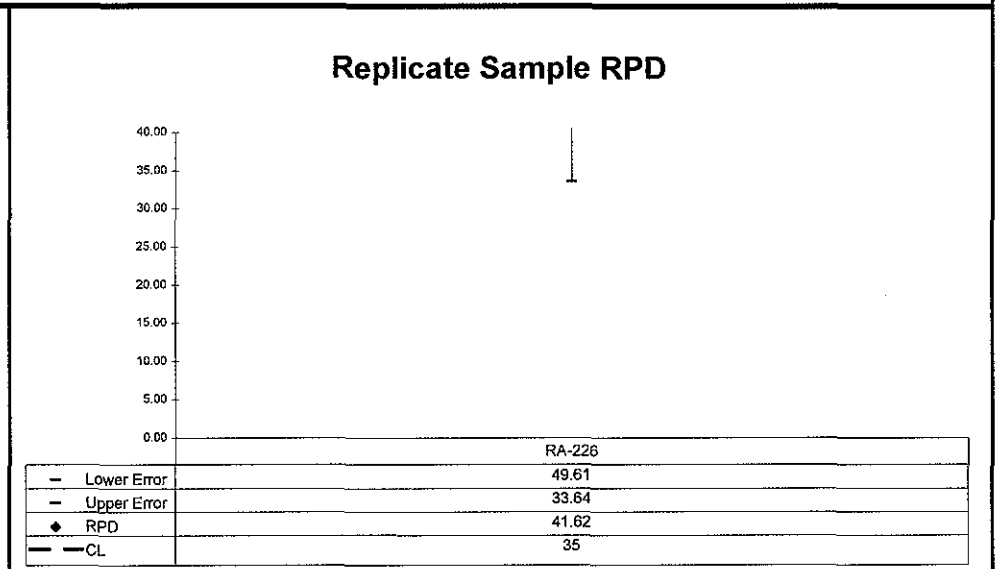
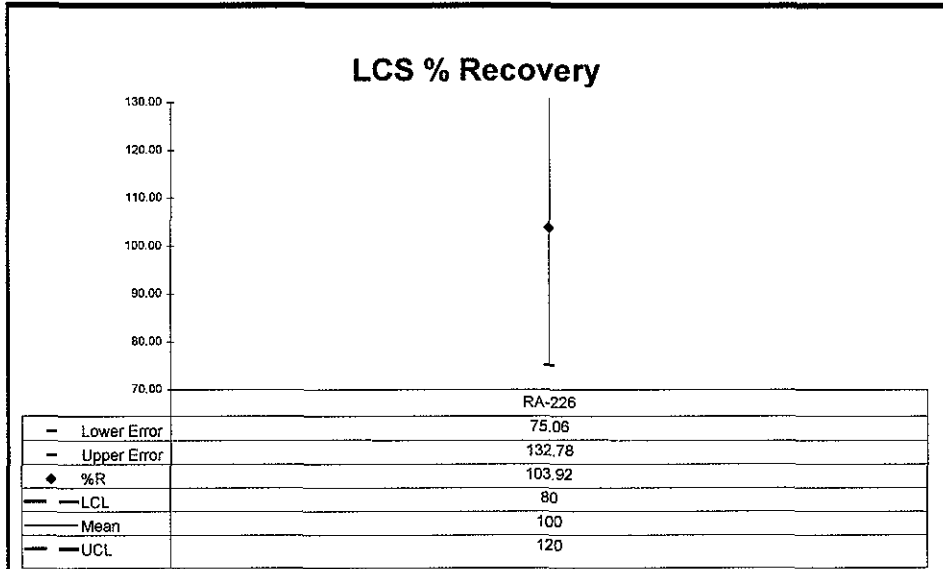
QC Summary

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-226	1.49	41.62	1.14E+00	4.11E-01	7.48E-01	3.14E-01	1.04	OK	OK			NA	OK

US EPA ARCHIVE DOCUMENT

0053

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04131	Ra226	1	pCi	I	Engineering Management Support, Inc.



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04131	Ra228	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	1.40	121.35%	24.45%	100.00%	5.10%	8.99E+00	4.58E-01	1.09E+01	2.67E+00	Ra-11	3.89E+01	5.10E+00	5.13E-01

Matrix Spike

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

Replicate Sample

QC Summary

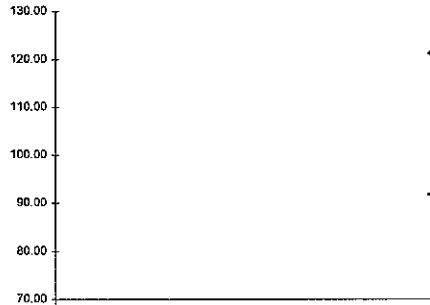
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-228	0.46	16.69	1.31E+00	6.29E-01	1.11E+00	5.82E-01	1.21	OK	OK			NA	OK

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

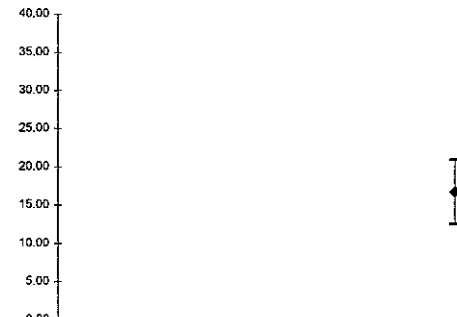
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04131	Ra228	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



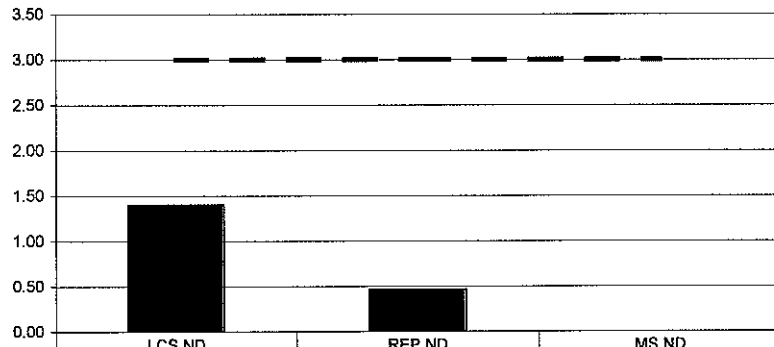
RA-228	
- Lower Error	91.80
- Upper Error	150.91
◆ %R	121.35
- LCL	80
- Mean	100
- UCL	120

Replicate Sample RPD



RA-228	
- Lower Error	20.85
- Upper Error	12.52
◆ RPD	16.69
- CL	35

Normalized Difference




	LCS ND	REP ND	MS ND
■ RA-228	1.40	0.46	0.00
- UCL	3	3	3

No Matrix Spike

**SECTION VII
LABORATORY TECHNICIAN'S NOTES**


ISO U NOTES

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:27	PREP	JBARNARD	ALIQUTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN

BT
4/30/13


US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:27	PREP	JBARNARD	ALIQUTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/07/13 16:07	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to 35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl - 0.1N NH4I, 35 ml of 6.5N HCl - 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.

John Demelas
5/7/13


US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:27	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/07/13 16:07	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	05/08/13 05:55	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
5/8/13

US EPA ARCHIVE DOCUMENT

 Reagents Used in an Analysis		Internal Work Order		
		13-04131		
		Analysis Code		Run
		UUISO		1
Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/30/2013
013708P	Anion Exchange Resin	Reagent Grade	JDEMELAS	5/7/2013
013675D02	Hydrochloric Acid	0.5N	JDEMELAS	5/7/2013
013734S	Hydrochloric Acid	6.5N	JDEMELAS	5/7/2013
013825S	Hydrochloric Acid	8N	JDEMELAS	5/7/2013
013809P	Hydrochloric Acid	Reagent Grade	JDEMELAS	5/7/2013
013840S	HCl - NH4I	8N - 0.1M	JDEMELAS	5/7/2013
013826S	HCl - HF	6.5N - 0.04N	JDEMELAS	5/7/2013
013246S	Carbon substrate	Solution	RMARTZ	5/8/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	5/8/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	5/8/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	5/8/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	5/8/2013

Date	Sample #	Client	Sample #	CT	Time	Director	Spec
5/7/17	1705607A(1-4)	Udon	1727	2hr		NP27	C
5/7/13	1304135A(1-7)	UCOR	1439	2hr	50mins	PU	ICB
5/7/13	1304135A(4)	UCOR	1440	2hr	50mins	PUNT	ICB
5/7/13	1305008A(1-3)	limited	1442	2hr	50min	ULL	ICB
5/7/13	1304131A(11-19)	Eng. Manag. Su.	1745	2hr	50min	TH	KB
5/7/13	1304135A(1-2)	Udon	1744	2hr	50min	NP	KB
5/7/17	Dugbyrulse	Ury	0826	1hr		VE	C
5/8/17	1704110A(6-7)	Engy Sol	0855	2hr		NP27	C
5/8/17	1704110A(1-4)	Engy Sol	0855	2hr		PU	-
5/8/17	1704115A(1-4)	Udon	0859	2hr		Pub	C
5/8/17	1704110A(5-9)	Engy Sol	0858	2hr		PU	-
5/8/17	1704115A(5)	Udon	0858	2hr		PU	-
5/8/17	1704110A(1-5)	Engy Sol	0827	2hr		PU	C
5/8/17	1705010A(1-4)	Udon	1152	2hr		PU	C
5/8/17	1705010A(4)	Udon	1152	2hr		PUNT	C
5/8/13	1304131A(3-7)	Eng. Manag. Su.	1242	2hr	50min	ULL	KB

US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Location	CT Time	Analyst	Stat
05/17/13	1704106ACT-12	Eng/Mc	0544	2hrs	Rob	C
05/17/13	SECCAL	MS	1227	2hrs	JMT	C
5/17/13	1704178A(12)	Unitech	0523	2hrs	AN247	C
5/17/13	1704171A(12)	Udon	0523	2hrs	AN247	C
5/13/13	System Bkgd	Lab	1708	16.40 hrs	2	KB
5/14/13	Daily Pulse	LAB	1123	10min	N/A	C
5/14/13	1705001A(2-4)	Udon	1148	2hrs	u230	C
5/14/13	1704174A(12)	Unitech	1150	2hrs	u230	C
5/16/13	Daily Pulse	MS	0521	1hr	N/A	-
5/16/13	1704170A(2-5)	Engy Sol.	0921	2hrs	AN247	C
5/16/13	1704175A(12)	Udon	0922	2hrs	AN241	C
5/16/13	1704170A(3-6)	Engy Sol.	1241	2hrs	Phase	C
5/16/13	1304120A(12)	Engy Sol.	1241	2hrs	u230	C
5/16/13	1304133A(1-6)	Eng. Manag. Sur.	1625	2hrs	Th	KB
5/17/13	Daily Pulse	MS	0546	1hr	N/A	-
5/17/13	1705010A(2-4)	Udon	1012	2hrs	AN247	C
5/17/13	1705007A(1-4)	Udon	1012	2hrs	u230	C
5/17/13	1705010A(1-4)	Udon	1720	2hrs	Rob	C
5/17/13	1705007A(12)	Udon	1720	2hrs	NP277	C
5/17/13	1304131A(5-10)	Eng. Manag. Sur.	1655	2hrs 50 mins	Th	KB
5/18/13	Daily Pulse	LAB	0526	1hr	N/A	C
5/18/13	1704170A(5)	Engy Sol.	0557	2hrs	NP277	C
5/18/13	1704110A(1-4)	Engy Sol.	0557	2hrs	NP277	C
5/18/13	1704110A(4-8)	Engy Sol.	0924	2hrs	AN247	C
5/18/13	1304135A(2-4)	Udon	1243	2hrs 50 mins	Th	KB
5/18/13	1304135A(4)	Udon	1244	2hrs 50 mins	TRNT	KB
5/18/13	1304131A(12)	Eng. Manag. Sur.	1245	2hrs 50 mins	UU	KB
5/18/13	1304131A(12)	Eng. Manag. Sur.	1245	2hrs 50 mins	UU	KB

Alpha # 3

Date	Sample #	Client	Facet #	CT Time	Manager	Spec
5/7/13	1705007A(1-4)	UWOR	1727	2hrs	NP277	C
5/7/13	1304135A(1-7)	UCOR	1439	2hr 50mins	PU	KB
5/7/13	1304135A(4)	UCOR	1440	2hr 50mins	PUNT	KB
5/7/13	1305008A(1-3)	Limited	1442	2hr 50min	UU	KB
5/7/13	1304131A(11-19)	Eng. Manag. Su.	1745	2hr 50-	th	KB
5/7/13	1304135A(1-2)	UWR	1746	2hr 50-	UP	KB
5/8/13	Daily use	UWR	0826	1hr	UWR	C
5/8/13	1704104(6-9)	Eng. Manag.	0855	2hr	NP277	C
5/8/13	1704110A(1-4)	Eng. Manag.	0855	2hr	PU	-
5/8/13	1704105A(1-4)	UWR	0859	2hr	PU	C
5/8/13	1704110A(5-9)	Eng. Manag.	0858	2hr	PU	-
5/8/13	1704105A(5)	UWR	0858	2hr	PU	-
5/8/13	1704110A(1-5)	Eng. Manag.	0927	2hr	PU	C
5/8/13	1705010A(1-4,7)	UWR	1152	2hr	PU	C
5/8/13	1705010A(4)	UWR	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(14-19)	Eng. Manag. Su.	1554	2hr 50-	UU	KB

Alpha #1

Date	Sample#	Client	Sample No	CTD In	Analysis	Rel
5/7/12	1705010A(1-4)	Udon	1011	2hr	Am 24	C
5/7/12	1705010A(1-7)	Udon	1011	2hr	Am 24	C
5/7/12	1705010A(1-4)	Udon	1719	2hr	Am 24	C
5/7/12	1705010A(1-4)	Udon	1719	2hr	Am 24	C
5/7/13	1305008A(4-5)	Unitech	1653	chrsmis	UU	KB
5/7/13	1304131A(1-4)	Eng. Manag. Su.	1654	chrsmis	Th	KB
5/8/12	Daily Puser	Udon	0526	1hr	Am 24	C
5/8/12	1704125A(1-4)	Udon	0552	2hr	Am 24	C
5/8/12	1704120A(1-4)	Eng. Manag. Su.	0553	2hr	Am 24	C
5/8/12	1704110A(1-4)	Eng. Manag. Su.	0528	2hr	Am 24	C
5/8/12	1704110A(1-7)	Eng. Manag. Su.	0528	2hr	Am 24	C
5/8/13	1305010A(1-4)	Udon	1242	chrsmis	Th	KB
5/8/13	1305010A(4)	Udon	1242	chrsmis	Th NT	KB
5/8/13	1304135A(1)	Udon	1243	chrsmis	Th	KB
5/8/13	1304131A(9-13)	Eng. Manag. Su.	1554	chrsmis	UU	KB

US EPA ARCHIVE DOCUMENT

ISO TH NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:27	PREP	JBARNARD	ALIQOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN

JB
4/30/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:27	PREP	JBARNARD	ALIQOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/06/13 17:57	CHEM	JDEMEAS	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 deionized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.

John Demelas
5/6/13

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:27	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- ADDED HNO3 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	05/06/13 17:57	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 deionized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.
3	05/07/13 06:22	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.

RMARTZ



Reagents Used in an Analysis

Internal Work Order

13-04131

Analysis Code

Run

ThISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/30/2013
013708P	Anion Exchange Resin	Reagent Grade	JDEMELAS	5/6/2013
013825S	Hydrochloric Acid	8N	JDEMELAS	5/6/2013
013809P	Hydrochloric Acid	Reagent Grade	JDEMELAS	5/6/2013
013814S	Nitric Acid	8N	JDEMELAS	5/6/2013
013624P	Nitric Acid	Reagent Grade	JDEMELAS	5/6/2013
013833S	Nitric Acid	8N	JDEMELAS	5/6/2013
013246S	Carbon substrate	Solution	RMARTZ	5/7/2013
013017S	Cerrium Carrier	0.1mg/ml	RMARTZ	5/7/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	5/7/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	5/7/2013

US EPA ARCHIVE DOCUMENT

Alpha #2

Date	Sample #	Client	Facilities	CT Time	Analyses	Deal
05/17/13	170410ACT-02	Eng/Mc	0544	2hr	Rad	C
05/17/13	SECCAL	MS	1227	2hr	IAA	C
5/10/13	1704178A(1-2)	Unitech	0923	2hr	AN247	C
5/17/13	1704171A(1-4)	Unitech	0923	2hr	AN247	C
5/3/13	System Bkgd	Lab	1708	16.40hrs	α	KB
5/14/13	Daily Pulse	LAB	1123	10min	N/A	C
5/14/13	1705001A(2-4,6)	Unitech	1148	2hr	AN247	C
5/14/13	1704178A(1-2)	Unitech	1150	2hr	AN247	C
5/16/13	Daily Pulse	MS	0521	10min	N/A	-
5/16/13	1704120A(2-5)	Eng/Sol.	0921	2hr	AN247	C
5/16/13	1704175A(1-2)	Unitech	0922	2hr	AN241	C
5/16/13	1704120A(3-6)	Eng/Sol.	1241	2hr	Phase	C
5/16/13	1304120A(1-2)	Eng/Sol.	1241	2hr	AN247	C
5/6/13	1304133A(1-6)	Eng. Manag. Svc.	1625	2hr 50min	Th	KB
5/7/13	Daily Pulse	MS	0546	10min	N/A	-
5/7/13	1705010A(2,4)	Unitech	1012	2hr	AN247	C
5/7/13	1705007A(1-4)	Unitech	1012	2hr	AN247	C
5/7/13	1705010A(1-4)	Unitech	1723	2hr	Rad	C
5/7/13	1705007A(1-2)	Unitech	1723	2hr	AN247	C
5/3/13	1304133A(5-10)	Eng. Manag. Svc.	1655	2hr 50min	Th	KB

US EPA ARCHIVE DOCUMENT

Alpha #1


Date	Sample #	Client	Sample Time	CTD in	Analysis	Ref
5/7/12	1705010A(1-4)	Udon	1011	2hr	Am 24	C
5/7/12	1705010A(1-7)	Udon	1011	2hr	Am 24	C
5/7/12	1705010A(1-4)	Udon	1719	2hr	Am 24	C
5/7/12	1705010A(1-4)	Udon	1719	2hr	Am 24	C
5/7/13	1305008A(4-5)	Lenitech	1653	chr 5 min	Ull	ICB
5/7/13	1304131A(1-4)	Eng Menas Sui	1654	chr 5 min	Th	ICB

US EPA ARCHIVE DOCUMENT

Alpha #3

Date	Sample #	Client	Trace #	CT Time	Detector	Tech
5/7/13	1705007A (3-11)	UCOR	1727	2hr	AP277	C
5/7/13	1304135A (1-7,7)	UCOR	1439	2hr 50mins	PU	ICB
5/7/13	1304135A (4)	UCOR	1440	2hr 50mins	PUNT	ICB
5/7/13	1305008A (1-3)	limited	1442	2hr 50min	LU	ICB
5/7/13	1304131A (11-19)	Eng. Manag. Sv.	1745	2hr 50m	Th	ICB
5/7/13	1304135A (1-2)	UCOR	1744	2hr 50m	NP	ICB


RA-226 NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:25	PREP	JBARNARD	ALIUQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTIONS 10 AND 12 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

JB
4/30/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:25	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTIONS 10 AND 12 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	05/01/13 12:19	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	05/10/13 12:15	CHEM	TSMITH	Followed steps 12.1 to 12.8 in AP-006 rev. 12 . (Sringe filtered samples. Precipitated and filtered samples, obtained final weights, and took to count room)

5-10-13
 JMW

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-04131

Analysis Code

Run

Ra226

1


Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/30/2013
013575D02	Ammonium Sulfate	200 mg/ml	JBARNARD	4/30/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	4/30/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/30/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/30/2013
013416P	Perchloric Acid	Reagent Grade	JBARNARD	4/30/2013
009098P	Sulfuric Acid	Reagent Grade	JBARNARD	4/30/2013
013811S	EDTA	0.25M	LWALKER	5/1/2013
011383P	Acetic Acid	Reagent Grade	TSMITH	5/10/2013
013751D01	Ammonium Sulfate	200 mg/ml	TSMITH	5/10/2013

US EPA ARCHIVE DOCUMENT

Alpha #3

Date	Sample #	Client	Parallels	CT Time	Analysis	Tech
5/10/13	1304170A (1-7)	UOR	1414	2hr 50m	PU	ICB
5/10/13	System Bkcd	Lab	1710	16.40 hrs		KB
5/11/13	Daily Pulsar	Lab	1056	10m	NA	AG
5/11/13	1304174A (8-15)	Analyst In	1458	2hr 50m	Am-241	AG
5/12/13	Daily Pulsar	Lab	1119	10m	NA	AG
5/12/13	304107A (14-19)	Erg. Manager	1210	2hr 50m	Ca-226	AG
7/4/12	Daily Pulsar	UOR	0525	6m	NA	C
7/17/12	1704171A (7-19)	Eng	0612	2hr	Reb	C


RA-228 NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:25	PREP	JBARNARD	ALIQOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTIONS 10 AND 12 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

Handwritten signature and date: JB 4/30/13


US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:25	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTIONS 10 AND 12 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	05/13/13 12:55	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	05/15/13 18:20	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)

J. Walker
 5/15/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04131
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	04/30/13 10:25	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTIONS 10 AND 12 DOWN AND DIGESTED DUE TO SAMPLES BEING DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	05/13/13 12:55	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	05/15/13 18:20	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)
4	05/16/13 07:50	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)

5-16-13
 JSM

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-04131

Analysis Code

Run

Ra228

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/30/2013
013575D02	Ammonium Sulfate	200 mg/ml	JBARNARD	4/30/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	4/30/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/30/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/30/2013
013416P	Perchloric Acid	Reagent Grade	JBARNARD	4/30/2013
009098P	Sulfuric Acid	Reagent Grade	JBARNARD	4/30/2013
012729D08	Lead Carrier	1.5 mg/ml	LWALKER	5/15/2013
013797P	Nitric Acid	Reagent Grade	LWALKER	5/15/2013
013690S	Sodium Hydroxide	10M	LWALKER	5/15/2013
013801S	Yttrium Carrier	9 mg/ml	LWALKER	5/15/2013
011504D23	Ammonium Sulfide	2%	LWALKER	5/15/2013
012717D04	Ammonium Oxalate	5%	TSMITH	5/16/2013
013686S	Nitric Acid	6N	TSMITH	5/16/2013
013690S	Sodium Hydroxide	10M	TSMITH	5/16/2013
013065D04	Sodium Hydroxide	18M	TSMITH	5/16/2013
013624D09	Nitric Acid	1N	TSMITH	5/16/2013

US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Location	CYTO	Analysis	Spec
5/10/13	1704125SR(4.5)	ERA	170	2h	SR707	C
5/10/13	1304125SR(4.7)	ERA	1226	2hrs	TOT SR	KB
5/11/13	Weekly BGG	LAB	1248	12HR	AB	AG
5/17/13	Buena	LAB	6507	60m	LIN	C
5/17/13	ETZee	LAB	0616	7m	LIN	C
5/17/13	170417054(6)	UWON	5749	2h	SASO4	C
5/17/13	PL 20 NE	LAB	1005	15min	PROP 2113	C
5/14/13	Buena	LAB	0101	60min	LIN	C
5/14/13	ETZee	LAB	0610	7m	LIN	C
5/14/13	170412554(4.6)	UWON	5746	2h	SASO4	C
5/14/13	1704106M(5.4)	Engl	0956	2h	RAY	C
5/14/13	1305029PB(1)	UWON	1210	30mins	Pb20	KB
5/14/13	1305029PB(2-4)	UWON	1211	2hrs	Pb20	KB
5/14/13	1305033NP(1-4)	UWON	1213	10mins	Np	KB
5/14/13	1305029RA(1-4)	UWON	1227	2hrs	Rad	KB
5/15/13	Buena	LAB	0121	60m	LIN	C
5/15/13	ETZee	LAB	0622	7m	M	C
5/15/13	170412554(4.9)	UTAH Div	102788	2h	SASO4	C
5/15/13	1704107NA(17.9)	Engl	1005	2h	RAY	C
5/15/13	170412554(10.1)	UTAH Div	1005	2h	SASO4	C
5/15/13	1704170PB(1-4)	UWON	1255	2h	Pb-200	C
5/15/13	1305024CU(1-3,5)	UWON	1539	30mins	CL36	KB
5/16/13	Buena	LAB	0509	60m	LIN	C
5/16/13	ETZee	LAB	0618	7m	LIN	C
5/16/13	Am 4 AREC	LAB	0851	15min	LIN	C
5/16/13	1704171RA(12.9)	Engl	0972	2h	RAY	C

Date	Sample #	Client	Transaction	CTOT	Analysis	Status
5/15/13	ET-6c	MS	0521	2m	MS	C
5/15/13	DUGRAE	MS	0558	6m	MS	C
5/15/13	1705071AB(1-9)	Accutest	0457	2h	MS	C
5/15/13	1704107NA(1-4)	Englem	0819	2h	MS	C
5/15/13	1304182NP(1-4)	UCOR	1202	10mins	NP	KB
5/15/13	1304180AB(1-4)	Wastren	1205	2hrs	2B	KB
5/15/13	1704148Pb(1-4)	MFA	1252	2h	Pb-210	C
5/15/13	1704072Pb(1-4)	UCOR	1252	2h	Pb-210	C
5/15/13	1305033CL(1-3,5)	UCOR	1535	30min	CL36	KB
5/15/13	1305022CL(1-3,5)	UCOR	1536	30mins	CL36	KB
5/15/13	1305023CL(1-3,5)	UCOR	1537	30mins	CL36	KB
5/16/13	ET-6c	MS	0505	2m	MS	C
5/16/13	DUGRAE	MS	0546	6m	MS	C
5/16/13	1704101NA(1-4)	Englem	0828	2h	MS	C
5/16/13	17	CR/MS				

US EPA ARCHIVE DOCUMENT

SECTION VIII
ANALYTICAL DATA (ISOTOPIC URANIUM)

US EPA ARCHIVE DOCUMENT

Work Order	13-04131
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	I
Matrix	WA
Method	EML U-02 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	U-232
Radiometric Sol#	U-10a
Tracer Act (dpm/g)	19.091
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-101-SS TOT	43	04/12/13 09:15	1.0000E+00
04	TRG	PZ-208-SS TOT	37	04/12/13 09:10	1.0000E+00
05	TRG	PZ-208-SS DIS	37	04/12/13 09:10	1.0000E+00
06	DO	PZ-101-SS TOT	43	04/12/13 09:15	1.0000E+00
07	TRG	PZ-101-SS DIS	43	04/12/13 09:15	1.0000E+00
08	TRG	MW-1204 TOT	42	04/12/13 09:26	1.0000E+00
09	TRG	MW-1204 DIS	42	04/12/13 09:26	1.0000E+00
10	TRG	PZ-113-SS TOT	39	04/12/13 09:40	1.0000E+00
11	TRG	PZ-113-SS DIS	39	04/12/13 09:40	1.0000E+00
12	TRG	I-73 TOT	36	04/12/13 10:05	1.0000E+00
13	TRG	I-73 DIS	36	04/12/13 10:05	1.0000E+00
14	TRG	PZ-113-AS TOT	41	04/12/13 10:35	1.0000E+00
15	TRG	PZ-113-AS DIS	41	04/12/13 10:35	1.0000E+00
16	TRG	PZ-107-SS TOT	45	04/12/13 10:40	1.0000E+00
17	TRG	PZ-107-SS DIS	45	04/12/13 10:40	1.0000E+00
18	TRG	PZ-116-SS TOT	40	04/12/13 10:46	1.0000E+00
19	TRG	PZ-116-SS DIS	40	04/12/13 10:46	1.0000E+00

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

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.6111	11.7		0.00								
02	MBL	0.6074	11.6		0.00								
03	DUP	0.6013	11.5		0.00								
04	TRG	0.5925	11.3		0.00								
05	TRG	0.5933	11.3		0.00								
06	DO	0.5993	11.4		0.00								
07	TRG	0.6011	11.5		0.00								
08	TRG	0.5991	11.4		0.00								
09	TRG	0.5999	11.5		0.00								
10	TRG	0.5986	11.4		0.00								
11	TRG	0.5950	11.4		0.00								
12	TRG	0.5969	11.4		0.00								
13	TRG	0.5969	11.4		0.00								
14	TRG	0.5973	11.4		0.00								
15	TRG	0.5979	11.4		0.00								
16	TRG	0.6003	11.5		0.00								
17	TRG	0.5990	11.4		0.00								
18	TRG	0.5937	11.3		0.00								
19	TRG	0.5995	11.4		0.00								

US EPA ARCHIVE DOCUMENT

0600

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

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			04/30/13 10:17	JBARNARD				
02	MBL			04/30/13 10:17	JBARNARD				
03	DUP			04/30/13 10:17	JBARNARD				
04	TRG			04/30/13 10:17	JBARNARD				
05	TRG			04/30/13 10:17	JBARNARD				
06	DO			04/30/13 10:17	JBARNARD				
07	TRG			04/30/13 10:17	JBARNARD				
08	TRG			04/30/13 10:17	JBARNARD				
09	TRG			04/30/13 10:17	JBARNARD				
10	TRG			04/30/13 10:17	JBARNARD				
11	TRG			04/30/13 10:17	JBARNARD				
12	TRG			04/30/13 10:17	JBARNARD				
13	TRG			04/30/13 10:17	JBARNARD				
14	TRG			04/30/13 10:17	JBARNARD				
15	TRG			04/30/13 10:17	JBARNARD				
16	TRG			04/30/13 10:17	JBARNARD				
17	TRG			04/30/13 10:17	JBARNARD				
18	TRG			04/30/13 10:17	JBARNARD				
19	TRG			04/30/13 10:17	JBARNARD				

US EPA ARCHIVE DOCUMENT

0091

* 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

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	7.23E+00	9.94E-01	7.49E-02	8.15E+00	88.69	OK		OK	
02	U-234	MBL	BLANK	pCi/l	3.61E-02	4.36E-02	5.32E-02					OK	OK
03	U-234	DUP	PZ-101-SS TOT	pCi/l	5.25E-01	4.17E-01	4.43E-01				INV	OK	
04	U-234	TRG	PZ-208-SS TOT	pCi/l	1.94E+00	3.75E-01	6.76E-02					OK	
05	U-234	TRG	PZ-208-SS DIS	pCi/l	1.69E+00	3.78E-01	9.41E-02					OK	
06	U-234	DO	PZ-101-SS TOT	pCi/l	7.35E-01	4.42E-01	3.39E-01					OK	
07	U-234	TRG	PZ-101-SS DIS	pCi/l	1.29E+00	5.70E-01	2.66E-01					OK	
08	U-234	TRG	MW-1204 TOT	pCi/l	5.86E-02	7.46E-02	1.11E-01					OK	
09	U-234	TRG	MW-1204 DIS	pCi/l	4.73E-02	8.37E-02	1.51E-01					OK	
10	U-234	TRG	PZ-113-SS TOT	pCi/l	2.60E+00	4.43E-01	7.59E-02					OK	
11	U-234	TRG	PZ-113-SS DIS	pCi/l	1.83E+00	3.48E-01	5.70E-02					OK	
12	U-234	TRG	I-73 TOT	pCi/l	1.50E+00	3.61E-01	7.03E-02					OK	
13	U-234	TRG	I-73 DIS	pCi/l	9.88E-01	3.49E-01	1.91E-01					OK	
14	U-234	TRG	PZ-113-AS TOT	pCi/l	9.18E-01	2.65E-01	6.86E-02					OK	
15	U-234	TRG	PZ-113-AS DIS	pCi/l	6.08E-01	1.96E-01	6.81E-02					OK	
16	U-234	TRG	PZ-107-SS TOT	pCi/l	1.68E+00	3.47E-01	7.95E-02					OK	
17	U-234	TRG	PZ-107-SS DIS	pCi/l	1.64E+00	3.92E-01	1.16E-01					OK	
18	U-234	TRG	PZ-116-SS TOT	pCi/l	5.69E+00	7.91E-01	6.34E-02					OK	
19	U-234	TRG	PZ-116-SS DIS	pCi/l	5.29E+00	7.19E-01	4.65E-02					OK	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04131	Analysis Code	UUISO	Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-UUISO-1

US EPA ARCHIVE DOCUMENT

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	115.67	0.00	0.00			
02	U-234	MBL	04/18/13 00:00	1.00E+00	107.10	0.00	0.00			
03	U-234	DUP	04/12/13 09:15	1.00E+00	19.97	0.00	0.00			
04	U-234	TRG	04/12/13 09:10	1.00E+00	111.59	0.00	0.00			
05	U-234	TRG	04/12/13 09:10	1.00E+00	94.59	0.00	0.00			
06	U-234	DO	04/12/13 09:15	1.00E+00	25.79	0.00	0.00			
07	U-234	TRG	04/12/13 09:15	1.00E+00	31.15	0.00	0.00			
08	U-234	TRG	04/12/13 09:26	1.00E+00	81.76	0.00	0.00			
09	U-234	TRG	04/12/13 09:26	1.00E+00	66.56	0.00	0.00			
10	U-234	TRG	04/12/13 09:40	1.00E+00	112.07	0.00	0.00			
11	U-234	TRG	04/12/13 09:40	1.00E+00	112.81	0.00	0.00			
12	U-234	TRG	04/12/13 10:05	1.00E+00	84.36	0.00	0.00			
13	U-234	TRG	04/12/13 10:05	1.00E+00	56.96	0.00	0.00			
14	U-234	TRG	04/12/13 10:35	1.00E+00	88.48	0.00	0.00			
15	U-234	TRG	04/12/13 10:35	1.00E+00	104.57	0.00	0.00			
16	U-234	TRG	04/12/13 10:40	1.00E+00	105.34	0.00	0.00			
17	U-234	TRG	04/12/13 10:40	1.00E+00	76.02	0.00	0.00			
18	U-234	TRG	04/12/13 10:46	1.00E+00	119.00	0.00	0.00			
19	U-234	TRG	04/12/13 10:46	1.00E+00	125.28	0.00	0.00			

Client	Engineering Management Support, Inc.
	13-04131
Eberline Services Work Order	13-04131
Analysis Code	UUISO
Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-UUISO-1

US EPA ARCHIVE DOCUMENT

	
Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04131
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	05/08/13 12:45		A_Spec	Alpha_027	170	5.44 E+02	4.00 E-03	17.3
02	U-234	MBL	05/08/13 12:45		A_Spec	Alpha_029	170	2.83 E+00	1.00 E-03	19.5
03	U-234	DUP	05/08/13 12:48		A_Spec	Alpha_041	170	7.81 E+00	7.00 E-03	19.8
04	U-234	TRG	05/08/13 12:48		A_Spec	Alpha_042	170	1.50 E+02	3.00 E-03	18.5
05	U-234	TRG	05/08/13 12:48		A_Spec	Alpha_046	170	1.08 E+02	0.00 E+00	17.9
06	U-234	DO	05/08/13 12:48		A_Spec	Alpha_047	170	1.30 E+01	0.00 E+00	18.2
07	U-234	TRG	05/08/13 12:48		A_Spec	Alpha_048	170	2.55 E+01	3.00 E-03	16.8
08	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_003	170	3.15 E+00	5.00 E-03	17.5
09	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_004	170	2.30 E+00	1.00 E-02	19.4
10	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_010	170	2.16 E+02	6.00 E-03	19.7
11	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_011	170	1.54 E+02	2.00 E-03	19.7
12	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_013	170	8.88 E+01	1.00 E-03	18.7
13	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_014	170	3.91 E+01	1.10 E-02	18.5
14	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_035	170	5.58 E+01	1.00 E-03	18.3
15	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_037	170	4.27 E+01	2.00 E-03	17.8
16	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_040	170	1.27 E+02	0.00 E+00	19
17	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_041	170	9.28 E+01	7.00 E-03	19.8
18	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_042	170	4.70 E+02	3.00 E-03	18.5
19	U-234	TRG	05/08/13 15:54		A_Spec	Alpha_044	170	4.75 E+02	1.00 E-03	19

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-UUISO-1

US EPA ARCHIVE DOCUMENT

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	7.82E+00	1.06E+00	8.34E-02	7.95E+00	98.37	OK		OK	
02	U-238	MBL	BLANK	pCi/l	2.32E-02	3.55E-02	5.30E-02					OK	OK
03	U-238	DUP	PZ-101-SS TOT	pCi/l	5.31E-01	4.61E-01	5.98E-01				OK	OK	
04	U-238	TRG	PZ-208-SS TOT	pCi/l	1.36E+00	2.98E-01	6.14E-02					OK	
05	U-238	TRG	PZ-208-SS DIS	pCi/l	1.23E+00	3.09E-01	6.52E-02					OK	
06	U-238	DO	PZ-101-SS TOT	pCi/l	5.53E-01	3.68E-01	2.35E-01					OK	
07	U-238	TRG	PZ-101-SS DIS	pCi/l	4.37E-01	3.11E-01	2.42E-01					OK	
08	U-238	TRG	MW-1204 TOT	pCi/l	6.15E-02	7.40E-02	1.04E-01					OK	
09	U-238	TRG	MW-1204 DIS	pCi/l	4.75E-02	7.11E-02	1.15E-01					OK	
10	U-238	TRG	PZ-113-SS TOT	pCi/l	1.76E+00	3.41E-01	7.18E-02					OK	
11	U-238	TRG	PZ-113-SS DIS	pCi/l	1.21E+00	2.67E-01	4.96E-02					OK	
12	U-238	TRG	I-73 TOT	pCi/l	1.64E+00	3.83E-01	1.10E-01					OK	
13	U-238	TRG	I-73 DIS	pCi/l	6.53E-01	2.74E-01	1.58E-01					OK	
14	U-238	TRG	PZ-113-AS TOT	pCi/l	7.86E-01	2.44E-01	9.81E-02					OK	
15	U-238	TRG	PZ-113-AS DIS	pCi/l	4.82E-01	1.73E-01	8.50E-02					OK	
16	U-238	TRG	PZ-107-SS TOT	pCi/l	1.27E+00	2.91E-01	6.93E-02					OK	
17	U-238	TRG	PZ-107-SS DIS	pCi/l	1.05E+00	3.04E-01	1.57E-01					OK	
18	U-238	TRG	PZ-116-SS TOT	pCi/l	1.62E+00	3.23E-01	5.75E-02					OK	
19	U-238	TRG	PZ-116-SS DIS	pCi/l	1.78E+00	3.30E-01	6.65E-02					OK	

Run

1

Analysis Code

UUISO

Eberline Services Work Order

13-04131

Client

Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-238	LCS	04/18/13 00:00	1.00E+00	115.67	0.00	0.00			
02	U-238	MBL	04/18/13 00:00	1.00E+00	107.10	0.00	0.00			
03	U-238	DUP	04/12/13 09:15	1.00E+00	19.97	0.00	0.00			
04	U-238	TRG	04/12/13 09:10	1.00E+00	111.59	0.00	0.00			
05	U-238	TRG	04/12/13 09:10	1.00E+00	94.59	0.00	0.00			
06	U-238	DO	04/12/13 09:15	1.00E+00	25.79	0.00	0.00			
07	U-238	TRG	04/12/13 09:15	1.00E+00	31.15	0.00	0.00			
08	U-238	TRG	04/12/13 09:26	1.00E+00	81.76	0.00	0.00			
09	U-238	TRG	04/12/13 09:26	1.00E+00	66.56	0.00	0.00			
10	U-238	TRG	04/12/13 09:40	1.00E+00	112.07	0.00	0.00			
11	U-238	TRG	04/12/13 09:40	1.00E+00	112.81	0.00	0.00			
12	U-238	TRG	04/12/13 10:05	1.00E+00	84.36	0.00	0.00			
13	U-238	TRG	04/12/13 10:05	1.00E+00	56.96	0.00	0.00			
14	U-238	TRG	04/12/13 10:35	1.00E+00	88.48	0.00	0.00			
15	U-238	TRG	04/12/13 10:35	1.00E+00	104.57	0.00	0.00			
16	U-238	TRG	04/12/13 10:40	1.00E+00	105.34	0.00	0.00			
17	U-238	TRG	04/12/13 10:40	1.00E+00	76.02	0.00	0.00			
18	U-238	TRG	04/12/13 10:46	1.00E+00	119.00	0.00	0.00			
19	U-238	TRG	04/12/13 10:46	1.00E+00	125.28	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04131	Analysis Code	UUISO	Run	1

	
Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04131
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	05/08/13 12:45		A_Spec	Alpha_027	170	5.91 E+02	6.00 E-03	17.3
02	U-238	MBL	05/08/13 12:45		A_Spec	Alpha_029	170	1.83 E+00	1.00 E-03	19.5
03	U-238	DUP	05/08/13 12:48		A_Spec	Alpha_041	170	7.94 E+00	1.80 E-02	19.8
04	U-238	TRG	05/08/13 12:48		A_Spec	Alpha_042	170	1.06 E+02	2.00 E-03	18.5
05	U-238	TRG	05/08/13 12:48		A_Spec	Alpha_046	170	7.88 E+01	1.00 E-03	17.9
06	U-238	DO	05/08/13 12:48		A_Spec	Alpha_047	170	9.83 E+00	1.00 E-03	18.2
07	U-238	TRG	05/08/13 12:48		A_Spec	Alpha_048	170	8.66 E+00	2.00 E-03	16.8
08	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_003	170	3.32 E+00	4.00 E-03	17.5
09	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_004	170	2.32 E+00	4.00 E-03	19.4
10	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_010	170	1.47 E+02	5.00 E-03	19.7
11	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_011	170	1.02 E+02	1.00 E-03	19.7
12	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_013	170	9.78 E+01	7.00 E-03	18.7
13	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_014	170	2.60 E+01	6.00 E-03	18.5
14	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_035	170	4.80 E+01	0.00 E+00	18.3
15	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_037	170	3.40 E+01	0.00 E+00	17.8
16	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_040	170	9.65 E+01	3.00 E-03	19
17	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_041	170	5.99 E+01	1.80 E-02	19.8
18	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_042	170	1.35 E+02	2.00 E-03	18.5
19	U-238	TRG	05/08/13 15:54		A_Spec	Alpha_044	170	1.60 E+02	0.00 E+00	19

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-UUISO-1

US EPA ARCHIVE DOCUMENT

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	5.79E-01	2.03E-01	9.25E-02					OK	
02	U-235	MBL	BLANK	pCi/l	1.30E-02	3.13E-02	6.56E-02					OK	OK
03	U-235	DUP	PZ-101-SS TOT	pCi/l	3.03E-01	3.35E-01	3.96E-01				INV	OK	
04	U-235	TRG	PZ-208-SS TOT	pCi/l	1.09E-01	8.35E-02	6.63E-02					OK	
05	U-235	TRG	PZ-208-SS DIS	pCi/l	9.02E-02	8.60E-02	9.25E-02					OK	
06	U-235	DO	PZ-101-SS TOT	pCi/l	1.74E-01	2.43E-01	3.66E-01					OK	
07	U-235	TRG	PZ-101-SS DIS	pCi/l	1.25E-01	2.14E-01	3.75E-01					OK	
08	U-235	TRG	MW-1204 TOT	pCi/l	1.12E-02	4.69E-02	1.20E-01					OK	
09	U-235	TRG	MW-1204 DIS	pCi/l	6.75E-02	8.74E-02	1.21E-01					OK	
10	U-235	TRG	PZ-113-SS TOT	pCi/l	2.90E-01	1.34E-01	7.80E-02					OK	
11	U-235	TRG	PZ-113-SS DIS	pCi/l	9.55E-02	7.74E-02	7.72E-02					OK	
12	U-235	TRG	I-73 TOT	pCi/l	2.87E-01	1.56E-01	8.67E-02					OK	
13	U-235	TRG	I-73 DIS	pCi/l	3.58E-01	2.19E-01	1.63E-01					OK	
14	U-235	TRG	PZ-113-AS TOT	pCi/l	2.23E-01	1.40E-01	1.22E-01					OK	
15	U-235	TRG	PZ-113-AS DIS	pCi/l	7.03E-02	7.74E-02	1.05E-01					OK	
16	U-235	TRG	PZ-107-SS TOT	pCi/l	1.61E-01	1.03E-01	6.83E-02					OK	
17	U-235	TRG	PZ-107-SS DIS	pCi/l	1.89E-01	1.31E-01	1.04E-01					OK	
18	U-235	TRG	PZ-116-SS TOT	pCi/l	4.15E-01	1.61E-01	6.22E-02					OK	
19	U-235	TRG	PZ-116-SS DIS	pCi/l	3.96E-01	1.51E-01	5.74E-02					OK	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04131	Analysis Code	UUISO	Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-UISO-1

US EPA ARCHIVE DOCUMENT

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	115.67	0.00	0.00			
02	U-235	MBL	04/18/13 00:00	1.00E+00	107.10	0.00	0.00			
03	U-235	DUP	04/12/13 09:15	1.00E+00	19.97	0.00	0.00			
04	U-235	TRG	04/12/13 09:10	1.00E+00	111.69	0.00	0.00			
05	U-235	TRG	04/12/13 09:10	1.00E+00	94.59	0.00	0.00			
06	U-235	DO	04/12/13 09:15	1.00E+00	25.79	0.00	0.00			
07	U-235	TRG	04/12/13 09:15	1.00E+00	31.15	0.00	0.00			
08	U-235	TRG	04/12/13 09:26	1.00E+00	81.76	0.00	0.00			
09	U-235	TRG	04/12/13 09:26	1.00E+00	66.56	0.00	0.00			
10	U-235	TRG	04/12/13 09:40	1.00E+00	112.07	0.00	0.00			
11	U-235	TRG	04/12/13 09:40	1.00E+00	112.81	0.00	0.00			
12	U-235	TRG	04/12/13 10:05	1.00E+00	84.36	0.00	0.00			
13	U-235	TRG	04/12/13 10:05	1.00E+00	56.96	0.00	0.00			
14	U-235	TRG	04/12/13 10:35	1.00E+00	88.48	0.00	0.00			
15	U-235	TRG	04/12/13 10:35	1.00E+00	104.57	0.00	0.00			
16	U-235	TRG	04/12/13 10:40	1.00E+00	105.34	0.00	0.00			
17	U-235	TRG	04/12/13 10:40	1.00E+00	76.02	0.00	0.00			
18	U-235	TRG	04/12/13 10:46	1.00E+00	119.00	0.00	0.00			
19	U-235	TRG	04/12/13 10:46	1.00E+00	125.28	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04131	Analysis Code	UISO	Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-UISO-1

US EPA ARCHIVE DOCUMENT

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	05/08/13 12:45		A_Spec	Alpha_027	170	3.53 E+01	4.00 E-03	17.3
02	U-235	MBL	05/08/13 12:45		A_Spec	Alpha_029	170	8.30 E-01	1.00 E-03	19.5
03	U-235	DUP	05/08/13 12:48		A_Spec	Alpha_041	170	3.66 E+00	2.00 E-03	19.8
04	U-235	TRG	05/08/13 12:48		A_Spec	Alpha_042	170	6.83 E+00	1.00 E-03	18.5
05	U-235	TRG	05/08/13 12:48		A_Spec	Alpha_046	170	4.66 E+00	2.00 E-03	17.9
06	U-235	DO	05/08/13 12:48		A_Spec	Alpha_047	170	2.49 E+00	3.00 E-03	18.2
07	U-235	TRG	05/08/13 12:48		A_Spec	Alpha_048	170	2.00 E+00	0.00 E+00	16.8
08	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_003	170	4.90 E-01	3.00 E-03	17.5
09	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_004	170	2.66 E+00	2.00 E-03	19.4
10	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_010	170	1.95 E+01	3.00 E-03	19.7
11	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_011	170	6.49 E+00	3.00 E-03	19.7
12	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_013	170	1.38 E+01	1.00 E-03	18.7
13	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_014	170	1.15 E+01	3.00 E-03	18.5
14	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_035	170	1.10 E+01	0.00 E+00	18.3
15	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_037	170	4.00 E+00	0.00 E+00	17.8
16	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_040	170	9.83 E+00	1.00 E-03	19
17	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_041	170	8.66 E+00	2.00 E-03	19.8
18	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_042	170	2.78 E+01	1.00 E-03	18.5
19	U-235	TRG	05/08/13 15:54		A_Spec	Alpha_044	170	2.88 E+01	1.00 E-03	19



Run 1

Analysis Code UISO

Eberline Services Work Order 13-04131

Client Engineering Management Support, Inc.

0010


2152

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	0.6111	11.6665		0.00		
02	MBL	BLANK	04/18/13 00:00	1.0000	0.6074	11.5959		0.00		
03	DUP	PZ-101-SS TOT	04/12/13 09:15	1.0000	0.6013	11.4794		0.00		
04	TRG	PZ-208-SS TOT	04/12/13 09:10	1.0000	0.5925	11.3114		0.00		
05	TRG	PZ-208-SS DIS	04/12/13 09:10	1.0000	0.5933	11.3267		0.00		
06	DO	PZ-101-SS TOT	04/12/13 09:15	1.0000	0.5993	11.4412		0.00		
07	TRG	PZ-101-SS DIS	04/12/13 09:15	1.0000	0.6011	11.4756		0.00		
08	TRG	MW-1204 TOT	04/12/13 09:26	1.0000	0.5991	11.4374		0.00		
09	TRG	MW-1204 DIS	04/12/13 09:26	1.0000	0.5999	11.4527		0.00		
10	TRG	PZ-113-SS TOT	04/12/13 09:40	1.0000	0.5986	11.4279		0.00		
11	TRG	PZ-113-SS DIS	04/12/13 09:40	1.0000	0.5950	11.3591		0.00		
12	TRG	I-73 TOT	04/12/13 10:05	1.0000	0.5969	11.3954		0.00		
13	TRG	I-73 DIS	04/12/13 10:05	1.0000	0.5969	11.3954		0.00		
14	TRG	PZ-113-AS TOT	04/12/13 10:35	1.0000	0.5973	11.4031		0.00		
15	TRG	PZ-113-AS DIS	04/12/13 10:35	1.0000	0.5979	11.4145		0.00		
16	TRG	PZ-107-SS TOT	04/12/13 10:40	1.0000	0.6003	11.4603		0.00		
17	TRG	PZ-107-SS DIS	04/12/13 10:40	1.0000	0.5990	11.4355		0.00		
18	TRG	PZ-116-SS TOT	04/12/13 10:46	1.0000	0.5937	11.3343		0.00		
19	TRG	PZ-116-SS DIS	04/12/13 10:46	1.0000	0.5995	11.4451		0.00		

3-14

35-44

0101

Internal Work Order					Run	Analysis Code			Date	Technician				Technician Initials	Witness Initials	
13-04131					1	UUISO			4/30/2013 10:16	JBARNARD						
LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
U-234	U-8a	35.240	4/30/2013	0.500	0.5137				8.15	0.294	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	4/30/2013	0.500	0.5137				7.95	0.286	0.00	0.000	0.00	0.000	0.00	0.000

Tracers							Balance Printer Tapes									
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS				
01	U-232	U-10a	19.091	4/30/2013	0.6111	0.6300										
02	U-232	U-10a	19.091	4/30/2013	0.6074	0.6300										
03	U-232	U-10a	19.091	4/30/2013	0.6013	0.6300										
04	U-232	U-10a	19.091	4/30/2013	0.5925	0.6300										
05	U-232	U-10a	19.091	4/30/2013	0.5933	0.6300										
06	U-232	U-10a	19.091	4/30/2013	0.5993	0.6300										
07	U-232	U-10a	19.091	4/30/2013	0.6011	0.6300										
08	U-232	U-10a	19.091	4/30/2013	0.5991	0.6300										
09	U-232	U-10a	19.091	4/30/2013	0.5999	0.6300										
10	U-232	U-10a	19.091	4/30/2013	0.5986	0.6300										
11	U-232	U-10a	19.091	4/30/2013	0.5950	0.6300										
12	U-232	U-10a	19.091	4/30/2013	0.5969	0.6300										
13	U-232	U-10a	19.091	4/30/2013	0.5969	0.6300										
14	U-232	U-10a	19.091	4/30/2013	0.5973	0.6300										
15	U-232	U-10a	19.091	4/30/2013	0.5979	0.6300										
16	U-232	U-10a	19.091	4/30/2013	0.6003	0.6300										
17	U-232	U-10a	19.091	4/30/2013	0.5990	0.6300										
18	U-232	U-10a	19.091	4/30/2013	0.5937	0.6300										
19	U-232	U-10a	19.091	4/30/2013	0.5995	0.6300										
												0.5137 g				
												Matrix Spike				

US EPA ARCHIVE DOCUMENT

0102
2010

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04131	1	UISO	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-101-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-208-SS TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-208-SS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-101-SS TOT	DO					1.0000E+00	1.0000E+00				
07	PZ-101-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	MW-1204 TOT	TRG					1.0000E+00	1.0000E+00				
09	MW-1204 DIS	TRG					1.0000E+00	1.0000E+00				
10	PZ-113-SS TOT	TRG					1.0000E+00	1.0000E+00				
11	PZ-113-SS DIS	TRG					1.0000E+00	1.0000E+00				
12	I-73 TOT	TRG					1.0000E+00	1.0000E+00				
13	I-73 DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-113-AS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-113-AS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-107-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-107-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-116-SS TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-116-SS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
----------	--

Technician: _____

JB Date: 4/30/13

US EPA ARCHIVE DOCUMENT

C
5/9/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 01
 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: 5/8/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 12:45:35 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: 0.1998 +/- 0.0111
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Chem. Recovery Factor: 1.1567 +/- 0.0677

Control Certificate Name: NatU_U-8A
 Chem. Recov. of Control: U-238 0.958903 +/- 0.072211
 Peak Match Tolerance: 0.150 MeV

 ----- PEAK AREA REPORT -----

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.272	393.98	9.89	1.02	0.00E+000	11.3
U-234	4.724	544.32	8.41	0.68	0.00E+000	39.6
U-235	4.386	35.32	33.35	0.68	0.00E+000	3.2
U-238	4.140	590.98	8.07	1.02	0.00E+000	22.6

T = Tracer Peak used for Effective Efficiency

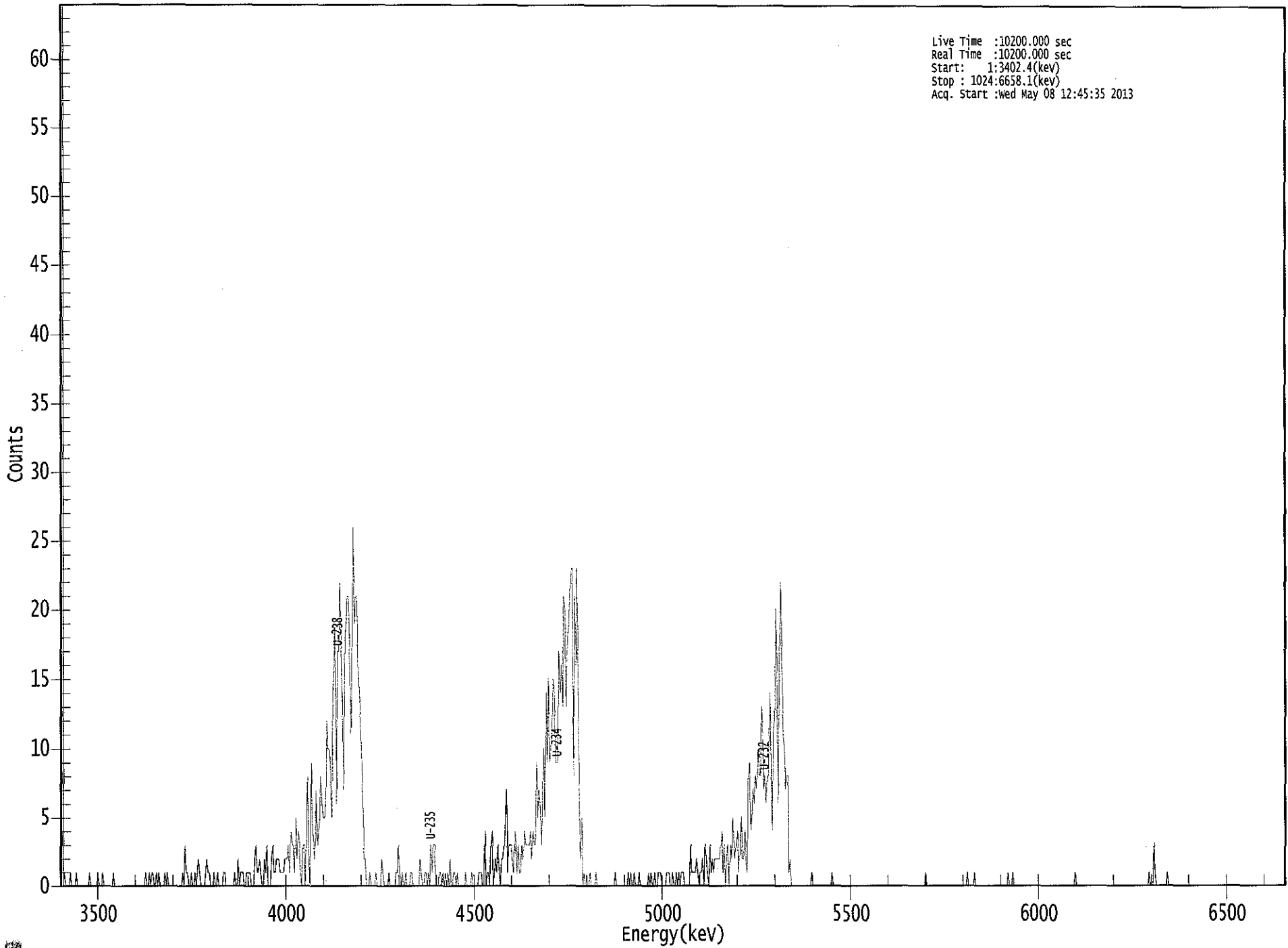
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.23E+000 +/- 5.69E-001	8.37E-002 +/- 9.10E-003
U-234	0.990	4761.50*	7.23E+000 +/- 9.94E-001	7.49E-002 +/- 8.15E-003
U-235	1.000	4385.50*	5.79E-001 +/- 2.03E-001	9.25E-002 +/- 1.00E-002
U-238	0.986	4184.40*	7.82E+000 +/- 1.06E+000	8.34E-002 +/- 9.06E-003

AG
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0000057469.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start : 1:3402.4(kev)
Stop : 1024:6658.1(kev)
Acq. Start :wed May 08 12:45:35 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	1	0	0	0	0
9:	1	0	0	0	0	1	0	0
17:	0	0	0	0	0	0	0	0
25:	1	0	0	0	0	0	0	1
33:	0	0	0	1	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	1
73:	0	0	1	0	1	1	0	0
81:	1	0	1	0	0	0	0	1
89:	0	1	0	0	0	0	0	0
97:	0	0	0	0	0	0	1	0
105:	3	1	1	0	0	1	0	0
113:	1	0	1	2	1	0	0	0
121:	0	1	2	1	1	0	0	0
129:	1	0	0	1	0	0	0	0
137:	1	1	0	0	0	0	0	0
145:	0	1	0	0	2	0	1	1
153:	1	0	0	1	1	1	1	0
161:	0	0	2	3	1	1	2	1
169:	0	0	2	1	3	0	0	0
177:	2	3	1	1	2	2	2	1
185:	1	1	1	2	2	2	3	1
193:	4	3	3	1	5	2	4	3
201:	1	0	3	3	0	4	8	2
209:	0	9	4	3	2	7	3	4
217:	5	8	6	5	5	6	12	10
225:	10	8	5	14	16	19	6	17
233:	17	22	17	13	7	18	19	21
241:	21	17	11	16	26	19	21	21
249:	16	14	12	9	6	2	2	0
257:	0	0	1	0	0	0	0	1
265:	0	0	0	0	2	1	0	0
273:	0	0	1	0	0	0	0	0
281:	1	1	3	1	0	1	0	0
289:	1	0	0	0	1	1	0	0
297:	0	0	0	0	2	1	0	0
305:	1	1	0	1	0	3	1	3
313:	3	0	0	0	1	1	0	1
321:	0	1	0	1	0	2	0	0
329:	1	1	0	1	0	0	0	0
337:	0	0	1	0	0	0	0	1
345:	0	0	0	0	0	1	1	1
353:	0	0	4	0	1	1	0	3
361:	4	0	1	2	1	3	1	0

369: 2 2 3 5 7 1 3 3

Sample Title: 01

Channel	1	2	3	4	5	6	7	8	9
377:	3	2	1	4	3	1	3	1	
385:	1	3	2	4	3	3	3	3	
393:	4	2	4	3	3	9	5	7	
401:	6	3	6	10	5	14	9	15	
409:	9	10	11	15	14	9	9	9	
417:	17	14	16	13	21	20	13	18	
425:	19	21	23	23	8	21	16	23	
433:	13	5	2	5	0	1	0	0	
441:	0	0	1	0	0	0	0	1	
449:	0	0	0	0	0	0	0	0	
457:	0	0	0	0	0	0	0	1	
465:	0	0	0	0	0	0	0	0	
473:	0	0	1	0	1	0	0	1	
481:	0	0	0	1	0	0	0	0	
489:	0	0	0	1	0	1	0	0	
497:	1	0	0	1	1	1	0	0	
505:	0	0	1	1	1	0	0	1	
513:	0	0	1	0	1	0	1	1	
521:	1	0	0	0	0	0	3	1	
529:	1	1	1	2	1	0	1	1	
537:	2	0	3	2	1	0	3	1	
545:	2	1	2	2	2	2	2	3	
553:	4	1	3	0	2	3	0	3	
561:	2	5	3	2	3	4	1	3	
569:	5	2	2	4	2	1	8	9	
577:	4	5	7	6	8	7	10	8	
585:	8	13	11	7	8	6	8	8	
593:	14	10	4	11	12	20	13	6	
601:	17	22	16	11	10	7	8	8	
609:	1	2	0	0	0	0	0	0	
617:	0	0	0	0	0	0	0	0	
625:	0	0	0	1	0	0	0	0	
633:	0	0	0	0	0	0	0	0	
641:	0	0	0	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	1	0	0	0	0	0	
729:	0	0	0	0	0	0	0	0	
737:	0	0	0	0	0	0	0	0	
745:	0	0	0	0	0	0	0	0	
753:	0	0	0	0	0	1	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	1	
793:	0	0	0	1	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	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	1	0	0
913:	0	3	1	0	0	0	0	0
921:	0	0	0	0	1	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



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Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 02
 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: 5/8/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 12:45:36 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.607 mL
 Effective Efficiency: 0.2084 +/- 0.0114
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Chem. Recovery Factor: 1.0710 +/- 0.0617

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	408.32	9.71	0.68	0.00E+000	45.6
U-234	4.638	2.83	120.53	0.17	0.00E+000	3.1
U-235	4.391	0.83	239.53	0.17	0.00E+000	3.1
U-238	4.182	1.83	152.56	0.17	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

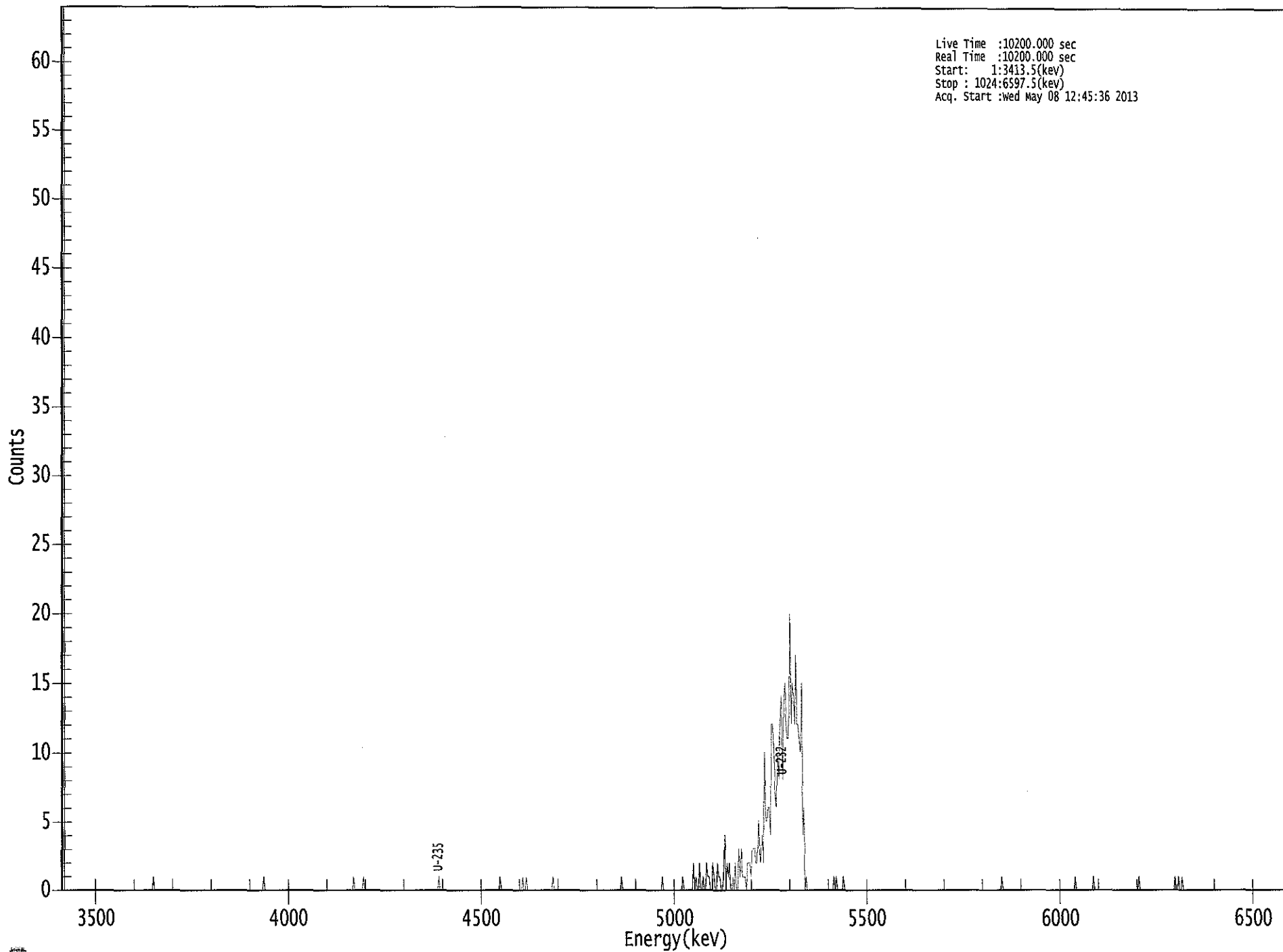
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.20E+000 +/- 5.57E-001	7.19E-002 +/- 7.70E-003
U-234	0.897	4761.50*	3.61E-002 +/- 4.36E-002	5.32E-002 +/- 5.69E-003
U-235	1.000	4385.50*	1.30E-002 +/- 3.13E-002	6.56E-002 +/- 7.02E-003
U-238	1.000	4184.40*	2.32E-002 +/- 3.55E-002	5.30E-002 +/- 5.67E-003

AG
5/9/13

US EPA ARCHIVE DOCUMENT

0000057470.CNF



Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3413.5(kev)
Stop : 1024:6597.5(kev)
Acq. Start :wed May 08 12:45:36 2013

0110

ROI Type: 1

ROI Type: 3

 ***** 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	1	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:	1	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	1	0	0	0	0
249:	0	0	0	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:	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	0	0	0	1	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 02

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	1	0	0	1	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	1	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	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	1	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	1	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	1	0	0
521:	0	0	0	0	0	0	2	0
529:	1	0	0	2	0	0	1	0
537:	0	2	1	1	0	0	2	1
545:	0	0	2	1	1	0	0	1
553:	4	0	2	1	2	0	0	1
561:	0	2	0	0	3	1	3	1
569:	1	1	0	2	2	2	1	3
577:	3	3	2	2	5	3	2	4
585:	2	10	5	5	6	6	4	12
593:	12	10	7	6	10	8	13	14
601:	8	14	15	12	11	11	20	12
609:	15	14	12	17	12	12	11	10
617:	15	4	6	0	1	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	1	0	1	0	0
649:	0	0	0	1	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	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	1
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 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	1	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	1	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	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	1
929:	0	0	1	0	0	1	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	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



C
01/12/13

Sample Description: PZ-101-SS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 03
 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 12:48:21 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.0395 +/- 0.0046
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 0.1997 +/- 0.0236

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	76.66	22.44	0.34	0.00E+000	5.2
U-234	4.696	7.81	76.13	1.19	0.00E+000	3.0
U-235	4.401	3.66	107.87	0.34	0.00E+000	3.0
U-238	4.146	7.94	83.78	3.06	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

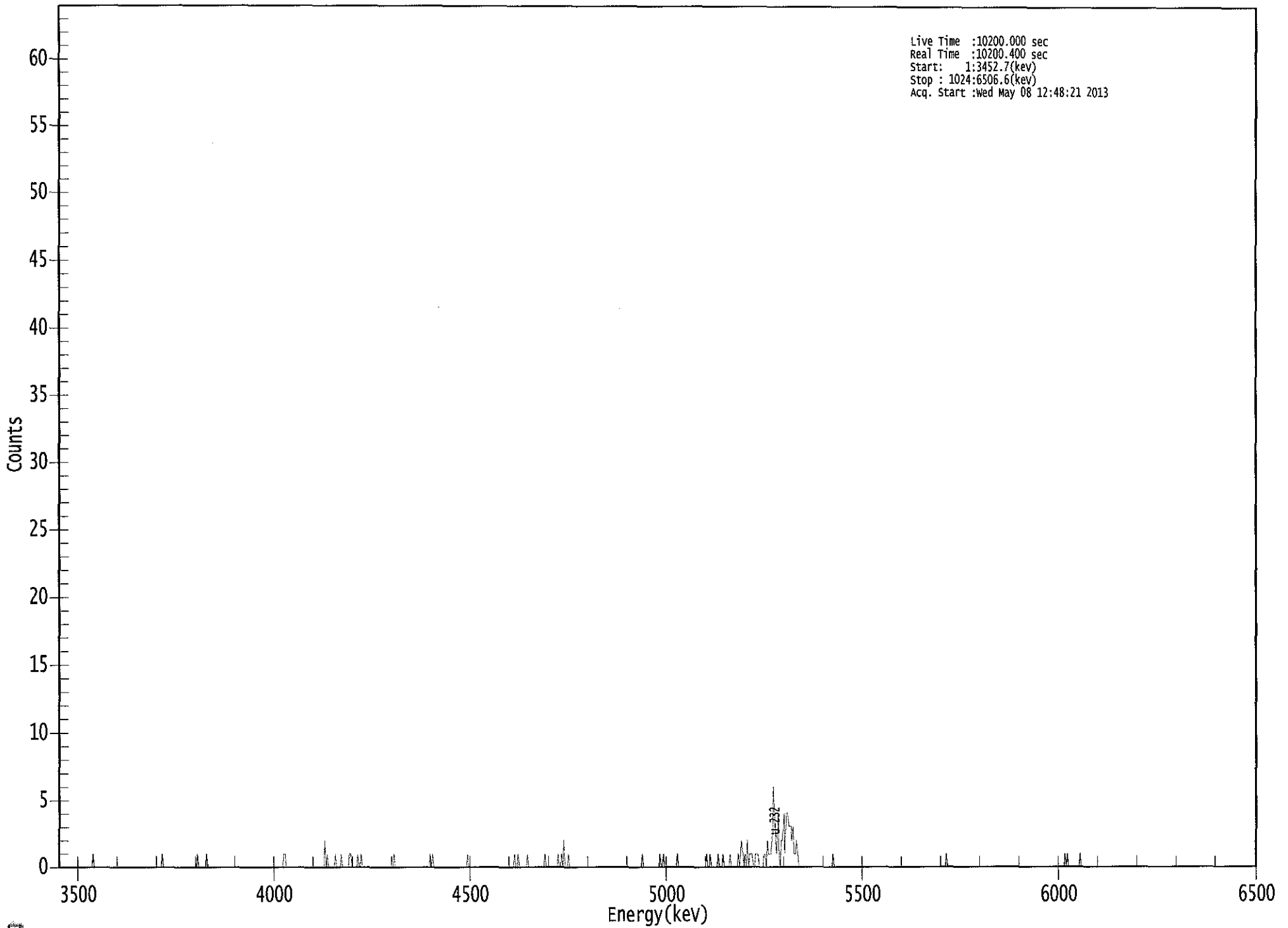
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.15E+000 +/- 1.18E+000	3.21E-001 +/- 7.36E-002
U-234	0.970	4761.50*	5.25E-001 +/- 4.17E-001	4.43E-001 +/- 1.01E-001
U-235	0.998	4385.50*	3.03E-001 +/- 3.35E-001	3.96E-001 +/- 9.07E-002
U-238	0.990	4184.40*	5.31E-001 +/- 4.61E-001	5.98E-001 +/- 1.37E-001

AG
5/9/13

US EPA ARCHIVE DOCUMENT

0000057471.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3452.7(kev)
Stop : 1024:6506.6(kev)
Acq. Start :wed May 08 12:48:21 2013



US EPA ARCHIVE DOCUMENT

0110

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 03

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	1	0	0
393:	1	0	0	0	0	0	0	0
401:	1	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	1
417:	0	0	0	0	0	0	0	0
425:	0	0	1	0	0	1	0	2
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	0	0
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	1	0	0	1	0	0	0
521:	0	0	0	0	0	0	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	1	0	0	1	0	0	0
561:	0	0	0	1	0	0	0	1
569:	0	0	0	0	0	1	0	0
577:	0	0	0	0	1	0	1	2
585:	1	0	1	0	2	0	1	1
593:	1	0	0	1	1	1	0	0
601:	0	0	1	1	0	2	1	1
609:	1	2	6	3	2	1	4	1
617:	0	2	2	4	1	4	4	3
625:	3	3	2	3	1	1	2	1
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	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	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	0	0	0	0	0
857:	0	0	0	1	0	1	0	0
865:	0	0	0	0	0	0	0	0
873:	1	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	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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5/15/2013

Sample Description: PZ-208-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 04
 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 12:48:22 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.592 mL
 Effective Efficiency: 0.2060 +/- 0.0114
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 1.1159 +/- 0.0648

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.277	393.83	9.88	0.17	0.00E+000	10.5
U-234	4.733	150.49	16.01	0.51	0.00E+000	10.0
U-235	4.333	6.83	76.08	0.17	0.00E+000	4.5
U-238	4.156	105.66	19.10	0.34	0.00E+000	7.5

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

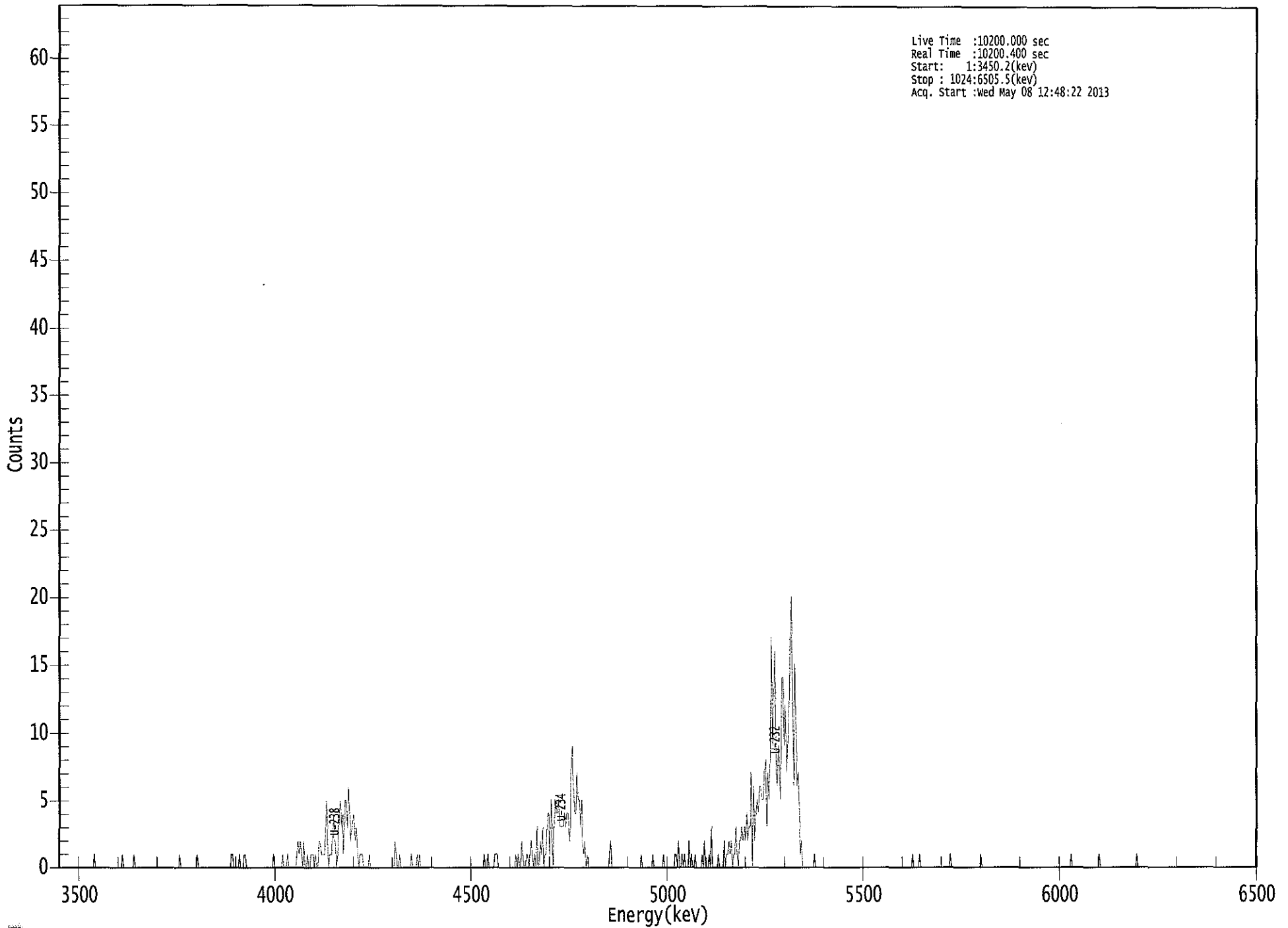
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.08E+000 +/- 5.52E-001	5.38E-002 +/- 5.85E-003
U-234	0.994	4761.50*	1.94E+000 +/- 3.75E-001	6.76E-002 +/- 7.34E-003
U-235	0.980	4385.50*	1.09E-001 +/- 8.35E-002	6.63E-002 +/- 7.21E-003
U-238	0.994	4184.40*	1.36E+000 +/- 2.98E-001	6.14E-002 +/- 6.66E-003

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5/1/13

US EPA ARCHIVE DOCUMENT

0000057472.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start : 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :wed May 08 12:48:22 2013



ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 1 1 1 0

Sample Title: 04

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	1	0
393:	1	0	0	2	1	0	0	1
401:	1	0	1	2	1	0	1	0
409:	3	0	0	2	1	3	0	1
417:	1	4	4	1	5	2	0	5
425:	4	4	5	3	3	3	3	4
433:	3	4	4	3	2	8	9	6
441:	4	4	7	5	5	3	5	2
449:	1	2	0	1	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	1	2
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	1	0	0	0	0	0	0
505:	0	0	0	1	0	0	0	0
513:	0	0	0	0	1	0	0	0
521:	0	0	0	0	0	0	1	1
529:	0	2	0	0	1	0	1	0
537:	0	0	2	0	1	0	0	1
545:	0	0	0	0	0	1	0	2
553:	0	0	0	1	0	3	0	0
561:	0	0	0	1	0	0	0	0
569:	2	0	1	1	2	1	2	0
577:	1	1	3	1	0	2	2	3
585:	2	3	2	4	2	3	3	7
593:	0	6	2	4	5	4	6	6
601:	5	5	7	8	3	7	5	8
609:	17	9	13	16	8	6	9	7
617:	5	14	14	9	12	7	9	10
625:	16	20	14	6	15	11	6	7
633:	4	1	2	0	0	0	0	0
641:	0	0	0	0	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	1	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	0	0	1	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:	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:	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:	1	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	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



5/18/13

Sample Description: PZ-208-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 05
 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 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 12:48:19 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.593 mL
 Effective Efficiency: 0.1693 +/- 0.0102
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Chem. Recovery Factor: 0.9459 +/- 0.0593

Peak Match Tolerance: 0.150 MeV

 ----- PEAK AREA REPORT -----

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.277	324.00	10.91	0.00	0.00E+000	36.8
U-234	4.724	108.00	18.95	0.00	0.00E+000	12.9
U-235	4.431	4.66	94.59	0.34	0.00E+000	3.0
U-238	4.146	78.83	22.10	0.17	0.00E+000	4.5

T = Tracer Peak used for Effective Efficiency

 ----- NUCLIDE ANALYSIS RESULTS -----

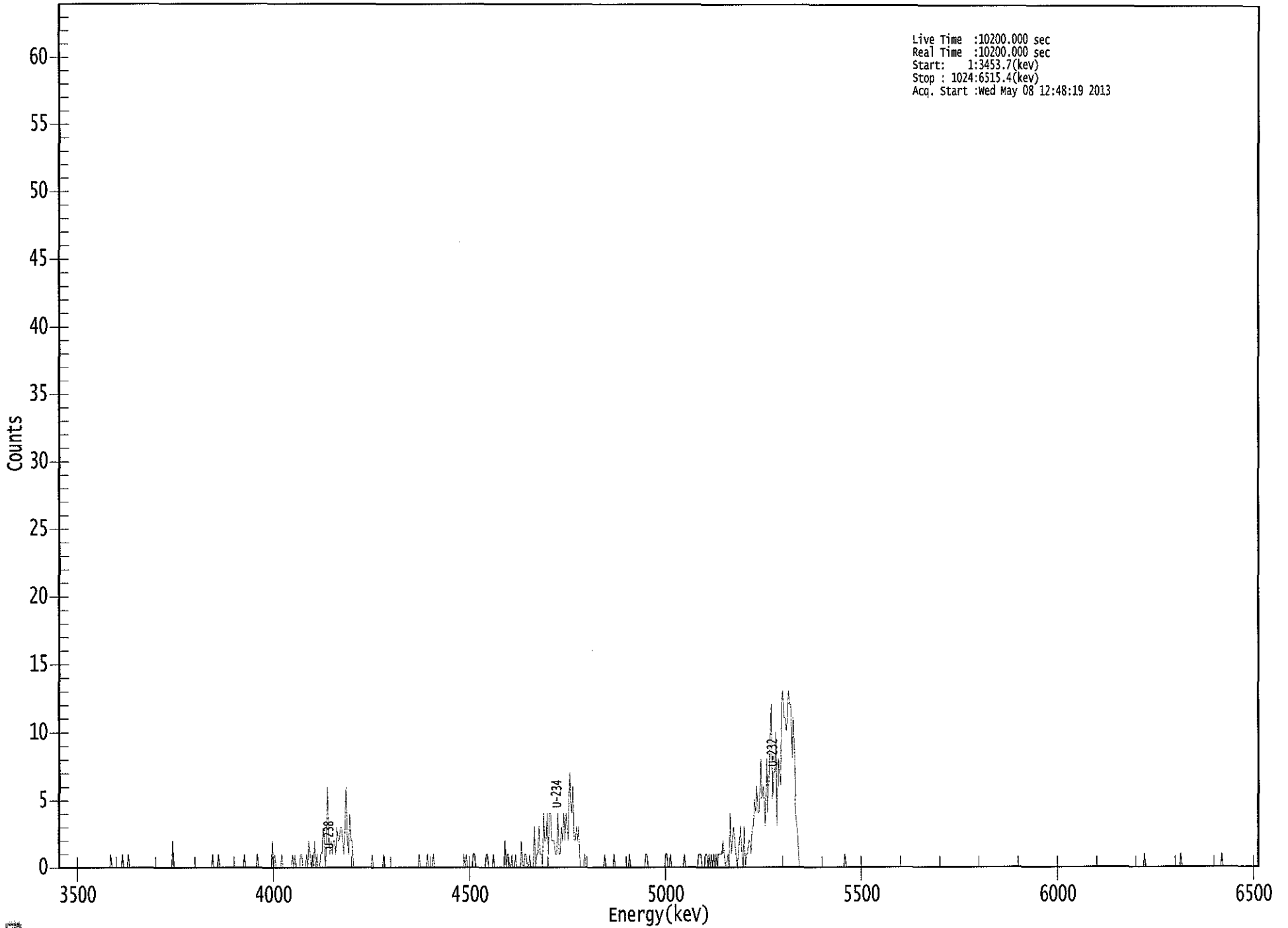
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.09E+000 +/- 6.00E-001	9.41E-002 +/- 1.11E-002
U-234	0.990	4761.50*	1.69E+000 +/- 3.78E-001	9.41E-002 +/- 1.11E-002
U-235	0.986	4385.50*	9.02E-002 +/- 8.60E-002	9.25E-002 +/- 1.09E-002
U-238	0.990	4184.40*	1.23E+000 +/- 3.09E-001	6.52E-002 +/- 7.69E-003

AG
5/9/13

US EPA ARCHIVE DOCUMENT

0000057473.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Wed May 08 12:48:19 2013



US EPA ARCHIVE DOCUMENT

0125

ROI Type: 1

ROI Type: 3

 ***** 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:	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	1	0	0	0
49:	0	0	0	0	0	0	1	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	2	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	1	0	0	0	0
137:	1	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	1	0	0	0	0	0	0
177:	0	0	0	0	0	0	2	0
185:	1	0	0	0	0	0	1	0
193:	0	0	0	0	0	0	0	1
201:	0	1	0	0	0	0	1	1
209:	0	0	0	1	0	2	1	0
217:	1	0	2	0	1	0	0	1
225:	1	3	2	0	2	6	2	1
233:	2	1	2	2	1	3	2	2
241:	3	3	2	1	3	6	2	1
249:	4	2	2	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	1	0	0	0	0
273:	0	0	0	0	0	1	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	1	0	0	0	0
313:	0	0	1	0	0	0	0	1
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	1	0	1	0	0	0	0
353:	0	1	1	0	0	0	0	0
361:	0	0	0	0	1	1	0	0

369: 0 0 1 0 0 0 0 0

Sample Title: 05

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	2	0	1	1
385:	0	0	1	0	0	1	0	0
393:	0	0	2	0	0	1	1	0
401:	0	1	0	0	0	3	0	1
409:	1	3	1	1	0	4	2	2
417:	4	1	4	4	2	2	2	1
425:	1	4	1	1	3	2	4	2
433:	4	3	2	7	5	4	6	2
441:	2	3	2	3	0	0	0	0
449:	1	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	1	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:	0	0	0	0	1	1	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	1	1	0
521:	0	1	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	1	1	1	0	0	0	1
553:	1	0	1	0	1	0	1	0
561:	1	0	1	1	1	1	2	1
569:	0	0	1	0	4	1	2	3
577:	2	1	0	1	2	3	1	0
585:	3	0	1	1	2	2	1	3
593:	3	5	4	6	4	4	8	5
601:	6	5	3	8	4	7	9	12
609:	5	7	7	10	3	8	7	6
617:	12	13	11	11	10	11	13	12
625:	12	8	11	8	4	3	2	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	1	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 05

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	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	1	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	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	1
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



c
5/19/13

Sample Description: PZ-101-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 06
 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 12:48:16 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.599 mL
 Effective Efficiency: 0.0470 +/- 0.0051
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Chem. Recovery Factor: 0.2579 +/- 0.0281

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.277	90.83	20.59	0.17	0.00E+000	4.9
U-234	4.709	13.00	56.41	0.00	0.00E+000	2.9
U-235	4.440	2.49	138.29	0.51	0.00E+000	2.9
U-238	4.140	9.83	63.14	0.17	0.00E+000	4.4

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

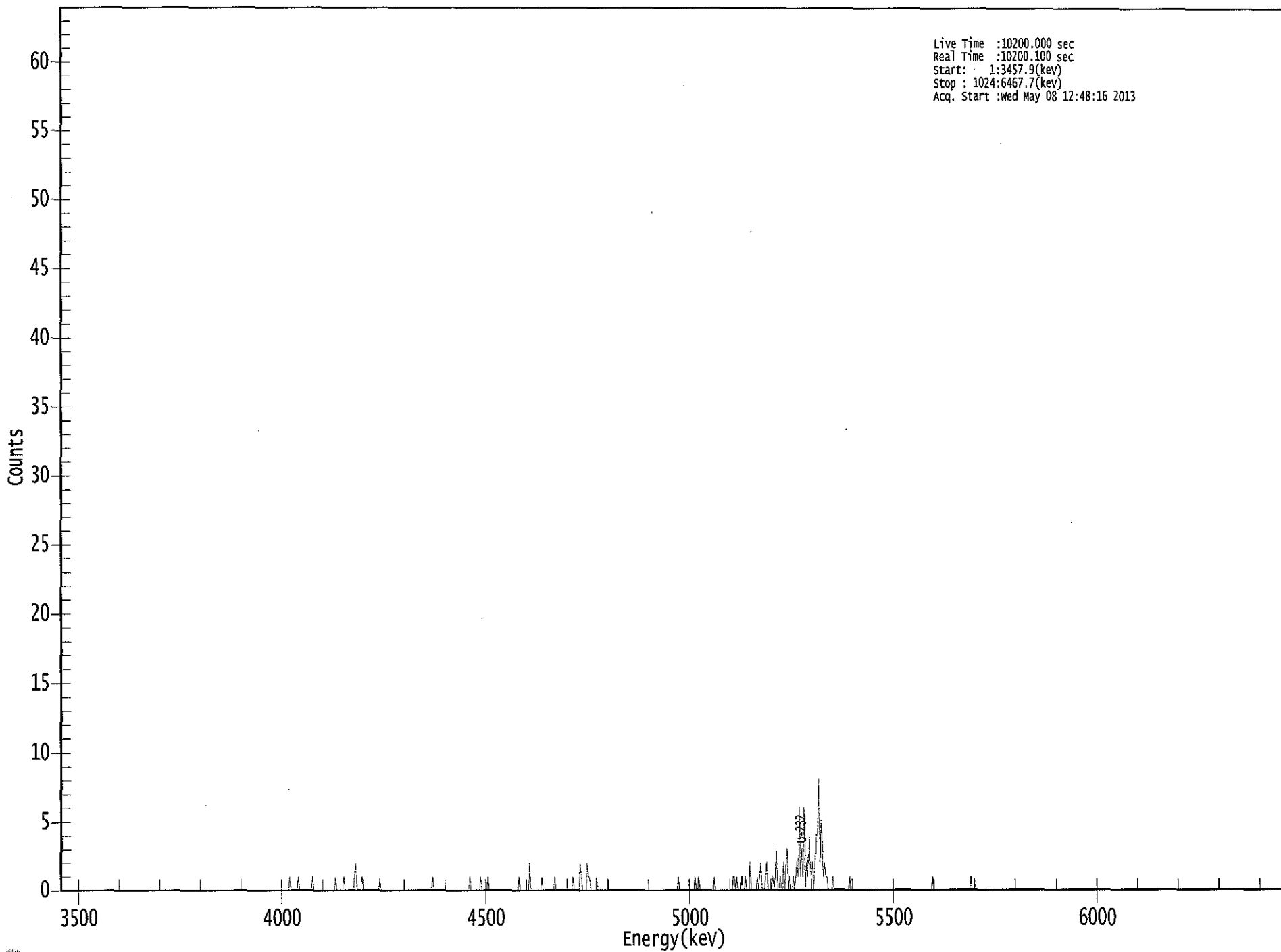
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.14E+000 +/- 1.08E+000	2.36E-001 +/- 4.98E-002
U-234	0.981	4761.50*	7.35E-001 +/- 4.42E-001	3.39E-001 +/- 7.14E-002
U-235	0.979	4385.50*	1.74E-001 +/- 2.43E-001	3.66E-001 +/- 7.71E-002
U-238	0.986	4184.40*	5.53E-001 +/- 3.68E-001	2.35E-001 +/- 4.95E-002

AG
5/9/13

US EPA ARCHIVE DOCUMENT

0000057474.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :wed May 08 12:48:16 2013



US EPA ARCHIVE DOCUMENT

0130

ROI Type: 1

ROI Type: 3

 ***** 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:	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	1
193:	0	0	0	0	0	0	1	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	1	0	0
233:	0	0	0	0	1	0	0	0
241:	0	0	0	0	0	1	2	0
249:	0	0	0	1	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	1	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	1	0	0
345:	0	0	0	0	0	0	1	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: 06

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	1	0
385:	0	0	0	0	0	0	0	2
393:	0	0	0	0	0	0	0	0
401:	0	1	0	0	0	0	0	0
409:	0	0	0	0	1	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	1	0	0	0	0
433:	0	2	1	0	0	0	0	2
441:	1	1	0	0	0	0	0	1
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	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	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	1	0	0	1	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	1	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	1	1	0	1	0	0	0
569:	1	0	0	1	0	0	0	2
577:	0	0	0	0	0	1	0	1
585:	2	0	0	0	1	2	0	0
593:	0	0	1	0	1	3	0	0
601:	1	0	0	2	0	2	3	0
609:	1	0	0	1	0	1	2	1
617:	6	1	3	1	6	0	2	1
625:	4	2	1	2	0	2	4	4
633:	8	2	5	3	1	2	1	1
641:	0	0	0	0	1	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	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	1
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 06

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



C
5/9/13

Sample Description: PZ-101-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_048
 Chamber Serial Number: 02030596B
 Detector Serial Number: 83111
 Env. Background: System Bkgd 56382
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 12:48:17 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.0523 +/- 0.0053
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Chem. Recovery Factor: 0.3115 +/- 0.0323

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	101.49	19.51	0.51	0.00E+000	4.3
U-234	4.714	25.49	39.27	0.51	0.00E+000	4.4
U-235	4.477	2.00	169.74	0.00	0.00E+000	3.0
U-238	4.117	8.66	68.12	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

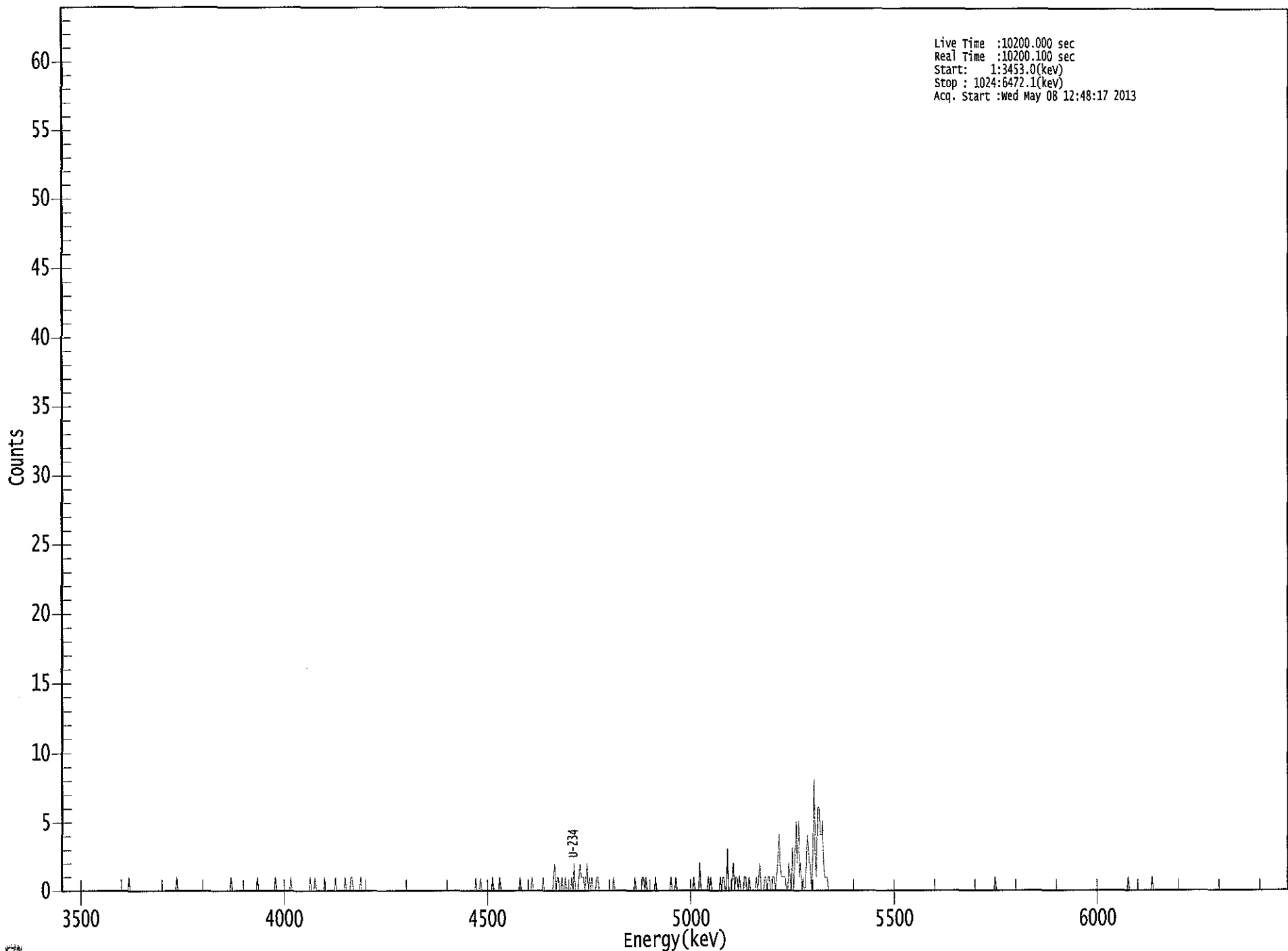
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.15E+000 +/- 1.03E+000	2.66E-001 +/- 5.34E-002
U-234	0.984	4761.50*	1.29E+000 +/- 5.70E-001	2.66E-001 +/- 5.33E-002
U-235	0.942	4385.50*	1.25E-001 +/- 2.14E-001	3.75E-001 +/- 7.52E-002
U-238	0.968	4184.40*	4.37E-001 +/- 3.11E-001	2.42E-001 +/- 4.84E-002

AG
5/9/13

US EPA ARCHIVE DOCUMENT

0000057475.CNF



0135

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 0 0 0 0

Sample Title: 07

Channel	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	1
385:	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0
401:	0	1	0	0	0	0	0
409:	0	0	1	2	0	1	1
417:	0	1	0	0	1	0	0
425:	0	1	0	2	0	0	1
433:	2	1	1	1	0	1	2
441:	1	0	1	0	0	0	1
449:	0	0	0	0	0	0	0
457:	0	0	0	0	1	0	0
465:	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	1
481:	0	0	0	0	1	1	0
489:	0	0	0	0	0	0	1
497:	0	0	0	0	0	0	0
505:	0	0	0	0	1	0	0
513:	1	0	0	0	0	0	0
521:	0	0	0	0	0	0	1
529:	0	0	0	0	2	0	0
537:	0	0	0	1	0	1	0
545:	0	0	0	0	0	1	0
553:	1	0	0	3	0	0	1
561:	2	0	1	1	0	1	0
569:	0	1	1	0	0	1	0
577:	0	0	0	1	0	1	2
585:	0	0	1	1	0	1	1
593:	0	1	1	0	1	2	4
601:	1	1	1	1	0	0	2
609:	0	3	0	2	5	2	5
617:	2	0	1	0	0	3	4
625:	2	0	2	8	3	1	6
633:	4	4	5	2	1	1	1
641:	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0
777:	0	0	1	0	0	0	0
785:	0	0	0	0	0	0	0
793:	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	1	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	1	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	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

5/8/13

Sample Description: MW-1204 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: U 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:14 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.599 mL
 Effective Efficiency: 0.1428 +/- 0.0092
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 0.8176 +/- 0.0550

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	275.98	11.82	1.02	0.00E+000	36.4
U-234	4.721	3.15	126.67	0.85	0.00E+000	3.0
U-235	4.375	0.49	416.98	0.51	0.00E+000	3.0
U-238	4.078	3.32	119.77	0.68	0.00E+000	3.0

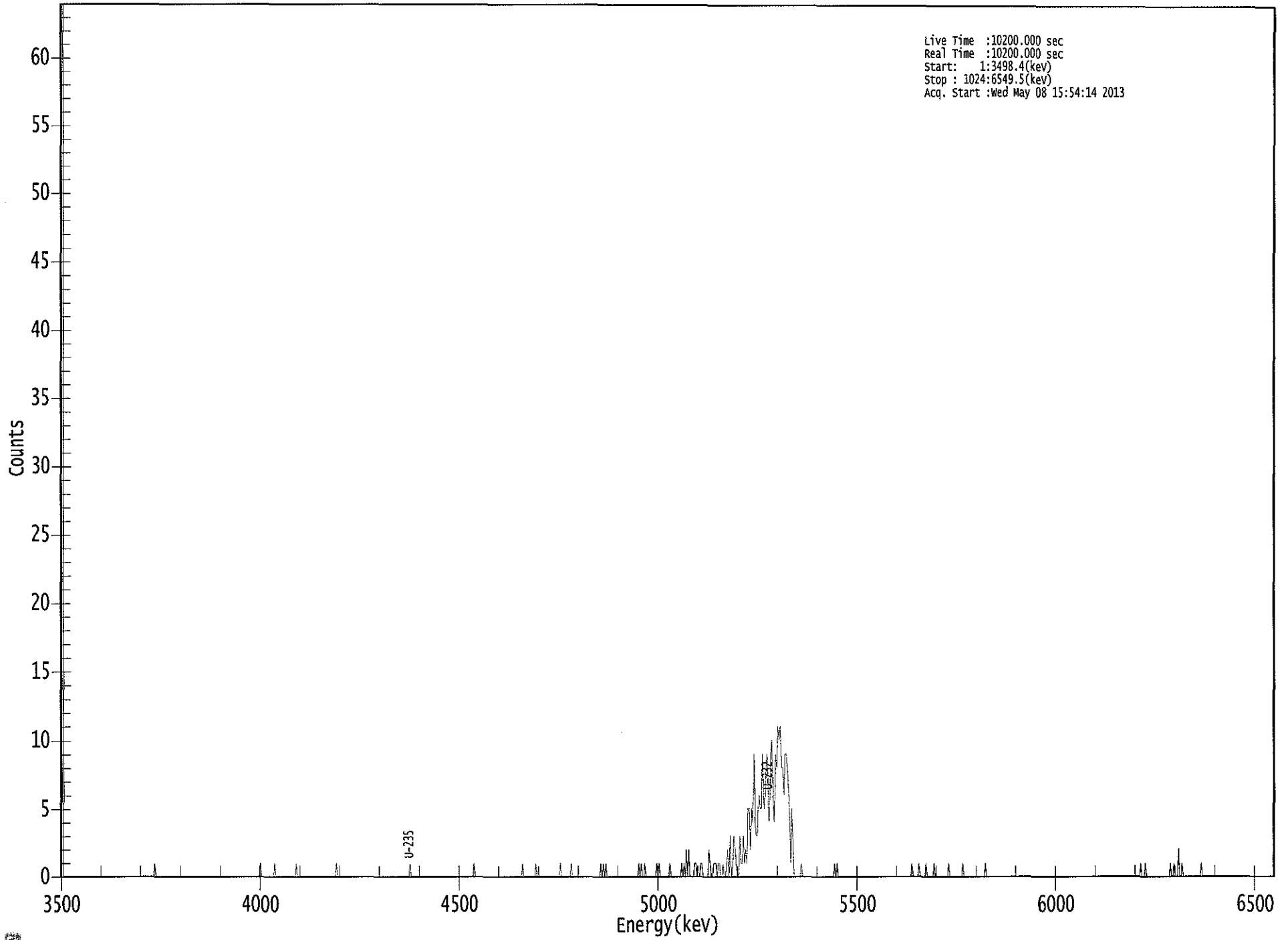
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.14E+000 +/- 6.50E-001	1.17E-001 +/- 1.48E-002
U-234	0.989	4761.50*	5.86E-002 +/- 7.46E-002	1.11E-001 +/- 1.41E-002
U-235	0.999	4385.50*	1.12E-002 +/- 4.69E-002	1.20E-001 +/- 1.52E-002
U-238	0.923	4184.40*	6.15E-002 +/- 7.40E-002	1.04E-001 +/- 1.32E-002

AG
 5/9/13

US EPA ARCHIVE DOCUMENT



0140

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0

Sample Title: 08

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

0143
g/s/2/13



C
5/9/13

Sample Description: MW-1204 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: U 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:15 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.600 mL
 Effective Efficiency: 0.1292 +/- 0.0087
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 0.6656 +/- 0.0465

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	249.98	12.43	1.02	0.00E+000	20.5
U-234	4.711	2.30	176.48	1.70	0.00E+000	2.9
U-235	4.386	2.66	128.85	0.34	0.00E+000	2.9
U-238	4.099	2.32	149.12	0.68	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 ----- NUCLIDE ANALYSIS RESULTS -----

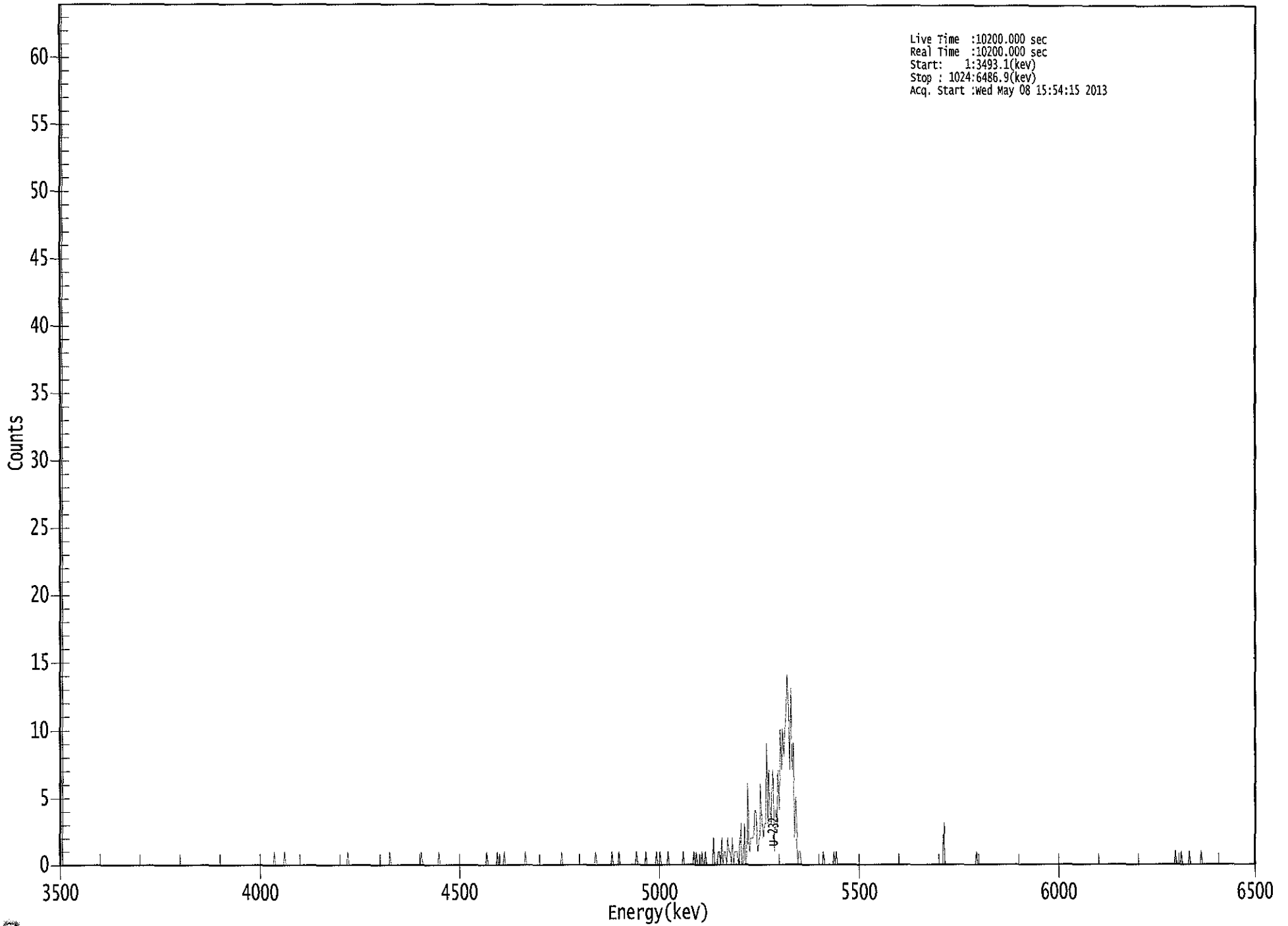
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.14E+000 +/- 6.80E-001	1.30E-001 +/- 1.71E-002
U-234	0.982	4761.50*	4.73E-002 +/- 8.37E-002	1.51E-001 +/- 2.00E-002
U-235	1.000	4385.50*	6.75E-002 +/- 8.74E-002	1.21E-001 +/- 1.60E-002
U-238	0.949	4184.40*	4.75E-002 +/- 7.11E-002	1.15E-001 +/- 1.53E-002

AG
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US EPA ARCHIVE DOCUMENT

0000057487.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3493.1(kev)
Stop : 1024:6486.9(kev)
Acq. Start :wed May 08 15:54:15 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0145

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

Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	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:	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	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	1	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	1	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	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	1	0	0

369: 0 0 0 0 0 0 1 0

Sample Title: 09

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	1	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	1	0	0
433:	0	0	0	0	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	1	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	1	0	0	0	0	0	1	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	1	0	0
505:	0	0	0	0	0	0	1	0
513:	0	1	0	0	0	0	0	0
521:	1	0	0	0	0	0	0	0
529:	0	0	0	0	0	1	0	0
537:	0	0	0	0	0	0	1	0
545:	1	0	0	0	0	1	0	0
553:	1	0	0	0	0	0	0	2
561:	0	0	0	1	1	0	2	0
569:	1	1	0	2	1	1	0	2
577:	0	1	1	1	0	1	3	0
585:	0	3	0	0	6	2	1	2
593:	2	2	4	4	2	1	2	6
601:	3	2	3	3	9	3	7	4
609:	3	7	5	1	4	3	7	4
617:	10	7	10	8	10	12	14	11
625:	7	13	7	9	2	5	2	0
633:	1	1	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	1	0	0
657:	0	0	0	0	0	0	1	0
665:	1	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	3	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	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 09

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



C
T1928

Sample Description: PZ-113-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: U 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:09 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.599 mL
 Effective Efficiency: 0.2205 +/- 0.0119
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 1.1207 +/- 0.0636

Peak Match Tolerance: 0.150 MeV

 ----- PEAK AREA REPORT -----

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.279	425.79	9.53	2.21	0.00E+000	33.1
U-234	4.733	215.98	13.37	1.02	0.00E+000	9.3
U-235	4.406	19.49	45.07	0.51	0.00E+000	2.9
U-238	4.148	147.15	16.21	0.85	0.00E+000	5.3

T = Tracer Peak used for Effective Efficiency

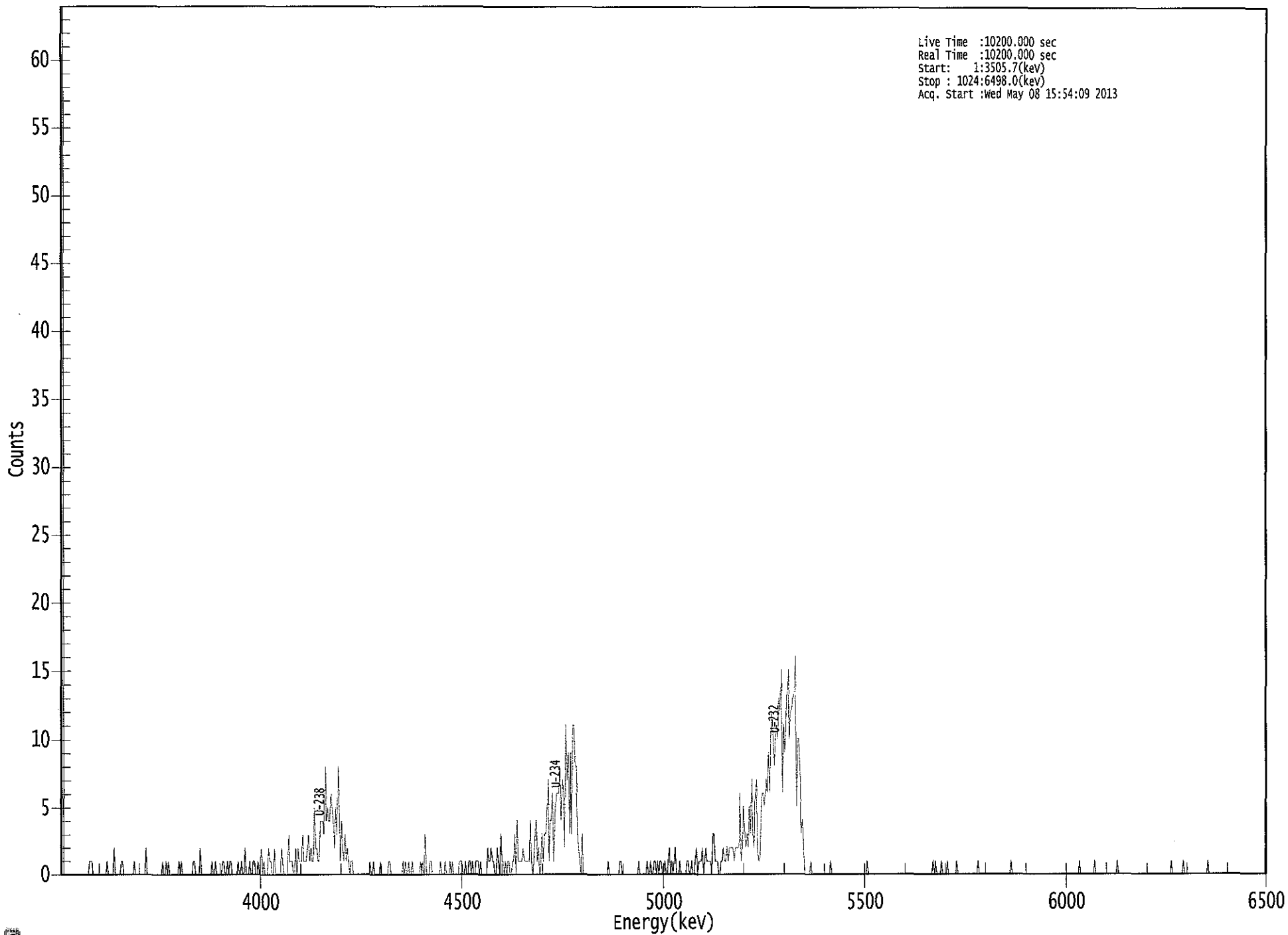
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.13E+000 +/- 5.41E-001	9.64E-002 +/- 1.02E-002
U-234	0.994	4761.50*	2.60E+000 +/- 4.43E-001	7.59E-002 +/- 8.00E-003
U-235	0.997	4385.50*	2.90E-001 +/- 1.34E-001	7.80E-002 +/- 8.22E-003
U-238	0.991	4184.40*	1.76E+000 +/- 3.41E-001	7.18E-002 +/- 7.57E-003

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US EPA ARCHIVE DOCUMENT

0000057482.CNF



0150

ROI Type: 1

ROI Type: 3

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

369: 0 0 2 1 0 3 1 1

Sample Title: 10

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

Sample Title: 10

Channel	1	2	3	4	5	6	7	8
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	1	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	1	0
945:	0	0	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	1	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



c
5/8/13

Sample Description: PZ-113-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: U 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 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:10 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: 0.2226 +/- 0.0119
 Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
 Chem. Recovery Factor: 1.1281 +/- 0.0650

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	427.30	9.50	1.70	0.00E+000	9.1
U-234	4.735	153.66	15.83	0.34	0.00E+000	4.2
U-235	4.375	6.49	80.40	0.51	0.00E+000	2.7
U-238	4.164	101.83	19.44	0.17	0.00E+000	10.3

T = Tracer Peak used for Effective Efficiency

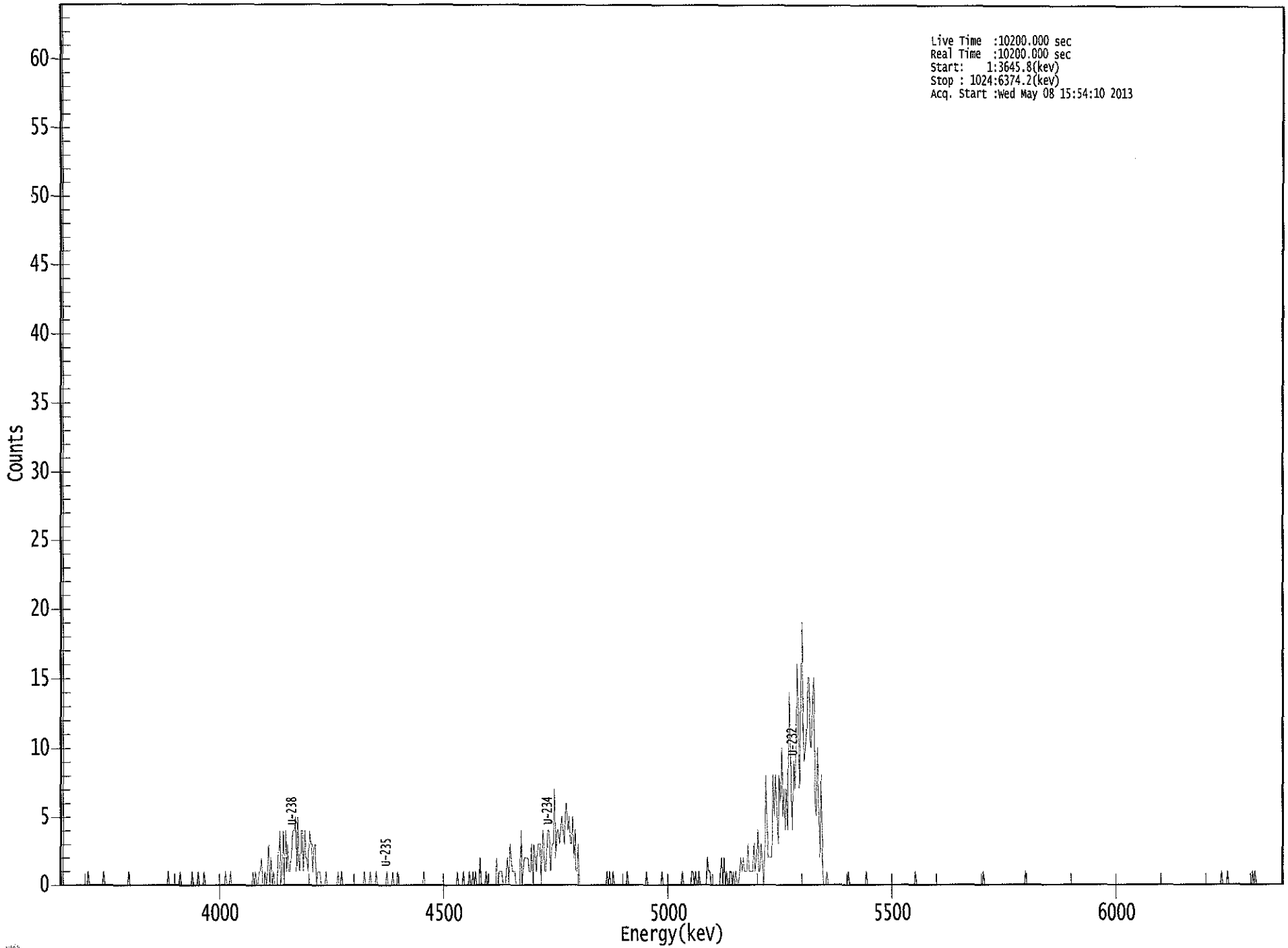
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.10E+000 +/- 5.37E-001	8.77E-002 +/- 9.22E-003
U-234	0.995	4761.50*	1.83E+000 +/- 3.48E-001	5.70E-002 +/- 6.00E-003
U-235	0.999	4385.50*	9.55E-002 +/- 7.74E-002	7.72E-002 +/- 8.12E-003
U-238	0.997	4184.40*	1.21E+000 +/- 2.67E-001	4.96E-002 +/- 5.21E-003

AG
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US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3645.8(kev)
Stop : 1024:6374.2(kev)
Acq. Start :wed May 08 15:54:10 2013



 ***** 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	1
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	1	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	1	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	1	0	0	0	0	0
97:	0	0	0	0	1	0	0	0
105:	0	0	0	0	0	0	1	0
113:	0	0	0	1	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	1	0	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	1	0	1	0	0	1	1
169:	2	0	0	1	0	1	3	0
177:	2	0	1	0	0	0	2	4
185:	0	1	4	0	4	1	3	1
193:	1	3	4	4	5	1	5	2
201:	1	4	4	1	4	2	2	1
209:	4	3	3	1	3	3	0	1
217:	1	1	0	0	0	0	1	0
225:	0	0	0	0	0	0	0	0
233:	1	0	0	1	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	1	0	0	0	0
265:	1	0	0	0	0	0	0	0
273:	0	1	0	0	0	0	1	0
281:	0	0	1	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	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	1	0	0	0	0	1	0
345:	0	1	0	1	0	0	0	2
353:	0	0	0	0	1	0	0	0
361:	0	0	0	0	0	2	0	1

369: 1 1 0 0 0 1 2 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0 1

Sample Title: 11

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



c
5/9/2013

Sample Description: I-73 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:11 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.597 mL
 Effective Efficiency: 0.1577 +/- 0.0098
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 0.8436 +/- 0.0546

Peak Match Tolerance: 0.150 MeV

 ----- PEAK AREA REPORT -----

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.273	303.64	11.28	1.36	0.00E+000	25.4
U-234	4.722	88.83	20.82	0.17	0.00E+000	2.8
U-235	4.409	13.83	53.08	0.17	0.00E+000	2.8
U-238	4.140	97.81	19.96	1.19	0.00E+000	6.6

T = Tracer Peak used for Effective Efficiency

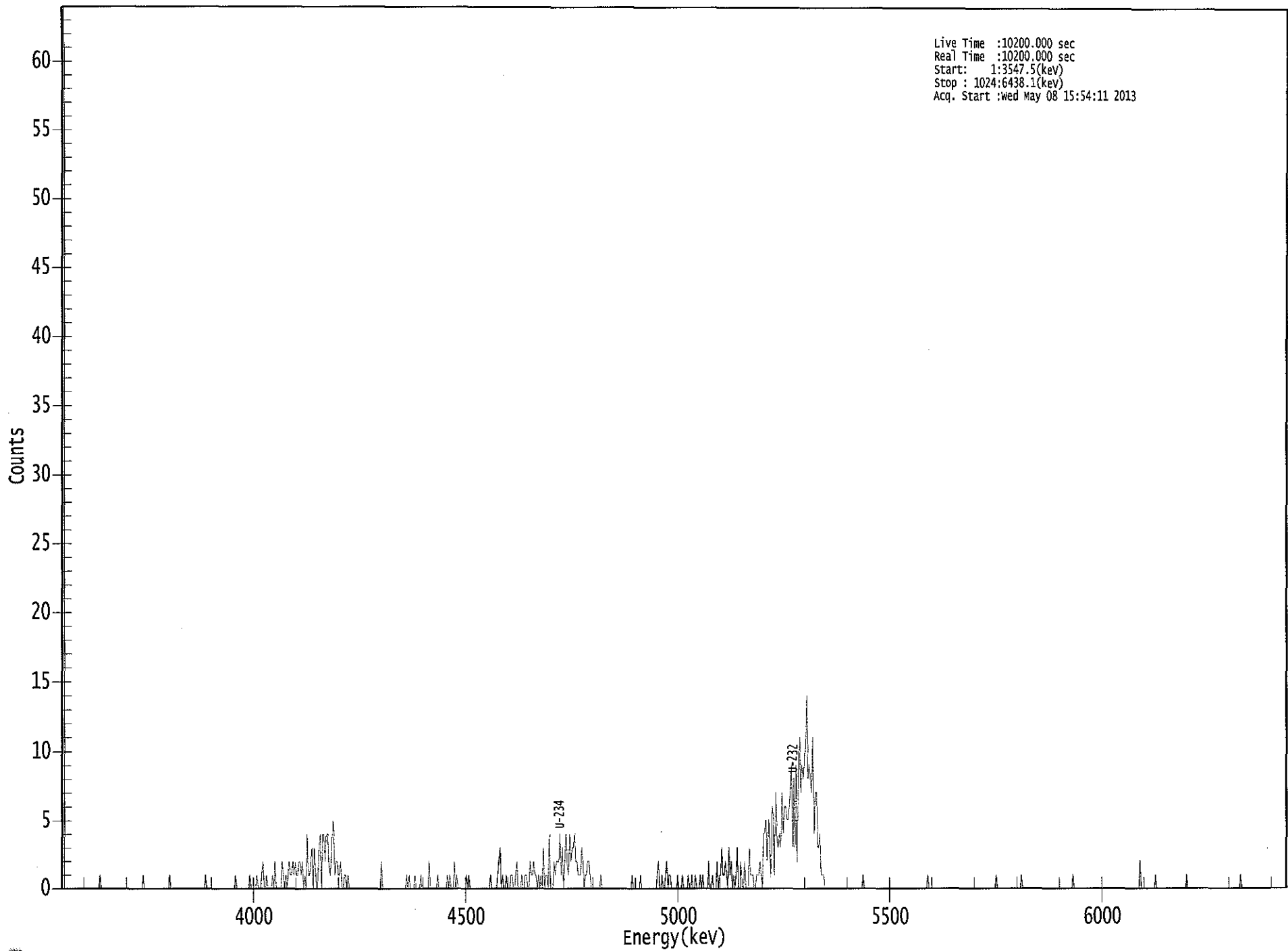
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.12E+000 +/- 6.22E-001	1.16E-001 +/- 1.40E-002
U-234	0.989	4761.50*	1.50E+000 +/- 3.61E-001	7.03E-002 +/- 8.54E-003
U-235	0.996	4385.50*	2.87E-001 +/- 1.56E-001	8.67E-002 +/- 1.05E-002
U-238	0.986	4184.40*	1.64E+000 +/- 3.83E-001	1.10E-001 +/- 1.34E-002

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US EPA ARCHIVE DOCUMENT

0000057484.CNF



Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3547.5(keV)
Stop : 1024:6438.1(keV)
Acq. Start :wed May 08 15:54:11 2013

0150

ROI Type: 1

ROI Type: 3

 ***** 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:	1	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	1	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	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:	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	1	0	0	0	0	0	0
153:	0	0	0	0	0	1	0	0
161:	0	0	0	1	0	0	0	1
169:	2	0	0	1	0	0	0	0
177:	1	0	2	0	0	0	0	0
185:	2	1	0	1	0	1	2	1
193:	1	2	1	2	1	1	2	2
201:	1	2	0	1	0	4	1	1
209:	2	3	0	3	1	0	1	3
217:	4	0	4	4	2	4	4	2
225:	1	2	5	4	1	2	2	1
233:	1	2	0	0	1	1	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	2	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	1	0	1	0	0	0	0	1
297:	0	0	0	0	1	0	0	0
305:	0	0	0	2	0	0	0	0
313:	0	0	1	0	0	0	0	0
321:	0	0	1	0	1	0	0	0
329:	2	0	1	0	0	0	0	0
337:	0	0	1	0	1	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	1	0
361:	0	0	0	0	1	2	3	0

369: 1 0 0 1 0 0 0 1

Sample Title: 12

Channel	1	2	3	4	5	6	7	8
377:	1	0	0	1	2	0	0	0
385:	1	0	0	1	1	0	0	2
393:	1	1	2	1	1	0	1	0
401:	1	0	3	0	1	1	0	4
409:	0	0	0	2	1	2	2	2
417:	4	1	3	0	2	4	2	1
425:	4	2	3	3	4	2	2	1
433:	1	1	3	2	0	1	1	2
441:	2	1	0	0	0	0	0	0
449:	0	0	1	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	1	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	1	2	0	0	1	0	0
505:	1	2	0	1	1	0	0	0
513:	0	0	1	0	0	0	1	0
521:	0	0	0	1	0	0	1	0
529:	0	1	0	0	0	1	0	1
537:	0	0	0	0	2	0	0	1
545:	0	0	0	2	0	1	1	3
553:	1	1	2	1	0	3	1	2
561:	0	1	0	1	3	0	0	2
569:	0	0	2	0	0	0	3	1
577:	1	1	0	0	1	1	1	2
585:	1	0	4	4	5	2	5	3
593:	1	6	5	1	7	4	3	4
601:	3	7	4	6	6	5	5	6
609:	7	9	3	8	3	9	2	9
617:	11	7	9	8	9	11	14	8
625:	9	8	7	11	4	7	7	3
633:	3	4	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	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	1	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	1	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 1 0 0 0 0 0 0

Sample Title: 12

Channel	1	2	3	4	5	6	7	8
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	1	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	2	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	1	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	1	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C
5/8/2013

Sample Description: I-73 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:12 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.597 mL
 Effective Efficiency: 0.1051 +/- 0.0078
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 0.5696 +/- 0.0437

Peak Match Tolerance: 0.150 MeV

 ----- PEAK AREA REPORT -----

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.277	202.45	13.88	2.55	0.00E+000	24.8
U-234	4.719	39.13	32.20	1.87	0.00E+000	3.7
U-235	4.422	11.49	59.30	0.51	0.00E+000	2.9
U-238	4.147	25.98	39.33	1.02	0.00E+000	5.9

T = Tracer Peak used for Effective Efficiency

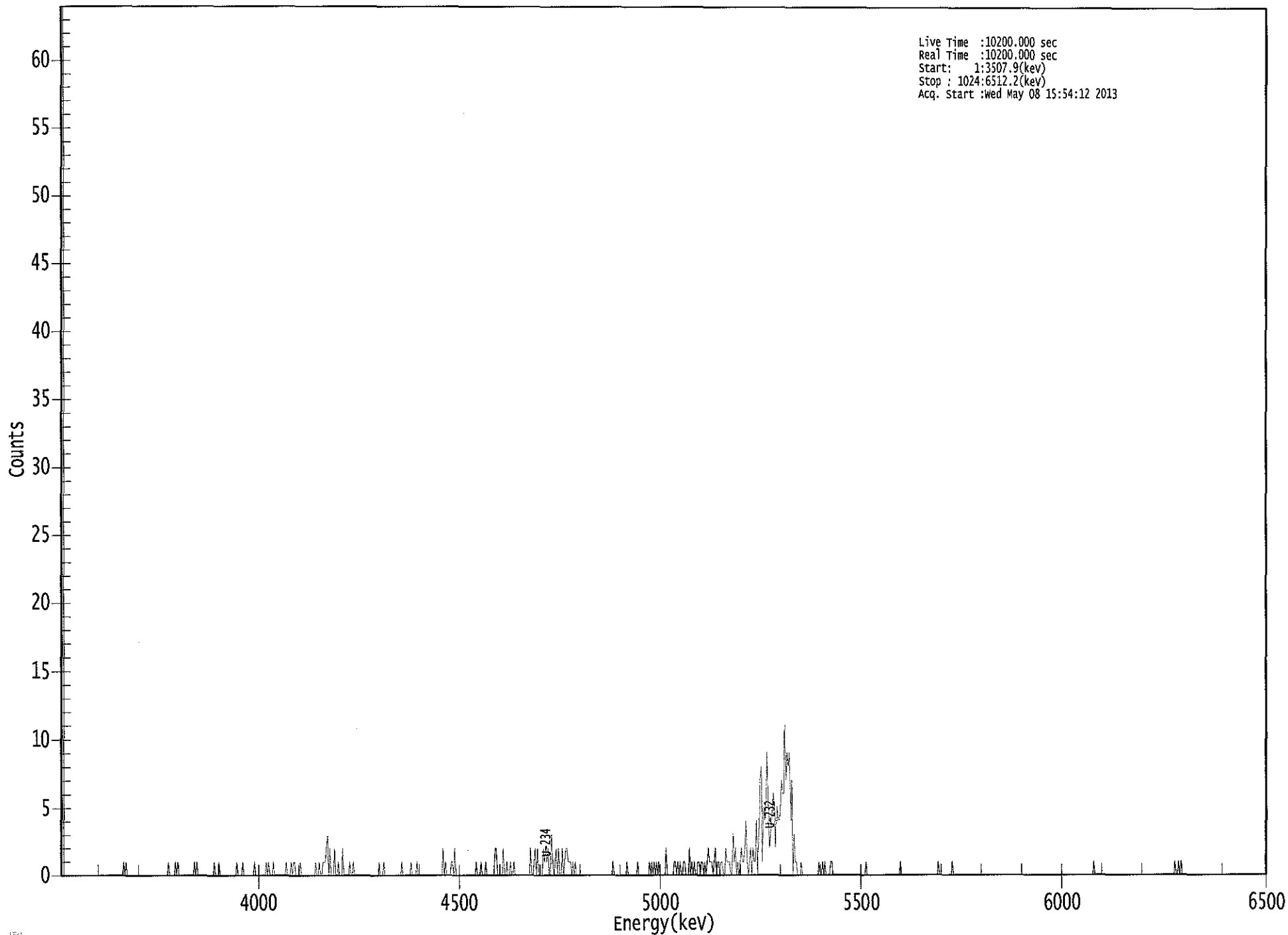
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.12E+000 +/- 7.47E-001	2.12E-001 +/- 3.09E-002
U-234	0.987	4761.50*	9.88E-001 +/- 3.49E-001	1.91E-001 +/- 2.79E-002
U-235	0.990	4385.50*	3.58E-001 +/- 2.19E-001	1.63E-001 +/- 2.39E-002
U-238	0.990	4184.40*	6.53E-001 +/- 2.74E-001	1.58E-001 +/- 2.31E-002

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US EPA ARCHIVE DOCUMENT

0000057485.CNF



0155

ROI Type: 1

ROI Type: 3

 ***** 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	10200	10200	0	0	0	0	0	0
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	1
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	1	0	0	0	0
97:	0	1	0	1	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	1	0	1	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	1	0	0	0	1	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	1	0	0
153:	0	0	1	0	0	0	0	0
161:	0	0	0	0	1	0	0	0
169:	0	0	0	0	0	0	1	0
177:	1	0	0	0	1	0	0	0
185:	0	0	0	0	0	0	0	1
193:	0	0	0	1	0	1	1	0
201:	0	0	0	1	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	1	0	0	1	0	0	1	1
225:	1	2	3	0	2	0	0	0
233:	2	0	0	1	0	0	0	2
241:	0	0	0	0	0	1	0	0
249:	1	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	1	0
273:	0	0	1	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	1	0	0	0	0	0	0
297:	0	1	0	0	0	0	1	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	2	0	1	0
329:	0	0	0	1	1	0	2	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	1	0	0	0	1	0	0	0
361:	1	0	0	0	0	0	0	0

369: 2 2 0 0 0 0 0 2

Sample Title: 13

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

801: 0 0 0 0 0 0 0 0

Sample Title: 13

Channel	1	2	3	4	5	6	7	8
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	1	0	0	0
881:	0	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	1	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



C
5/9/13

Sample Description: PZ-113-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 14
 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:43 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.597 mL
 Effective Efficiency: 0.1615 +/- 0.0099
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 0.8848 +/- 0.0563

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 5.299	311.32	11.12	0.68	0.00E+000	8.2
U-234	4.735	55.83	26.28	0.17	0.00E+000	5.1
U-235	4.401	11.00	61.72	0.00	0.00E+000	2.9
U-238	4.174	48.00	28.58	0.00	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 ----- NUCLIDE ANALYSIS RESULTS -----

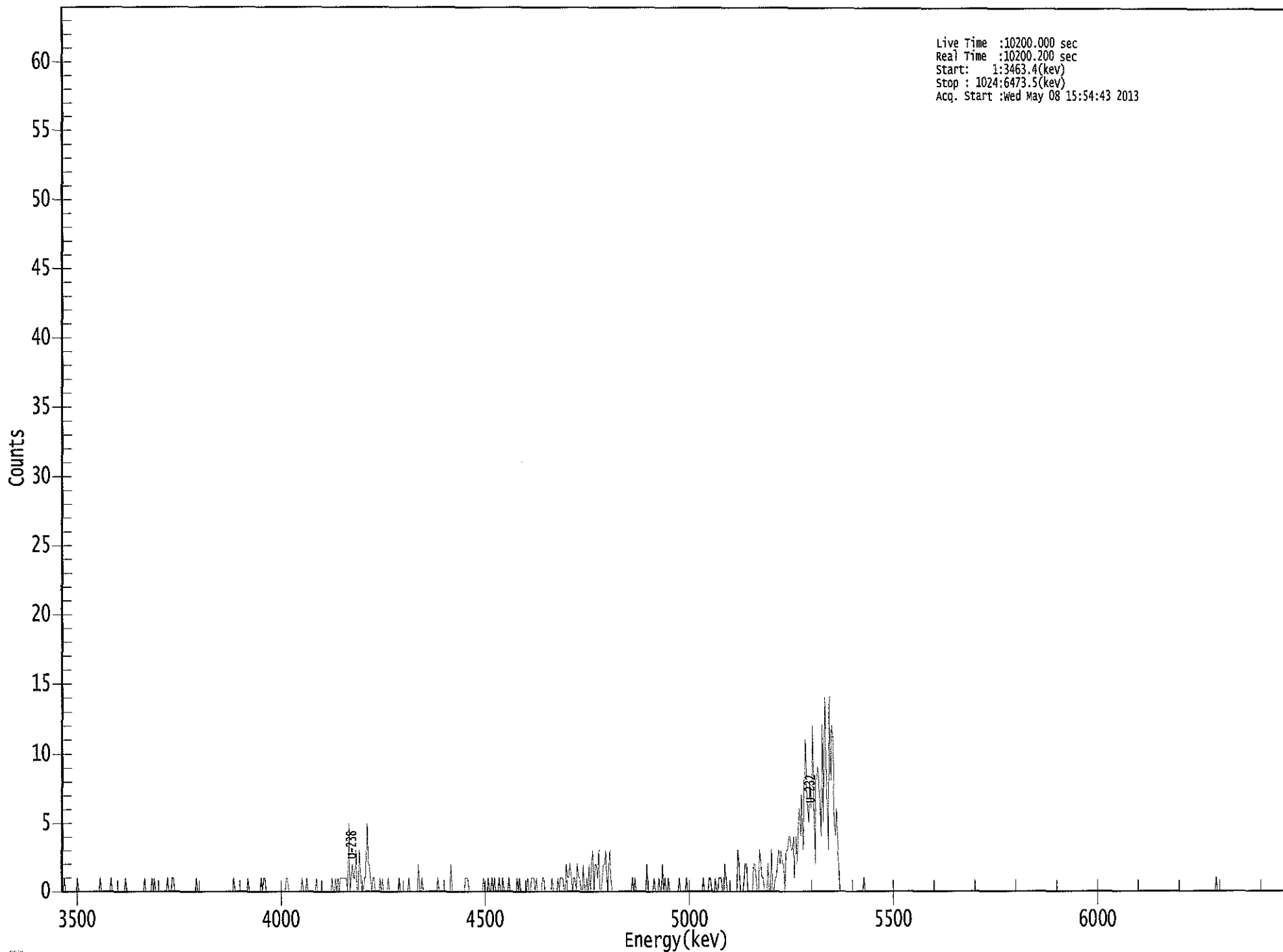
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	1.000	5302.50*	5.12E+000 +/- 6.15E-001	9.28E-002 +/- 1.11E-002
U-234	0.995	4761.50*	9.18E-001 +/- 2.65E-001	6.86E-002 +/- 8.23E-003
U-235	0.998	4385.50*	2.23E-001 +/- 1.40E-001	1.22E-001 +/- 1.46E-002
U-238	0.999	4184.40*	7.86E-001 +/- 2.44E-001	9.81E-002 +/- 1.18E-002

AG
5/9/13

US EPA ARCHIVE DOCUMENT

0000057488.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :wed May 08 15:54:43 2013



US EPA ARCHIVE DOCUMENT

0170

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 1 0 0 0

Sample Title: 14

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	1	0	1	0	0
385:	0	0	0	0	1	0	0	1
393:	1	1	0	1	0	0	0	0
401:	1	1	0	0	0	0	0	0
409:	1	0	0	0	0	1	0	1
417:	1	1	0	0	2	1	1	2
425:	1	0	1	1	0	2	1	1
433:	0	0	2	0	0	1	0	2
441:	0	2	3	0	2	2	1	3
449:	0	0	1	2	2	3	0	1
457:	3	1	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	1	0	1	0	0
481:	0	0	0	0	0	0	0	2
489:	0	0	0	0	0	1	0	0
497:	0	1	0	0	2	0	1	0
505:	0	1	0	0	0	0	0	0
513:	0	0	1	0	0	0	0	0
521:	1	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	1	0
537:	0	0	0	1	1	0	0	0
545:	1	0	0	1	1	1	0	0
553:	2	1	0	0	0	0	0	0
561:	0	0	0	3	2	0	0	0
569:	1	2	2	0	0	0	0	0
577:	2	2	1	0	0	3	2	1
585:	1	0	0	0	2	0	0	3
593:	0	0	1	1	2	3	2	3
601:	2	2	0	3	3	4	4	3
609:	3	4	1	4	2	5	6	4
617:	7	3	7	11	8	6	5	8
625:	6	12	7	2	8	9	8	7
633:	4	12	5	14	9	7	3	14
641:	8	12	11	5	4	6	3	2
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	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	1	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C
5/9/2013

Sample Description: PZ-113-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 15
 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:45 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.598 mL
 Effective Efficiency: 0.1864 +/- 0.0107
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Chem. Recovery Factor: 1.0457 +/- 0.0632

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.278	359.66	10.34	0.34	0.00E+000	18.9
U-234	4.733	42.66	30.15	0.34	0.00E+000	4.9
U-235	4.362	4.00	109.57	0.00	0.00E+000	2.9
U-238	4.158	34.00	34.10	0.00	0.00E+000	3.7

T = Tracer Peak used for Effective Efficiency

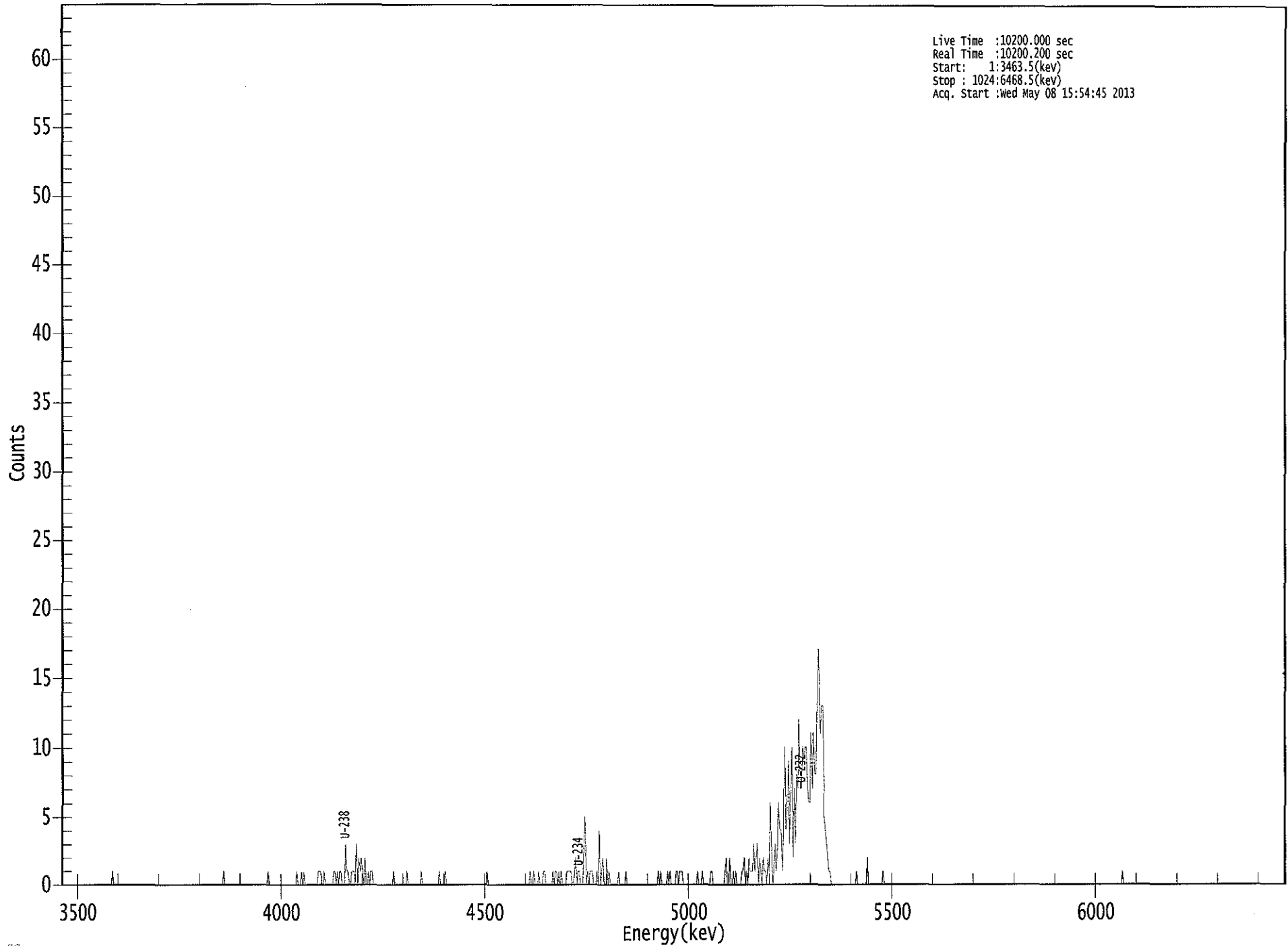
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.13E+000 +/- 5.78E-001	6.81E-002 +/- 7.69E-003
U-234	0.994	4761.50*	6.08E-001 +/- 1.96E-001	6.81E-002 +/- 7.68E-003
U-235	0.996	4385.50*	7.03E-002 +/- 7.74E-002	1.05E-001 +/- 1.19E-002
U-238	0.995	4184.40*	4.82E-001 +/- 1.73E-001	8.50E-002 +/- 9.59E-003

AG
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US EPA ARCHIVE DOCUMENT

0000057489.CNF



Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3463.5(kev)
Stop : 1024:6468.5(kev)
Acq. Start :wed May 08 15:54:45 2013

0175

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 15

Channel	1	2	3	4	5	6	7	8	9
377:	0	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0	1
393:	0	0	1	0	0	0	0	1	0
401:	0	0	1	1	0	0	0	0	0
409:	0	0	1	0	1	1	1	0	1
417:	0	1	0	0	0	0	0	1	1
425:	1	1	0	0	1	2	0	0	1
433:	1	0	0	0	3	5	0	0	1
441:	0	1	1	1	0	0	0	0	1
449:	0	4	0	1	2	0	0	0	2
457:	0	1	0	0	0	0	0	0	0
465:	0	1	0	0	0	0	0	0	1
473:	0	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0	0
497:	0	0	1	0	1	0	0	0	0
505:	0	0	1	0	1	0	0	0	0
513:	0	1	1	0	1	1	1	1	0
521:	0	0	0	0	0	0	0	0	0
529:	0	0	0	1	0	0	0	0	1
537:	0	0	0	0	0	0	0	1	1
545:	0	0	0	0	0	0	0	0	0
553:	0	0	1	2	0	0	0	2	0
561:	0	1	0	1	0	0	0	0	0
569:	1	1	2	0	1	0	2	1	1
577:	1	1	3	1	2	3	0	2	2
585:	1	0	2	1	1	0	2	1	1
593:	6	3	0	1	3	1	3	6	6
601:	4	4	1	4	10	4	5	9	9
609:	3	7	10	2	7	3	8	7	7
617:	12	7	7	10	9	10	10	7	7
625:	6	6	11	7	11	8	8	12	12
633:	17	14	11	13	13	5	4	3	3
641:	2	1	1	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0	0
665:	1	0	0	0	0	0	0	0	0
673:	0	2	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	1	0	0
689:	0	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0	0
793:	0	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	1	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



Apex-Alpha™

5/9/2013

Sample Description: PZ-107-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 16
 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:52 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.600 mL
 Effective Efficiency: 0.2001 +/- 0.0112
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 1.0534 +/- 0.0615

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	387.66	9.96	0.34	0.00E+000	20.8
U-234	4.729	127.00	17.46	0.00	0.00E+000	7.9
U-235	4.384	9.83	63.14	0.17	0.00E+000	5.9
U-238	4.152	96.49	20.01	0.51	0.00E+000	16.6

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

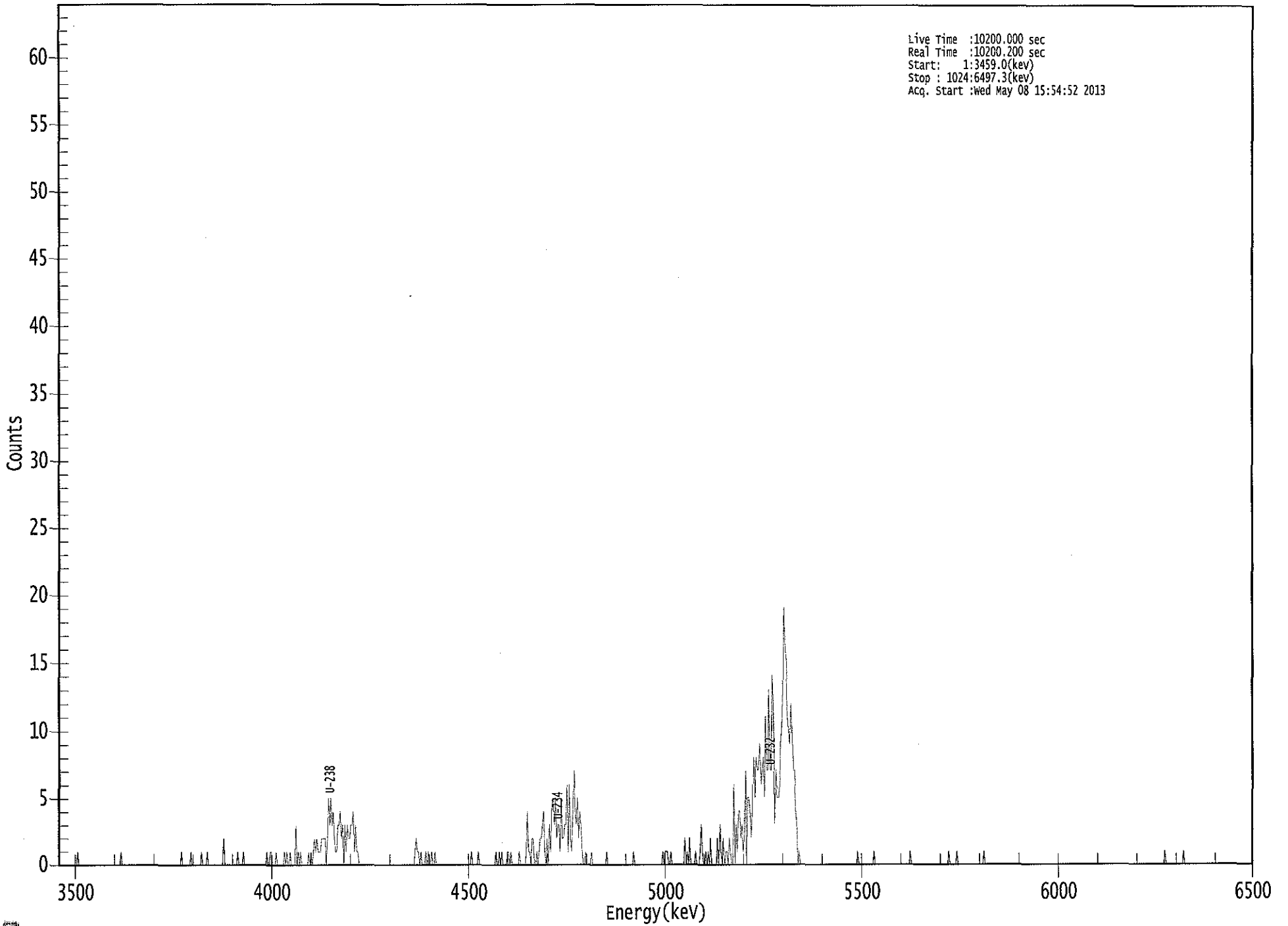
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	5.15E+000 +/- 5.63E-001	6.35E-002 +/- 6.94E-003
U-234	0.993	4761.50*	1.68E+000 +/- 3.47E-001	7.95E-002 +/- 8.70E-003
U-235	1.000	4385.50*	1.61E-001 +/- 1.03E-001	6.83E-002 +/- 7.47E-003
U-238	0.993	4184.40*	1.27E+000 +/- 2.91E-001	6.93E-002 +/- 7.58E-003

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US EPA ARCHIVE DOCUMENT

0000057490.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Wed May 08 15:54:52 2013



ROI Type: 1

ROI Type: 3

0180

 ***** 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:	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	0	0	0	0	0
49:	0	0	0	0	0	1	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	1	0	0	0	0	0	0
113:	0	1	0	0	0	0	0	0
121:	0	0	1	0	0	0	0	1
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	2	0	0
145:	0	0	0	0	0	0	0	0
153:	0	1	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	1	0	0	1	1	0
185:	0	0	1	0	0	0	0	0
193:	0	1	0	1	0	0	1	0
201:	0	0	0	3	0	1	0	1
209:	0	0	0	0	0	0	1	0
217:	1	0	1	2	1	2	1	1
225:	1	2	2	2	2	0	2	5
233:	3	5	3	4	2	1	1	3
241:	3	4	2	3	0	3	1	3
249:	2	2	3	3	4	1	3	1
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	1	2	1	1	0	1	0
313:	0	0	1	0	1	0	0	1
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	1	0	0	0	0	0	1
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 1 0

Sample Title: 16

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	1	0	1	0	0	0	0
385:	1	1	0	1	0	0	0	0
393:	0	0	1	0	0	0	0	0
401:	1	4	1	1	0	2	2	0
409:	0	1	0	1	2	2	3	4
417:	1	0	2	0	3	1	4	5
425:	3	5	2	3	3	1	5	2
433:	2	3	3	6	1	6	2	1
441:	4	7	4	3	5	2	4	3
449:	1	0	0	1	0	0	0	0
457:	1	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	1	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	1	0	1
521:	1	1	0	0	1	0	0	0
529:	0	0	0	0	0	0	0	0
537:	2	0	1	0	2	0	0	0
545:	0	1	0	0	0	1	3	1
553:	0	0	1	0	1	0	2	0
561:	0	0	0	0	2	0	3	1
569:	0	2	0	1	1	0	2	1
577:	0	0	6	0	3	1	4	4
585:	2	3	1	2	7	0	5	5
593:	4	2	4	8	5	8	7	7
601:	9	6	7	8	5	11	7	7
609:	13	7	7	14	12	3	7	5
617:	5	5	9	10	12	19	16	15
625:	11	10	9	12	10	7	7	4
633:	3	0	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	1	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	1	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	1	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	1	0	0	0	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	1	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



C
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Sample Description: PZ-107-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 17
 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:48 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.599 mL
 Effective Efficiency: 0.1504 +/- 0.0095
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 0.7602 +/- 0.0497

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.285	290.66	11.50	0.34	0.00E+000	5.1
U-234		4.734	92.81	20.50	1.19	0.00E+000	9.8
U-235		4.378	8.66	68.12	0.34	0.00E+000	3.0
U-238		4.165	59.94	26.06	3.06	0.00E+000	12.3

T = Tracer Peak used for Effective Efficiency

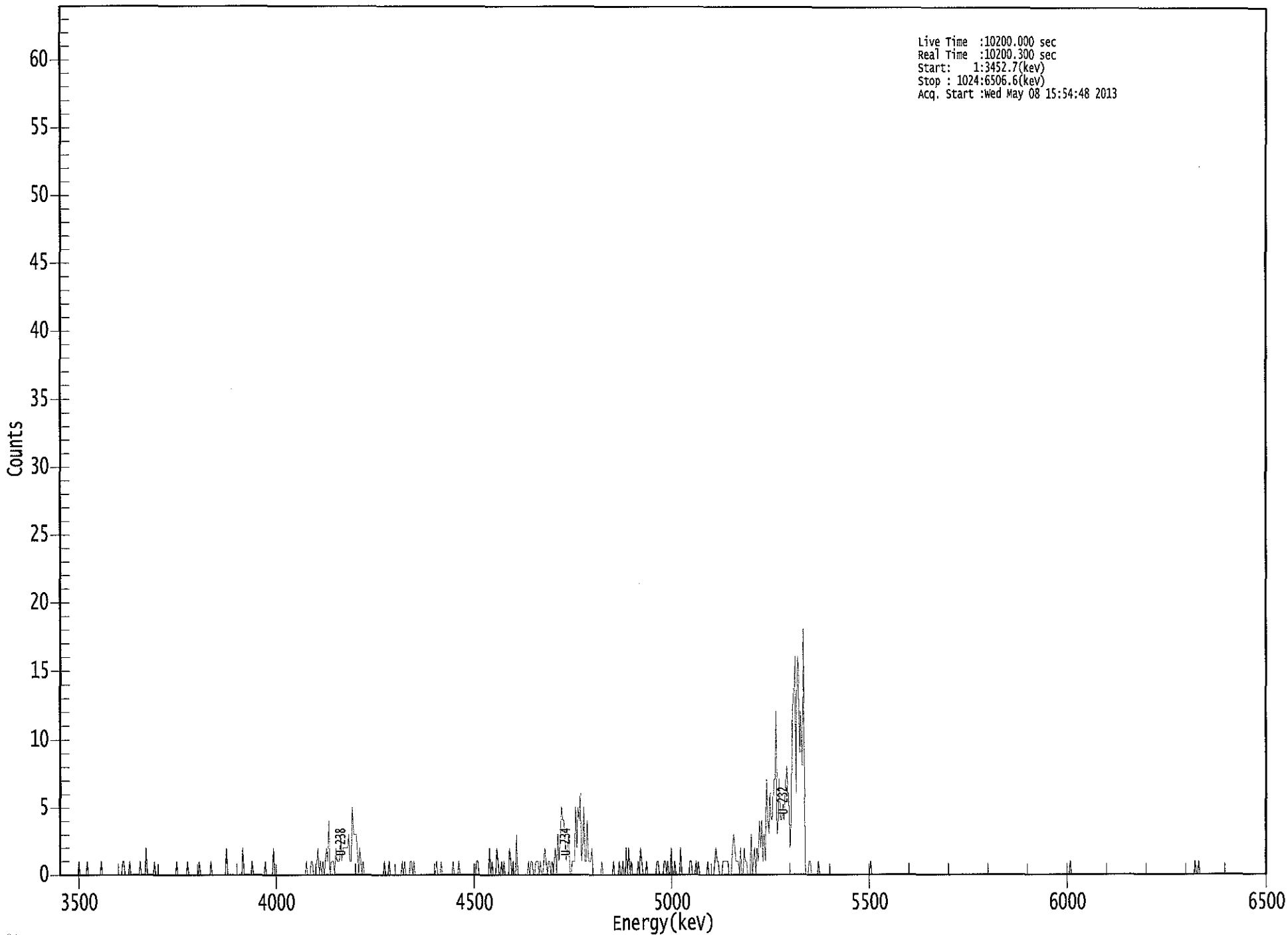
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.13E+000 +/- 6.35E-001	8.45E-002 +/- 1.04E-002
U-234	0.995	4761.50*	1.64E+000 +/- 3.92E-001	1.16E-001 +/- 1.44E-002
U-235	1.000	4385.50*	1.89E-001 +/- 1.31E-001	1.04E-001 +/- 1.29E-002
U-238	0.997	4184.40*	1.05E+000 +/- 3.04E-001	1.57E-001 +/- 1.94E-002

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US EPA ARCHIVE DOCUMENT

0000057491.CNF



Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3452.7(keV)
Stop : 1024:6506.6(keV)
Acq. Start :wed May 08 15:54:48 2013

0185

ROI Type: 1

ROI Type: 3

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

369: 0 0 2 1 0 0 1 0

Sample Title: 17

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	1	0	0	0	0	2	1	0
385:	1	0	0	3	0	0	0	0
393:	0	0	0	0	0	1	0	1
401:	1	0	0	1	1	1	0	1
409:	0	0	1	2	1	0	1	1
417:	0	1	0	1	2	0	3	1
425:	3	5	4	4	2	1	2	3
433:	0	0	1	1	1	5	2	5
441:	4	6	1	2	5	1	1	4
449:	1	1	1	2	0	0	0	0
457:	0	0	0	1	0	0	0	0
465:	0	0	0	0	0	1	0	0
473:	0	0	1	0	0	1	0	0
481:	2	0	2	0	1	0	0	0
489:	0	0	1	0	2	1	0	0
497:	0	1	0	0	0	0	0	0
505:	0	0	1	1	0	0	0	0
513:	1	1	0	1	0	0	2	0
521:	0	1	0	0	0	0	2	0
529:	0	0	0	0	0	0	1	1
537:	0	0	0	1	0	1	0	0
545:	0	0	0	0	0	1	0	0
553:	0	0	0	1	2	1	1	0
561:	0	0	1	1	1	1	1	0
569:	0	0	2	3	2	1	1	1
577:	0	2	0	0	2	1	1	0
585:	0	0	3	0	1	2	0	2
593:	1	4	2	4	1	3	1	7
601:	4	3	6	4	4	7	7	12
609:	3	4	7	4	4	5	4	6
617:	8	6	6	2	4	12	13	16
625:	6	16	15	9	12	8	18	7
633:	0	0	0	1	1	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	1
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	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: 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:	1	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	1	0	0	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



5/8/2013

Sample Description: PZ-116-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 18
 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:50 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.594 mL
 Effective Efficiency: 0.2197 +/- 0.0118
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 1.1900 +/- 0.0674

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	5.276	420.83	9.56	0.17	0.00E+000	44.8
U-234	4.730	470.49	9.04	0.51	0.00E+000	18.5
U-235	4.413	27.83	37.29	0.17	0.00E+000	3.7
U-238	4.151	134.66	16.92	0.34	0.00E+000	7.5

T = Tracer Peak used for Effective Efficiency

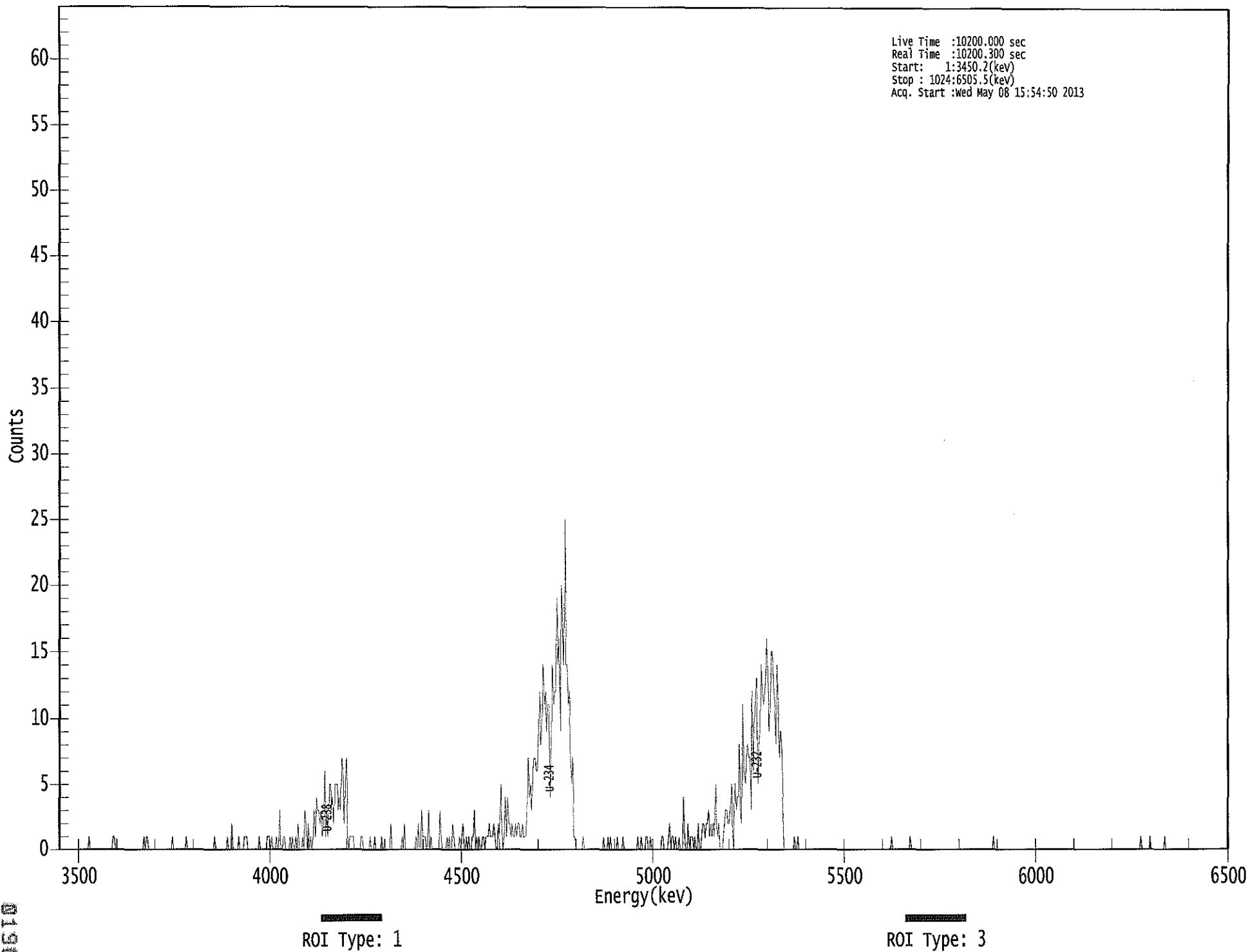
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.09E+000 +/- 5.38E-001	5.05E-002 +/- 5.33E-003
U-234	0.993	4761.50*	5.69E+000 +/- 7.91E-001	6.34E-002 +/- 6.70E-003
U-235	0.995	4385.50*	4.15E-001 +/- 1.61E-001	6.22E-002 +/- 6.58E-003
U-238	0.992	4184.40*	1.62E+000 +/- 3.23E-001	5.75E-002 +/- 6.08E-003

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US EPA ARCHIVE DOCUMENT

0000057492.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	2	3	4	5	6	7	8	9
1:	0	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0	0
25:	0	0	1	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0	1
49:	1	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0	0
73:	0	0	1	0	1	1	0	0	0
81:	0	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0	0
97:	0	0	0	1	0	0	0	0	0
105:	0	0	0	0	0	0	0	0	1
113:	0	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0	0
137:	1	0	0	0	0	0	0	0	0
145:	0	0	0	1	0	0	0	0	2
153:	0	0	0	0	0	1	0	0	0
161:	0	0	1	1	1	0	0	0	0
169:	0	0	0	0	0	0	0	0	1
177:	0	0	0	0	0	0	1	1	1
185:	1	0	1	0	0	0	1	0	0
193:	0	3	0	0	1	1	0	0	0
201:	0	0	1	0	1	0	0	0	1
209:	0	2	0	0	0	1	0	0	3
217:	2	0	2	0	1	0	1	0	3
225:	1	4	3	3	2	3	1	0	2
233:	6	1	3	1	5	5	3	0	4
241:	2	5	5	5	3	4	3	0	7
249:	6	2	5	7	1	0	1	0	1
257:	1	1	0	0	0	0	0	0	0
265:	1	1	0	0	0	0	0	0	0
273:	1	0	0	0	1	0	0	0	0
281:	0	0	1	0	0	0	0	0	0
289:	0	0	2	0	0	0	0	0	0
297:	0	0	0	0	1	0	2	0	0
305:	0	0	0	0	0	0	0	0	0
313:	1	0	2	0	0	3	1	0	1
321:	1	0	0	3	0	1	0	0	0
329:	0	0	0	0	0	3	1	0	0
337:	0	0	0	1	0	1	0	0	0
345:	2	1	0	0	0	0	1	0	0
353:	1	2	0	0	1	0	1	0	0
361:	0	1	1	3	0	1	0	0	1

369: 0 0 1 1 0 1 1 1

Sample Title: 18

Channel	1	2	3	4	5	6	7	8
377:	2	1	1	1	2	1	0	0
385:	2	1	5	2	0	1	4	1
393:	4	2	2	1	2	1	1	2
401:	1	2	2	1	1	2	1	1
409:	1	3	7	4	5	3	6	7
417:	7	6	6	9	12	8	9	14
425:	11	12	9	11	11	4	8	14
433:	11	12	12	19	14	16	9	20
441:	17	14	25	14	14	11	12	7
449:	5	7	1	1	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	1	0	0	0
481:	1	0	1	0	0	0	0	0
489:	1	0	0	0	0	1	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	1	0	0	1	0	0
513:	0	1	1	0	0	1	0	0
521:	0	0	0	0	0	0	0	1
529:	1	0	0	0	0	1	2	0
537:	1	1	0	1	0	0	1	0
545:	0	0	4	1	0	0	2	0
553:	1	1	1	0	1	0	0	2
561:	0	0	1	2	2	1	2	2
569:	3	1	2	1	2	1	5	2
577:	1	2	0	0	0	1	2	3
585:	3	2	2	3	5	2	0	5
593:	3	4	4	8	3	2	11	6
601:	5	7	8	7	7	3	12	6
609:	10	12	13	5	8	9	14	12
617:	11	12	13	16	13	9	11	15
625:	15	12	11	8	14	10	7	9
633:	8	3	0	0	0	0	0	0
641:	0	0	0	1	0	0	1	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	1	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	1	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	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	1	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	1	0	0	0	0	0
953:	0	0	1	0	0	0	0	0
961:	0	0	0	0	0	0	0	1
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



5/9/2013

Sample Description: PZ-116-SS DIS
 Spectrum File: \\OR-ALPHA1\Camberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-UU
 Sample Identification: 19
 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: 4/12/2013 7:40:10 AM
 Acquisition Date/Time: 5/8/2013 3:54:47 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.600 mL
 Effective Efficiency: 0.2382 +/- 0.0124
 Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
 Chem. Recovery Factor: 1.2528 +/- 0.0687

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	460.83	9.13	0.17	0.00E+000	30.5
U-234	4.732	474.83	9.00	0.17	0.00E+000	32.9
U-235	4.401	28.83	36.63	0.17	0.00E+000	3.0
U-238	4.159	160.00	15.54	0.00	0.00E+000	20.3

T = Tracer Peak used for Effective Efficiency

 ----- NUCLIDE ANALYSIS RESULTS -----

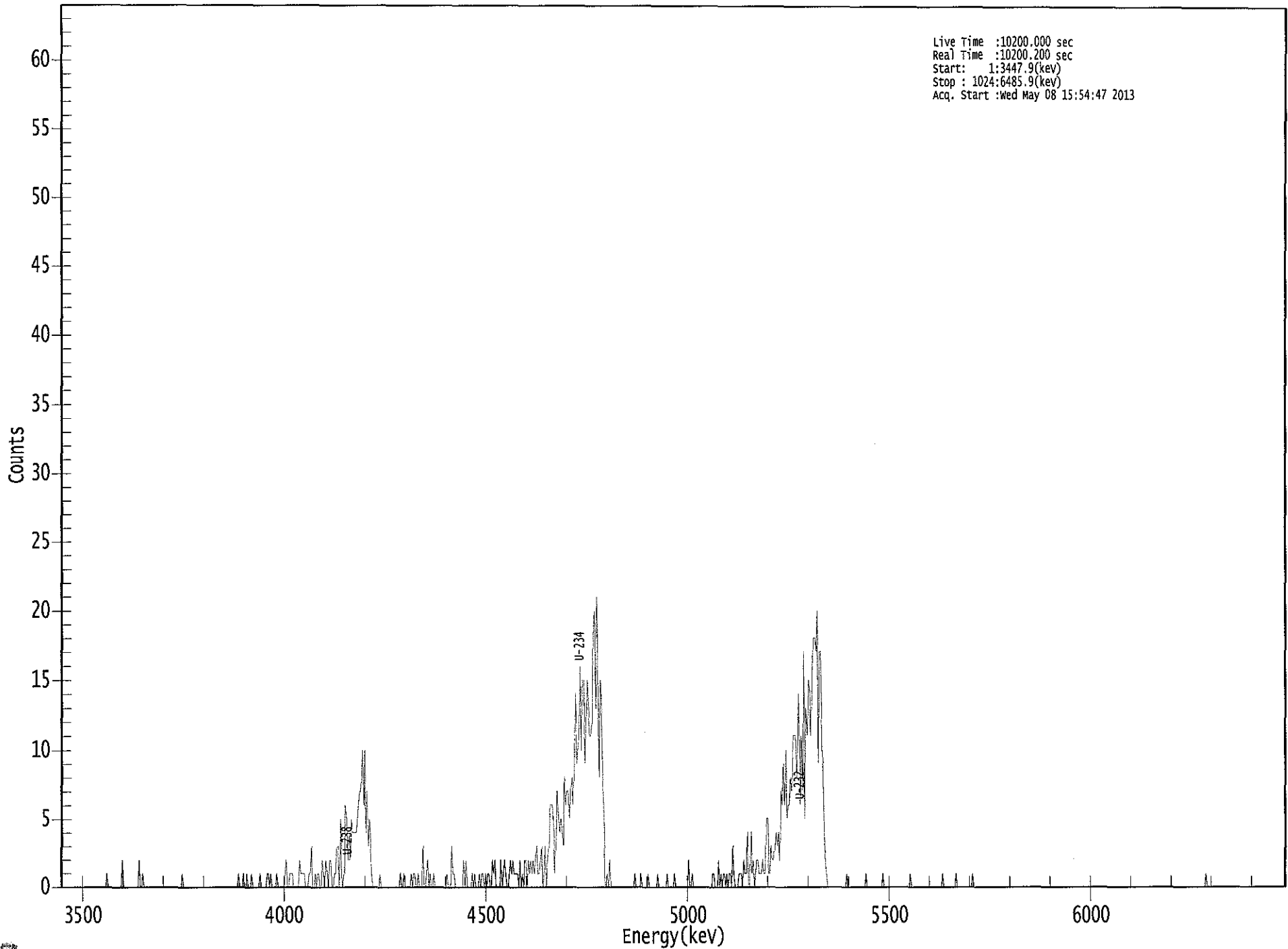
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.14E+000 +/- 5.23E-001	4.65E-002 +/- 4.74E-003
U-234	0.994	4761.50*	5.29E+000 +/- 7.19E-001	4.65E-002 +/- 4.74E-003
U-235	0.998	4385.50*	3.96E-001 +/- 1.51E-001	5.74E-002 +/- 5.84E-003
U-238	0.995	4184.40*	1.78E+000 +/- 3.30E-001	6.65E-002 +/- 6.78E-003

*AG
5/9/13*

US EPA ARCHIVE DOCUMENT

0000057493.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3447.9(kev)
Stop : 1024:6485.9(kev)
Acq. Start :wed May 08 15:54:47 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0195

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

369: 0 1 2 1 0 0 1 2

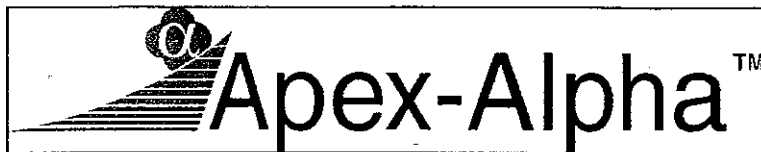
Sample Title: 19

Channel	1	2	3	4	5	6	7	8
377:	1	2	1	1	1	1	0	2
385:	0	1	0	2	2	0	2	1
393:	2	1	2	1	2	3	1	1
401:	2	3	0	1	3	0	2	3
409:	6	6	6	4	1	4	7	5
417:	4	5	4	3	8	6	7	7
425:	5	7	8	6	9	14	9	10
433:	11	16	10	15	15	9	12	15
441:	13	11	11	12	19	20	13	21
449:	14	8	15	13	8	6	0	0
457:	1	0	2	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	1
481:	0	0	0	0	1	0	0	0
489:	0	0	1	0	0	0	0	0
497:	0	0	1	0	0	0	0	0
505:	0	0	1	0	0	0	0	0
513:	1	0	0	0	0	0	0	0
521:	0	0	0	0	2	0	0	1
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	1	1	0	0	0	2	0	1
553:	0	1	1	0	1	0	1	1
561:	0	3	1	0	0	0	1	1
569:	1	0	2	1	1	4	0	0
577:	4	1	2	0	1	2	2	1
585:	1	1	2	1	1	5	5	1
593:	1	3	2	2	3	4	3	4
601:	2	7	6	9	6	10	5	6
609:	6	8	7	11	11	11	8	11
617:	14	6	11	7	17	5	13	11
625:	15	14	11	16	18	18	17	20
633:	9	17	17	10	9	3	2	1
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:	1	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	1	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	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	1	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 19

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



QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 5/8/2013
Time : 5:50:51 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	5/8/2013 5:26:15 AM
Alpha 004	21f	ALL	Passed	5/8/2013 5:26:16 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	5/8/2013 5:26:17 AM
Alpha 011	21f	ALL	Passed	5/8/2013 5:26:18 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	5/8/2013 5:26:18 AM
Alpha 014	21f	ALL	Passed	5/8/2013 5:26:19 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	5/8/2013 5:26:20 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	5/8/2013 5:26:21 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	5/8/2013 5:26:22 AM
Alpha 025	AIM730	ALL	Passed	5/8/2013 5:26:23 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	5/8/2013 5:26:23 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	5/8/2013 5:26:24 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	5/8/2013 5:26:25 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:27 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:29 AM
Alpha 036	Alpha Analyst100DC	ALL	Not Done	
Alpha 037	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:31 AM
Alpha 038	Alpha Analyst100DC	ALL	Not Done	
Alpha 039	Alpha Analyst100DC	ALL	Not Done	
Alpha 040	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:33 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:36 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:38 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:41 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:44 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:46 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	5/8/2013 5:26:48 AM

APPROVED BY: _____

APPROVAL DATE: _____

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

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

SECTION IX
ANALYTICAL DATA (ISOTOPIC THORIUM)

US EPA ARCHIVE DOCUMENT

Work Order	13-04131
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-101-SS TOT	43	04/12/13 09:15	1.0000E+00
04	TRG	PZ-208-SS TOT	37	04/12/13 09:10	1.0000E+00
05	TRG	PZ-208-SS DIS	37	04/12/13 09:10	1.0000E+00
06	DO	PZ-101-SS TOT	43	04/12/13 09:15	1.0000E+00
07	TRG	PZ-101-SS DIS	43	04/12/13 09:15	1.0000E+00
08	TRG	MW-1204 TOT	42	04/12/13 09:26	1.0000E+00
09	TRG	MW-1204 DIS	42	04/12/13 09:26	1.0000E+00
10	TRG	PZ-113-SS TOT	39	04/12/13 09:40	1.0000E+00
11	TRG	PZ-113-SS DIS	39	04/12/13 09:40	1.0000E+00
12	TRG	I-73 TOT	36	04/12/13 10:05	1.0000E+00
13	TRG	I-73 DIS	36	04/12/13 10:05	1.0000E+00
14	TRG	PZ-113-AS TOT	41	04/12/13 10:35	1.0000E+00
15	TRG	PZ-113-AS DIS	41	04/12/13 10:35	1.0000E+00
16	TRG	PZ-107-SS TOT	45	04/12/13 10:40	1.0000E+00
17	TRG	PZ-107-SS DIS	45	04/12/13 10:40	1.0000E+00
18	TRG	PZ-116-SS TOT	40	04/12/13 10:46	1.0000E+00
19	TRG	PZ-116-SS DIS	40	04/12/13 10:46	1.0000E+00

0203

* 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.

ThISO

Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.4772	10.7		0.00								
02	MBL	0.2367	5.3		0.00								
03	DUP	0.2362	5.3		0.00								
04	TRG	0.2344	5.3		0.00								
05	TRG	0.2346	5.3		0.00								
06	DO	0.2334	5.2		0.00								
07	TRG	0.2330	5.2		0.00								
08	TRG	0.2317	5.2		0.00								
09	TRG	0.2331	5.2		0.00								
10	TRG	0.2314	5.2		0.00								
11	TRG	0.2311	5.2		0.00								
12	TRG	0.2321	5.2		0.00								
13	TRG	0.2304	5.2		0.00								
14	TRG	0.2314	5.2		0.00								
15	TRG	0.2302	5.2		0.00								
16	TRG	0.2302	5.2		0.00								
17	TRG	0.2300	5.2		0.00								
18	TRG	0.2304	5.2		0.00								
19	TRG	0.2295	5.2		0.00								

US EPA ARCHIVE DOCUMENT

0204

* 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.

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			04/30/13 10:06	JBARNARD				
02	MBL			04/30/13 10:06	JBARNARD				
03	DUP			04/30/13 10:06	JBARNARD				
04	TRG			04/30/13 10:06	JBARNARD				
05	TRG			04/30/13 10:06	JBARNARD				
06	DO			04/30/13 10:06	JBARNARD				
07	TRG			04/30/13 10:06	JBARNARD				
08	TRG			04/30/13 10:06	JBARNARD				
09	TRG			04/30/13 10:06	JBARNARD				
10	TRG			04/30/13 10:06	JBARNARD				
11	TRG			04/30/13 10:06	JBARNARD				
12	TRG			04/30/13 10:06	JBARNARD				
13	TRG			04/30/13 10:06	JBARNARD				
14	TRG			04/30/13 10:06	JBARNARD				
15	TRG			04/30/13 10:06	JBARNARD				
16	TRG			04/30/13 10:06	JBARNARD				
17	TRG			04/30/13 10:06	JBARNARD				
18	TRG			04/30/13 10:06	JBARNARD				
19	TRG			04/30/13 10:06	JBARNARD				

US EPA ARCHIVE DOCUMENT

0205

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

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-THISO-1

US EPA ARCHIVE DOCUMENT

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-04131
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-228	LCS	LCS	pCi/l	4.78E+00	7.09E-01	1.09E-01	4.79E+00	99.79	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	-1.66E-02	3.75E-02	1.10E-01					OK	OK
03	TH-228	DUP	PZ-101-SS TOT	pCi/l	1.16E-01	8.85E-02	1.07E-01				NA	OK	
04	TH-228	TRG	PZ-208-SS TOT	pCi/l	3.36E-01	1.47E-01	1.27E-01					OK	
05	TH-228	TRG	PZ-208-SS DIS	pCi/l	6.93E-02	1.05E-01	1.78E-01					OK	
06	TH-228	DO	PZ-101-SS TOT	pCi/l	4.89E-02	9.87E-02	1.84E-01					OK	
07	TH-228	TRG	PZ-101-SS DIS	pCi/l	7.58E-03	4.76E-02	1.15E-01					OK	
08	TH-228	TRG	MW-1204 TOT	pCi/l	7.98E-02	7.25E-02	9.30E-02					OK	
09	TH-228	TRG	MW-1204 DIS	pCi/l	6.24E-02	7.29E-02	1.13E-01					OK	
10	TH-228	TRG	PZ-113-SS TOT	pCi/l	1.09E+00	3.00E-01	1.04E-01					OK	
11	TH-228	TRG	PZ-113-SS DIS	pCi/l	9.41E-02	7.72E-02	7.61E-02					OK	
12	TH-228	TRG	I-73 TOT	pCi/l	4.11E-01	2.09E-01	9.61E-02					OK	
13	TH-228	TRG	I-73 DIS	pCi/l	1.84E-02	3.98E-02	7.85E-02					OK	
14	TH-228	TRG	PZ-113-AS TOT	pCi/l	9.79E-02	7.45E-02	6.86E-02					OK	
15	TH-228	TRG	PZ-113-AS DIS	pCi/l	1.43E-02	3.58E-02	7.45E-02					OK	
16	TH-228	TRG	PZ-107-SS TOT	pCi/l	1.01E+00	2.73E-01	7.57E-02					OK	
17	TH-228	TRG	PZ-107-SS DIS	pCi/l	2.04E-03	2.85E-02	8.14E-02					OK	
18	TH-228	TRG	PZ-116-SS TOT	pCi/l	2.69E-02	4.13E-02	6.13E-02					OK	
19	TH-228	TRG	PZ-116-SS DIS	pCi/l	3.28E-02	5.04E-02	7.48E-02					OK	

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-THISO-1

US EPA ARCHIVE DOCUMENT

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	118.81	0.00	0.00			
02	TH-228	MBL	04/18/13 00:00	1.00E+00	113.05	0.00	0.00			
03	TH-228	DUP	04/12/13 09:15	1.00E+00	116.05	0.00	0.00			
04	TH-228	TRG	04/12/13 09:10	1.00E+00	120.02	0.00	0.00			
05	TH-228	TRG	04/12/13 09:10	1.00E+00	79.57	0.00	0.00			
06	TH-228	DO	04/12/13 09:15	1.00E+00	82.76	0.00	0.00			
07	TH-228	TRG	04/12/13 09:15	1.00E+00	98.54	0.00	0.00			
08	TH-228	TRG	04/12/13 09:26	1.00E+00	123.70	0.00	0.00			
09	TH-228	TRG	04/12/13 09:26	1.00E+00	124.60	0.00	0.00			
10	TH-228	TRG	04/12/13 09:40	1.00E+00	101.49	0.00	0.00			
11	TH-228	TRG	04/12/13 09:40	1.00E+00	102.76	0.00	0.00			
12	TH-228	TRG	04/12/13 10:05	1.00E+00	63.63	0.00	0.00			
13	TH-228	TRG	04/12/13 10:05	1.00E+00	107.06	0.00	0.00			
14	TH-228	TRG	04/12/13 10:35	1.00E+00	116.67	0.00	0.00			
15	TH-228	TRG	04/12/13 10:35	1.00E+00	114.94	0.00	0.00			
16	TH-228	TRG	04/12/13 10:40	1.00E+00	108.66	0.00	0.00			
17	TH-228	TRG	04/12/13 10:40	1.00E+00	108.32	0.00	0.00			
18	TH-228	TRG	04/12/13 10:46	1.00E+00	97.31	0.00	0.00			
19	TH-228	TRG	04/12/13 10:46	1.00E+00	84.80	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04131	Analysis Code	THISO	Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	05/07/13 16:54		A_Spec	Alpha_010	170	4.21 E+02	2.20 E-02	19.7
02	TH-228	MBL	05/07/13 16:54		A_Spec	Alpha_011	170	-1.40 E+00	2.00 E-02	19.7
03	TH-228	DUP	05/07/13 16:54		A_Spec	Alpha_013	170	9.28 E+00	1.60 E-02	18.7
04	TH-228	TRG	05/07/13 16:54		A_Spec	Alpha_014	170	2.74 E+01	2.70 E-02	18.5
05	TH-228	TRG	05/07/13 16:55		A_Spec	Alpha_018	170	3.60 E+00	2.00 E-02	17.8
06	TH-228	DO	05/07/13 16:55		A_Spec	Alpha_022	170	2.28 E+00	1.60 E-02	15.3
07	TH-228	TRG	05/07/13 16:55		A_Spec	Alpha_024	170.02	4.70 E-01	9.00 E-03	17.1
08	TH-228	TRG	05/07/13 16:55		A_Spec	Alpha_025	170	6.30 E+00	1.00 E-02	17.4
09	TH-228	TRG	05/07/13 16:55		A_Spec	Alpha_027	170.02	4.94 E+00	1.80 E-02	17.3
10	TH-228	TRG	05/07/13 16:55		A_Spec	Alpha_029	170	7.91 E+01	1.10 E-02	19.5
11	TH-228	TRG	05/07/13 17:45		A_Spec	Alpha_033	170	6.49 E+00	3.00 E-03	18.2
12	TH-228	TRG	05/07/13 17:45		A_Spec	Alpha_034	170	1.78 E+01	1.00 E-03	18.6
13	TH-228	TRG	05/07/13 17:44		A_Spec	Alpha_035	170	1.32 E+00	4.00 E-03	18.3
14	TH-228	TRG	05/07/13 17:44		A_Spec	Alpha_037	170	7.49 E+00	3.00 E-03	17.8
15	TH-228	TRG	05/07/13 17:45		A_Spec	Alpha_040	170	1.15 E+00	5.00 E-03	19
16	TH-228	TRG	05/07/13 17:45		A_Spec	Alpha_041	170	8.02 E+01	5.00 E-03	19.8
17	TH-228	TRG	05/07/13 17:45		A_Spec	Alpha_042	170	1.50 E-01	5.00 E-03	18.5
18	TH-228	TRG	05/07/13 17:45		A_Spec	Alpha_044	170	1.83 E+00	1.00 E-03	19
19	TH-228	TRG	05/07/13 17:45		A_Spec	Alpha_046	170	1.83 E+00	1.00 E-03	17.9

 Eberline Services Work Order 13-04131	Analysis Code	THISO 1
	Run	
Client	Engineering Management Support, Inc.	

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-230	LCS	LCS	pCi/l	5.00E+00	7.33E-01	7.16E-02	5.46E+00	91.51	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	1.41E-01	8.37E-02	4.97E-02					OK	OK
03	TH-230	DUP	PZ-101-SS TOT	pCi/l	1.39E-01	8.61E-02	6.90E-02				NA	OK	
04	TH-230	TRG	PZ-208-SS TOT	pCi/l	3.57E-01	1.42E-01	7.89E-02					OK	
05	TH-230	TRG	PZ-208-SS DIS	pCi/l	2.69E-01	1.52E-01	1.06E-01					OK	
06	TH-230	DO	PZ-101-SS TOT	pCi/l	3.28E-01	1.82E-01	1.44E-01					OK	
07	TH-230	TRG	PZ-101-SS DIS	pCi/l	1.49E-01	1.01E-01	8.26E-02					OK	
08	TH-230	TRG	MW-1204 TOT	pCi/l	1.21E-01	8.33E-02	8.15E-02					OK	
09	TH-230	TRG	MW-1204 DIS	pCi/l	1.42E-01	8.68E-02	6.47E-02					OK	
10	TH-230	TRG	PZ-113-SS TOT	pCi/l	2.37E+00	5.17E-01	8.05E-02					OK	
11	TH-230	TRG	PZ-113-SS DIS	pCi/l	1.82E-01	1.05E-01	5.91E-02					OK	
12	TH-230	TRG	I-73 TOT	pCi/l	5.54E-01	2.47E-01	1.07E-01					OK	
13	TH-230	TRG	I-73 DIS	pCi/l	1.31E-01	8.70E-02	6.49E-02					OK	
14	TH-230	TRG	PZ-113-AS TOT	pCi/l	2.25E-01	1.12E-01	6.10E-02					OK	
15	TH-230	TRG	PZ-113-AS DIS	pCi/l	1.56E-01	8.93E-02	5.07E-02					OK	
16	TH-230	TRG	PZ-107-SS TOT	pCi/l	7.84E-01	2.30E-01	8.78E-02					OK	
17	TH-230	TRG	PZ-107-SS DIS	pCi/l	1.15E-01	8.04E-02	6.35E-02					OK	
18	TH-230	TRG	PZ-116-SS TOT	pCi/l	1.50E-01	9.69E-02	7.53E-02					OK	
19	TH-230	TRG	PZ-116-SS DIS	pCi/l	8.45E-02	7.84E-02	7.30E-02					OK	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04131	Analysis Code	THISO	Run	1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-230	LCS	04/18/13 00:00	1.00E+00	118.81	0.00	0.00			
02	TH-230	MBL	04/18/13 00:00	1.00E+00	113.05	0.00	0.00			
03	TH-230	DUP	04/12/13 09:15	1.00E+00	116.05	0.00	0.00			
04	TH-230	TRG	04/12/13 09:10	1.00E+00	120.02	0.00	0.00			
05	TH-230	TRG	04/12/13 09:10	1.00E+00	79.57	0.00	0.00			
06	TH-230	DO	04/12/13 09:15	1.00E+00	82.76	0.00	0.00			
07	TH-230	TRG	04/12/13 09:15	1.00E+00	98.54	0.00	0.00			
08	TH-230	TRG	04/12/13 09:26	1.00E+00	123.70	0.00	0.00			
09	TH-230	TRG	04/12/13 09:26	1.00E+00	124.60	0.00	0.00			
10	TH-230	TRG	04/12/13 09:40	1.00E+00	101.49	0.00	0.00			
11	TH-230	TRG	04/12/13 09:40	1.00E+00	102.76	0.00	0.00			
12	TH-230	TRG	04/12/13 10:05	1.00E+00	63.63	0.00	0.00			
13	TH-230	TRG	04/12/13 10:05	1.00E+00	107.06	0.00	0.00			
14	TH-230	TRG	04/12/13 10:35	1.00E+00	116.67	0.00	0.00			
15	TH-230	TRG	04/12/13 10:35	1.00E+00	114.94	0.00	0.00			
16	TH-230	TRG	04/12/13 10:40	1.00E+00	108.66	0.00	0.00			
17	TH-230	TRG	04/12/13 10:40	1.00E+00	108.32	0.00	0.00			
18	TH-230	TRG	04/12/13 10:46	1.00E+00	97.31	0.00	0.00			
19	TH-230	TRG	04/12/13 10:46	1.00E+00	84.80	0.00	0.00			

 Eberline Services Work Order 13-04131	Analysis Code THISO	Run	1
		Client	Engineering Management Support, Inc.

US EPA ARCHIVE DOCUMENT

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-04131
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	05/07/13 16:54		A_Spec	Alpha_010	170	4.40 E+02	6.00 E-03	19.7
02	TH-230	MBL	05/07/13 16:54		A_Spec	Alpha_011	170	1.18 E+01	1.00 E-03	19.7
03	TH-230	DUP	05/07/13 16:54		A_Spec	Alpha_013	170	1.13 E+01	4.00 E-03	18.7
04	TH-230	TRG	05/07/13 16:54		A_Spec	Alpha_014	170	2.98 E+01	7.00 E-03	18.5
05	TH-230	TRG	05/07/13 16:55		A_Spec	Alpha_018	170	1.43 E+01	4.00 E-03	17.8
06	TH-230	DO	05/07/13 16:55		A_Spec	Alpha_022	170	1.56 E+01	8.00 E-03	15.3
07	TH-230	TRG	05/07/13 16:55		A_Spec	Alpha_024	170.02	9.49 E+00	3.00 E-03	17.1
08	TH-230	TRG	05/07/13 16:55		A_Spec	Alpha_025	170	9.81 E+00	7.00 E-03	17.4
09	TH-230	TRG	05/07/13 16:55		A_Spec	Alpha_027	170.02	1.15 E+01	3.00 E-03	17.3
10	TH-230	TRG	05/07/13 16:55		A_Spec	Alpha_029	170	1.76 E+02	5.00 E-03	19.5
11	TH-230	TRG	05/07/13 17:45		A_Spec	Alpha_033	170	1.28 E+01	1.00 E-03	18.2
12	TH-230	TRG	05/07/13 17:45		A_Spec	Alpha_034	170	2.47 E+01	2.00 E-03	18.6
13	TH-230	TRG	05/07/13 17:44		A_Spec	Alpha_035	170	9.66 E+00	2.00 E-03	18.3
14	TH-230	TRG	05/07/13 17:44		A_Spec	Alpha_037	170	1.77 E+01	2.00 E-03	17.8
15	TH-230	TRG	05/07/13 17:45		A_Spec	Alpha_040	170	1.28 E+01	1.00 E-03	19
16	TH-230	TRG	05/07/13 17:45		A_Spec	Alpha_041	170	6.35 E+01	9.00 E-03	19.8
17	TH-230	TRG	05/07/13 17:45		A_Spec	Alpha_042	170	8.66 E+00	2.00 E-03	18.5
18	TH-230	TRG	05/07/13 17:45		A_Spec	Alpha_044	170	1.05 E+01	3.00 E-03	19
19	TH-230	TRG	05/07/13 17:45		A_Spec	Alpha_046	170	4.83 E+00	1.00 E-03	17.9

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-THISO-1

US EPA ARCHIVE DOCUMENT

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	4.91E+00	7.22E-01	7.14E-02	4.79E+00	102.46	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	4.15E-02	4.75E-02	6.23E-02					OK	OK
03	TH-232	DUP	PZ-101-SS TOT	pCi/l	3.46E-02	4.20E-02	5.10E-02				NA	OK	
04	TH-232	TRG	PZ-208-SS TOT	pCi/l	3.64E-01	1.44E-01	8.50E-02					OK	
05	TH-232	TRG	PZ-208-SS DIS	pCi/l	-6.75E-03	4.08E-02	1.29E-01					OK	
06	TH-232	DO	PZ-101-SS TOT	pCi/l	8.32E-02	9.46E-02	1.32E-01					OK	
07	TH-232	TRG	PZ-101-SS DIS	pCi/l	-2.67E-03	3.13E-02	6.56E-02					OK	
08	TH-232	TRG	MW-1204 TOT	pCi/l	1.02E-02	2.46E-02	5.15E-02					OK	
09	TH-232	TRG	MW-1204 DIS	pCi/l	1.83E-02	3.50E-02	6.46E-02					OK	
10	TH-232	TRG	PZ-113-SS TOT	pCi/l	8.68E-01	2.54E-01	6.42E-02					OK	
11	TH-232	TRG	PZ-113-SS DIS	pCi/l	2.83E-02	4.82E-02	8.47E-02					OK	
12	TH-232	TRG	I-73 TOT	pCi/l	4.45E-01	2.16E-01	9.37E-02					OK	
13	TH-232	TRG	I-73 DIS	pCi/l	1.36E-02	3.76E-02	8.13E-02					OK	
14	TH-232	TRG	PZ-113-AS TOT	pCi/l	3.82E-02	5.03E-02	7.64E-02					OK	
15	TH-232	TRG	PZ-113-AS DIS	pCi/l	2.22E-02	3.40E-02	5.06E-02					OK	
16	TH-232	TRG	PZ-107-SS TOT	pCi/l	1.11E+00	2.92E-01	1.16E-01					OK	
17	TH-232	TRG	PZ-107-SS DIS	pCi/l	-2.25E-03	2.63E-02	5.53E-02					OK	
18	TH-232	TRG	PZ-116-SS TOT	pCi/l	2.86E-02	4.88E-02	8.59E-02					OK	
19	TH-232	TRG	PZ-116-SS DIS	pCi/l	1.75E-02	4.85E-02	1.05E-01					OK	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04131	Analysis Code	THISO	Run	1
							

US EPA ARCHIVE DOCUMENT

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	118.81	0.00	0.00			
02	TH-232	MBL	04/18/13 00:00	1.00E+00	113.05	0.00	0.00			
03	TH-232	DUP	04/12/13 09:15	1.00E+00	116.05	0.00	0.00			
04	TH-232	TRG	04/12/13 09:10	1.00E+00	120.02	0.00	0.00			
05	TH-232	TRG	04/12/13 09:10	1.00E+00	79.57	0.00	0.00			
06	TH-232	DO	04/12/13 09:15	1.00E+00	82.76	0.00	0.00			
07	TH-232	TRG	04/12/13 09:15	1.00E+00	98.54	0.00	0.00			
08	TH-232	TRG	04/12/13 09:26	1.00E+00	123.70	0.00	0.00			
09	TH-232	TRG	04/12/13 09:26	1.00E+00	124.60	0.00	0.00			
10	TH-232	TRG	04/12/13 09:40	1.00E+00	101.49	0.00	0.00			
11	TH-232	TRG	04/12/13 09:40	1.00E+00	102.76	0.00	0.00			
12	TH-232	TRG	04/12/13 10:05	1.00E+00	63.63	0.00	0.00			
13	TH-232	TRG	04/12/13 10:05	1.00E+00	107.06	0.00	0.00			
14	TH-232	TRG	04/12/13 10:35	1.00E+00	116.67	0.00	0.00			
15	TH-232	TRG	04/12/13 10:35	1.00E+00	114.94	0.00	0.00			
16	TH-232	TRG	04/12/13 10:40	1.00E+00	108.66	0.00	0.00			
17	TH-232	TRG	04/12/13 10:40	1.00E+00	108.32	0.00	0.00			
18	TH-232	TRG	04/12/13 10:46	1.00E+00	97.31	0.00	0.00			
19	TH-232	TRG	04/12/13 10:46	1.00E+00	84.80	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04131	Analysis Code	THISO	Run	1

US EPA ARCHIVE DOCUMENT

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	05/07/13 16:54		A_Spec	Alpha_010	170	4.33 E+02	6.00 E-03	19.7
02	TH-232	MBL	05/07/13 16:54		A_Spec	Alpha_011	170	3.49 E+00	3.00 E-03	19.7
03	TH-232	DUP	05/07/13 16:54		A_Spec	Alpha_013	170	2.83 E+00	1.00 E-03	18.7
04	TH-232	TRG	05/07/13 16:54		A_Spec	Alpha_014	170	3.05 E+01	9.00 E-03	18.5
05	TH-232	TRG	05/07/13 16:55		A_Spec	Alpha_018	170	-3.60 E-01	8.00 E-03	17.8
06	TH-232	DO	05/07/13 16:55		A_Spec	Alpha_022	170	3.98 E+00	6.00 E-03	15.3
07	TH-232	TRG	05/07/13 16:55		A_Spec	Alpha_024	170.02	-1.70 E-01	1.00 E-03	17.1
08	TH-232	TRG	05/07/13 16:55		A_Spec	Alpha_025	170	8.30 E-01	1.00 E-03	17.4
09	TH-232	TRG	05/07/13 16:55		A_Spec	Alpha_027	170.02	1.49 E+00	3.00 E-03	17.3
10	TH-232	TRG	05/07/13 16:55		A_Spec	Alpha_029	170	6.47 E+01	2.00 E-03	19.5
11	TH-232	TRG	05/07/13 17:45		A_Spec	Alpha_033	170	2.00 E+00	0.00 E+00	18.2
12	TH-232	TRG	05/07/13 17:45		A_Spec	Alpha_034	170	1.98 E+01	1.00 E-03	18.6
13	TH-232	TRG	05/07/13 17:44		A_Spec	Alpha_035	170	1.00 E+00	0.00 E+00	18.3
14	TH-232	TRG	05/07/13 17:44		A_Spec	Alpha_037	170	3.00 E+00	0.00 E+00	17.8
15	TH-232	TRG	05/07/13 17:45		A_Spec	Alpha_040	170	1.83 E+00	1.00 E-03	19
16	TH-232	TRG	05/07/13 17:45		A_Spec	Alpha_041	170	9.04 E+01	2.10 E-02	19.8
17	TH-232	TRG	05/07/13 17:45		A_Spec	Alpha_042	170	-1.70 E-01	1.00 E-03	18.5
18	TH-232	TRG	05/07/13 17:45		A_Spec	Alpha_044	170	2.00 E+00	0.00 E+00	19
19	TH-232	TRG	05/07/13 17:45		A_Spec	Alpha_046	170	1.00 E+00	0.00 E+00	17.9

Run	1	Analysis Code	THISO	Eberline Services Work Order	13-04131	Client	Engineering Management Support, Inc.

0214


10-14

1829

33-46

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	0.4772	10.7213		0.00		
02	MBL	BLANK	04/18/13 00:00	1.0000	0.2367	5.3179		0.00		
03	DUP	PZ-101-SS TOT	04/12/13 09:15	1.0000	0.2362	5.3067		0.00		
04	TRG	PZ-208-SS TOT	04/12/13 09:10	1.0000	0.2344	5.2663		0.00		
05	TRG	PZ-208-SS DIS	04/12/13 09:10	1.0000	0.2346	5.2708		0.00		
06	DO	PZ-101-SS TOT	04/12/13 09:15	1.0000	0.2334	5.2438		0.00		
07	TRG	PZ-101-SS DIS	04/12/13 09:15	1.0000	0.2330	5.2348		0.00		
08	TRG	MW-1204 TOT	04/12/13 09:26	1.0000	0.2317	5.2056		0.00		
09	TRG	MW-1204 DIS	04/12/13 09:26	1.0000	0.2331	5.2371		0.00		
10	TRG	PZ-113-SS TOT	04/12/13 09:40	1.0000	0.2314	5.1989		0.00		
11	TRG	PZ-113-SS DIS	04/12/13 09:40	1.0000	0.2311	5.1921		0.00		
12	TRG	I-73 TOT	04/12/13 10:05	1.0000	0.2321	5.2146		0.00		
13	TRG	I-73 DIS	04/12/13 10:05	1.0000	0.2304	5.1764		0.00		
14	TRG	PZ-113-AS TOT	04/12/13 10:35	1.0000	0.2314	5.1989		0.00		
15	TRG	PZ-113-AS DIS	04/12/13 10:35	1.0000	0.2302	5.1719		0.00		
16	TRG	PZ-107-SS TOT	04/12/13 10:40	1.0000	0.2302	5.1719		0.00		
17	TRG	PZ-107-SS DIS	04/12/13 10:40	1.0000	0.2300	5.1674		0.00		
18	TRG	PZ-116-SS TOT	04/12/13 10:46	1.0000	0.2304	5.1764		0.00		
19	TRG	PZ-116-SS DIS	04/12/13 10:46	1.0000	0.2295	5.1562		0.00		

0215

Internal Work Order					Run	Analysis Code			Date	Technician			Technician Initials	Witness Initials		
13-04131					1	THISO			4/30/2013 10:01	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
Th-228	Th-8b	103.560	4/30/2013	0.100	0.1027				4.79	0.172	0.00	0.000	0.00	0.000	0.00	0.000
Th-230	Th-1b	23.525	4/30/2013	0.500	0.5153				5.46	0.147	0.00	0.000	0.00	0.000	0.00	0.000
Th-232	Th-8b	103.560	4/30/2013	0.100	0.1027				4.79	0.172	0.00	0.000	0.00	0.000	0.00	0.000

Tracers							Balance Printer Tapes										
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS					
01	Th-229	Th-18a	22.467	4/30/2013	0.4772	0.2200											
02	Th-229	Th-18a	22.467	4/30/2013	0.2367	0.2200											
03	Th-229	Th-18a	22.467	4/30/2013	0.2362	0.2200											
04	Th-229	Th-18a	22.467	4/30/2013	0.2344	0.2200											
05	Th-229	Th-18a	22.467	4/30/2013	0.2346	0.2200											
06	Th-229	Th-18a	22.467	4/30/2013	0.2334	0.2200											
07	Th-229	Th-18a	22.467	4/30/2013	0.2330	0.2200											
08	Th-229	Th-18a	22.467	4/30/2013	0.2317	0.2200											
09	Th-229	Th-18a	22.467	4/30/2013	0.2331	0.2200											
10	Th-229	Th-18a	22.467	4/30/2013	0.2314	0.2200											
11	Th-229	Th-18a	22.467	4/30/2013	0.2311	0.2200											
12	Th-229	Th-18a	22.467	4/30/2013	0.2321	0.2200											
13	Th-229	Th-18a	22.467	4/30/2013	0.2304	0.2200											
14	Th-229	Th-18a	22.467	4/30/2013	0.2314	0.2200											
15	Th-229	Th-18a	22.467	4/30/2013	0.2302	0.2200											
16	Th-229	Th-18a	22.467	4/30/2013	0.2302	0.2200											
17	Th-229	Th-18a	22.467	4/30/2013	0.2300	0.2200											
18	Th-229	Th-18a	22.467	4/30/2013	0.2304	0.2200											
19	Th-229	Th-18a	22.467	4/30/2013	0.2295	0.2200											

US EPA ARCHIVE DOCUMENT

Aliquot Worksheet

US EPA ARCHIVE DOCUMENT

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04131	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-101-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-208-SS TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-208-SS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-101-SS TOT	DO					1.0000E+00	1.0000E+00				
07	PZ-101-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	MW-1204 TOT	TRG					1.0000E+00	1.0000E+00				
09	MW-1204 DIS	TRG					1.0000E+00	1.0000E+00				
10	PZ-113-SS TOT	TRG					1.0000E+00	1.0000E+00				
11	PZ-113-SS DIS	TRG					1.0000E+00	1.0000E+00				
12	I-73 TOT	TRG					1.0000E+00	1.0000E+00				
13	I-73 DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-113-AS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-113-AS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-107-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-107-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-116-SS TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-116-SS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
----------	--

Technician: _____



Date: _____

4/30/13

5/8/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 01
 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: 5/7/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:54:55 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.477 mL
 Effective Efficiency: 0.2337 +/- 0.0135
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 1.1881 +/- 0.0718

Control Certificate Name: NatTh_Th-8
 Chem. Recov. of Control: TH-232 1.024603 +/- 0.082846
 Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

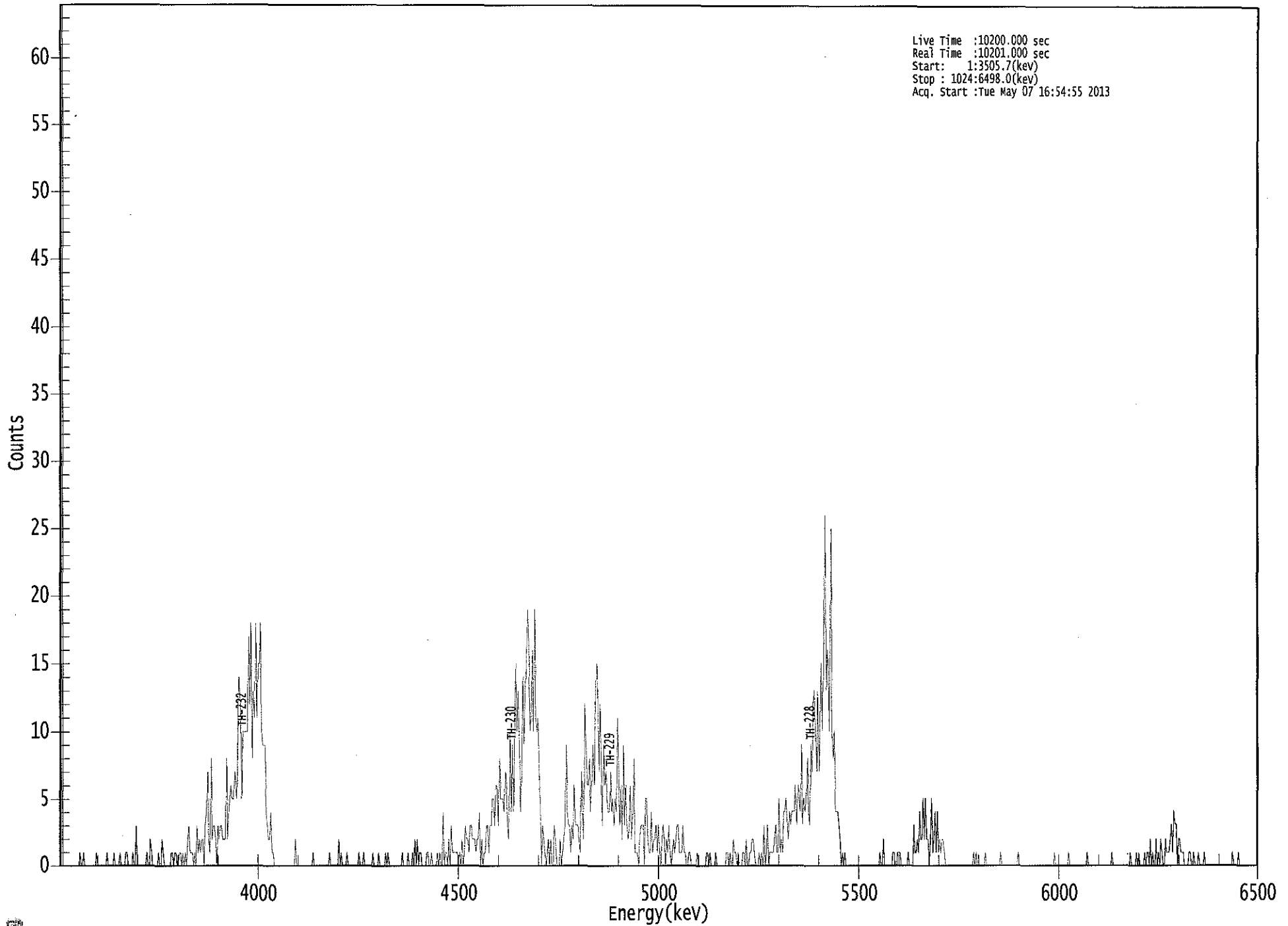
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.783	12.77	62.44	3.23	0.00E+000	5.9
TH-228	5.380	421.26	9.60	3.74	0.00E+000	7.5
TH-229 T	4.879	425.96	9.52	2.04	0.00E+000	10.7
TH-230	4.636	439.98	9.36	1.02	0.00E+000	35.6
TH-232	3.961	432.98	9.43	1.02	0.00E+000	23.7

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.977	5850.00*	1.48E-001 +/- 9.42E-002	1.06E-001 +/- 1.20E-002
TH-228	0.998	5400.00*	4.78E+000 +/- 7.09E-001	1.09E-001 +/- 1.23E-002
TH-229	1.000	4872.00*	4.85E+000 +/- 5.48E-001	8.87E-002 +/- 1.00E-002
TH-230	0.993	4672.00*	5.00E+000 +/- 7.33E-001	7.16E-002 +/- 8.08E-003
TH-232	0.993	3997.00*	4.91E+000 +/- 7.22E-001	7.14E-002 +/- 8.07E-003

AG
 5/8/13



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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10201

Channel	10201	10200	0	0	0	0	0	0
1:	10201	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	1	0	0	1	0	0	0
25:	0	0	0	0	0	0	0	1
33:	0	0	0	0	0	0	0	0
41:	1	0	0	0	0	0	1	0
49:	0	0	0	1	0	0	0	0
57:	1	1	0	0	0	0	1	0
65:	0	3	0	0	0	0	0	0
73:	0	0	1	0	0	2	1	0
81:	0	0	0	0	1	0	0	2
89:	1	0	0	0	0	0	0	1
97:	1	0	1	1	0	0	1	1
105:	0	1	0	1	0	2	3	1
113:	1	1	0	1	0	3	1	2
121:	1	2	2	0	3	4	7	2
129:	1	8	2	3	3	2	0	3
137:	2	3	3	2	2	2	8	2
145:	4	5	6	5	5	7	6	5
153:	12	14	12	5	10	10	10	10
161:	10	17	12	18	8	13	11	18
169:	11	15	15	18	10	9	9	9
177:	4	3	2	2	4	1	1	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	2	0	0	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	1	0
233:	0	0	0	0	0	0	2	0
241:	1	0	0	0	0	1	0	0
249:	0	0	0	0	0	0	0	1
257:	0	0	0	1	0	0	0	0
265:	0	0	0	1	0	0	0	0
273:	1	0	0	0	0	0	1	0
281:	1	0	0	0	0	0	0	0
289:	0	0	0	0	1	0	0	0
297:	0	1	0	0	0	1	0	2
305:	0	2	0	1	1	0	0	0
313:	0	1	1	0	0	1	0	0
321:	0	0	1	0	1	0	0	4
329:	0	1	1	0	2	0	3	1
337:	1	1	1	1	0	1	0	2
345:	0	1	3	2	2	1	3	3
353:	2	2	2	1	2	2	4	0
361:	2	0	1	1	3	3	1	3

369: 3 5 5 3 6 6 3 8

Sample Title: 01

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

801: 0 0 0 1 0 0 0 0

Sample Title: 01

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	1	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	1	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	1	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	1	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	1	0	0	0	0	1
921:	0	1	0	0	0	0	1	0
929:	1	1	0	2	0	1	0	0
937:	2	0	1	0	2	1	0	0
945:	2	1	1	1	2	3	1	4
953:	3	3	0	2	2	1	1	1
961:	0	0	0	0	1	1	0	0
969:	1	0	0	0	1	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	1	0	0	0	0	1	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

8/8/13

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 02
 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: 5/7/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:54:56 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: 0.2231 +/- 0.0172
 Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
 Chem. Recovery Factor: 1.1305 +/- 0.0905

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	4.13	119.29	1.87	0.00E+000	2.7
TH-228	5.291	-1.40	224.79	3.40	0.00E+000	2.7
TH-229 T	4.874	201.64	13.86	1.36	0.00E+000	4.3
TH-230	4.655	11.83	57.46	0.17	0.00E+000	2.7
TH-232	3.881	3.49	113.53	0.51	0.00E+000	2.7

T = Tracer Peak used for Effective Efficiency

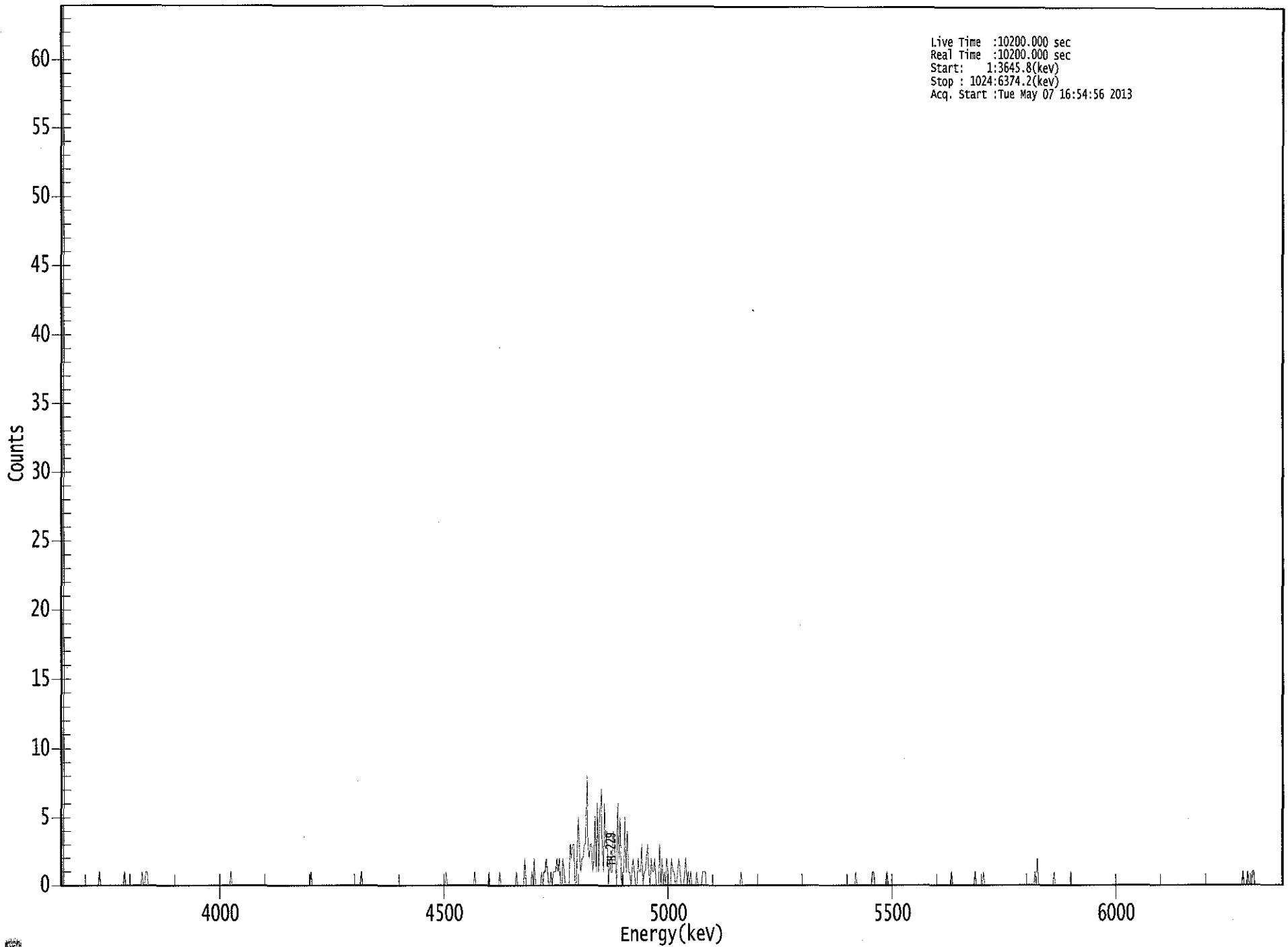
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.996	5850.00*	5.03E-002 +/- 6.05E-002	9.23E-002 +/- 1.40E-002
TH-228	0.940	5400.00*	-1.66E-002 +/- 3.75E-002	1.10E-001 +/- 1.67E-002
TH-229	1.000	4872.00*	2.41E+000 +/- 3.64E-001	8.18E-002 +/- 1.24E-002
TH-230	0.999	4672.00*	1.41E-001 +/- 8.37E-002	4.97E-002 +/- 7.51E-003
TH-232	0.932	3997.00*	4.15E-002 +/- 4.75E-002	6.23E-002 +/- 9.43E-003

AG
 5/8/13

0000057354.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3645.8(kev)
Stop : 1024:6374.2(kev)
Acq. Start :Tue May 07 16:54:56 2013



US EPA ARCHIVE DOCUMENT

0224

ROI Type: 1

ROI Type: 3

 ***** 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:	1	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	1	0	0	1
73:	1	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	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	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	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:	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	1	0	0	0	0	0
353:	0	0	0	0	0	0	1	0
361:	0	0	0	0	0	0	0	1

369: 0 0 0 0 0 0 0 0 0

Sample Title: 02

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	1	0	0
385:	0	0	0	0	2	0	0	0
393:	0	0	1	0	2	0	0	0
401:	0	0	1	0	1	1	2	1
409:	0	0	1	0	1	1	1	2
417:	1	2	0	0	2	1	0	0
425:	0	0	3	2	3	3	0	0
433:	3	5	2	1	2	2	3	3
441:	8	3	2	3	3	1	2	5
449:	1	6	1	5	7	3	1	6
457:	3	4	0	2	1	1	4	3
465:	2	0	6	2	5	0	1	1
473:	5	1	4	1	1	0	1	2
481:	1	0	0	2	1	1	3	0
489:	1	1	2	3	1	0	2	1
497:	1	2	0	0	0	3	0	2
505:	0	1	0	2	1	0	0	2
513:	1	1	0	0	1	2	1	0
521:	0	0	1	2	0	1	0	1
529:	0	0	0	0	1	0	0	0
537:	0	1	1	1	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	1	0	0	0	0	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	1	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	1
681:	1	0	0	0	0	0	0	0
689:	0	0	0	1	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	1	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	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: 02

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	1
817:	0	2	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	1
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	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	1	0	0
993:	0	1	0	0	0	1	1	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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Sample Description: PZ-101-SS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 03
 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 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:54:57 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: 0.2169 +/- 0.0169
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 1.1605 +/- 0.0930

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	5.834	5.13	103.36	1.87	0.00E+000	2.8
TH-228	5.375	9.28	74.56	2.72	0.00E+000	4.2
TH-229 T	4.866	195.66	14.03	0.34	0.00E+000	4.5
TH-230	4.634	11.32	60.27	0.68	0.00E+000	2.8
TH-232	3.904	2.83	120.53	0.17	0.00E+000	2.8

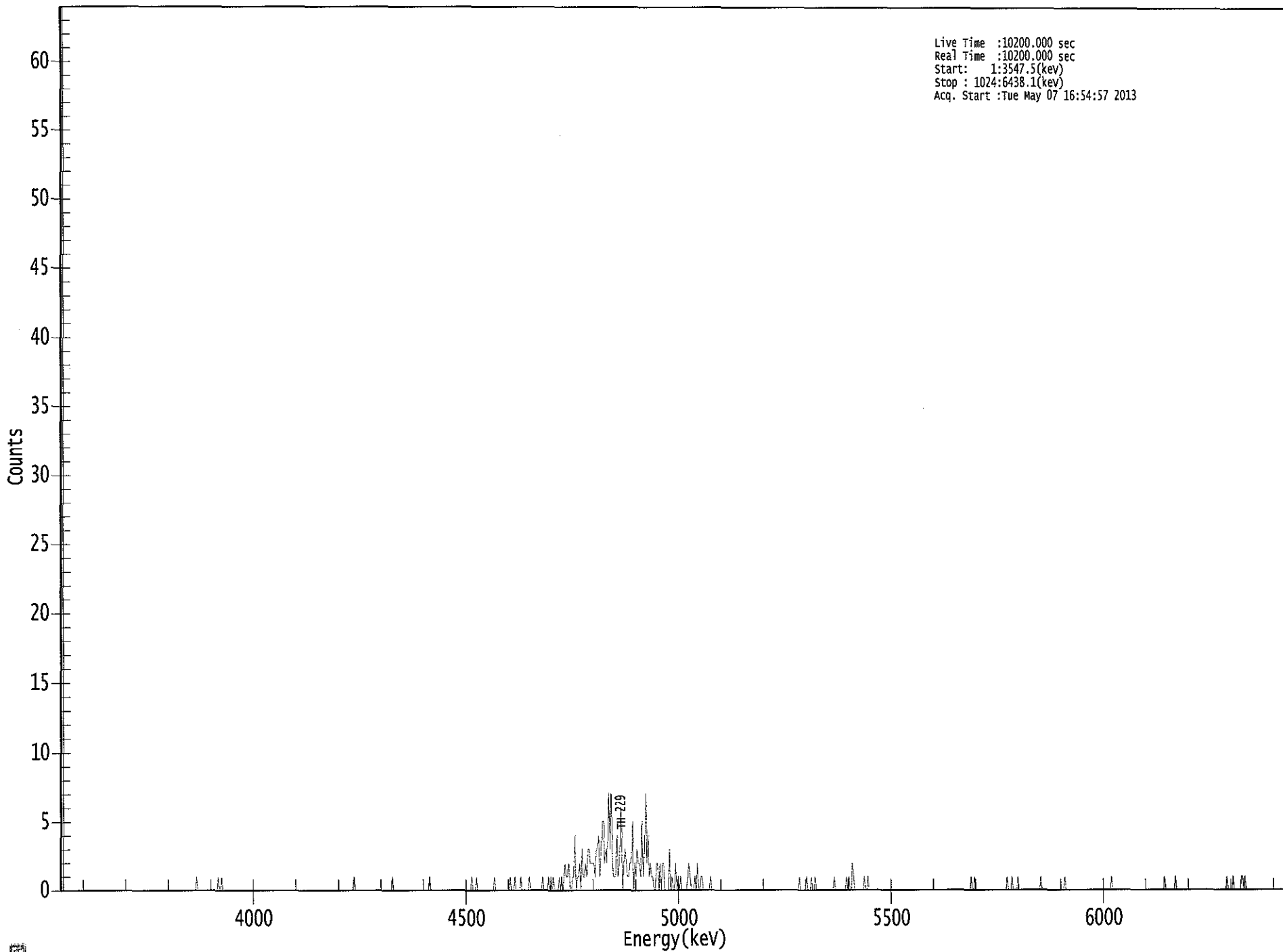
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	6.44E-002 +/- 6.73E-002	9.51E-002 +/- 1.45E-002
TH-228	0.997	5400.00*	1.16E-001 +/- 8.85E-002	1.07E-001 +/- 1.64E-002
TH-229	1.000	4872.00*	2.40E+000 +/- 3.67E-001	5.87E-002 +/- 8.97E-003
TH-230	0.992	4672.00*	1.39E-001 +/- 8.61E-002	6.90E-002 +/- 1.06E-002
TH-232	0.955	3997.00*	3.46E-002 +/- 4.20E-002	5.10E-002 +/- 7.79E-003

AG
5/8/13

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3547.5(kev)
Stop : 1024:6438.1(kev)
Acq. Start :Tue May 07 16:54:57 2013



US EPA ARCHIVE DOCUMENT

0229

ROI Type: 1

ROI Type: 3

 ***** 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	10200	10200	0	0	0	0	0	0
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	1	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	1	0	0	1	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	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	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	1	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	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	0	0	1	0
345:	0	0	1	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	1	0	0	0	0	0	0

369: 0 0 0 0 0 0 1 0

Sample Title: 03

Channel	1	2	3	4	5	6	7	8
377:	0	0	1	0	0	0	0	1
385:	0	0	0	0	0	0	1	0
393:	0	0	0	0	0	0	0	0
401:	0	1	0	0	0	0	1	0
409:	1	0	1	0	0	0	0	1
417:	0	1	0	1	2	1	1	2
425:	0	0	1	1	4	0	1	1
433:	2	0	3	1	1	2	1	3
441:	3	2	2	2	2	1	3	3
449:	4	1	3	5	5	2	3	2
457:	7	3	7	3	1	1	1	4
465:	1	2	6	4	0	2	3	2
473:	1	1	2	2	5	0	2	1
481:	3	2	2	1	5	1	3	7
489:	2	4	1	2	1	1	0	0
497:	2	2	0	2	0	2	2	0
505:	0	0	0	3	0	1	0	0
513:	2	0	1	0	1	0	0	0
521:	0	0	1	2	1	0	0	0
529:	1	0	2	0	0	1	1	0
537:	0	0	0	0	0	1	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	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	1
617:	0	0	0	0	0	1	0	0
625:	0	1	0	0	1	0	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:	1	0	0	2	1	0	0	0
665:	0	0	0	0	0	1	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	1	0
761:	0	1	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	1	0	0	0
793:	1	0	0	0	0	1	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 03

Channel								
809:	0	0	0	0	0	0	0	0
817:	1	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	1	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	1	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	1
921:	0	0	0	0	0	0	0	0
929:	1	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	1	0	0	0	0
977:	1	0	0	0	0	0	0	1
985:	1	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

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Sample Description: PZ-208-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 04
 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 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:54:58 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.2215 +/- 0.0172
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 1.2002 +/- 0.0960

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.849	3.45	144.10	2.55	0.00E+000	2.9
TH-228	5.378	27.41	40.94	4.59	0.00E+000	2.9
TH-229 T	4.875	198.30	13.99	1.70	0.00E+000	11.0
TH-230	4.630	29.81	36.73	1.19	0.00E+000	2.9
TH-232	3.954	30.47	36.54	1.53	0.00E+000	3.9

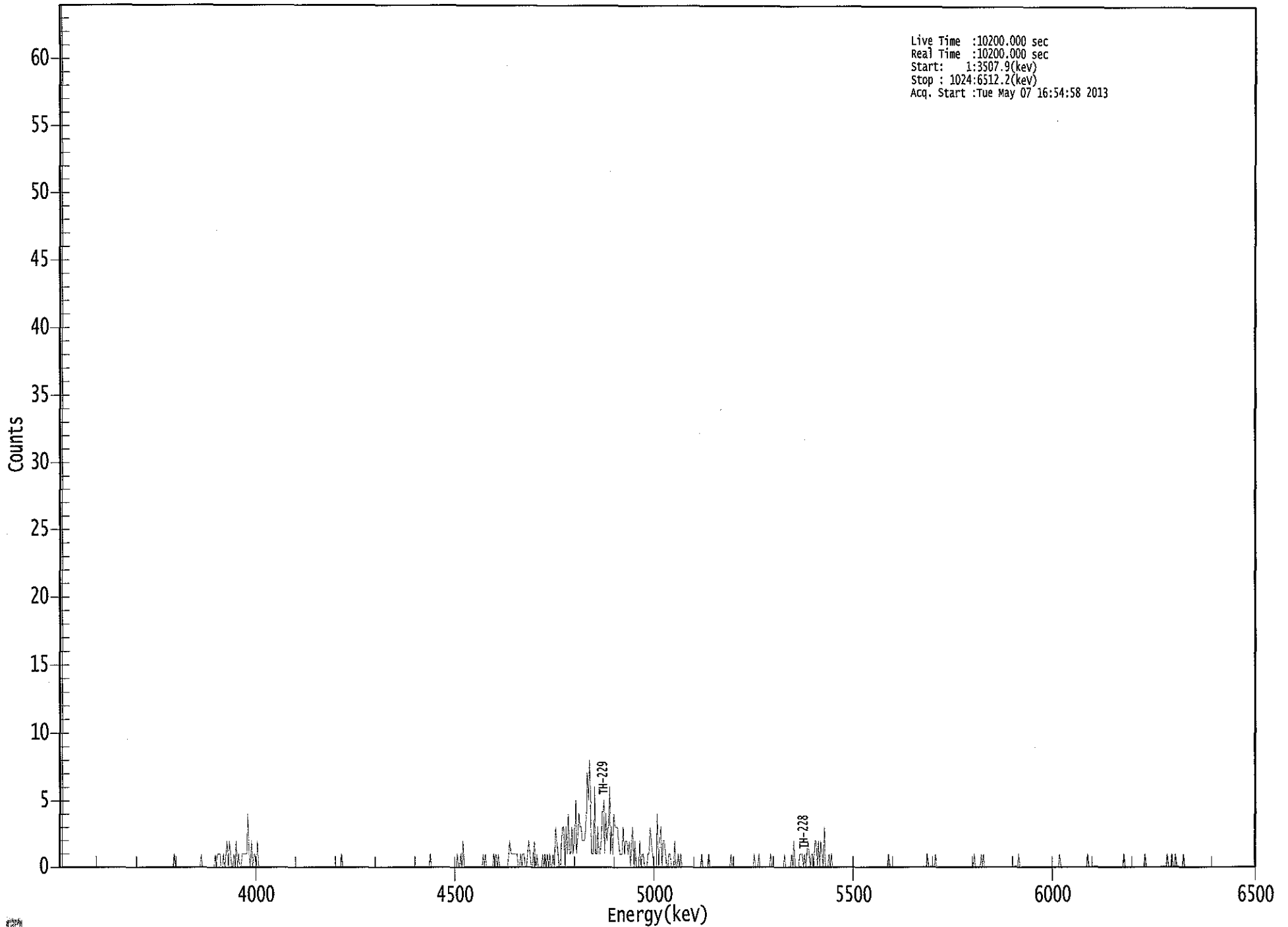
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	4.24E-002 +/- 6.15E-002	1.03E-001 +/- 1.57E-002
TH-228	0.998	5400.00*	3.36E-001 +/- 1.47E-001	1.27E-001 +/- 1.93E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 3.64E-001	8.83E-002 +/- 1.35E-002
TH-230	0.991	4672.00*	3.57E-001 +/- 1.42E-001	7.89E-002 +/- 1.20E-002
TH-232	0.991	3997.00*	3.64E-001 +/- 1.44E-001	8.50E-002 +/- 1.30E-002

AG
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Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3507.9(kev)
Stop : 1024:6512.2(kev)
Acq. Start :Tue May 07 16:54:58 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	1	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	1	0	0	0	0	0	0
129:	0	0	0	0	0	1	0	1
137:	1	1	0	0	1	0	1	2
145:	0	2	1	0	0	1	0	2
153:	0	1	0	0	1	1	1	1
161:	1	4	1	0	2	0	1	1
169:	0	2	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	1	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	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	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	1	0	0	1
345:	0	2	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	1	0	1	0	0	0

369: 0 0 0 1 0 1 0 1

Sample Title: 04

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

801: 0 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	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	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	1
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	1	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	1	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	1	0	0	0	1
953:	0	0	1	0	0	0	0	0
961:	0	1	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

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Sample Description: PZ-208-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 05
 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 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:55:26 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: 0.1413 +/- 0.0134
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 0.7957 +/- 0.0767

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	-1.04	218.72	2.04	0.00E+000	3.1
TH-228	5.370	3.60	149.87	3.40	0.00E+000	3.1
TH-229 T	4.836	126.64	17.53	1.36	0.00E+000	15.6
TH-230	4.656	14.32	53.21	0.68	0.00E+000	3.1
TH-232	3.998	-0.36	604.15	1.36	0.00E+000	3.1

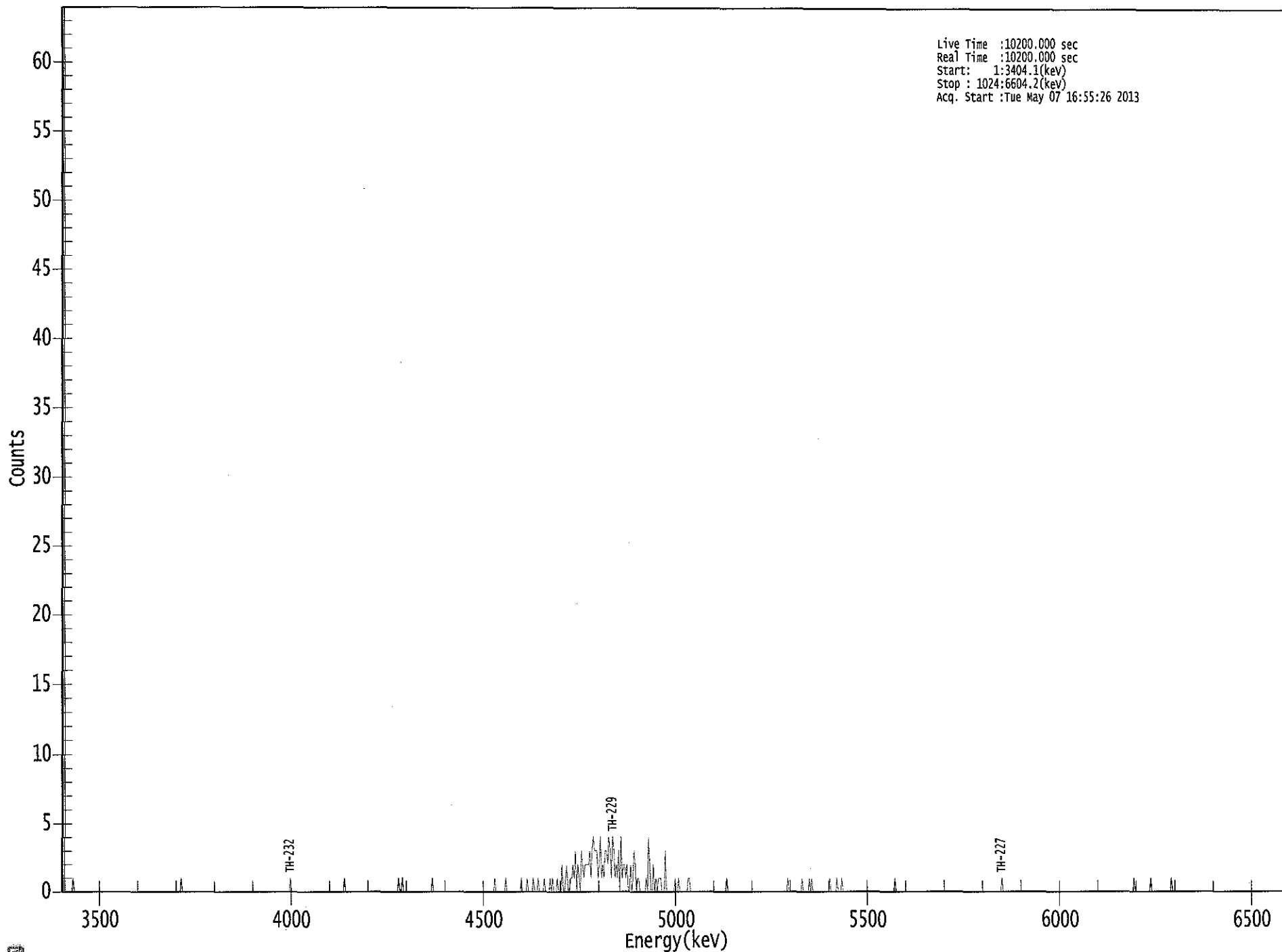
T = Tracer Peak used for Effective Efficiency

 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	-2.00E-002 +/- 4.40E-002	1.50E-001 +/- 2.78E-002
TH-228	0.995	5400.00*	6.93E-002 +/- 1.05E-001	1.78E-001 +/- 3.31E-002
TH-229	0.993	4872.00*	2.39E+000 +/- 4.43E-001	1.29E-001 +/- 2.40E-002
TH-230	0.999	4672.00*	2.69E-001 +/- 1.52E-001	1.06E-001 +/- 1.96E-002
TH-232	1.000	3997.00*	-6.75E-003 +/- 4.08E-002	1.29E-001 +/- 2.38E-002

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Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start :Tue May 07 16:55:26 2013



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

369: 0 1 0 0 0 0 0 0 0

Sample Title: 05

Channel	1	2	3	4	5	6	7	8	9
377:	0	0	0	0	0	0	0	1	0
385:	0	0	0	1	0	0	0	0	0
393:	1	0	0	0	1	0	0	0	0
401:	0	1	0	0	0	0	0	1	0
409:	1	0	0	0	1	0	0	0	0
417:	2	0	0	1	2	0	0	0	1
425:	1	2	1	3	0	2	1	1	0
433:	3	2	1	2	2	2	2	2	3
441:	1	3	4	3	3	3	1	2	2
449:	4	1	2	1	3	3	2	4	4
457:	3	1	4	3	1	2	1	3	3
465:	0	4	1	2	2	1	2	0	0
473:	0	2	0	1	3	2	0	1	1
481:	1	0	0	0	0	0	1	0	0
489:	4	2	0	0	2	0	1	0	0
497:	1	1	1	0	0	0	3	0	0
505:	0	0	0	0	0	0	1	0	0
513:	0	1	0	0	0	0	0	0	0
521:	0	1	1	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0	0
553:	0	1	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0	0
601:	0	0	0	0	1	0	0	0	0
609:	0	0	0	0	0	0	0	0	0
617:	1	0	0	0	0	0	1	0	0
625:	1	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	1	0
641:	0	0	0	0	0	1	0	0	0
649:	0	1	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	1	0	0	0
697:	0	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	1	0	0
785:	0	0	0	0	0	0	0	0	0
793:	0	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	1	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	1	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	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	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

C
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Sample Description: PZ-101-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 06
 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 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:55:27 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.1267 +/- 0.0126
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 0.8276 +/- 0.0839

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	5.767	1.13	315.93	1.87	0.00E+000	3.1
TH-228	5.354	2.28	200.91	2.72	0.00E+000	3.1
TH-229 T	4.868	112.98	18.54	1.02	0.00E+000	4.2
TH-230	4.656	15.64	52.02	1.36	0.00E+000	4.7
TH-232	3.970	3.98	112.01	1.02	0.00E+000	3.1

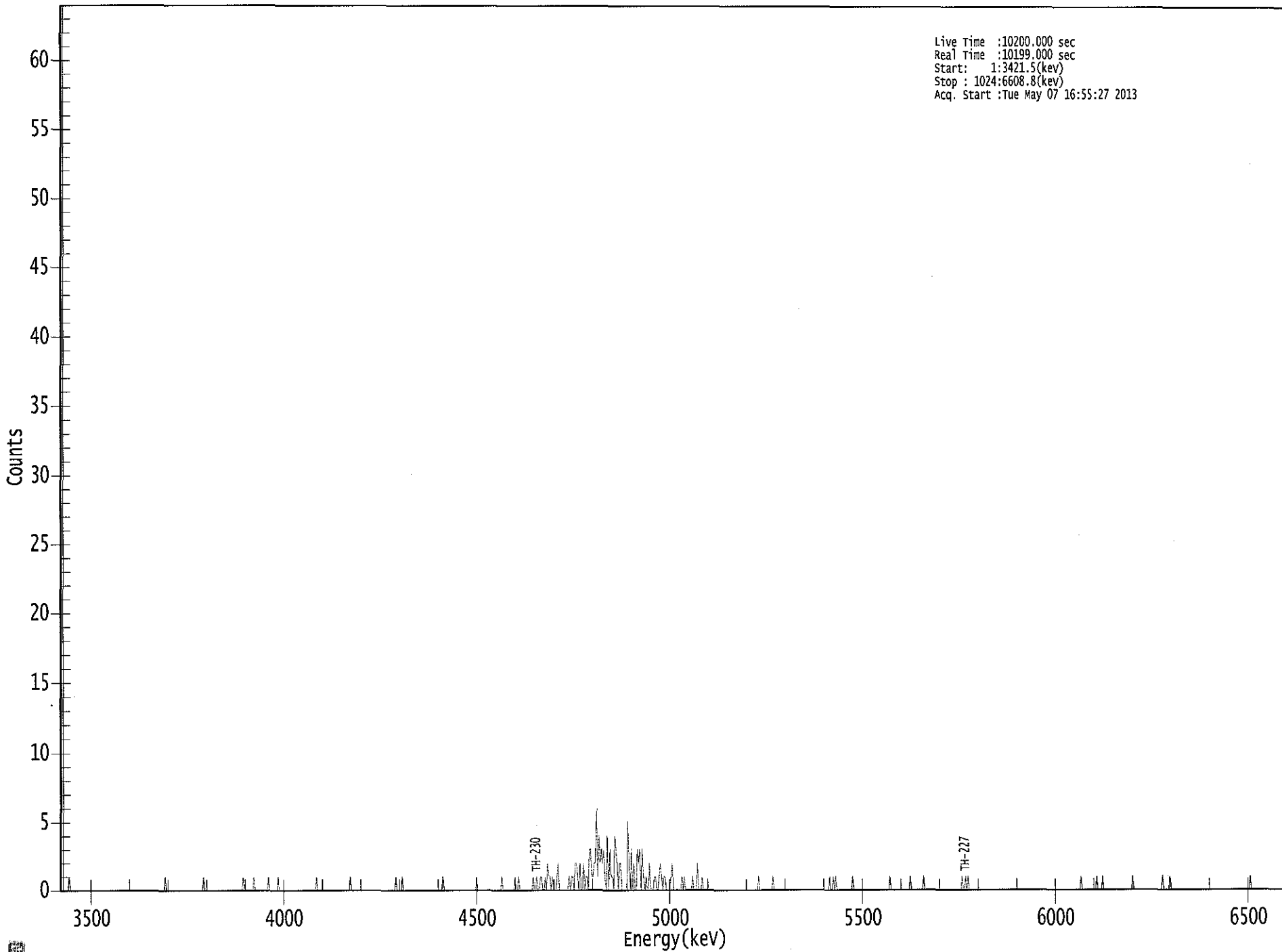
T = Tracer Peak used for Effective Efficiency

 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.964	5850.00*	2.43E-002 +/- 7.69E-002	1.63E-001 +/- 3.17E-002
TH-228	0.989	5400.00*	4.89E-002 +/- 9.87E-002	1.84E-001 +/- 3.59E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 4.63E-001	1.32E-001 +/- 2.58E-002
TH-230	0.999	4672.00*	3.28E-001 +/- 1.82E-001	1.44E-001 +/- 2.80E-002
TH-232	0.996	3997.00*	8.32E-002 +/- 9.46E-002	1.32E-001 +/- 2.57E-002

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US EPA ARCHIVE DOCUMENT



Live Time :10200.000 sec
Real Time :10199.000 sec
Start: 1:3421.5(kev)
Stop : 1024:6608.8(kev)
Acq. Start :Tue May 07 16:55:27 2013

 ***** 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: 10199

Channel	10199	10200						
1:	10199	10200	0	0	0	0	0	1
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	1
89:	0	0	0	0	0	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:	1	0	0	0	0	0	0	0
161:	0	1	0	0	0	0	0	0
169:	0	0	0	0	0	1	0	0
177:	0	0	0	0	0	1	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	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	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	1
281:	0	0	0	0	1	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	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	0	0
345:	0	0	1	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	1

369: 0 0 0 0 0 0 0 0 0

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	1	0	0	1	0	0
385:	0	0	0	0	0	0	0	0
393:	0	1	0	0	1	0	0	1
401:	1	0	0	1	0	2	1	1
409:	0	1	0	0	0	1	2	0
417:	0	0	0	0	0	0	0	1
425:	0	1	1	0	2	2	1	0
433:	2	0	0	2	0	1	1	0
441:	3	3	1	1	2	2	6	1
449:	4	2	3	2	3	1	0	4
457:	0	3	1	1	0	4	3	2
465:	0	2	2	0	0	0	0	0
473:	5	2	0	3	0	2	0	0
481:	3	2	3	0	3	1	0	1
489:	0	0	2	0	0	0	1	1
497:	0	0	1	2	1	0	1	1
505:	0	0	0	0	1	2	0	0
513:	0	0	0	0	0	1	0	1
521:	0	0	0	0	0	0	1	0
529:	0	0	2	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	1	0	0
585:	0	0	0	0	0	0	0	0
593:	0	1	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:	1	0	0	1	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	1	0	0	0	0
665:	0	0	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	1	0	0	0	0
713:	0	0	0	0	0	0	1	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	1	0
753:	0	1	0	1	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 06

Channel	1	2	3	4	5	6	7	8
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	1	0	0	0	0	0	0
857:	0	0	0	0	0	0	1	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	1	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	1	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	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	1	0
993:	0	0	0	0	0	0	0	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



Sample Description: PZ-101-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-TH
 Sample Identification: 07
 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 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:55:29 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.1685 +/- 0.0148
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Chem. Recovery Factor: 0.9854 +/- 0.0883

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	5.912	0.47	627.14	1.53	0.00E+000	3.1
TH-228	5.392	0.47	627.14	1.53	0.00E+000	3.1
TH-229 T	4.844	149.98	16.07	1.02	0.00E+000	5.8
TH-230	4.647	9.49	65.59	0.51	0.00E+000	3.1
TH-232	3.969	-0.17	1169.3	0.17	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

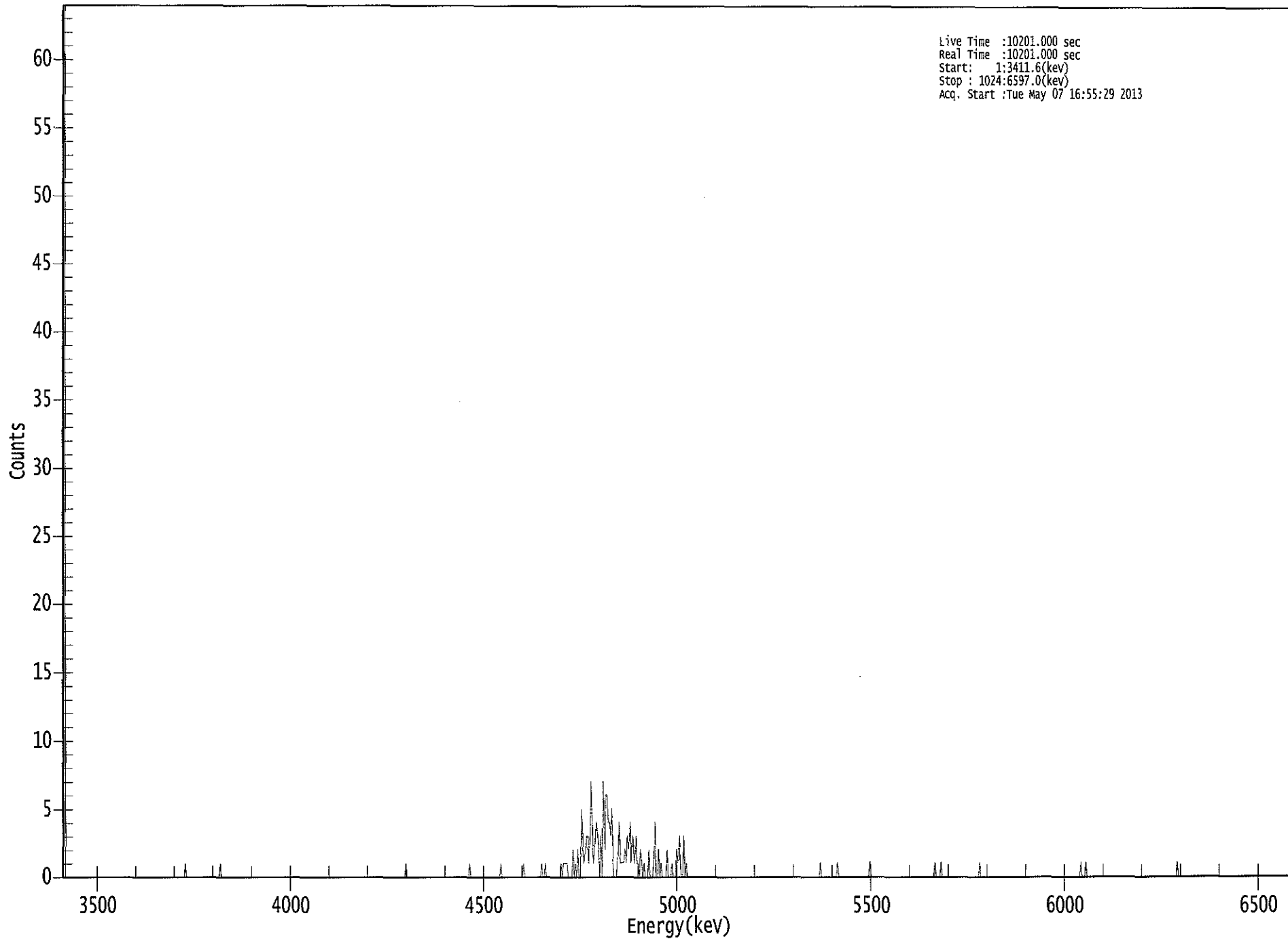
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.980	5850.00*	7.59E-003 +/- 4.76E-002	1.15E-001 +/- 1.97E-002
TH-228	1.000	5400.00*	7.58E-003 +/- 4.76E-002	1.15E-001 +/- 1.97E-002
TH-229	0.996	4872.00*	2.37E+000 +/- 4.07E-001	9.95E-002 +/- 1.71E-002
TH-230	0.997	4672.00*	1.49E-001 +/- 1.01E-001	8.26E-002 +/- 1.42E-002
TH-232	0.996	3997.00*	-2.67E-003 +/- 3.13E-002	6.56E-002 +/- 1.13E-002

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US EPA ARCHIVE DOCUMENT

0000057420.CNF



ROI Type: 1

ROI Type: 3

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

Sample Title: 07

Elapsed Live time: 10201
 Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	1	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	1	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	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	1	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	1	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 0

Sample Title: 07

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	1
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	1	0
401:	0	1	0	0	0	0	0	0
409:	0	0	0	0	0	0	1	0
417:	1	1	1	1	0	0	0	0
425:	2	0	1	0	2	0	0	5
433:	2	1	2	3	3	1	4	7
441:	2	1	3	4	3	2	0	3
449:	0	7	2	6	6	4	4	3
457:	5	1	0	0	0	2	4	1
465:	1	1	1	2	1	3	2	4
473:	1	3	2	1	3	1	1	0
481:	2	1	0	1	0	0	0	2
489:	0	0	0	1	4	0	0	2
497:	0	1	0	0	0	0	2	0
505:	0	0	1	0	0	0	2	1
513:	3	1	0	0	3	0	1	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	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	1	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	1	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	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	1	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	1	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 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	1	0	0
849:	0	1	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	1	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

C
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Sample Description: MW-1204 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 08
 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 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:55:30 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: 0.2147 +/- 0.0170
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Chem. Recovery Factor: 1.2370 +/- 0.1005

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	5.867	2.13	191.21	1.87	0.00E+000	3.1
TH-228	5.287	6.30	89.57	1.70	0.00E+000	3.1
TH-229 T	4.875	189.98	14.26	1.02	0.00E+000	4.4
TH-230	4.650	9.81	66.87	1.19	0.00E+000	3.1
TH-232	3.826	0.83	239.53	0.17	0.00E+000	3.1

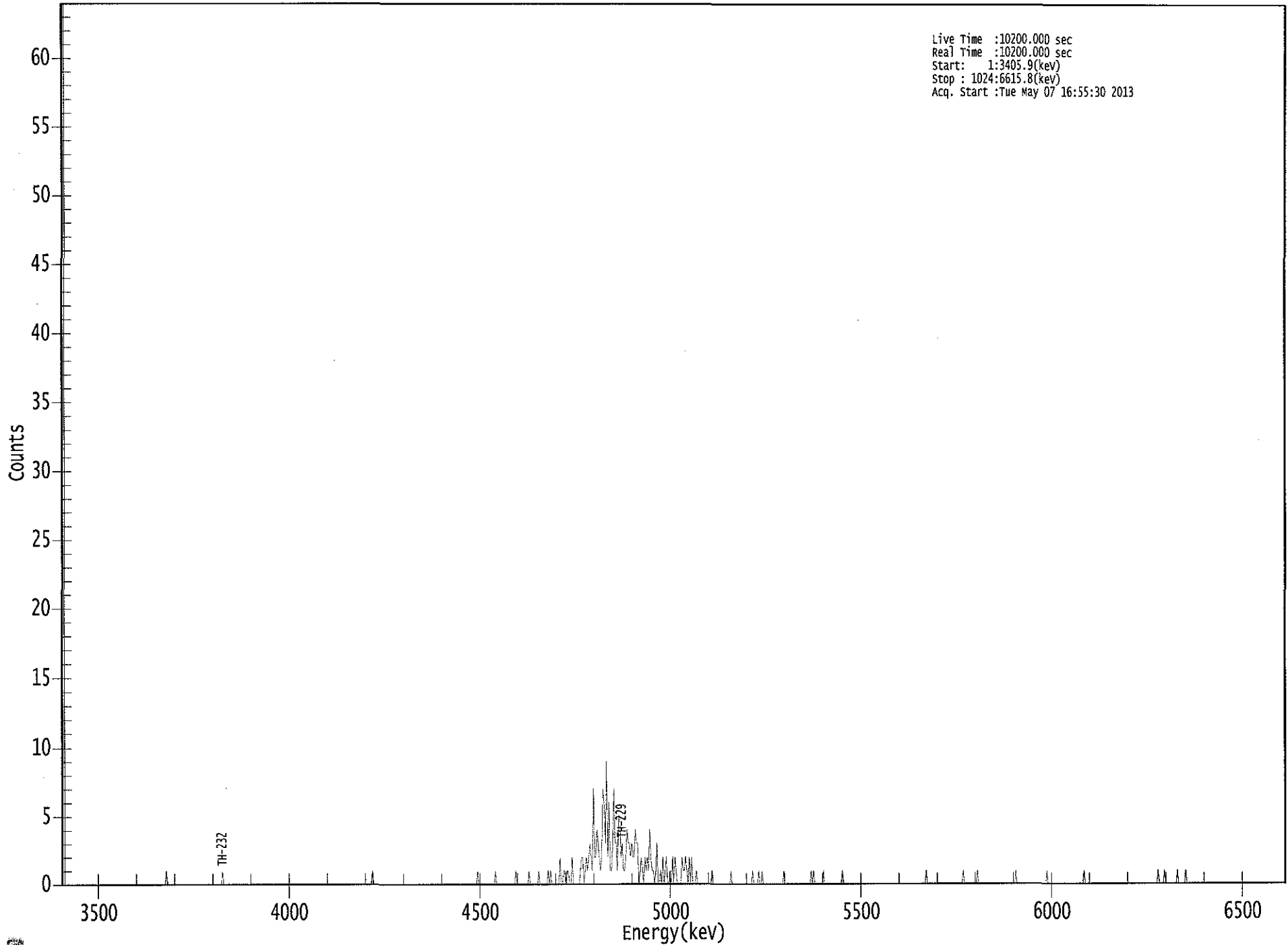
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	2.70E-002 +/- 5.18E-002	9.61E-002 +/- 1.49E-002
TH-228	0.935	5400.00*	7.98E-002 +/- 7.25E-002	9.30E-002 +/- 1.44E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 3.65E-001	7.81E-002 +/- 1.21E-002
TH-230	0.997	4672.00*	1.21E-001 +/- 8.33E-002	8.15E-002 +/- 1.26E-002
TH-232	0.859	3997.00*	1.02E-002 +/- 2.46E-002	5.15E-002 +/- 7.99E-003

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Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3405.9(keV)
Stop : 1024:6615.8(keV)
Acq. Start :Tue May 07 16:55:30 2013

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 08

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	1	0	0	0	0
385:	0	0	0	0	0	0	1	0
393:	0	0	0	0	0	0	1	0
401:	0	0	0	0	0	0	1	0
409:	1	0	0	0	0	0	0	0
417:	2	0	0	1	1	0	1	1
425:	0	0	2	0	0	0	0	0
433:	0	1	2	2	0	1	2	1
441:	2	3	2	1	7	2	2	4
449:	3	2	1	2	7	6	3	9
457:	2	6	1	1	3	7	3	3
465:	1	5	5	2	3	1	1	2
473:	4	3	3	2	3	2	2	4
481:	3	3	0	1	2	1	0	2
489:	1	2	1	4	2	1	1	0
497:	1	3	0	0	1	0	2	0
505:	1	2	0	0	1	0	2	0
513:	2	1	0	0	0	0	2	1
521:	1	2	1	0	2	0	2	0
529:	0	0	1	0	0	0	0	0
537:	0	0	0	0	0	0	0	1
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	1
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	1	0	0	0	0	1	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	0	0	0	0	0	0	0
625:	0	0	1	0	1	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	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	1	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	1	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	1	0	0

801: 0 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	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	1	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	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	1	0	0	0	0	0	0
929:	0	0	0	0	1	0	0	0
937:	0	0	0	1	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

C 8184

Sample Description: MW-1204 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 09
 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 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:55:31 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.2152 +/- 0.0170
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Chem. Recovery Factor: 1.2460 +/- 0.1010

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	5.838	2.79	162.89	2.21	0.00E+000	3.2
TH-228	5.342	4.94	115.82	3.06	0.00E+000	3.2
TH-229 T	4.863	191.64	14.22	1.36	0.00E+000	11.4
TH-230	4.670	11.49	59.31	0.51	0.00E+000	3.2
TH-232	3.978	1.49	190.03	0.51	0.00E+000	3.2

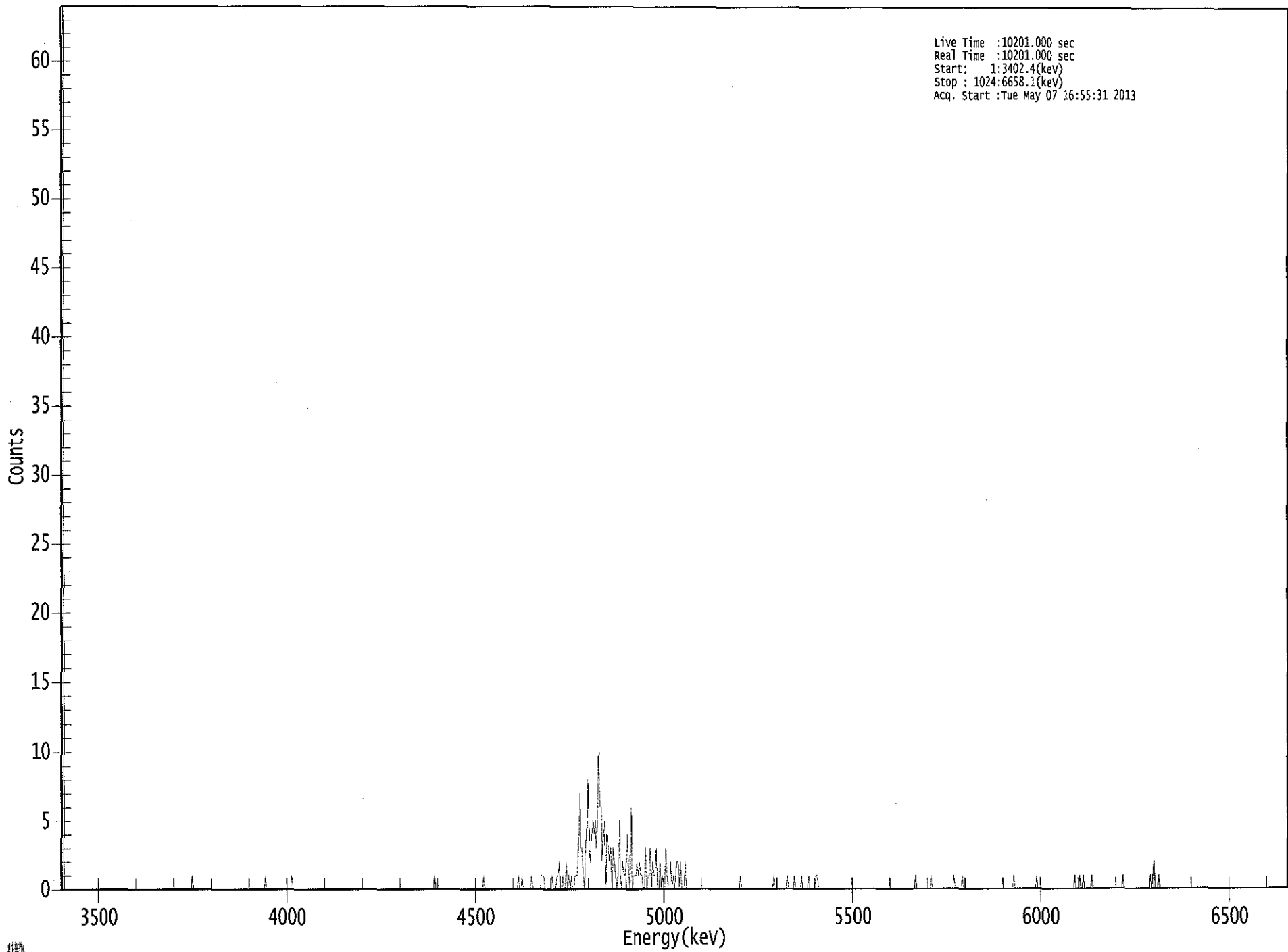
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	3.53E-002 +/- 5.78E-002	1.01E-001 +/- 1.56E-002
TH-228	0.982	5400.00*	6.24E-002 +/- 7.29E-002	1.13E-001 +/- 1.74E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 3.66E-001	8.48E-002 +/- 1.31E-002
TH-230	1.000	4672.00*	1.42E-001 +/- 8.68E-002	6.47E-002 +/- 1.00E-002
TH-232	0.998	3997.00*	1.83E-002 +/- 3.50E-002	6.46E-002 +/- 9.99E-003

AG
 5/8/13

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3402.4(kev)
Stop : 1024:6658.1(kev)
Acq. Start :Tue May 07 16:55:31 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 09

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	10201	10201	0	0	0	0	0	0
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	1	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	1	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	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	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:	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 0

Sample Title: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	1	0	0
385:	1	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	1	1	1	0	0	0	0	0
409:	0	1	0	0	0	1	1	2
417:	0	0	1	0	0	2	0	1
425:	0	1	0	0	1	1	1	3
433:	7	3	3	1	0	3	4	8
441:	3	2	4	5	4	5	3	6
449:	10	6	6	2	4	5	0	4
457:	3	2	3	0	3	2	1	0
465:	1	5	1	0	2	1	1	2
473:	4	1	0	6	0	1	1	1
481:	2	1	2	1	1	0	0	3
489:	0	1	1	3	0	2	1	1
497:	3	0	0	2	0	1	0	0
505:	3	1	0	0	2	0	1	0
513:	1	2	2	0	2	0	0	0
521:	2	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	1	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	1	0	0	0	0	0
601:	0	0	0	0	0	1	0	0
609:	0	0	0	1	0	0	0	0
617:	0	1	0	0	0	0	0	1
625:	0	0	0	0	0	1	1	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	1	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:	1	0	0	0	0	0	0	1
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	1	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 09

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

*C
T182*

Sample Description: PZ-113-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 10
 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: 4/12/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 4:55:32 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.231 mL
 Effective Efficiency: 0.1974 +/- 0.0162
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Chem. Recovery Factor: 1.0149 +/- 0.0852

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	13.96	56.77	2.04	0.00E+000	3.1
TH-228	5.375	79.13	22.34	1.87	0.00E+000	6.6
TH-229 T	4.875	174.49	14.86	0.51	0.00E+000	4.2
TH-230	4.625	176.15	14.81	0.85	0.00E+000	21.4
TH-232	3.957	64.66	24.45	0.34	0.00E+000	5.2

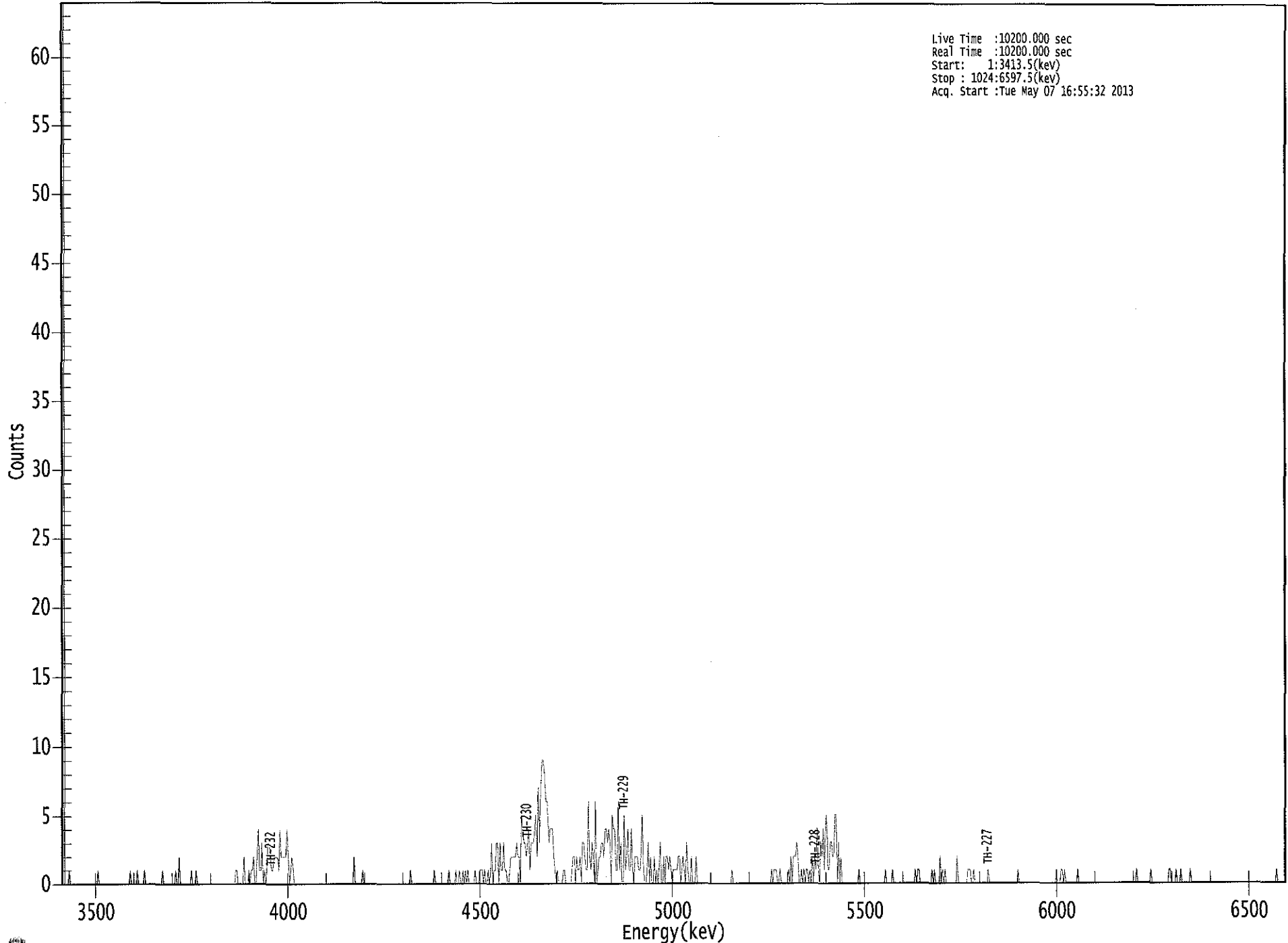
T = Tracer Peak used for Effective Efficiency

 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.996	5850.00*	1.93E-001 +/- 1.14E-001	1.07E-001 +/- 1.73E-002
TH-228	0.997	5400.00*	1.09E+000 +/- 3.00E-001	1.04E-001 +/- 1.67E-002
TH-229	1.000	4872.00*	2.35E+000 +/- 3.78E-001	7.08E-002 +/- 1.14E-002
TH-230	0.989	4672.00*	2.37E+000 +/- 5.17E-001	8.05E-002 +/- 1.29E-002
TH-232	0.992	3997.00*	8.68E-001 +/- 2.54E-001	6.42E-002 +/- 1.03E-002

*AG
5/8/13*

US EPA ARCHIVE DOCUMENT



Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3413.5(kev)
Stop : 1024:6597.5(kev)
Acq. Start :Tue May 07 16:55:32 2013

0264

ROI Type: 1

ROI Type: 3

 ***** 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	10200	10200	0	0	0	0	1	0
1:	10200	10200	0	0	0	0	1	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	1	0	0	0	0	0	1
65:	0	0	0	0	0	1	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	1	0	0	0
89:	0	0	0	0	0	0	0	1
97:	0	0	2	0	0	0	0	0
105:	0	0	0	0	1	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	1	1	0	0	0	0	0
153:	2	0	0	0	1	0	1	1
161:	2	0	0	2	4	1	1	3
169:	0	1	0	1	3	3	2	1
177:	1	2	2	2	2	1	4	2
185:	2	2	2	2	4	2	0	1
193:	2	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	2	0	0	0
249:	0	0	0	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	1	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	1	0	0	0	0
329:	0	1	0	0	1	0	0	1
337:	0	1	0	1	0	0	0	0
345:	0	1	0	0	0	1	1	1
353:	0	1	0	0	1	0	1	3
361:	0	1	1	3	3	0	3	1

369: 1 3 1 1 0 0 1 2

Sample Title: 10

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

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	1
833:	0	0	0	1	1	0	1	0
841:	0	0	0	0	0	0	0	0
849:	0	1	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	1	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	1	1	0
929:	0	0	0	1	0	0	0	1
937:	0	0	0	0	0	0	0	1
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	1
1017:	0	0	0	0	0	0	0	0

C
5/18/13

Sample Description: PZ-113-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 11
 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: 4/12/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 5:45:00 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.231 mL
 Effective Efficiency: 0.1875 +/- 0.0157
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
 Chem. Recovery Factor: 1.0276 +/- 0.0880

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	5.736	1.15	249.59	0.85	0.00E+000	3.0
TH-228	5.302	6.49	80.40	0.51	0.00E+000	3.0
TH-229 T	4.885	165.49	15.26	0.51	0.00E+000	4.7
TH-230	4.646	12.83	55.14	0.17	0.00E+000	3.0
TH-232	3.890	2.00	169.74	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

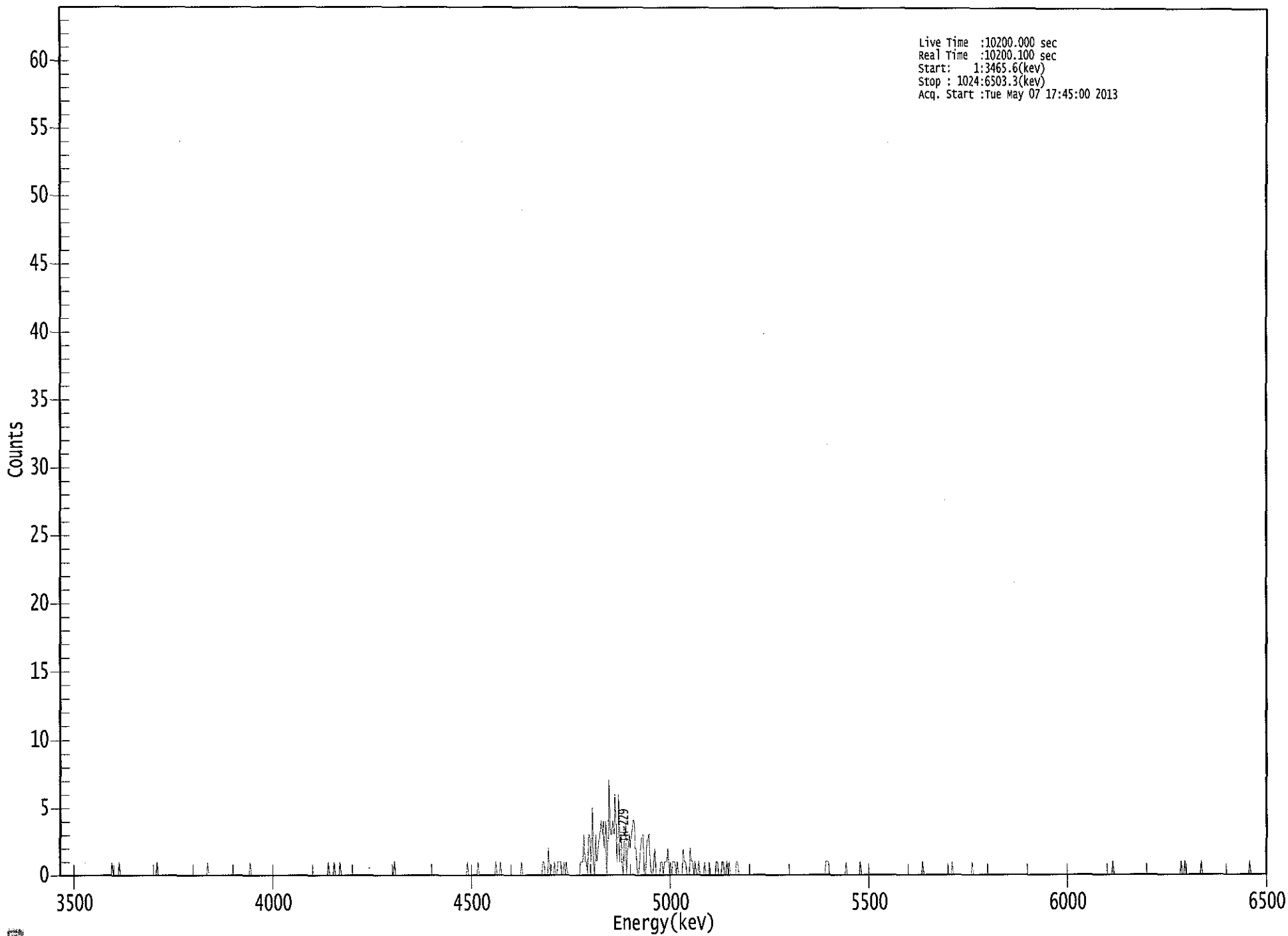
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.934	5850.00*	1.67E-002 +/- 4.18E-002	8.70E-002 +/- 1.43E-002
TH-228	0.951	5400.00*	9.41E-002 +/- 7.72E-002	7.61E-002 +/- 1.25E-002
TH-229	0.999	4872.00*	2.35E+000 +/- 3.86E-001	7.45E-002 +/- 1.22E-002
TH-230	0.996	4672.00*	1.82E-001 +/- 1.05E-001	5.91E-002 +/- 9.71E-003
TH-232	0.942	3997.00*	2.83E-002 +/- 4.82E-002	8.47E-002 +/- 1.39E-002

AG
5/8/13

0000057366.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3465.6(kev)
Stop : 1024:6503.3(kev)
Acq. Start :Tue May 07 17:45:00 2013



US EPA ARCHIVE DOCUMENT

0269

ROI Type: 1

ROI Type: 3

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

369: 0 1 0 0 0 1 0 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 11

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



STW

Sample Description: I-73 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 12
 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: 4/12/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 5:45:03 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: 0.1181 +/- 0.0121
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 0.6363 +/- 0.0663

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.874	-0.17	1169.4	0.17	0.00E+000	0.0
TH-228	5.387	17.83	46.68	0.17	0.00E+000	4.5
TH-229 T	4.874	104.66	19.20	0.34	0.00E+000	4.0
TH-230	4.661	24.66	39.79	0.34	0.00E+000	7.4
TH-232	3.964	19.83	44.23	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

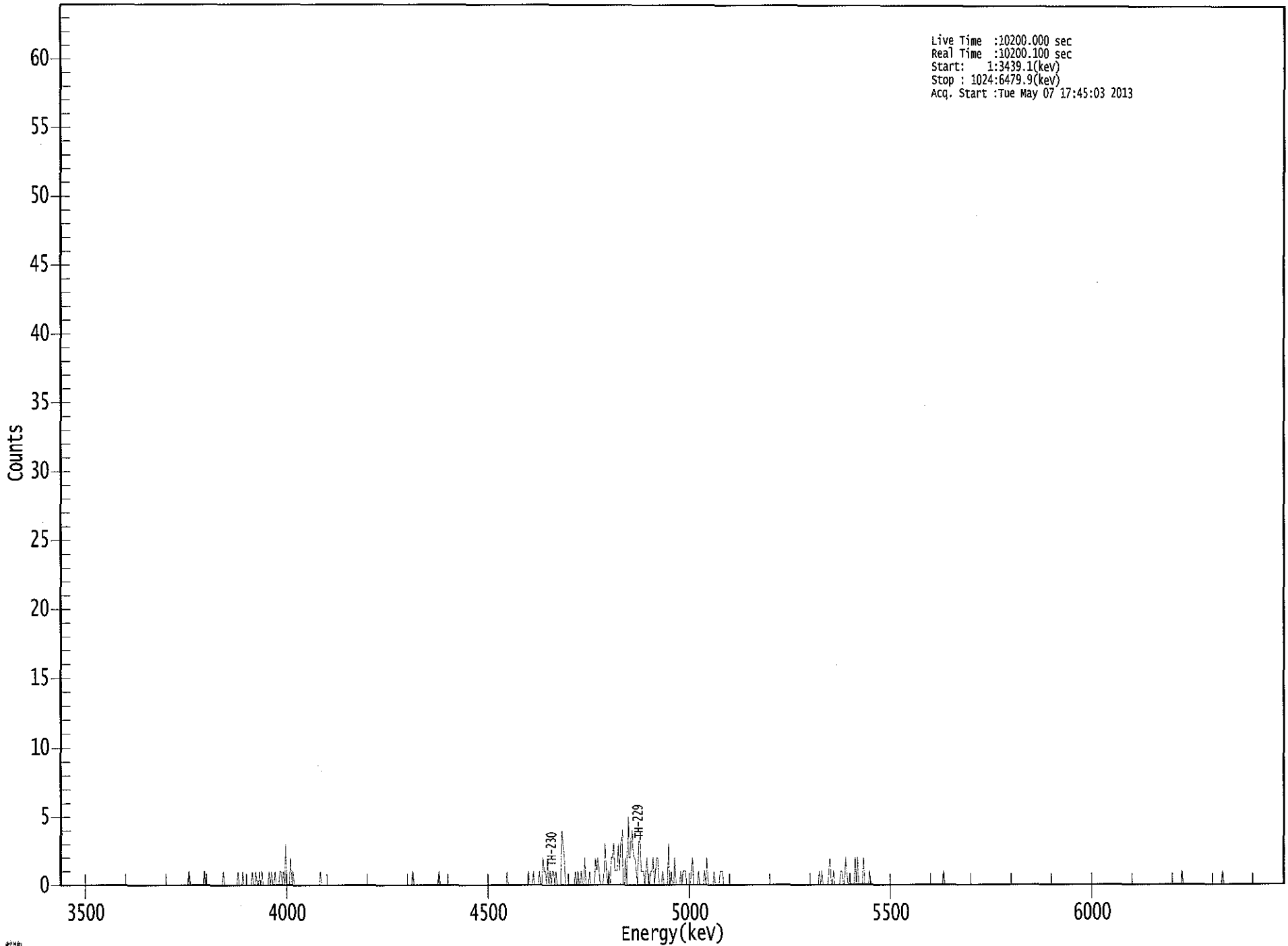
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	-3.92E-003 +/- 4.59E-002	9.63E-002 +/- 1.94E-002
TH-228	0.999	5400.00*	4.11E-001 +/- 2.09E-001	9.61E-002 +/- 1.94E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 4.75E-001	1.08E-001 +/- 2.17E-002
TH-230	0.999	4672.00*	5.54E-001 +/- 2.47E-001	1.07E-001 +/- 2.16E-002
TH-232	0.994	3997.00*	4.45E-001 +/- 2.16E-001	9.37E-002 +/- 1.89E-002

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Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Tue May 07 17:45:03 2013



ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 0 1 0 0

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0

Sample Title: 12

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

C
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Sample Description: I-73 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 13
 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: 4/12/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 5:44:56 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.230 mL
 Effective Efficiency: 0.1955 +/- 0.0161
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 1.0706 +/- 0.0903

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	5.817	3.98	112.01	1.02	0.00E+000	2.9
TH-228	5.283	1.32	215.97	0.68	0.00E+000	2.9
TH-229 T	4.900	172.00	14.99	0.00	0.00E+000	9.8
TH-230	4.660	9.66	64.35	0.34	0.00E+000	3.4
TH-232	3.905	1.00	277.19	0.00	0.00E+000	2.9

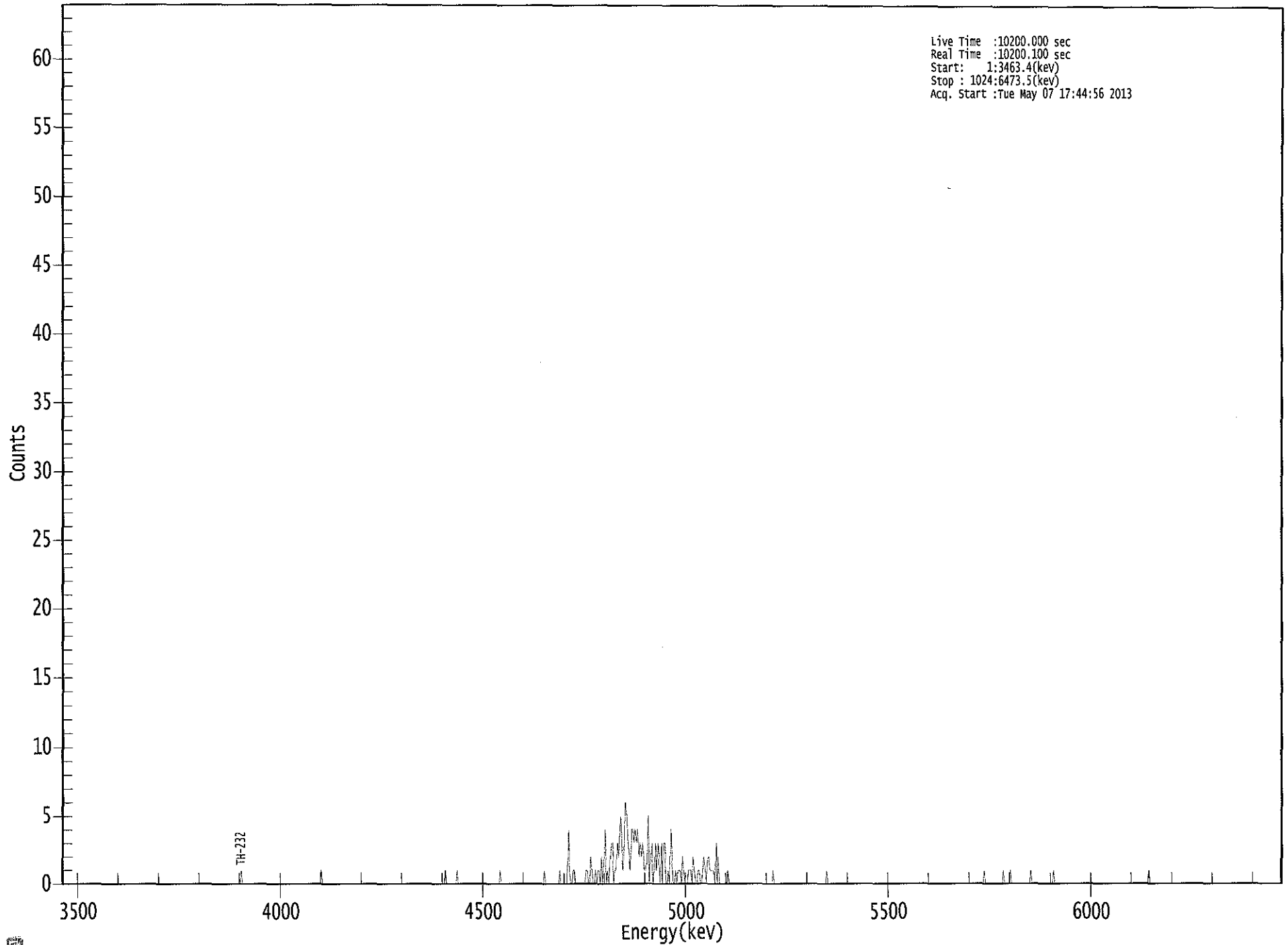
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.994	5850.00*	5.55E-002 +/- 6.28E-002	8.78E-002 +/- 1.42E-002
TH-228	0.931	5400.00*	1.84E-002 +/- 3.98E-002	7.85E-002 +/- 1.27E-002
TH-229	0.996	4872.00*	2.34E+000 +/- 3.79E-001	8.17E-002 +/- 1.32E-002
TH-230	0.999	4672.00*	1.31E-001 +/- 8.70E-002	6.49E-002 +/- 1.05E-002
TH-232	0.957	3997.00*	1.36E-002 +/- 3.76E-002	8.13E-002 +/- 1.31E-002

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US EPA ARCHIVE DOCUMENT



0279

ROI Type: 1

ROI Type: 3

 ***** 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	1	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	1	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	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	1	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	1

369: 0 0 0 0 0 0 0 0 0

Sample Title: 13

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

801: 0 0 0 0 0 0 0 0

Sample Title: 13

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	1	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	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	1
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



Sample Description: PZ-113-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-TH
 Sample Identification: 14
 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: 4/12/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 5:44:58 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.231 mL
 Effective Efficiency: 0.2080 +/- 0.0166
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Chem. Recovery Factor: 1.1667 +/- 0.0959

Peak Match Tolerance: 0.175 MeV

 ----- PEAK AREA REPORT -----

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.855	-0.17	1169.4	0.17	0.00E+000	0.0
TH-228	5.386	7.49	74.41	0.51	0.00E+000	2.9
TH-229 T	4.872	183.83	14.46	0.17	0.00E+000	10.3
TH-230	4.655	17.66	47.16	0.34	0.00E+000	2.9
TH-232	3.944	3.00	130.67	0.00	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

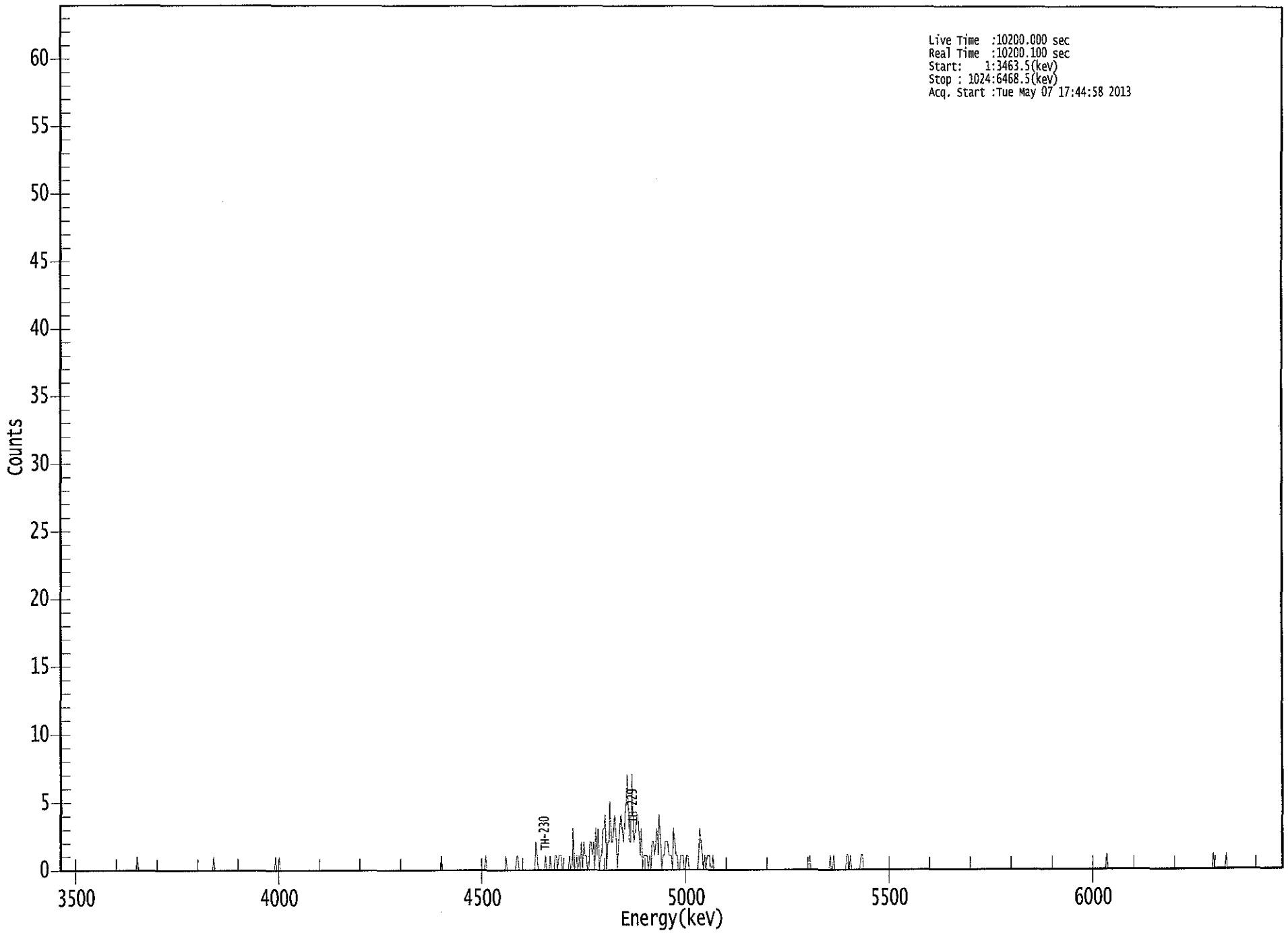
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	-2.23E-003 +/- 2.60E-002	5.46E-002 +/- 8.57E-003
TH-228	0.999	5400.00*	9.79E-002 +/- 7.45E-002	6.86E-002 +/- 1.08E-002
TH-229	1.000	4872.00*	2.35E+000 +/- 3.69E-001	5.34E-002 +/- 8.38E-003
TH-230	0.998	4672.00*	2.25E-001 +/- 1.12E-001	6.10E-002 +/- 9.57E-003
TH-232	0.986	3997.00*	3.82E-002 +/- 5.03E-002	7.64E-002 +/- 1.20E-002

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US EPA ARCHIVE DOCUMENT

000057421.CNF



0284

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 0 0 1 0 0

Sample Title: 14

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	1	1
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	2	1
401:	0	0	0	0	0	0	1	0
409:	0	0	1	0	0	0	1	1
417:	0	1	1	1	0	0	0	0
425:	0	0	1	0	0	3	0	0
433:	1	0	1	0	2	0	2	1
441:	1	0	0	2	2	1	2	0
449:	3	1	3	0	1	1	3	3
457:	4	0	2	2	5	2	2	3
465:	4	2	0	2	3	4	3	2
473:	4	5	7	4	2	2	7	3
481:	2	3	4	4	3	1	3	0
489:	1	1	1	1	0	1	0	2
497:	2	1	2	3	1	4	2	0
505:	1	1	2	2	2	1	1	1
513:	0	3	2	1	1	0	0	1
521:	1	1	0	0	1	1	0	0
529:	0	0	0	0	0	0	1	3
537:	2	1	0	1	0	1	1	1
545:	0	0	1	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	1	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	1	0	0	1
649:	0	0	0	0	0	0	0	0
657:	0	0	1	1	0	1	0	0
665:	0	0	0	0	0	0	1	1
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	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	1	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	1	0	0	0
969:	0	0	0	0	0	0	0	1
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

C
E 8/13

Sample Description: PZ-113-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 15
 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: 4/12/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 5:45:16 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.230 mL
 Effective Efficiency: 0.2184 +/- 0.0172
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 1.1494 +/- 0.0926

Peak Match Tolerance: 0.175 MeV

 ----- PEAK AREA REPORT -----

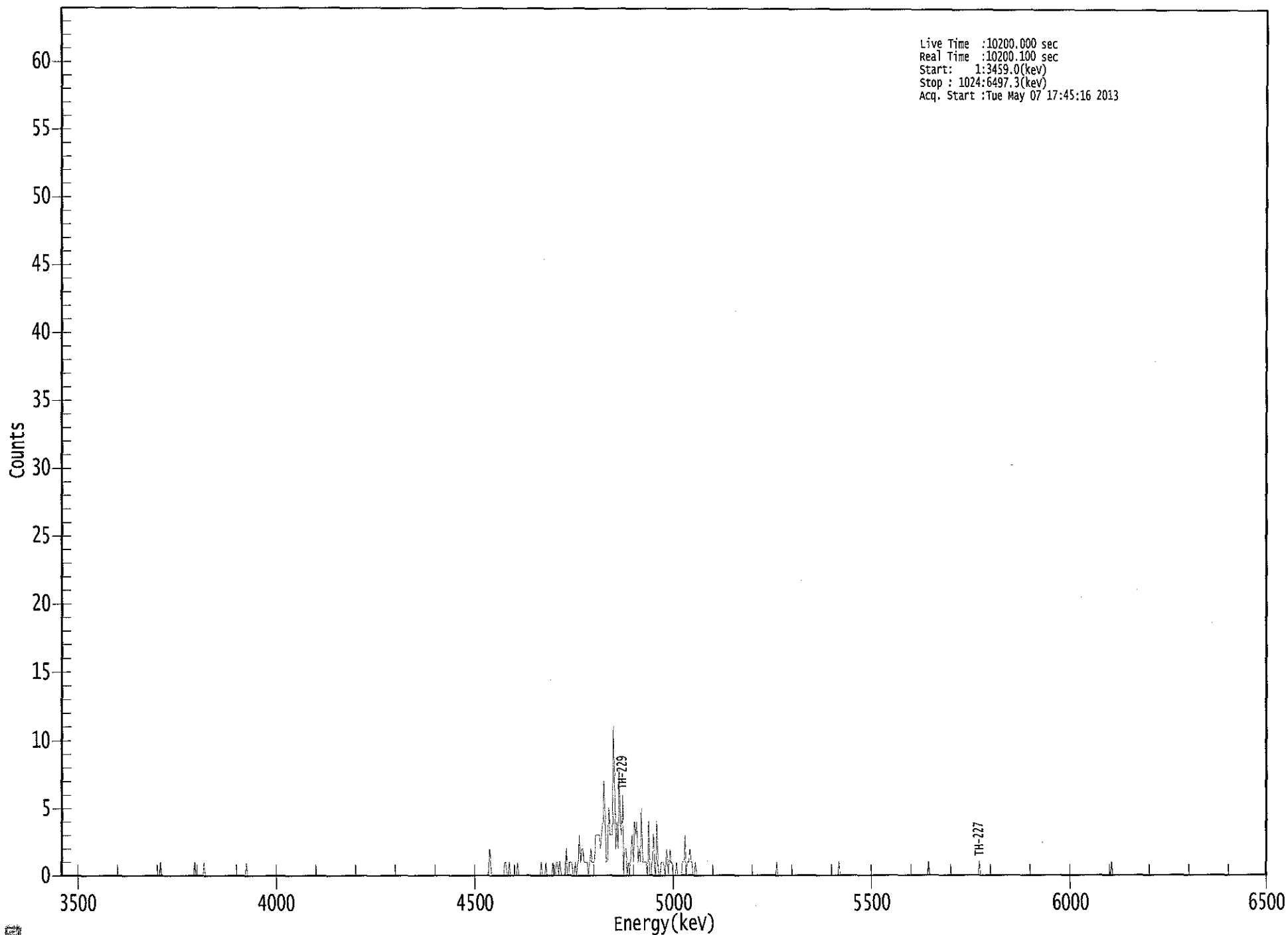
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.773	0.49	416.98	0.51	0.00E+000	3.0
TH-228	5.340	1.15	249.59	0.85	0.00E+000	3.0
TH-229 T	4.873	192.00	14.18	0.00	0.00E+000	5.9
TH-230	4.626	12.83	55.14	0.17	0.00E+000	4.5
TH-232	3.872	1.83	152.56	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.969	5850.00*	6.11E-003 +/- 2.55E-002	6.54E-002 +/- 1.01E-002
TH-228	0.982	5400.00*	1.43E-002 +/- 3.58E-002	7.45E-002 +/- 1.15E-002
TH-229	1.000	4872.00*	2.34E+000 +/- 3.61E-001	7.31E-002 +/- 1.13E-002
TH-230	0.989	4672.00*	1.56E-001 +/- 8.93E-002	5.07E-002 +/- 7.83E-003
TH-232	0.921	3997.00*	2.22E-002 +/- 3.40E-002	5.06E-002 +/- 7.81E-003

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Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3459.0(keV)
Stop : 1024:6497.3(keV)
Acq. Start :Tue May 07 17:45:16 2013

0289

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 15

Channel	1	2	3	4	5	6	7	8	9
377:	1	1	0	0	1	0	0	0	
385:	0	0	0	1	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	1	0	0	0	0	
417:	0	1	0	0	1	1	0	1	
425:	0	0	0	0	2	0	0	1	
433:	1	1	0	0	1	0	1	3	
441:	1	2	2	1	1	1	1	0	
449:	1	2	1	1	1	3	3	3	
457:	3	2	3	4	7	4	1	1	
465:	5	3	3	3	11	7	2	4	
473:	2	8	4	3	6	0	2	2	
481:	0	1	0	2	3	1	4	3	
489:	4	1	2	1	5	1	1	1	
497:	1	0	4	0	0	1	3	1	
505:	0	4	1	0	0	1	1	1	
513:	0	2	1	0	2	1	1	0	
521:	0	0	1	0	0	0	0	1	
529:	1	3	0	1	1	2	1	1	
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	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:	0	0	0	0	0	0	0	0	
657:	0	0	0	0	1	0	0	0	
665:	0	0	0	0	0	0	0	0	
673:	0	0	0	0	0	0	0	0	
681:	0	0	0	0	0	0	0	0	
689:	0	0	0	0	0	0	0	0	
697:	0	0	0	0	0	0	0	0	
705:	0	0	0	0	0	0	0	0	
713:	0	0	0	0	0	0	0	0	
721:	0	0	0	0	0	0	0	0	
729:	0	0	0	0	0	0	0	0	
737:	1	0	0	0	0	0	0	0	
745:	0	0	0	0	0	0	0	0	
753:	0	0	0	0	0	0	0	0	
761:	0	0	0	0	0	0	0	0	
769:	0	0	0	0	0	0	0	0	
777:	0	0	0	1	0	0	0	0	
785:	0	0	0	0	0	0	0	0	
793:	0	0	0	0	0	0	0	0	

801: 0 0 0 0 0 0 0 0

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

C
584

Sample Description: PZ-107-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 16
 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: 4/12/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 5:45:10 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.230 mL
 Effective Efficiency: 0.2150 +/- 0.0170
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 1.0866 +/- 0.0881

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	5.869	4.49	98.45	0.51	0.00E+000	3.0
TH-228	5.377	80.15	22.03	0.85	0.00E+000	4.5
TH-229 T	4.870	189.00	14.29	0.00	0.00E+000	4.5
TH-230	4.643	63.47	24.95	1.53	0.00E+000	3.4
TH-232	3.967	90.43	21.08	3.57	0.00E+000	7.5

T = Tracer Peak used for Effective Efficiency

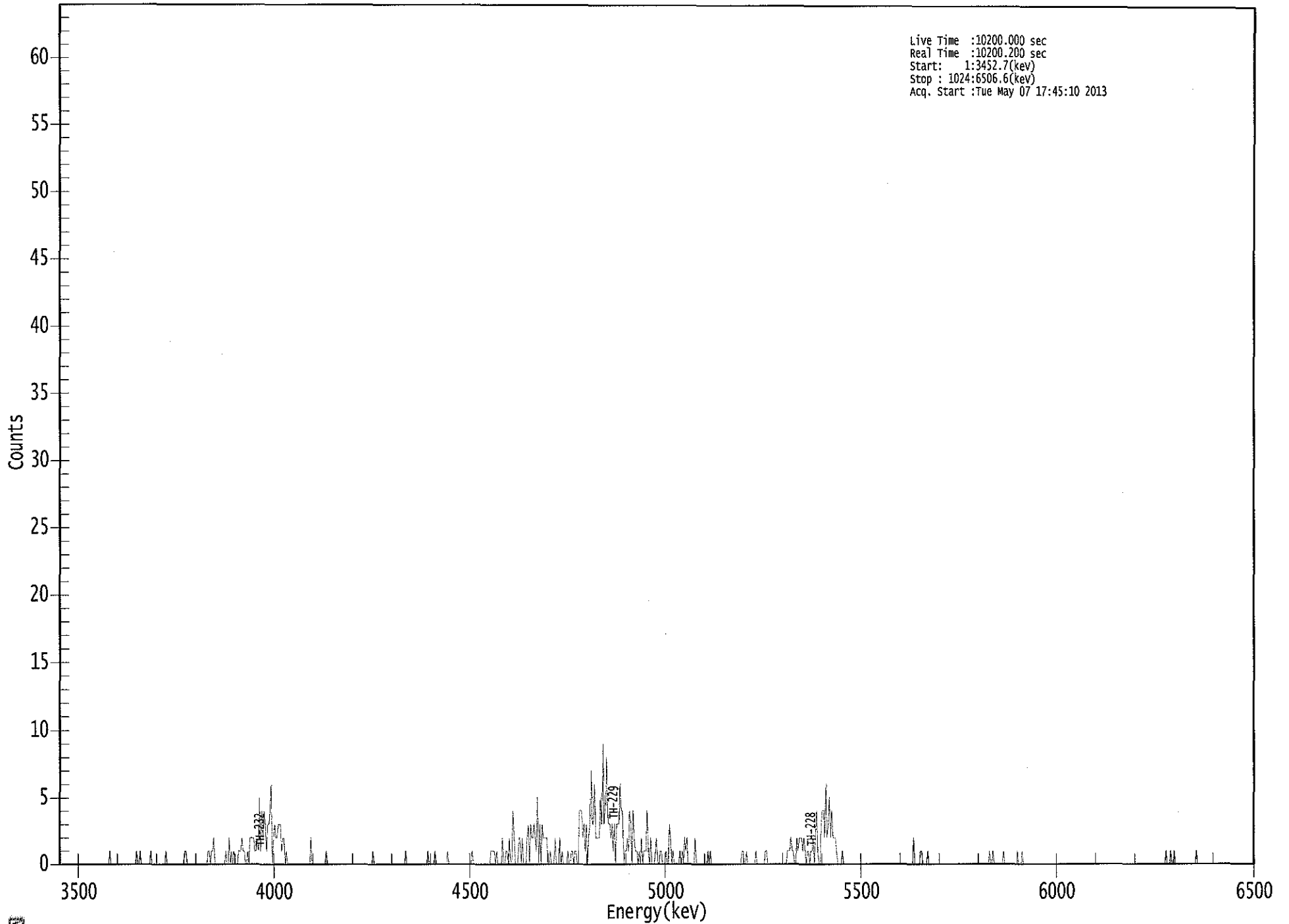
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	5.69E-002 +/- 5.67E-002	6.65E-002 +/- 1.03E-002
TH-228	0.997	5400.00*	1.01E+000 +/- 2.73E-001	7.57E-002 +/- 1.18E-002
TH-229	1.000	4872.00*	2.34E+000 +/- 3.64E-001	7.43E-002 +/- 1.15E-002
TH-230	0.995	4672.00*	7.84E-001 +/- 2.30E-001	8.78E-002 +/- 1.36E-002
TH-232	0.995	3997.00*	1.11E+000 +/- 2.92E-001	1.16E-001 +/- 1.81E-002

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US EPA ARCHIVE DOCUMENT

0000057370.CNF



Live Time : 10200.000 sec
Real Time : 10200.200 sec
Start : 1:3452.7(keV)
Stop : 1024:6506.6(keV)
Acq. Start : Tue May 07 17:45:10 2013

ROI Type: 1

ROI Type: 3

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

369: 0 1 1 1 1 0 1 0

Sample Title: 16

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

801: 0 0 0 0 0 0 0 0

Sample Title: 16

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	1	0	0	0	0	0	0	0
817:	0	0	0	0	1	0	0	0
825:	1	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	1	0	0	0	1
953:	0	0	1	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	1	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



Sample Description: PZ-107-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000574
 Batch Identification: 1304131A-TH
 Sample Identification: 17
 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: 4/12/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 5:45:13 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.230 mL
 Effective Efficiency: 0.2000 +/- 0.0163
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 1.0832 +/- 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	5.773	5.83	82.55	0.17	0.00E+000	9.0
TH-228	5.418	0.15	1397.8	0.85	0.00E+000	3.0
TH-229 T	4.894	175.66	14.81	0.34	0.00E+000	5.5
TH-230	4.615	8.66	68.12	0.34	0.00E+000	3.0
TH-232	3.958	-0.17	1169.4	0.17	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

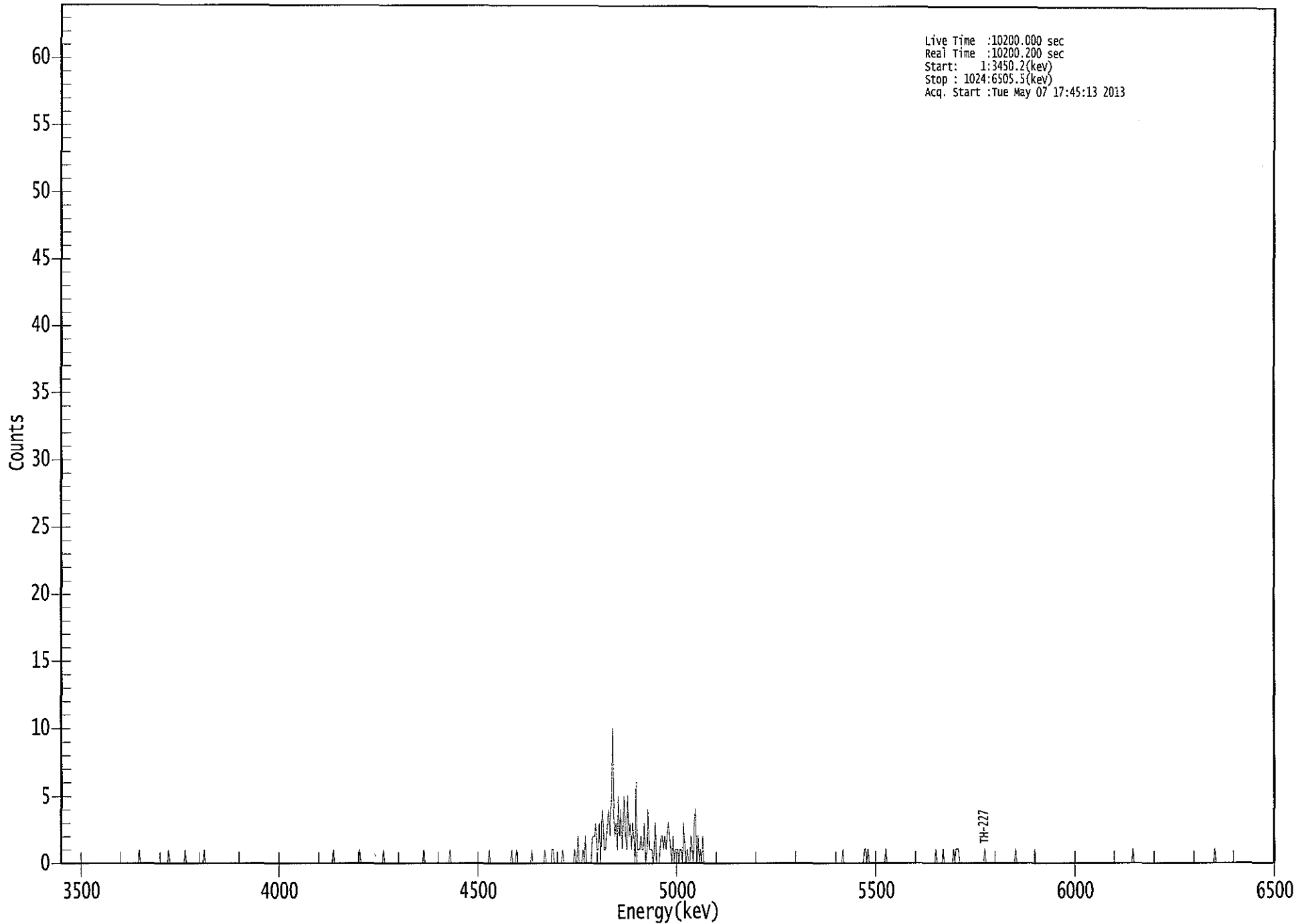
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.970	5850.00*	7.94E-002 +/- 6.68E-002	5.68E-002 +/- 9.10E-003
TH-228	0.998	5400.00*	2.04E-003 +/- 2.85E-002	8.14E-002 +/- 1.30E-002
TH-229	0.998	4872.00*	2.34E+000 +/- 3.74E-001	6.37E-002 +/- 1.02E-002
TH-230	0.983	4672.00*	1.15E-001 +/- 8.04E-002	6.35E-002 +/- 1.02E-002
TH-232	0.992	3997.00*	-2.25E-003 +/- 2.63E-002	5.53E-002 +/- 8.85E-003

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US EPA ARCHIVE DOCUMENT

000057422.CNF



0299

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 17

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

801: 0 0 0 0 1 0 0 0

Sample Title: 17

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:	0	0	0	0	0	0	0	1
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	1	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	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

CF182

Sample Description: PZ-116-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: Th 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: 4/12/2013 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 5:45:05 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.230 mL
 Effective Efficiency: 0.1850 +/- 0.0156
 Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
 Chem. Recovery Factor: 0.9731 +/- 0.0838

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	5.879	4.49	98.45	0.51	0.00E+000	3.0
TH-228	5.323	1.83	152.56	0.17	0.00E+000	3.0
TH-229 T	4.883	162.83	15.37	0.17	0.00E+000	4.8
TH-230	4.637	10.49	62.21	0.51	0.00E+000	4.5
TH-232	3.907	2.00	169.74	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

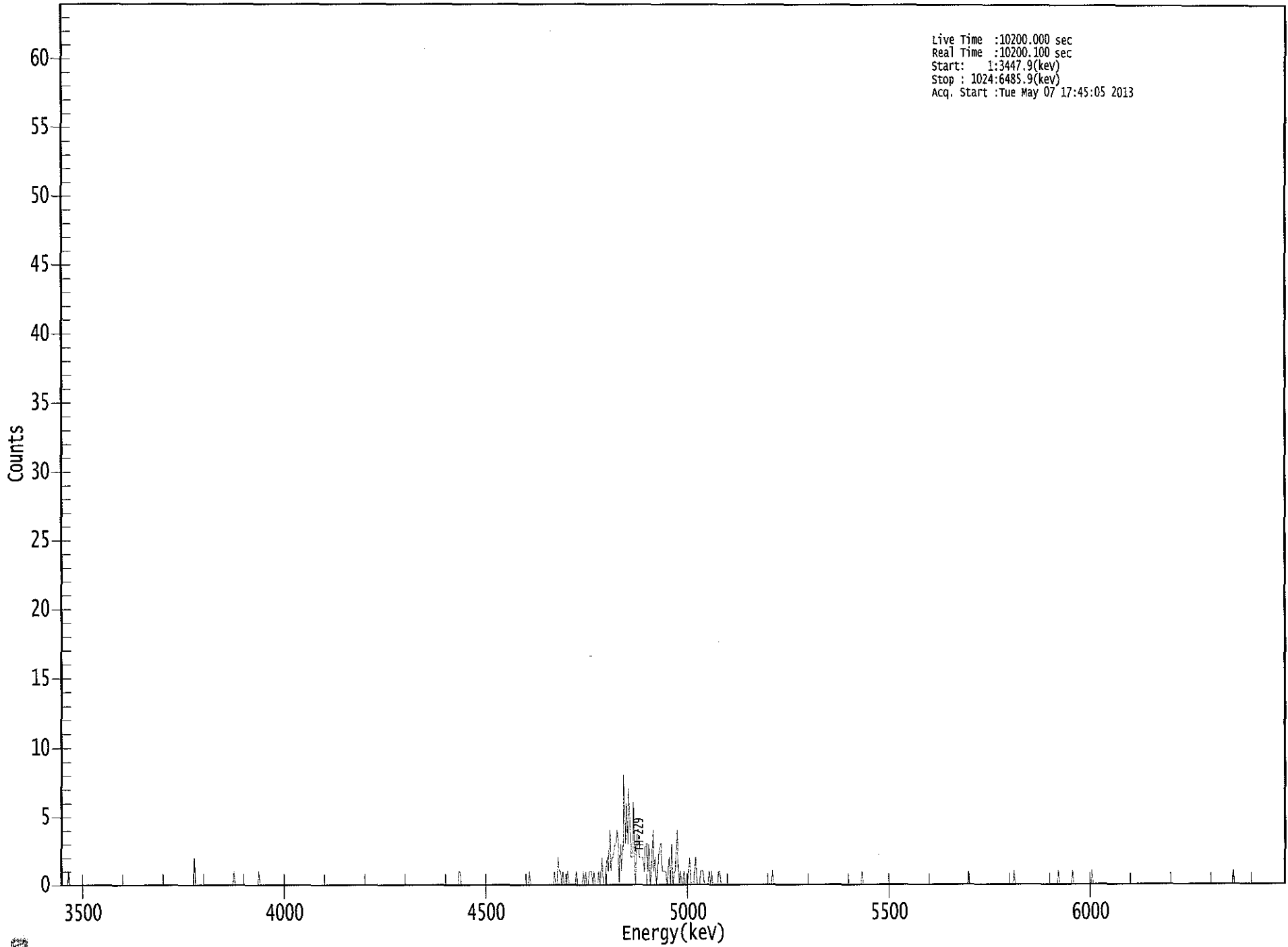
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.996	5850.00*	6.61E-002 +/- 6.60E-002	7.72E-002 +/- 1.28E-002
TH-228	0.970	5400.00*	2.69E-002 +/- 4.13E-002	6.13E-002 +/- 1.01E-002
TH-229	0.999	4872.00*	2.34E+000 +/- 3.87E-001	6.00E-002 +/- 9.92E-003
TH-230	0.993	4672.00*	1.50E-001 +/- 9.69E-002	7.53E-002 +/- 1.24E-002
TH-232	0.958	3997.00*	2.86E-002 +/- 4.88E-002	8.59E-002 +/- 1.42E-002

AG
5/8/13

0000057364.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3447.9(key)
Stop : 1024:6485.9(key)
Acq. Start :Tue May 07 17:45:05 2013



US EPA ARCHIVE DOCUMENT

0304

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 18

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	1
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	1	0	0	2
417:	1	1	0	1	0	0	0	1
425:	0	0	0	0	0	0	1	0
433:	0	0	0	0	1	0	1	0
441:	0	1	1	1	0	1	0	0
449:	0	1	0	1	2	0	0	1
457:	2	1	4	1	2	2	3	3
465:	4	3	0	3	1	3	8	3
473:	6	3	7	4	2	2	6	1
481:	0	4	4	2	2	2	2	1
489:	3	3	1	3	0	1	4	1
497:	2	0	1	2	3	3	1	1
505:	1	1	0	1	2	0	3	0
513:	1	1	4	2	0	1	0	0
521:	1	0	0	0	1	2	0	0
529:	0	1	2	0	0	0	1	1
537:	1	0	0	0	0	1	0	1
545:	0	0	0	0	0	1	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	1	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	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	1	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	1	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	1	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	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	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	1	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

C 518

Sample Description: PZ-116-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000573
 Batch Identification: 1304131A-TH
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: Th 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 7:31:39 AM
 Acquisition Date/Time: 5/7/2013 5:45:08 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.229 mL
 Effective Efficiency: 0.1517 +/- 0.0140
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Chem. Recovery Factor: 0.8480 +/- 0.0798

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	5.872	0.00	1960.0	0.00	0.00E+000	0.0
TH-228	5.291	1.83	152.56	0.17	0.00E+000	3.0
TH-229 T	4.882	133.00	17.06	0.00	0.00E+000	4.8
TH-230	4.656	4.83	91.00	0.17	0.00E+000	3.0
TH-232	3.852	1.00	277.19	0.00	0.00E+000	3.0

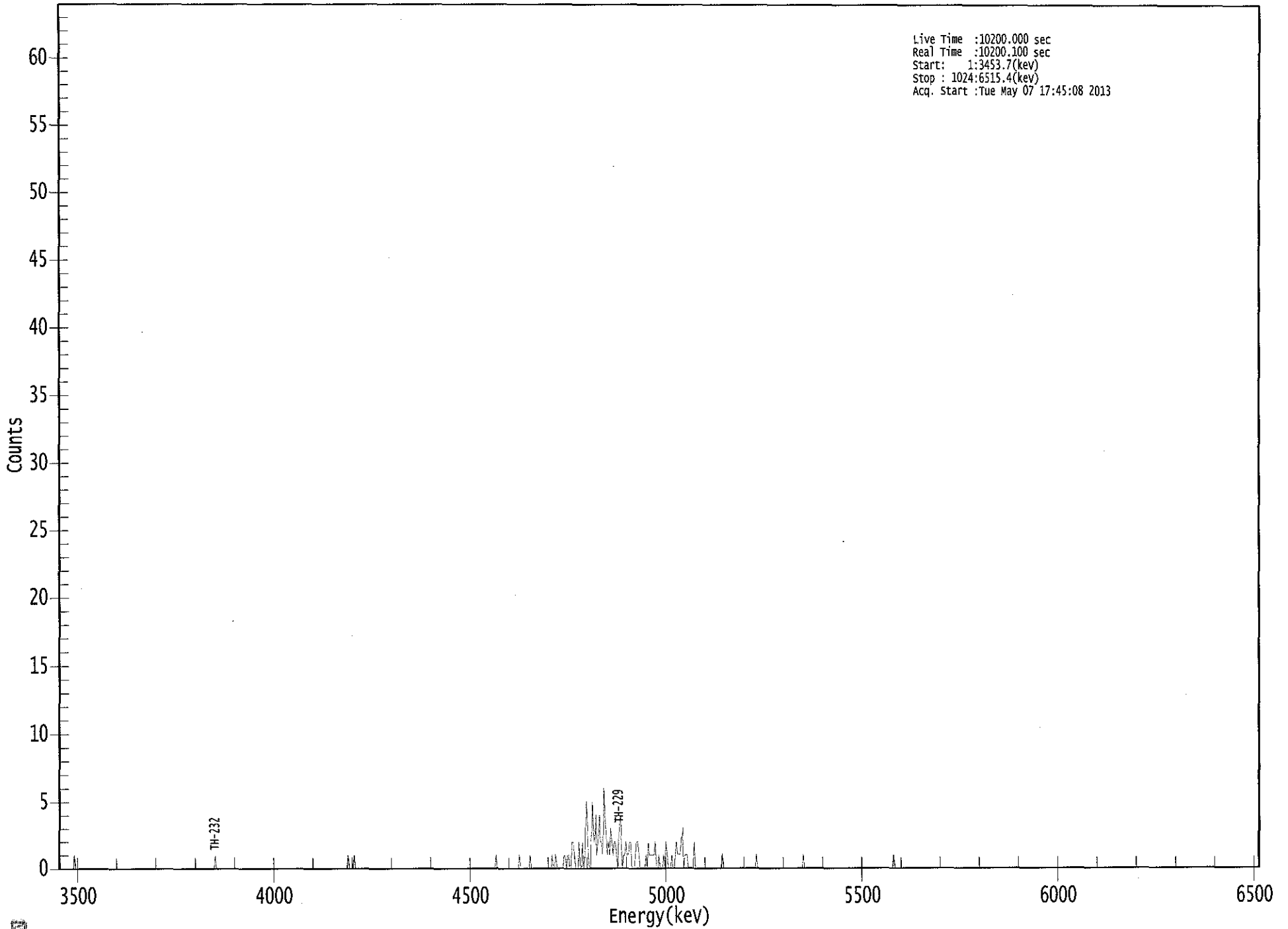
T = Tracer Peak used for Effective Efficiency

 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	0.00E+000 +/- 4.98E-002	1.08E-001 +/- 1.95E-002
TH-228	0.940	5400.00*	3.28E-002 +/- 5.04E-002	7.48E-002 +/- 1.35E-002
TH-229	0.999	4872.00*	2.33E+000 +/- 4.23E-001	1.05E-001 +/- 1.91E-002
TH-230	0.999	4672.00*	8.45E-002 +/- 7.84E-002	7.30E-002 +/- 1.32E-002
TH-232	0.896	3997.00*	1.75E-002 +/- 4.85E-002	1.05E-001 +/- 1.90E-002

AG
5/8/13

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Tue May 07 17:45:08 2013



US EPA ARCHIVE DOCUMENT

0309

ROI Type: 1

ROI Type: 3

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

369: 0 0 0 0 1 0 0 0

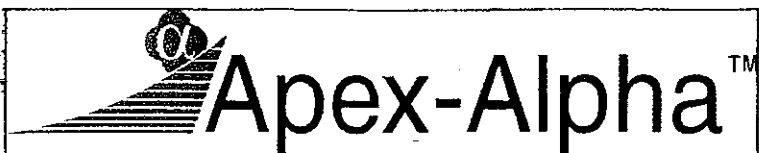
Sample Title: 19

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	1	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	1	0	0	1
425:	0	0	0	0	0	0	1	1
433:	0	1	1	0	0	2	2	1
441:	0	0	0	2	0	0	2	0
449:	1	5	3	1	0	0	5	3
457:	2	4	1	2	4	2	2	1
465:	6	3	3	1	2	1	3	2
473:	1	2	2	1	0	3	4	2
481:	0	1	1	2	1	1	2	2
489:	0	0	0	1	2	2	1	0
497:	0	0	0	0	1	0	2	1
505:	1	1	1	1	2	0	0	1
513:	0	0	0	1	0	2	1	0
521:	0	0	1	0	0	1	2	1
529:	1	1	2	3	0	1	1	1
537:	0	0	0	0	0	2	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	1	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	1	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:	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	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 19

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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

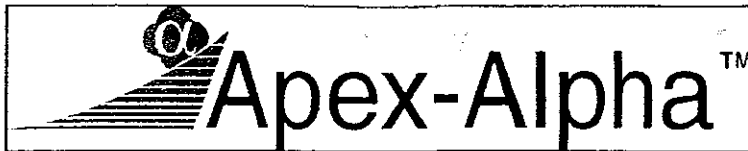
Date : 5/7/2013
Time : 6:01:09 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	5/7/2013 5:46:31 AM
Alpha 004	21f	ALL	Passed	5/7/2013 5:46:32 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	5/7/2013 5:46:33 AM
Alpha 011	21f	ALL	Passed	5/7/2013 5:46:34 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	5/7/2013 5:46:34 AM
Alpha 014	21f	ALL	Passed	5/7/2013 5:46:35 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	5/7/2013 5:46:36 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	5/7/2013 5:46:37 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	5/7/2013 5:46:38 AM
Alpha 025	AIM730	ALL	Passed	5/7/2013 5:46:39 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	5/7/2013 5:46:40 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	5/7/2013 5:46:40 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	5/7/2013 5:46:42 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:44 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:45 AM
Alpha 036	Alpha Analyst100DC	ALL	Not Done	
Alpha 037	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:47 AM
Alpha 038	Alpha Analyst100DC	ALL	Not Done	
Alpha 039	Alpha Analyst100DC	ALL	Not Done	
Alpha 040	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:48 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:50 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:52 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:53 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:55 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:57 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:58 AM

APPROVED BY: _____ C

APPROVAL DATE: _____ 5/7/13



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 5/7/2013
Time : 6:01:09 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	5/7/2013 5:46:31 AM
Alpha 004	21f	ALL	Passed	5/7/2013 5:46:32 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	5/7/2013 5:46:33 AM
Alpha 011	21f	ALL	Passed	5/7/2013 5:46:34 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	5/7/2013 5:46:34 AM
Alpha 014	21f	ALL	Passed	5/7/2013 5:46:35 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	5/7/2013 5:46:36 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	5/7/2013 5:46:37 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	5/7/2013 5:46:38 AM
Alpha 025	AIM730	ALL	Passed	5/7/2013 5:46:39 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	5/7/2013 5:46:40 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	5/7/2013 5:46:40 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Not Done	
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha AnalystI00DC	ALL	Passed	5/7/2013 5:46:42 AM
Alpha 034	Alpha AnalystI00DC	ALL	Passed	5/7/2013 5:46:44 AM
Alpha 035	Alpha AnalystI00DC	ALL	Passed	5/7/2013 5:46:45 AM
Alpha 036	Alpha AnalystI00DC	ALL	Not Done	
Alpha 037	Alpha AnalystI00DC	ALL	Passed	5/7/2013 5:46:47 AM
Alpha 038	Alpha AnalystI00DC	ALL	Not Done	
Alpha 039	Alpha AnalystI00DC	ALL	Not Done	
Alpha 040	Alpha AnalystI00DC	ALL	Passed	5/7/2013 5:46:48 AM
Alpha 041	Alpha AnalystI00DC	ALL	Passed	5/7/2013 5:46:50 AM
Alpha 042	Alpha AnalystI00DC	ALL	Passed	5/7/2013 5:46:52 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:53 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:55 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:57 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	5/7/2013 5:46:58 AM

APPROVED BY: _____ C

APPROVAL DATE: _____ 5/7/13

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

Nuclide Library Title: Thorium

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

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

* = key line

TOTALS: 5 Nuclides 5 Energy Lines

SECTION X
ANALYTICAL DATA (RADIUM-226)

US EPA ARCHIVE DOCUMENT

Work Order	13-04131	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra226	01	LCS	LCS		04/18/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		04/18/13 00:00	1.5000E+00
Date Received	4/18/2013	03	DUP	PZ-208-SS TOT	37	04/12/13 09:10	1.5000E+00
Lab Deadline	5/9/2013	04	DO	PZ-208-SS TOT	37	04/12/13 09:10	1.5000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-208-SS DIS	37	04/12/13 09:10	1.5000E+00
Project	West Lake OU-1	06	TRG	PZ-101-SS TOT	43	04/12/13 09:15	1.5000E+00
Report Level	4	07	TRG	PZ-101-SS DIS	43	04/12/13 09:15	1.5000E+00
Activity Units	pCi	08	TRG	MW-1204 TOT	42	04/12/13 09:26	1.5000E+00
Aliquot Units	I	09	TRG	MW-1204 DIS	42	04/12/13 09:26	1.5000E+00
Matrix	WA	10	TRG	PZ-113-SS TOT	39	04/12/13 09:40	1.5000E+00
Method	EPA 903.0 Modified	11	TRG	PZ-113-SS DIS	39	04/12/13 09:40	1.5000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	I-73 TOT	36	04/12/13 10:05	1.5000E+00
Radiometric Tracer	Ba-133	13	TRG	I-73 DIS	36	04/12/13 10:05	1.5000E+00
Radiometric Sol#	Ba-6a	14	TRG	PZ-113-AS TOT	41	04/12/13 10:35	1.5000E+00
Tracer Act (dpm/g)	1008.134	15	TRG	PZ-113-AS DIS	41	04/12/13 10:35	1.5000E+00
Carrier		16	TRG	PZ-107-SS TOT	45	04/12/13 10:40	1.5000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-107-SS DIS	45	04/12/13 10:40	1.5000E+00
		18	TRG	PZ-116-SS TOT	40	04/12/13 10:46	1.5000E+00
		19	TRG	PZ-116-SS DIS	40	04/12/13 10:46	1.5000E+00

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

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.9122	919.6	421.2	101.68		0.0228	0.0293	0.0065		101.68	2.34	1.00
02	MBL	0.9101	917.5	416.3	100.73		0.0226	0.0292	0.0066		100.73	2.37	1.00
03	DUP	0.9081	915.5	351.7	85.29		0.0228	0.0291	0.0063		85.29	2.27	1.00
04	DO	0.9020	909.3	359.1	87.67		0.0226	0.0292	0.0066		87.67	2.37	1.00
05	TRG	0.9020	909.3	389.0	94.97		0.0224	0.0290	0.0066		94.97	2.37	1.00
06	TRG	0.8995	906.8	393.3	96.28		0.0223	0.0317	0.0094		96.28	3.12	1.00
07	TRG	0.9020	909.3	391.9	95.68		0.0226	0.0308	0.0082		95.68	2.82	1.00
08	TRG	0.9046	912.0	151.5	36.88		0.0226	0.0282	0.0056		36.88	2.00	1.00
09	TRG	0.9030	910.3	390.6	95.25		0.0223	0.0297	0.0074		95.25	2.61	1.00
10	TRG	0.8976	904.9	291.7	71.56		0.0223	0.0282	0.0059		71.56	2.12	1.00
11	TRG	0.9028	910.1	353.4	86.20		0.0223	0.0291	0.0068		86.20	2.44	1.00
12	TRG	0.9012	908.5	327.3	79.98		0.0223	0.0297	0.0074		79.98	2.61	1.00
13	TRG	0.9002	907.5	373.9	91.46		0.0225	0.0312	0.0087		91.46	2.94	1.00
14	TRG	0.9024	909.7	384.8	93.90		0.0224	0.0303	0.0079		93.90	2.74	1.00
15	TRG	0.9007	908.0	360.5	88.14		0.0226	0.0303	0.0077		88.14	2.69	1.00
16	TRG	0.9013	908.6	191.5	46.79		0.0227	0.0283	0.0056		46.79	2.00	1.00
17	TRG	0.9048	912.2	424.1	103.22		0.0222	0.0305	0.0083		103.22	2.84	1.00
18	TRG	0.9052	912.6	448.9	109.20		0.0223	0.0300	0.0077		109.20	2.69	1.00
19	TRG	0.8991	906.4	419.5	102.74		0.0229	0.0303	0.0074		102.74	2.61	1.00

US EPA ARCHIVE DOCUMENT

0320

* 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 10 Date/Time	Sep 10 By	Sep 11 Date/Time	Sep 11 By
01	LCS			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
02	MBL			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
03	DUP			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
04	DO			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
05	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
06	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
07	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
08	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
09	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
10	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
11	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
12	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
13	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
14	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
15	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
16	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
17	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
18	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		
19	TRG			04/30/13 09:57	JBARNARD	05/10/13 08:55	TSMITH		

US EPA ARCHIVE DOCUMENT

0321

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

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-Ra226-1

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-226	LCS	LCS	pCi/l	1.07E+01	1.27E+00	2.34E-01	1.03E+01	103.92	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	-1.88E-02	4.86E-02	1.63E-01					OK	OK
03	RA-226	DUP	PZ-208-SS TOT	pCi/l	7.48E-01	2.72E-01	1.76E-01				NA	OK	
04	RA-226	DO	PZ-208-SS TOT	pCi/l	1.14E+00	3.32E-01	1.45E-01					OK	
05	RA-226	TRG	PZ-208-SS DIS	pCi/l	1.06E+00	3.16E-01	1.49E-01					OK	
06	RA-226	TRG	PZ-101-SS TOT	pCi/l	2.19E+01	1.80E+00	2.54E-01					OK	
07	RA-226	TRG	PZ-101-SS DIS	pCi/l	2.33E+01	1.79E+00	1.19E-01					OK	
08	RA-226	TRG	MW-1204 TOT	pCi/l	3.34E+00	8.24E-01	2.47E-01					OK	
09	RA-226	TRG	MW-1204 DIS	pCi/l	2.90E+00	5.54E-01	1.50E-01					OK	
10	RA-226	TRG	PZ-113-SS TOT	pCi/l	4.92E+00	7.30E-01	1.75E-01					OK	
11	RA-226	TRG	PZ-113-SS DIS	pCi/l	2.48E+00	5.27E-01	1.47E-01					OK	
12	RA-226	TRG	I-73 TOT	pCi/l	1.79E+00	4.87E-01	1.76E-01					OK	
13	RA-226	TRG	I-73 DIS	pCi/l	1.04E+00	3.47E-01	1.73E-01					OK	
14	RA-226	TRG	PZ-113-AS TOT	pCi/l	6.10E-01	2.56E-01	1.42E-01					OK	
15	RA-226	TRG	PZ-113-AS DIS	pCi/l	4.94E-01	2.41E-01	2.06E-01					OK	
16	RA-226	TRG	PZ-107-SS TOT	pCi/l	7.72E+00	1.13E+00	1.71E-01					OK	
17	RA-226	TRG	PZ-107-SS DIS	pCi/l	5.80E+00	7.92E-01	1.10E-01					OK	
18	RA-226	TRG	PZ-116-SS TOT	pCi/l	8.31E-01	2.96E-01	1.50E-01					OK	
19	RA-226	TRG	PZ-116-SS DIS	pCi/l	2.14E-01	1.53E-01	1.45E-01					OK	

 Eberline Services Work Order 13-04131	Analysis Code Ra226	Run	1
		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	100.00	0.00	101.68		5/10/2013 8:55	
02	RA-226	MBL	04/18/13 00:00	1.50E+00	100.00	0.00	100.73		5/10/2013 8:55	
03	RA-226	DUP	04/12/13 09:10	1.50E+00	85.29	0.00	85.29		5/10/2013 8:55	
04	RA-226	DO	04/12/13 09:10	1.50E+00	87.67	0.00	87.67		5/10/2013 8:55	
05	RA-226	TRG	04/12/13 09:10	1.50E+00	94.97	0.00	94.97		5/10/2013 8:55	
06	RA-226	TRG	04/12/13 09:15	1.50E+00	96.28	0.00	96.28		5/10/2013 8:55	
07	RA-226	TRG	04/12/13 09:15	1.50E+00	95.68	0.00	95.68		5/10/2013 8:55	
08	RA-226	TRG	04/12/13 09:26	1.50E+00	36.88	0.00	36.88		5/10/2013 8:55	
09	RA-226	TRG	04/12/13 09:26	1.50E+00	95.25	0.00	95.25		5/10/2013 8:55	
10	RA-226	TRG	04/12/13 09:40	1.50E+00	71.56	0.00	71.56		5/10/2013 8:55	
11	RA-226	TRG	04/12/13 09:40	1.50E+00	86.20	0.00	86.20		5/10/2013 8:55	
12	RA-226	TRG	04/12/13 10:05	1.50E+00	79.98	0.00	79.98		5/10/2013 8:55	
13	RA-226	TRG	04/12/13 10:05	1.50E+00	91.46	0.00	91.46		5/10/2013 8:55	
14	RA-226	TRG	04/12/13 10:35	1.50E+00	93.90	0.00	93.90		5/10/2013 8:55	
15	RA-226	TRG	04/12/13 10:35	1.50E+00	88.14	0.00	88.14		5/10/2013 8:55	
16	RA-226	TRG	04/12/13 10:40	1.50E+00	46.79	0.00	46.79		5/10/2013 8:55	
17	RA-226	TRG	04/12/13 10:40	1.50E+00	100.00	0.00	103.22		5/10/2013 8:55	
18	RA-226	TRG	04/12/13 10:46	1.50E+00	100.00	0.00	109.20		5/10/2013 8:55	
19	RA-226	TRG	04/12/13 10:46	1.50E+00	100.00	0.00	102.74		5/10/2013 8:55	

	
Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-04131
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-226	LCS	05/13/13 06:12		A_Spec	Alpha_003	170	3.01 E+02	7.00 E-03	17.5
02	RA-226	MBL	05/13/13 06:12		A_Spec	Alpha_004	170.02	8.70 E-01	1.10 E-02	19.4
03	RA-226	DUP	05/13/13 06:12		A_Spec	Alpha_010	170.02	3.13 E+01	1.00 E-02	19.7
04	RA-226	DO	05/13/13 06:12		A_Spec	Alpha_011	170	4.72 E+01	5.00 E-03	19.7
05	RA-226	TRG	05/13/13 06:12		A_Spec	Alpha_013	170	4.50 E+01	6.00 E-03	18.7
06	RA-226	TRG	05/13/13 06:12		A_Spec	Alpha_014	170	7.06 E+02	1.40 E-02	18.5
07	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_033	170	8.16 E+02	1.00 E-03	18.2
08	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_034	170	6.47 E+01	2.00 E-03	18.6
09	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_035	170	1.09 E+02	4.00 E-03	18.3
10	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_036	170	1.86 E+02	7.00 E-03	19.8
11	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_037	170	8.85 E+01	3.00 E-03	17.8
12	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_038	170	5.35 E+01	3.00 E-03	17.2
13	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_039	170	3.62 E+01	5.00 E-03	19.7
14	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_040	170	2.25 E+01	3.00 E-03	19
15	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_041	170	1.81 E+01	1.10 E-02	19.8
16	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_042	170	1.89 E+02	1.00 E-03	18.5
17	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_044	170	2.20 E+02	1.00 E-03	19
18	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_045	170	3.13 E+01	4.00 E-03	17.9
19	RA-226	TRG	05/13/13 06:13		A_Spec	Alpha_046	170	8.32 E+00	4.00 E-03	17.9


	Run	1
	Analysis Code	Ra226
Eberline Services Work Order	13-04131	
Client	Engineering Management Support, Inc.	

2.5

0617

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	0.9122	919.6198	421.2000	101.68	2.34	1.00
02	MBL	BLANK	04/18/13 00:00	1.5000	0.9101	917.5028	416.3000	100.73	2.37	1.00
03	DUP	PZ-208-SS TOT	04/12/13 09:10	1.5000	0.9081	915.4865	351.7000	85.29	2.27	1.00
04	DO	PZ-208-SS TOT	04/12/13 09:10	1.5000	0.9020	909.3369	359.1000	87.67	2.37	1.00
05	TRG	PZ-208-SS DIS	04/12/13 09:10	1.5000	0.9020	909.3369	389.0000	94.97	2.37	1.00
06	TRG	PZ-101-SS TOT	04/12/13 09:15	1.5000	0.8995	906.8165	393.3000	96.28	3.12	1.00
07	TRG	PZ-101-SS DIS	04/12/13 09:15	1.5000	0.9020	909.3369	391.9000	95.68	2.82	1.00
08	TRG	MW-1204 TOT	04/12/13 09:26	1.5000	0.9046	911.9580	151.5000	36.88	2.00	1.00
09	TRG	MW-1204 DIS	04/12/13 09:26	1.5000	0.9030	910.3450	390.6000	95.25	2.61	1.00
10	TRG	PZ-113-SS TOT	04/12/13 09:40	1.5000	0.8976	904.9011	291.7000	71.56	2.12	1.00
11	TRG	PZ-113-SS DIS	04/12/13 09:40	1.5000	0.9028	910.1434	353.4000	86.20	2.44	1.00
12	TRG	I-73 TOT	04/12/13 10:05	1.5000	0.9012	908.5304	327.3000	79.98	2.61	1.00
13	TRG	I-73 DIS	04/12/13 10:05	1.5000	0.9002	907.5222	373.9000	91.46	2.94	1.00
14	TRG	PZ-113-AS TOT	04/12/13 10:35	1.5000	0.9024	909.7401	384.8000	93.90	2.74	1.00
15	TRG	PZ-113-AS DIS	04/12/13 10:35	1.5000	0.9007	908.0263	360.5000	88.14	2.69	1.00
16	TRG	PZ-107-SS TOT	04/12/13 10:40	1.5000	0.9013	908.6312	191.5000	46.79	2.00	1.00
17	TRG	PZ-107-SS DIS	04/12/13 10:40	1.5000	0.9048	912.1596	424.1000	103.22	2.84	1.00
18	TRG	PZ-116-SS TOT	04/12/13 10:46	1.5000	0.9052	912.5629	448.9000	109.20	2.69	1.00
19	TRG	PZ-116-SS DIS	04/12/13 10:46	1.5000	0.8991	906.4133	419.5000	102.74	2.61	1.00

0325

Internal Work Order					Run	Analysis Code		Date	Technician				Technician Initials	Witness Initials		
13-04131					1	Ra226		4/30/2013 9:57	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	4/30/2013	0.500	0.5177				10.28	0.473	0.00	0.000	0.00	0.000	0.00	0.000

Tracers							Balance Printer Tapes									
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS				
01	Ba-133	Ba-6a	1008.134	4/30/2013	0.9122	1.0000										
02	Ba-133	Ba-6a	1008.134	4/30/2013	0.9101	1.0000	0.9122 g									
03	Ba-133	Ba-6a	1008.134	4/30/2013	0.9081	1.0000	0.9101 g									
04	Ba-133	Ba-6a	1008.134	4/30/2013	0.9020	1.0000	-0.9081 g									
05	Ba-133	Ba-6a	1008.134	4/30/2013	0.9020	1.0000	-0.9020 g									
06	Ba-133	Ba-6a	1008.134	4/30/2013	0.8995	1.0000	-0.9020 g					0.5177 g				
07	Ba-133	Ba-6a	1008.134	4/30/2013	0.9020	1.0000	-0.8995 g					0.5133 g				
08	Ba-133	Ba-6a	1008.134	4/30/2013	0.9046	1.0000										
09	Ba-133	Ba-6a	1008.134	4/30/2013	0.9030	1.0000										
10	Ba-133	Ba-6a	1008.134	4/30/2013	0.8976	1.0000						Matrix Spike				
11	Ba-133	Ba-6a	1008.134	4/30/2013	0.9028	1.0000	-0.9020 g									
12	Ba-133	Ba-6a	1008.134	4/30/2013	0.9012	1.0000	-0.9046 g									
13	Ba-133	Ba-6a	1008.134	4/30/2013	0.9002	1.0000	-0.9030 g									
14	Ba-133	Ba-6a	1008.134	4/30/2013	0.9024	1.0000	-0.8976 g									
15	Ba-133	Ba-6a	1008.134	4/30/2013	0.9007	1.0000										
16	Ba-133	Ba-6a	1008.134	4/30/2013	0.9013	1.0000	-0.9028 g									
17	Ba-133	Ba-6a	1008.134	4/30/2013	0.9048	1.0000	-0.9012 g									
18	Ba-133	Ba-6a	1008.134	4/30/2013	0.9052	1.0000	-0.9002 g									
19	Ba-133	Ba-6a	1008.134	4/30/2013	0.8991	1.0000	-0.9024 g									
							-0.9007 g									
							-0.9013 g									
							-0.9048 g									
							-0.9052 g									
							-0.8991 g									


Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04131	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	PZ-208-SS TOT	DUP					1.5000E+00	1.5000E+00				
04	PZ-208-SS TOT	DO					1.5000E+00	1.5000E+00				
05	PZ-208-SS DIS	TRG					1.5000E+00	1.5000E+00				
06	PZ-101-SS TOT	TRG					1.5000E+00	1.5000E+00				
07	PZ-101-SS DIS	TRG					1.5000E+00	1.5000E+00				
08	MW-1204 TOT	TRG					1.5000E+00	1.5000E+00				
09	MW-1204 DIS	TRG					1.5000E+00	1.5000E+00				
10	PZ-113-SS TOT	TRG					1.5000E+00	1.5000E+00				
11	PZ-113-SS DIS	TRG					1.5000E+00	1.5000E+00				
12	I-73 TOT	TRG					1.5000E+00	1.5000E+00				
13	I-73 DIS	TRG					1.5000E+00	1.5000E+00				
14	PZ-113-AS TOT	TRG					1.5000E+00	1.5000E+00				
15	PZ-113-AS DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-107-SS TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-107-SS DIS	TRG					1.5000E+00	1.5000E+00				
18	PZ-116-SS TOT	TRG					1.5000E+00	1.5000E+00				
19	PZ-116-SS DIS	TRG					1.5000E+00	1.5000E+00				

Comments	
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Technician: _____

 Date: 4/30/13

US EPA ARCHIVE DOCUMENT

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-04131	1	Ra226			TSMITH

TRetec Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric % Recovery
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	
01	LCS	LCS		0.0228	0.0293	0.0065	
02	BLANK	MBL		0.0226	0.0292	0.0066	
03	DUP	DUP		0.0228	0.0291	0.0063	
04	PZ-208-SS TOT	DO		0.0226	0.0292	0.0066	
05	PZ-208-SS DIS	TRG		0.0224	0.0290	0.0066	
06	PZ-101-SS TOT	TRG		0.0223	0.0317	0.0094	
07	PZ-101-SS DIS	TRG		0.0226	0.0308	0.0082	
08	MW-1204 TOT	TRG		0.0226	0.0282	0.0056	
09	MW-1204 DIS	TRG		0.0223	0.0297	0.0074	
10	PZ-113-SS TOT	TRG		0.0223	0.0282	0.0059	
11	PZ-113-SS DIS	TRG		0.0223	0.0291	0.0068	
12	I-73 TOT	TRG		0.0223	0.0297	0.0074	
13	I-73 DIS	TRG		0.0225	0.0312	0.0087	
14	PZ-113-AS TOT	TRG		0.0224	0.0303	0.0079	
15	PZ-113-AS DIS	TRG		0.0226	0.0303	0.0077	
16	PZ-107-SS TOT	TRG		0.0227	0.0283	0.0056	
17	PZ-107-SS DIS	TRG		0.0222	0.0305	0.0083	
18	PZ-116-SS TOT	TRG		0.0223	0.0300	0.0077	
19	PZ-116-SS DIS	TRG		0.0229	0.0303	0.0074	

US EPA ARCHIVE DOCUMENT

0328

Technician: *T Smith*

Date: 5, 10, 13



Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_003
 Chamber Serial Number:
 Detector Serial Number: 3
 Env. Background: System Bkgd 56970
 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: 5/13/2013 5:58:47 AM
 Acquisition Date/Time: 5/13/2013 6:12:25 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Effective Efficiency: 0.1746 +/- 0.0033

Control Certificate Name: Ra226_Ra-5b
 Chem. Recov. of Control: RA-226 0.444095 +/- 0.030084
 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	5.528	502.24	8.79	4.76	0.00E+000	4.0
RA-226	4.711	300.81	11.33	1.19	0.00E+000	7.2

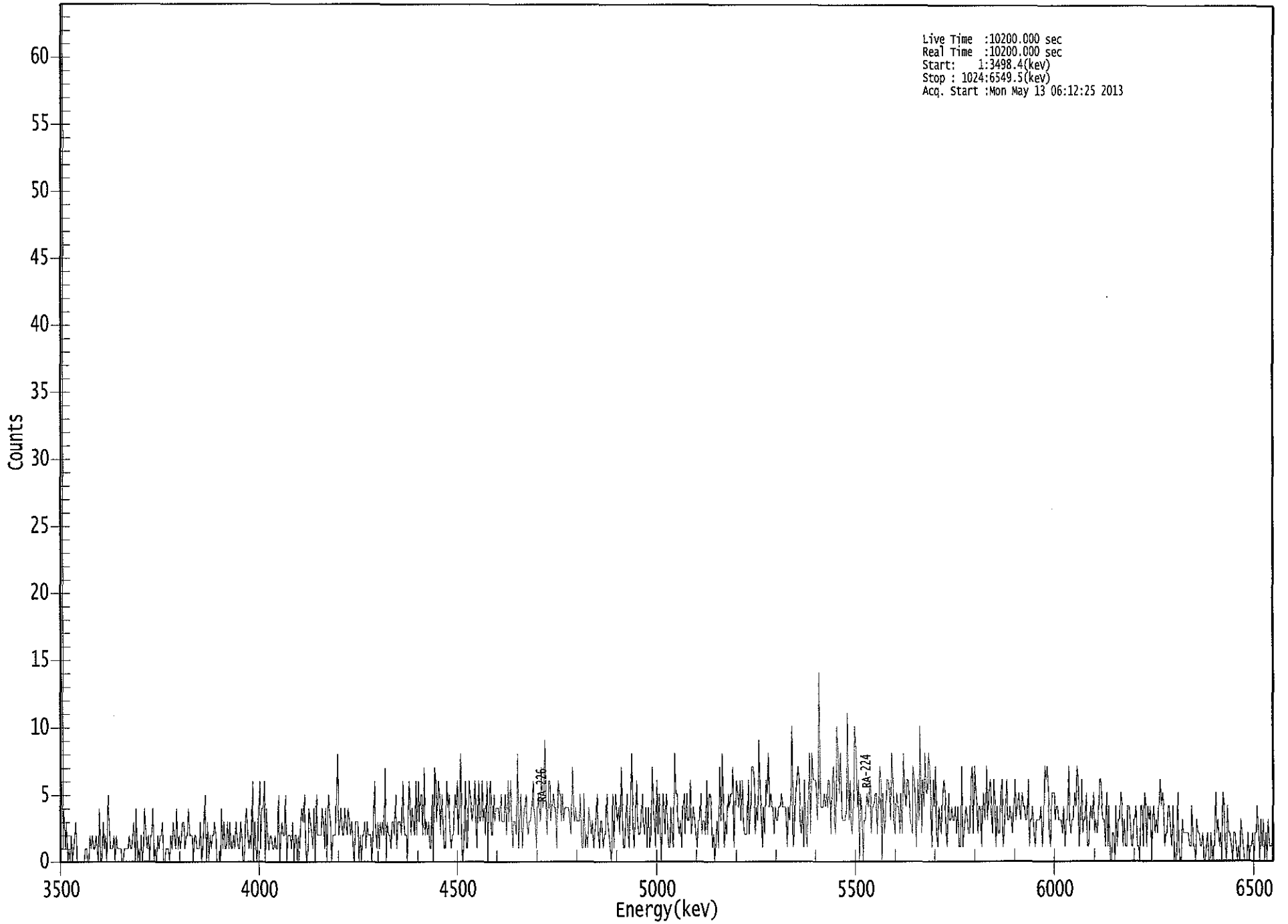
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	1.88E+001 +/- 4.62E+001	3.92E-001 +/- 9.62E-001
RA-226	0.993	4785.00*	1.07E+001 +/- 1.27E+000	2.34E-001 +/- 8.57E-003

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 5/13/13

US EPA ARCHIVE DOCUMENT

000057883.CNF



0330

ROI Type: 1

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

369: 4 4 4 3 5 3 3 3

Sample Title: 01

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

801: 3 4 3 2 4 6 3 4

Sample Title: 01

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



5117117

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 02
 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: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.370E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/13/2013 5:58:47 AM
 Acquisition Date/Time: 5/13/2013 6:12:26 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Effective Efficiency: 0.1940 +/- 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	5.468	10.45	68.75	2.55	0.00E+000	2.9
RA-226	4.570	-0.87	258.59	1.87	0.00E+000	2.9

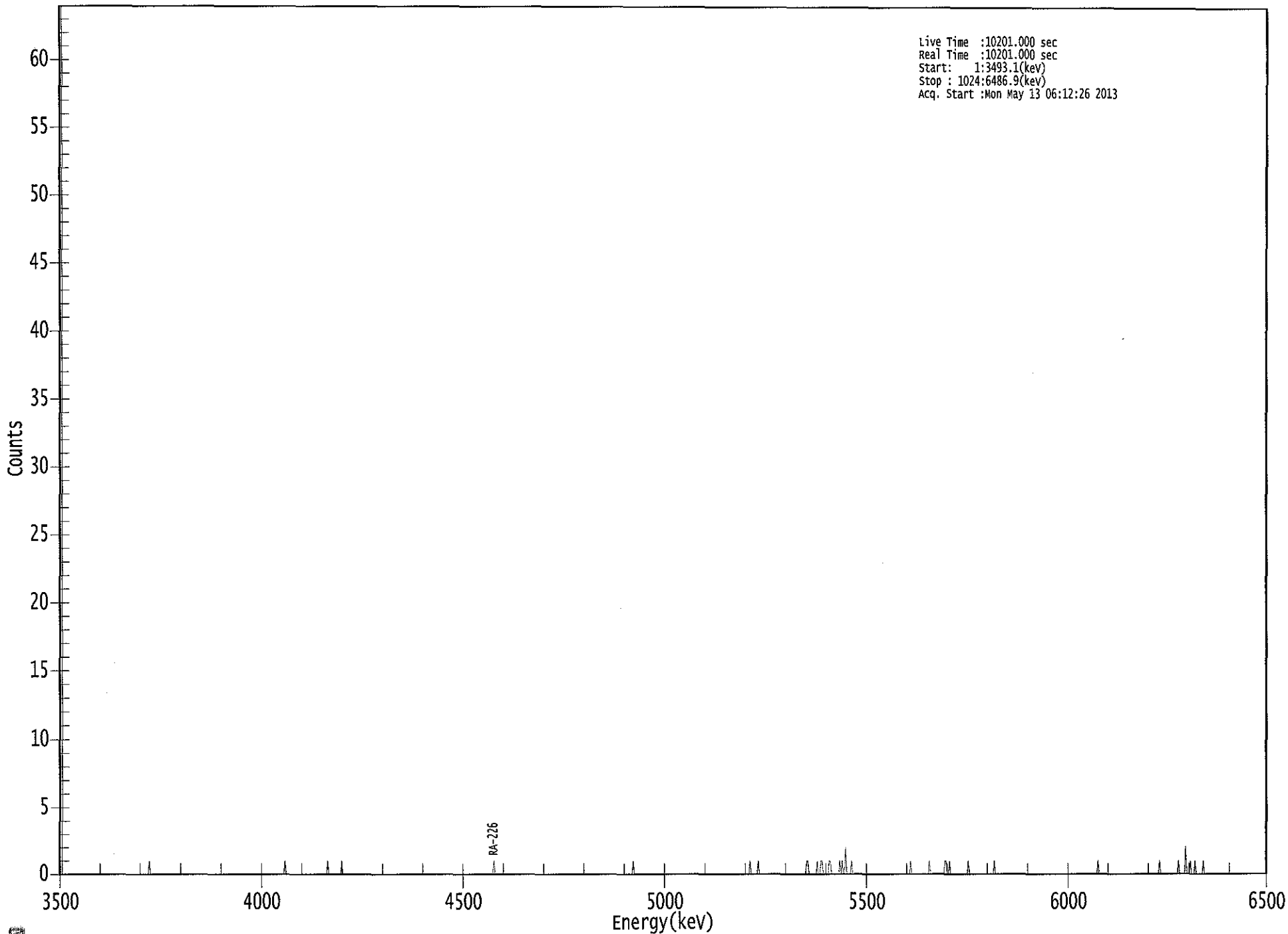
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.940	5685.50*	2.37E-001 +/- 6.07E-001	1.91E-001 +/- 4.69E-001
RA-226	0.941	4785.00*	-1.88E-002 +/- 4.86E-002	1.63E-001 +/- 5.88E-003

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 5/13/13

US EPA ARCHIVE DOCUMENT

0000057865.CNF



0335

ROI Type: 1

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

369: 1 0 0 0 0 0 0 0 0

Sample Title: 02

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

801: 0 0 0 0 0 0 0 0

Sample Title: 02

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	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	1	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	1	0	0	0
953:	0	0	2	0	0	0	1	0
961:	0	0	1	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



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8/17/12

Sample Description: PZ-208-SS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 03
 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: 2.270E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:12:21 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8529 +/- 0.0000
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Effective Efficiency: 0.1678 +/- 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	5.510	17.24	54.30	4.76	0.00E+000	2.9
RA-226	4.615	31.30	36.13	1.70	0.00E+000	2.9

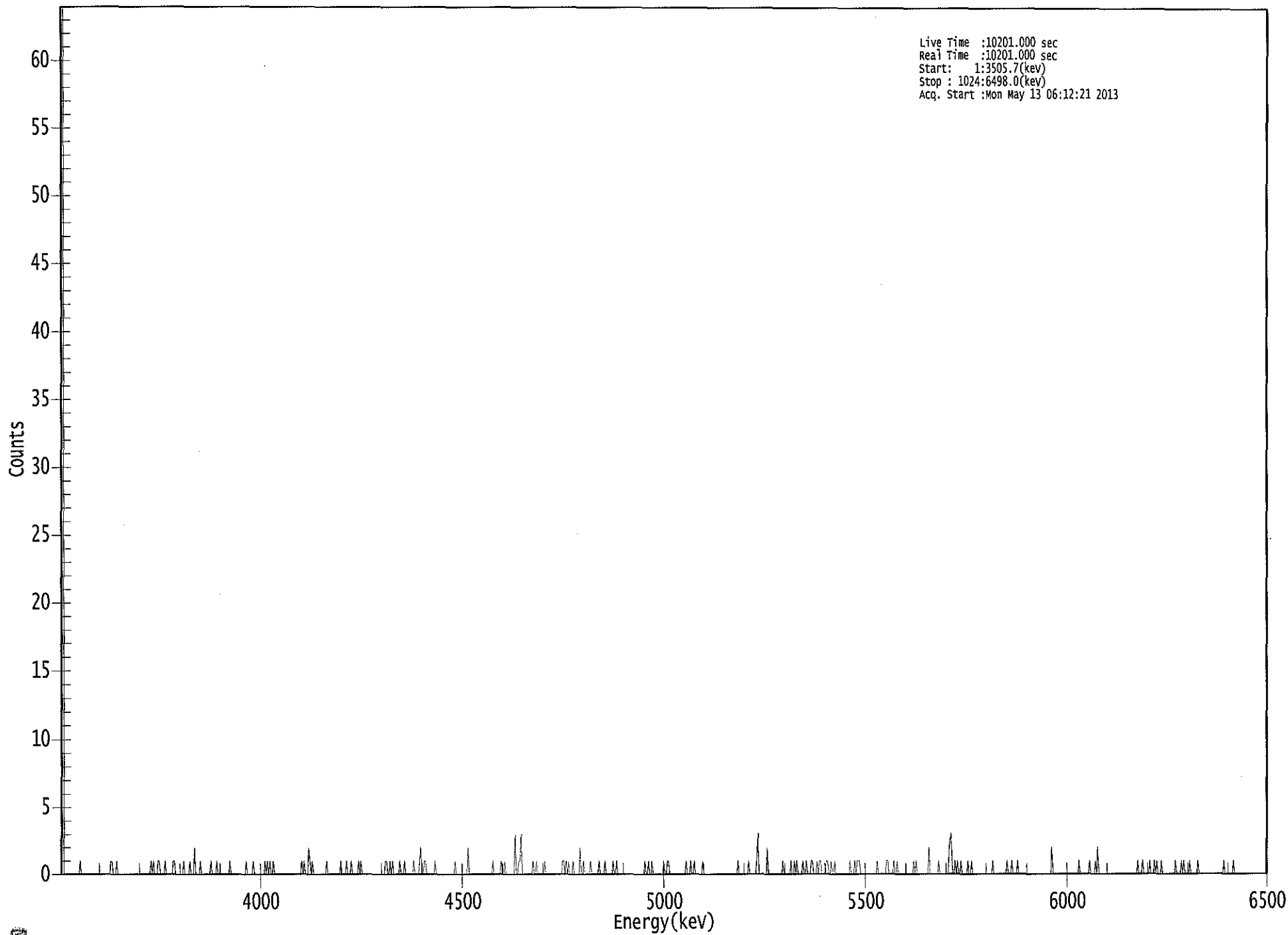
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.958	5685.50*	7.48E-001 +/- 5.60E+002	4.55E-001 +/- 3.40E+002
RA-226	0.963	4785.00*	7.48E-001 +/- 2.72E-001	1.76E-001 +/- 6.27E-003

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US EPA ARCHIVE DOCUMENT

0000057863.CNF



US EPA ARCHIVE DOCUMENT

0340
0740

ROI Type: 1

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

Sample Title: 03

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	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	1	1	0	0	0	1
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	1	0	1	0
81:	0	0	1	1	0	0	0	0
89:	1	0	0	0	0	0	0	1
97:	1	0	0	0	0	0	0	0
105:	1	0	0	0	0	1	0	0
113:	0	2	0	0	0	0	1	0
121:	0	0	0	0	0	0	0	1
129:	0	0	0	0	1	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	1	0	0
161:	0	0	0	1	0	0	0	0
169:	0	0	0	0	0	1	0	1
177:	0	1	0	0	1	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	1	0	1	0
209:	0	0	2	1	0	1	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	0	0	0	0	0
233:	0	0	0	0	0	1	0	0
241:	0	0	1	0	0	0	1	0
249:	0	0	0	0	1	0	1	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	1	1	0	0	1
281:	0	1	0	0	0	0	0	1
289:	0	0	0	1	0	0	0	0
297:	0	0	0	1	0	0	0	0
305:	1	2	0	0	1	1	0	0
313:	0	0	0	0	0	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	1	0
337:	0	0	0	0	0	0	0	0
345:	0	2	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	1	0

369: 0 0 0 0 0 1 0 0

Sample Title: 03

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

Sample Title: 03

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	1	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	2	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	1
865:	0	0	0	0	0	0	0	0
873:	1	0	0	0	0	1	0	2
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	1	0	0
921:	0	0	0	1	0	0	0	1
929:	0	1	0	0	0	1	0	0
937:	0	0	0	0	0	0	0	0
945:	0	1	0	0	0	0	1	0
953:	1	0	0	0	0	1	0	0
961:	0	0	0	0	1	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	1	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



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Sample Description: PZ-208-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 04
 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: 2.370E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:12:22 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8767 +/- 0.0000
 Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
 Effective Efficiency: 0.1730 +/- 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	5.481	16.75	54.54	4.25	0.00E+000	4.0
RA-226	4.612	47.15	28.84	0.85	0.00E+000	2.7

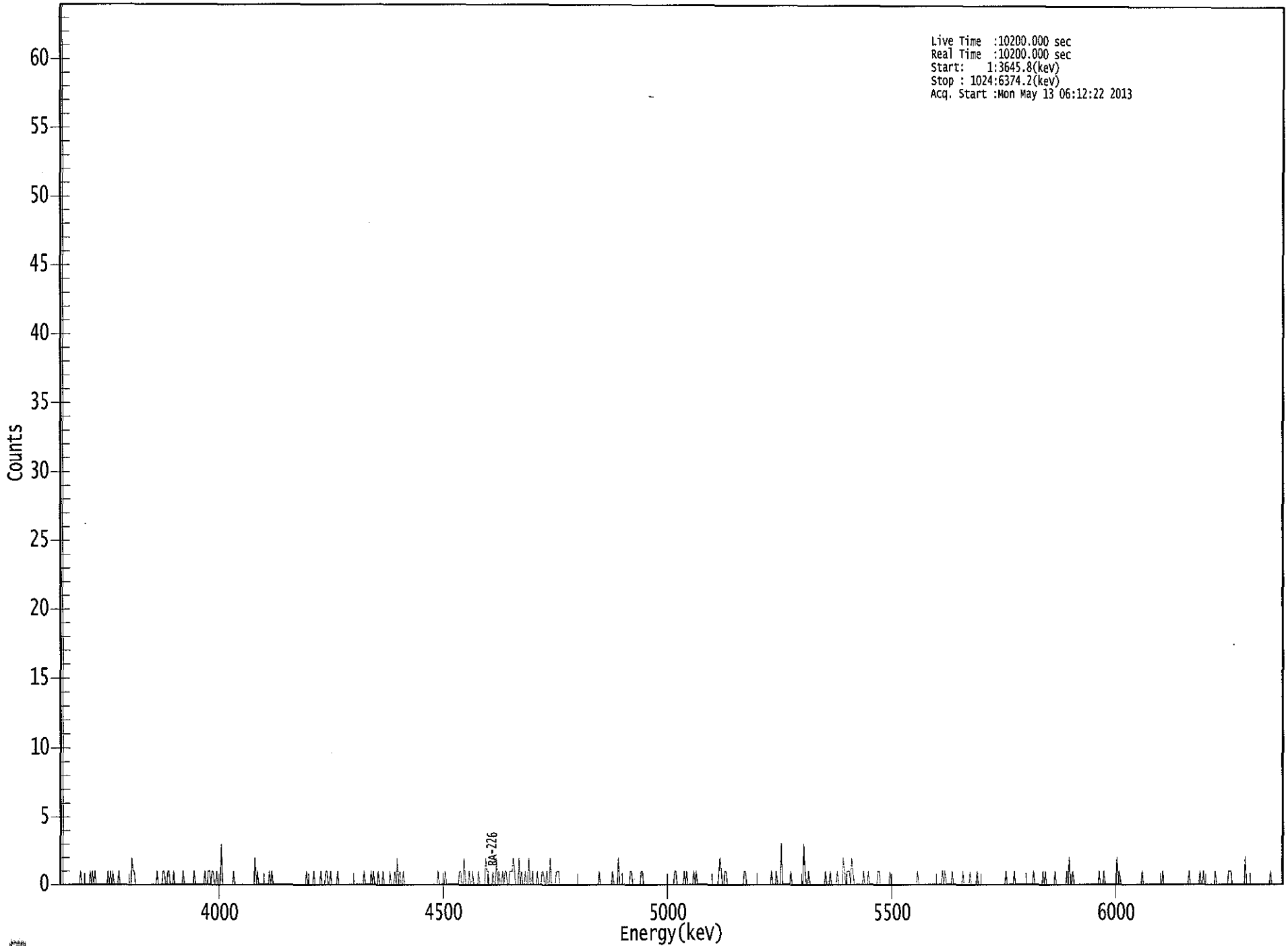
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.944	5685.50*	7.36E-001 +/- 5.51E+002	4.41E-001 +/- 3.30E+002
RA-226	0.962	4785.00*	1.14E+000 +/- 3.32E-001	1.45E-001 +/- 5.98E-003

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US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3645.8(kev)
Stop : 1024:6374.2(kev)
Acq. Start :Mon May 13 06:12:22 2013



US EPA ARCHIVE DOCUMENT

57866

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

369: 0 0 1 0 1 1 0 0

Sample Title: 04

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 04

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



C
5/13/13

Sample Description: PZ-208-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_013
 Chamber Serial Number:
 Detector Serial Number: 13
 Env. Background: System Bkgd 56974
 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: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:12:23 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9497 +/- 0.0000
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Effective Efficiency: 0.1775 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

 ----- PEAK AREA REPORT -----

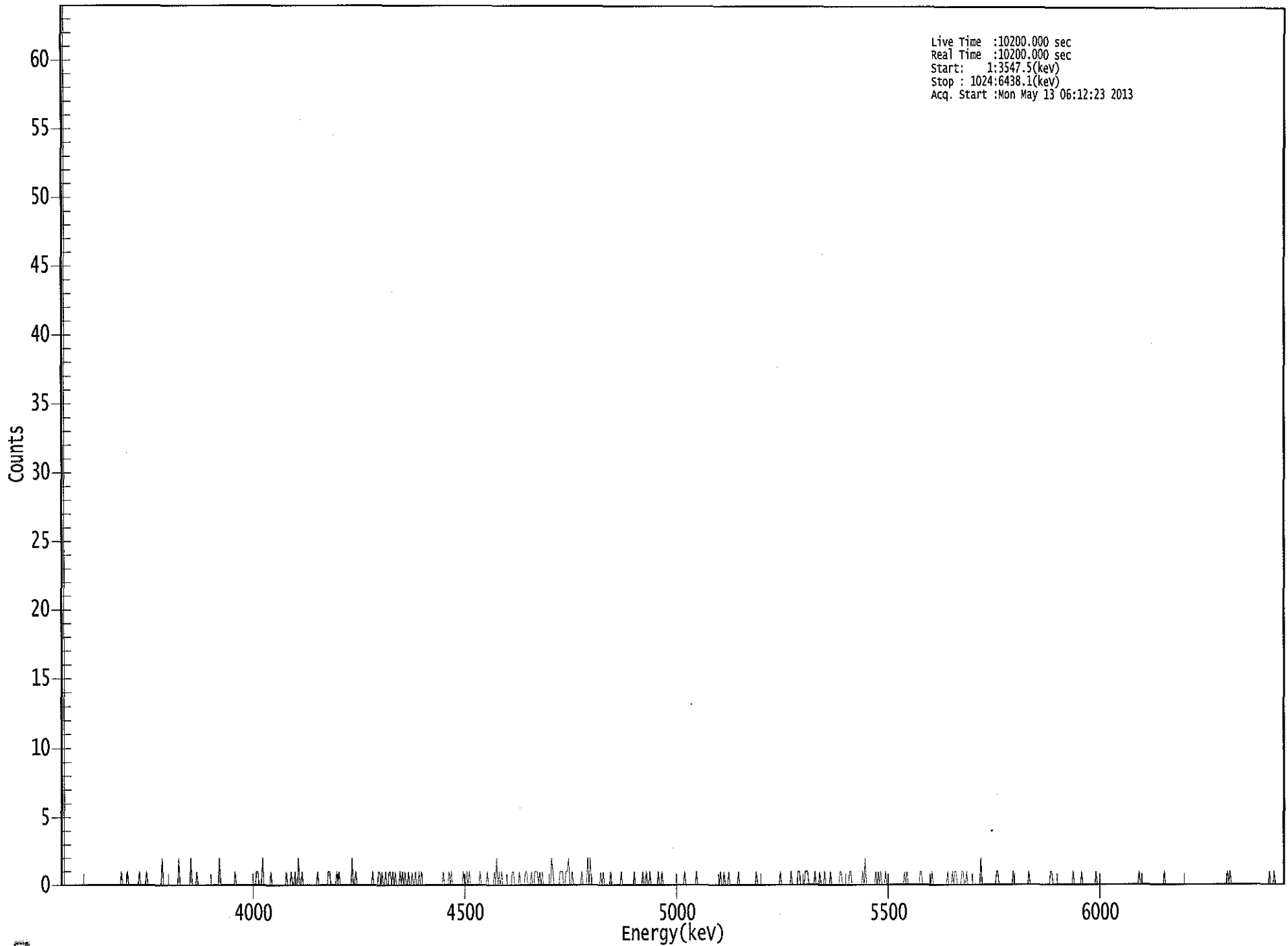
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.537	19.94	47.67	3.06	0.00E+000	2.8
RA-226	4.636	44.98	29.61	1.02	0.00E+000	2.8

 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	8.54E-001 +/- 6.39E+002	3.83E-001 +/- 2.86E+002
RA-226	0.971	4785.00*	1.06E+000 +/- 3.16E-001	1.49E-001 +/- 5.38E-003

AG
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US EPA ARCHIVE DOCUMENT



0350

ROI Type: 1

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 0 0 0 0 0 0 0

Sample Title: 05

Channel	1	2	3	4	5	6	7	8	9
377:	0	1	1	0	0	0	0	1	
385:	0	0	0	0	1	1	0	0	
393:	0	1	0	0	1	1	1	0	
401:	1	0	1	0	0	0	0	0	
409:	0	0	2	1	0	0	0	0	
417:	0	1	1	1	0	0	1	1	
425:	2	0	0	1	0	0	0	0	
433:	0	0	0	1	0	0	0	0	
441:	2	0	2	0	0	0	0	0	
449:	0	0	0	1	0	1	0	0	
457:	0	0	0	1	0	0	0	0	
465:	0	0	0	0	1	0	0	0	
473:	0	0	0	0	0	0	0	1	
481:	0	0	0	0	0	0	1	0	
489:	0	1	0	0	1	0	0	0	
497:	0	0	0	1	0	0	1	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	1	0	0	0	0	
537:	0	0	0	0	0	0	0	0	
545:	0	0	0	0	0	0	0	1	
553:	0	0	1	0	0	0	1	0	
561:	0	0	0	0	0	0	1	0	
569:	0	0	0	0	0	0	0	0	
577:	0	0	0	0	0	1	0	0	
585:	0	0	0	0	0	0	0	0	
593:	0	0	0	0	0	0	0	0	
601:	0	1	0	0	0	0	0	0	
609:	0	0	1	0	0	0	0	0	
617:	1	1	0	0	0	0	1	1	
625:	1	0	0	0	0	0	1	0	
633:	0	0	1	0	0	0	1	0	
641:	0	0	0	1	0	0	0	0	
649:	0	0	0	1	1	0	0	0	
657:	0	0	0	1	1	0	0	0	
665:	0	0	0	0	0	0	1	0	
673:	2	0	0	0	0	0	0	0	
681:	0	1	0	1	0	1	0	0	
689:	0	1	0	0	0	0	0	0	
697:	0	0	0	0	0	0	0	0	
705:	0	1	0	1	0	0	0	0	
713:	0	0	0	0	0	0	1	1	
721:	0	0	0	0	0	0	0	0	
729:	1	0	0	0	0	0	0	0	
737:	0	0	0	0	0	1	0	0	
745:	0	1	0	1	1	0	0	0	
753:	0	1	1	0	0	1	0	0	
761:	0	0	0	0	0	0	0	0	
769:	0	2	0	0	0	0	0	0	
777:	0	0	0	0	0	0	1	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: 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	1	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	1	0	0
857:	0	0	0	0	0	0	0	0
865:	0	1	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	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	1	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	1
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	1	0	0	0	1	0
1017:	0	0	0	0	0	0	0	0

C
5/13/13

Sample Description: PZ-101-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.120E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:12:24 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9628 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Effective Efficiency: 0.1777 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

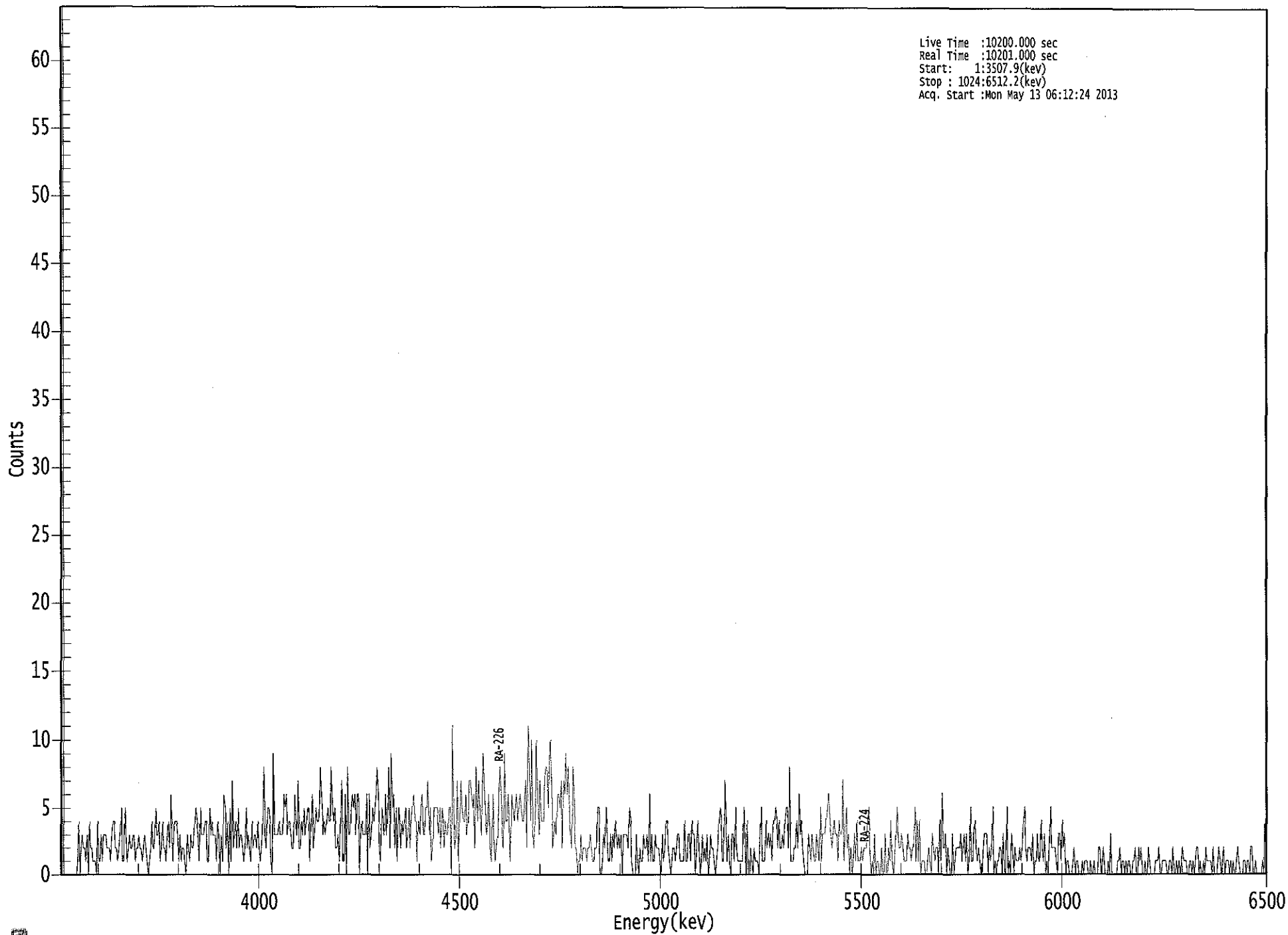
 ----- PEAK AREA REPORT -----

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.512	217.26	13.43	3.74	0.00E+000	4.3
RA-226	4.601	705.62	7.39	2.38	0.00E+000	3.8

 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.958	5685.50*	1.22E+001 +/- 9.16E+003	5.40E-001 +/- 4.04E+002
RA-226	0.957	4785.00*	2.19E+001 +/- 1.80E+000	2.54E-001 +/- 9.24E-003

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5/13/13



0353

ROI Type: 1

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

Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 10201

Channel	10201	10200							
1:	10201	10200	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	1	4	
17:	0	2	3	2	2	1	3	0	
25:	4	2	2	1	1	1	0	4	
33:	1	1	3	1	3	3	3	2	
41:	2	2	1	3	4	4	2	2	
49:	1	2	3	5	1	1	5	3	
57:	1	2	3	2	2	3	3	1	
65:	2	2	3	2	2	1	2	3	
73:	2	1	0	1	2	4	2	2	
81:	5	3	3	4	1	2	4	2	
89:	2	1	3	4	2	6	3	1	
97:	4	4	4	3	1	3	1	2	
105:	2	1	0	3	2	1	3	2	
113:	2	4	5	4	3	1	5	3	
121:	3	3	4	4	1	1	5	3	
129:	4	3	3	3	1	4	3	0	
137:	3	1	6	5	2	4	0	5	
145:	1	7	2	3	4	2	5	2	
153:	3	3	2	1	2	5	2	3	
161:	2	1	4	2	3	3	2	4	
169:	2	1	2	4	8	3	2	5	
177:	5	4	1	0	9	3	3	3	
185:	3	4	3	3	3	6	5	6	
193:	3	4	4	3	2	2	6	4	
201:	3	7	2	2	4	3	5	3	
209:	4	5	5	1	4	6	2	3	
217:	5	4	4	5	8	6	3	4	
225:	3	4	5	4	4	8	5	4	
233:	5	2	2	3	1	4	7	1	
241:	1	6	0	8	3	3	5	6	
249:	5	6	3	6	6	0	3	4	
257:	3	3	3	6	0	6	2	3	
265:	5	4	5	6	8	6	2	1	
273:	5	4	3	6	3	5	8	2	
281:	9	5	6	2	5	1	5	4	
289:	2	4	3	4	5	2	3	5	
297:	2	4	5	6	4	4	1	4	
305:	3	5	6	3	3	5	5	7	
313:	3	5	1	2	5	5	5	5	
321:	3	5	2	5	4	2	4	3	
329:	3	5	5	0	11	4	2	3	
337:	7	1	4	7	5	4	4	6	
345:	3	4	7	7	6	5	6	2	
353:	8	4	7	5	3	6	9	6	
361:	4	3	4	6	2	1	6	3	

369: 1 2 3 6 8 6 3 2

Sample Title: 06

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

801: 0 0 5 0 1 0 3 2

Sample Title: 06

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



2
5/17/13

Sample Description: PZ-101-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 07
 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: 2.820E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:01 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9568 +/- 0.0000
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
 Effective Efficiency: 0.1746 +/- 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	5.505	218.98	13.28	1.02	0.00E+000	5.9
RA-226	4.596	815.83	6.86	0.17	0.00E+000	5.1

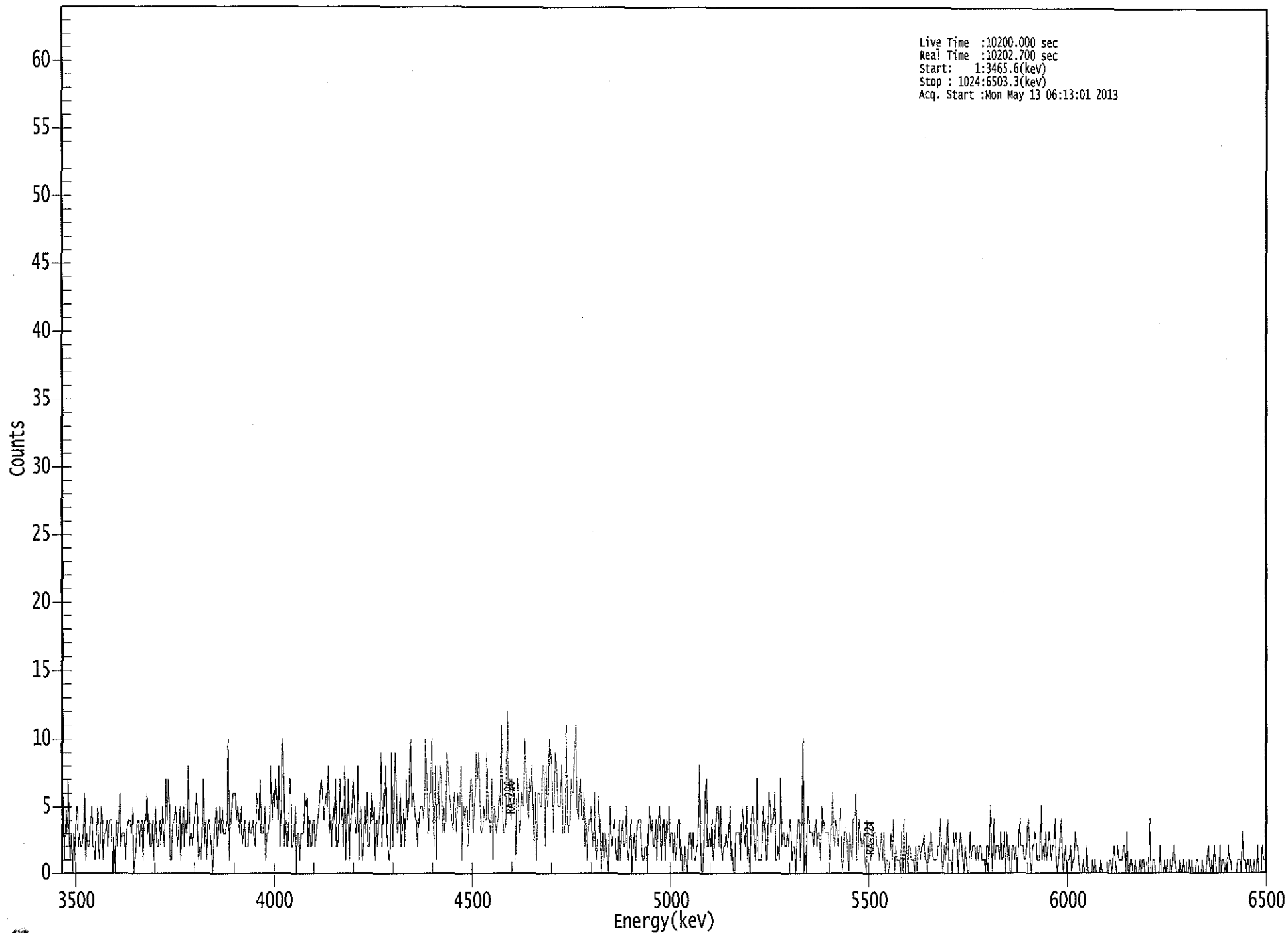
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.955	5685.50*	1.14E+001 +/- 8.50E+003	3.27E-001 +/- 2.44E+002
RA-226	0.954	4785.00*	2.33E+001 +/- 1.79E+000	1.19E-001 +/- 4.10E-003

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5/13/13

US EPA ARCHIVE DOCUMENT

0000057875.CNF



0360

ROI Type: 1

 ***** 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: 10203

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

369: 4 3 4 6 5 11 4 3

Sample Title: 07

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

801: 3 0 3 1 2 0 0 2

Sample Title: 07

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



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5/17/13

Sample Description: MW-1204 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 08
 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: 2.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:03 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.3688 +/- 0.0000
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Effective Efficiency: 0.0684 +/- 0.0012

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	5.460	10.66	61.14	0.34	0.00E+000	4.5
RA-226	4.610	64.66	24.45	0.34	0.00E+000	3.7

 NUCLIDE ANALYSIS RESULTS

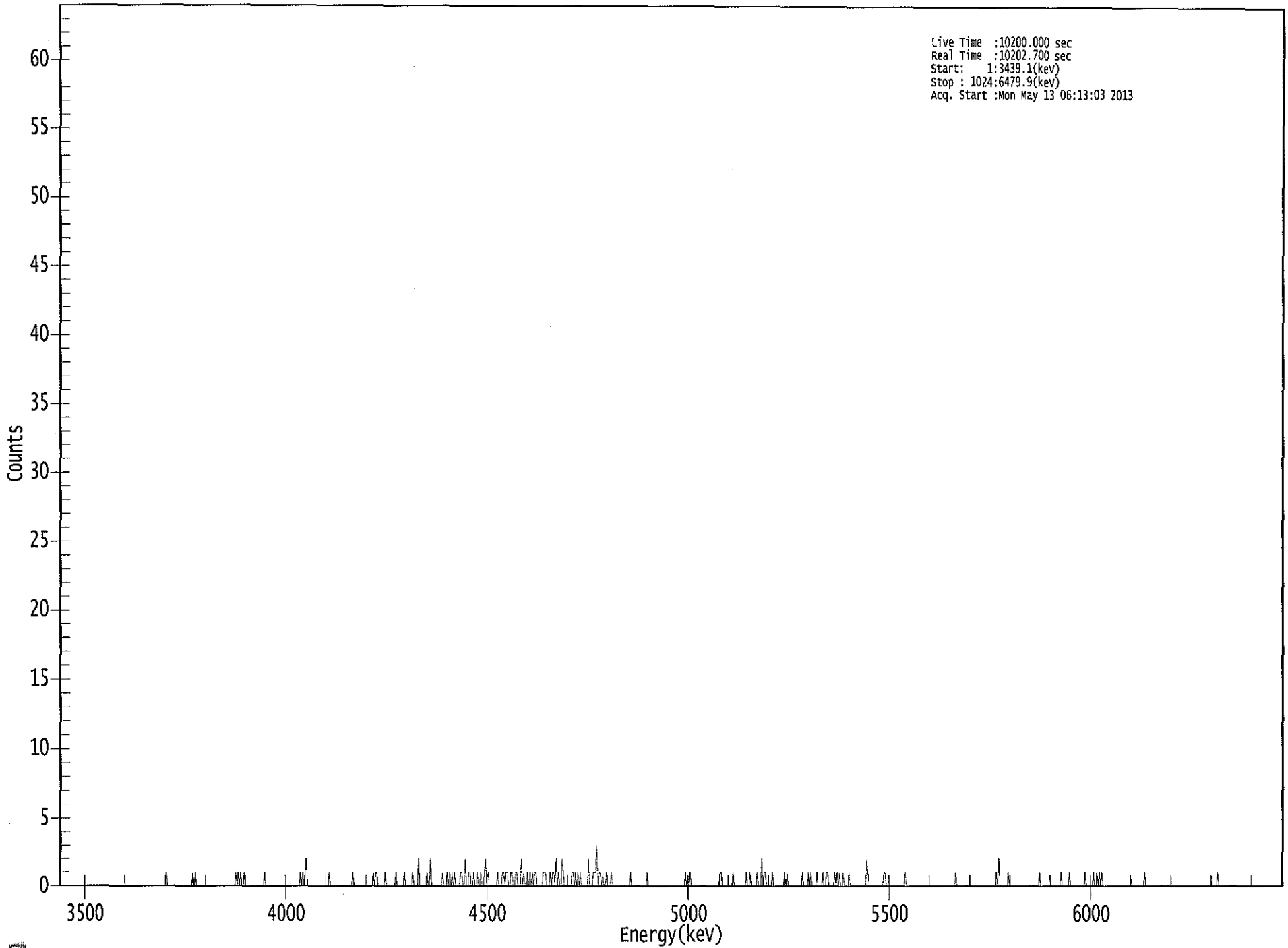
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.933	5685.50*	1.00E+000 +/- 7.48E+002	4.48E-001 +/- 3.36E+002
RA-226	0.961	4785.00*	3.34E+000 +/- 8.24E-001	2.47E-001 +/- 8.42E-003

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5/13/13

US EPA ARCHIVE DOCUMENT

0000057876.CNF

Live Time :10200.000 sec
Real Time :10202.700 sec
Start: 1:3439.1(keV)
Stop : 1024:6479.9(keV)
Acq. Start :Mon May 13 06:13:03 2013



US EPA ARCHIVE DOCUMENT

0355

ROI Type: 1

***** 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: 10203

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

369: 0 0 1 1 0 1 1 0

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	0	0
841:	0	0	0	0	1	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	1	0	0	0	0	0	0
865:	1	0	0	1	0	1	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	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	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	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



C
T117107

Sample Description: MW-1204 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 09
 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: 2.610E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:04 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9525 +/- 0.0000
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Effective Efficiency: 0.1739 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.523	39.00	31.78	0.00	0.00E+000	2.9
RA-226	4.578	109.32	18.81	0.68	0.00E+000	3.4

 NUCLIDE ANALYSIS RESULTS

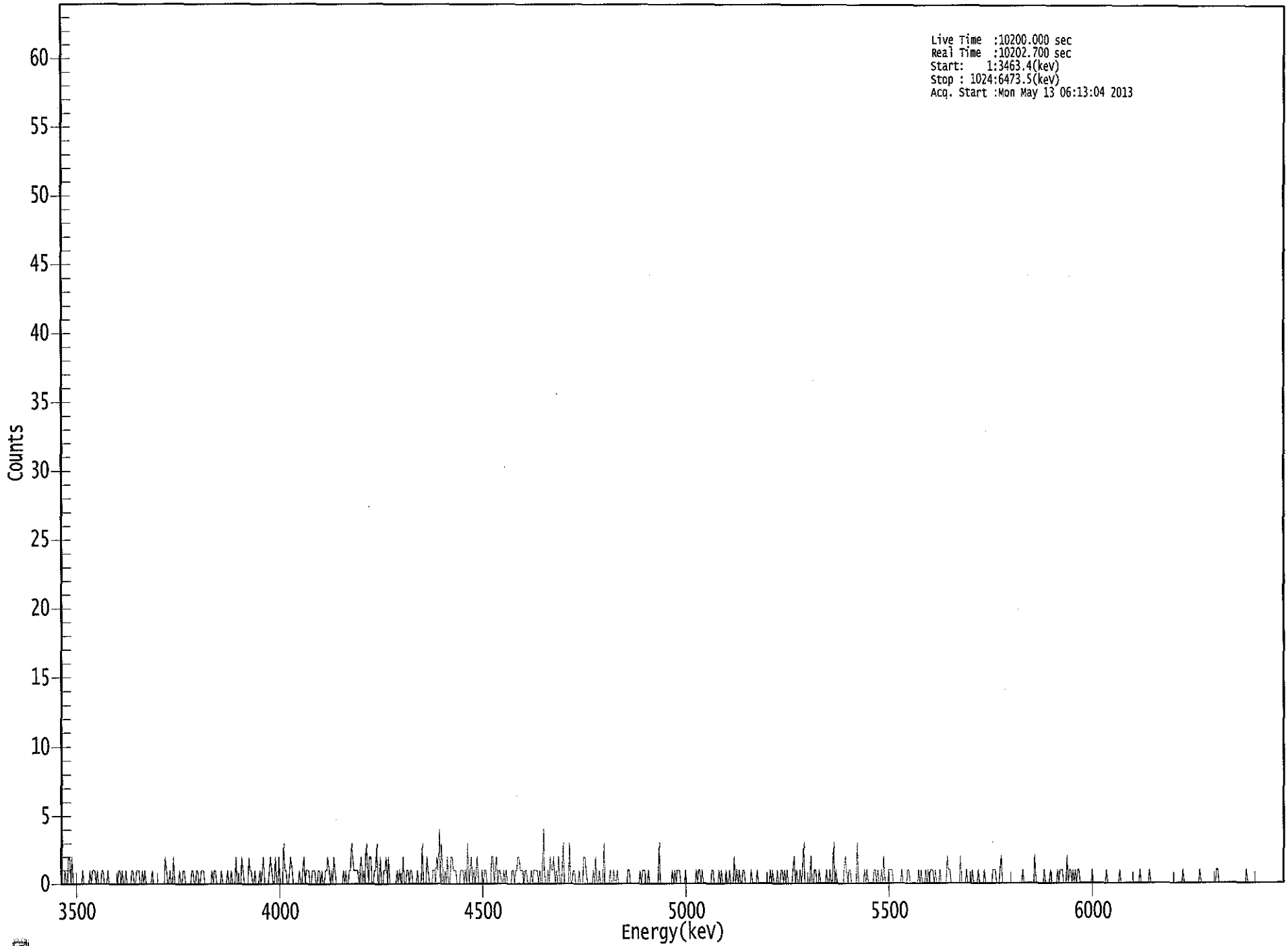
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.963	5685.50*	1.88E+000 +/- 1.41E+003	2.89E-001 +/- 2.16E+002
RA-226	0.946	4785.00*	2.90E+000 +/- 5.54E-001	1.50E-001 +/- 5.12E-003

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5/13/13

US EPA ARCHIVE DOCUMENT

0000057874.CNF

Live Time :10200.000 sec
Real Time :10202.700 sec
Start: 1:3463.4(keV)
Stop : 1024:6473.5(keV)
Acq. Start :Mon May 13 06:13:04 2013



US EPA ARCHIVE DOCUMENT

0370

ROI Type: 1

 ***** 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: 10203

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

369: 0 0 1 0 1 0 0 0

Sample Title: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	1	1	0	1	1	2	2
385:	1	1	1	0	1	1	0	0
393:	0	1	0	1	1	1	1	0
401:	1	0	0	4	1	0	0	1
409:	0	2	1	1	2	0	1	0
417:	2	0	0	1	3	0	0	0
425:	0	3	0	0	1	1	0	0
433:	0	1	0	0	0	2	2	1
441:	0	0	0	0	0	1	0	2
449:	0	0	1	0	0	0	3	0
457:	0	0	0	1	0	0	1	0
465:	0	1	0	0	0	0	0	0
473:	0	0	1	1	0	0	0	0
481:	0	0	0	0	1	0	1	1
489:	1	0	0	1	0	0	0	0
497:	0	0	0	0	3	0	0	0
505:	0	0	0	0	0	0	0	1
513:	0	1	0	1	1	1	0	0
521:	0	0	1	0	0	0	0	0
529:	0	0	0	1	0	1	1	0
537:	1	0	0	0	0	0	0	0
545:	1	1	0	0	0	0	1	0
553:	1	0	0	0	1	0	0	1
561:	0	0	0	2	0	1	0	1
569:	0	0	1	1	0	0	0	0
577:	0	1	0	0	0	0	1	0
585:	0	0	0	0	0	0	0	0
593:	0	1	0	1	0	0	0	1
601:	0	0	1	1	0	1	0	1
609:	0	0	0	0	1	2	0	1
617:	0	0	1	0	1	3	0	0
625:	0	0	0	2	0	0	1	1
633:	0	0	1	0	0	0	0	0
641:	1	0	0	1	0	0	3	0
649:	1	0	0	0	0	0	0	1
657:	2	1	0	1	1	0	0	0
665:	0	0	3	0	0	0	0	0
673:	1	0	1	0	0	0	0	0
681:	1	1	0	1	0	0	1	0
689:	2	0	0	0	1	1	1	1
697:	0	0	0	0	0	0	0	1
705:	0	0	0	0	1	1	0	0
713:	0	0	0	0	0	1	0	1
721:	0	0	0	1	0	1	0	1
729:	1	1	0	1	0	0	0	1
737:	0	0	0	0	0	2	1	1
745:	0	0	0	0	0	0	0	0
753:	2	0	0	0	0	1	0	0
761:	0	0	1	0	0	0	0	1
769:	0	0	0	0	1	0	0	0
777:	0	0	0	1	1	1	0	0
785:	0	1	2	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: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	2	0
817:	0	0	0	0	0	0	1	0
825:	0	0	0	1	0	0	0	0
833:	0	1	0	1	1	1	0	0
841:	0	2	0	1	1	0	1	0
849:	1	0	1	1	0	0	0	0
857:	0	0	0	0	0	0	1	0
865:	0	0	0	0	0	0	0	0
873:	0	0	1	0	0	0	0	0
881:	0	0	0	0	0	1	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	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	1	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	1	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	1	1
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	1
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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5/13/13

Sample Description: PZ-113-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 10
 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: 2.120E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:06 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.7156 +/- 0.0000
 Counting Efficiency: 0.1975 +/- 0.0034 on 4/20/2013 2:01:29 PM
 Effective Efficiency: 0.1414 +/- 0.0024

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

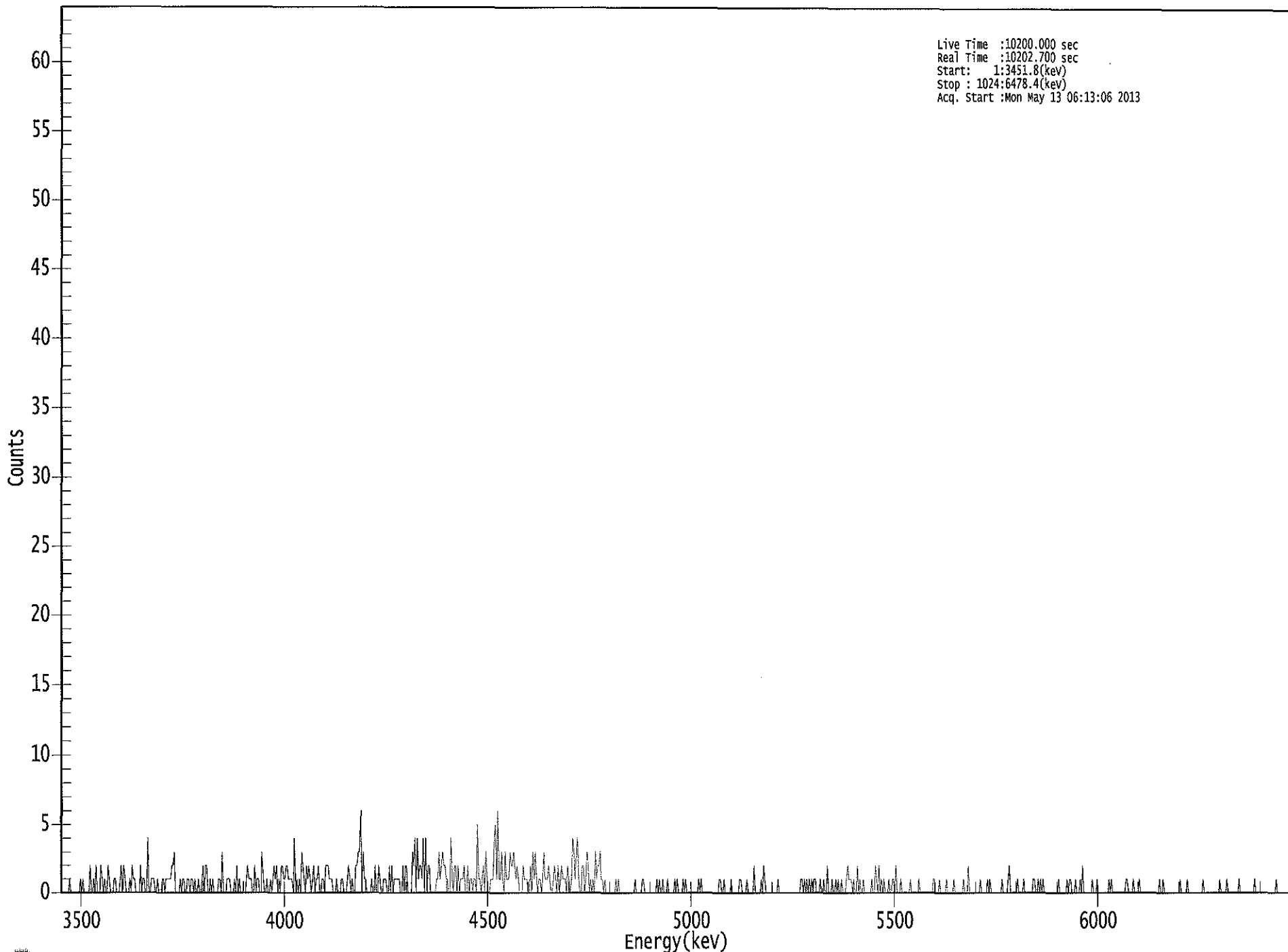
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.491	35.32	33.35	0.68	0.00E+000	5.9
RA-226	4.582	185.81	14.43	1.19	0.00E+000	3.6

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.949	5685.50*	1.70E+000 +/- 1.27E+003	2.71E-001 +/- 2.03E+002
RA-226	0.948	4785.00*	4.92E+000 +/- 7.30E-001	1.75E-001 +/- 5.92E-003

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US EPA ARCHIVE DOCUMENT



0375

ROI Type: 1

 ***** 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: 10203

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

369: 0 3 1 1 1 3 2 2

Sample Title: 10

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

801: 1 0 0 0 0 0 0 0

Sample Title: 10

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



C
J11717

Sample Description: PZ-113-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 11
 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: 2.440E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:07 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8620 +/- 0.0000
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Effective Efficiency: 0.1537 +/- 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	5.495	27.66	37.53	0.34	0.00E+000	3.7
RA-226	4.597	88.49	20.91	0.51	0.00E+000	5.1

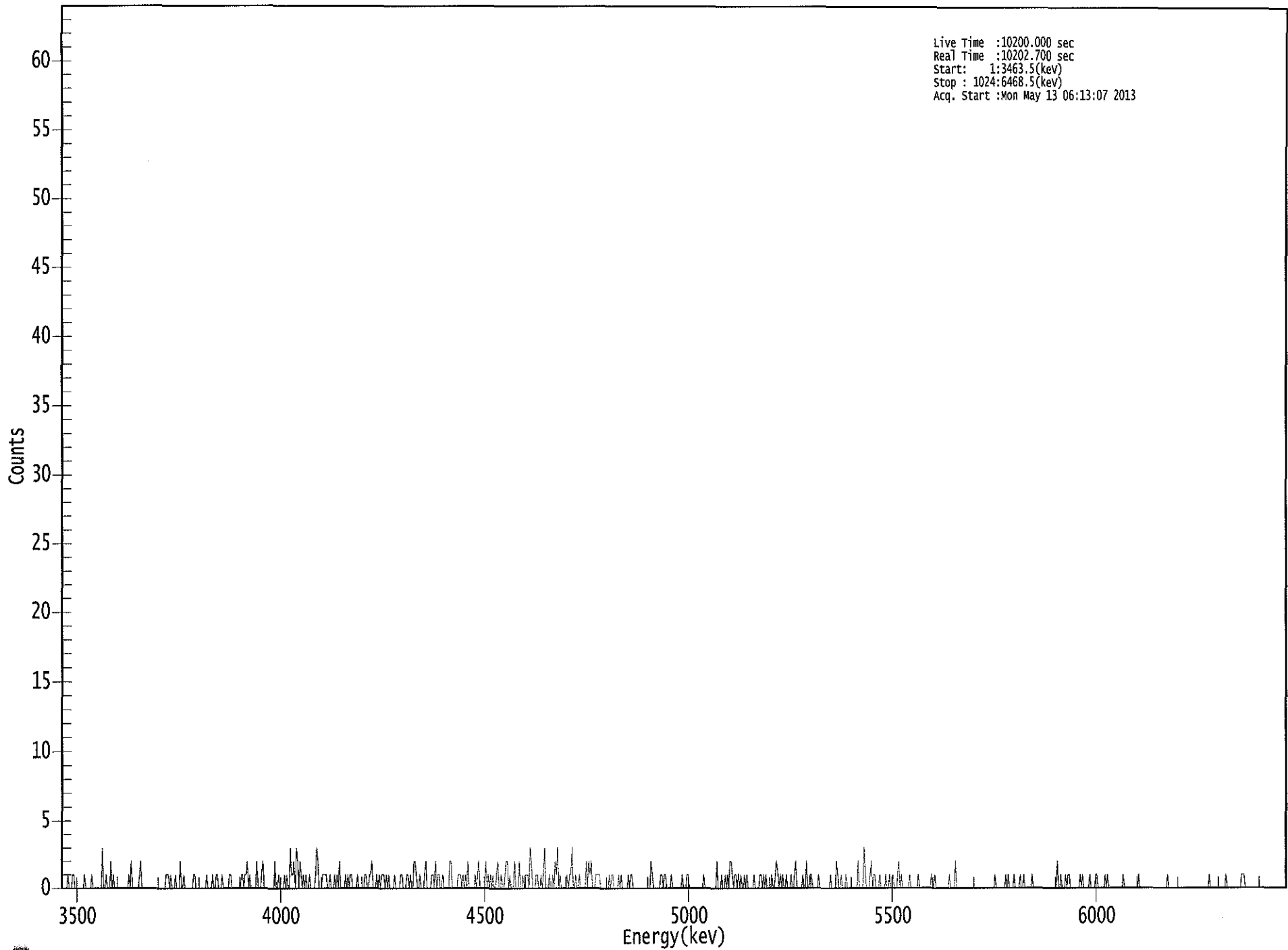
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.951	5685.50*	1.41E+000 +/- 1.05E+003	2.44E-001 +/- 1.82E+002
RA-226	0.955	4785.00*	2.48E+000 +/- 5.27E-001	1.47E-001 +/- 5.36E-003

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US EPA ARCHIVE DOCUMENT

0000057871.CNF



0380

ROI Type: 1

 ***** 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: 10203

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

369: 0 0 1 2 2 0 1 0

Sample Title: 11

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

801: 1 0 0 1 0 0 0 0

Sample Title: 11

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	2
833:	0	0	1	0	0	0	1	0
841:	1	1	0	0	0	0	0	0
849:	0	0	1	0	1	0	0	0
857:	0	0	1	0	0	0	0	1
865:	1	0	0	0	0	0	0	1
873:	0	1	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	1	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	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	0	1	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	1	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	1	1	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



5/13/13

Sample Description: I-73 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 12
 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: 2.610E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:09 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.7998 +/- 0.0000
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Effective Efficiency: 0.1377 +/- 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	5.527	14.66	51.88	0.34	0.00E+000	3.0
RA-226	4.595	53.49	26.95	0.51	0.00E+000	3.0

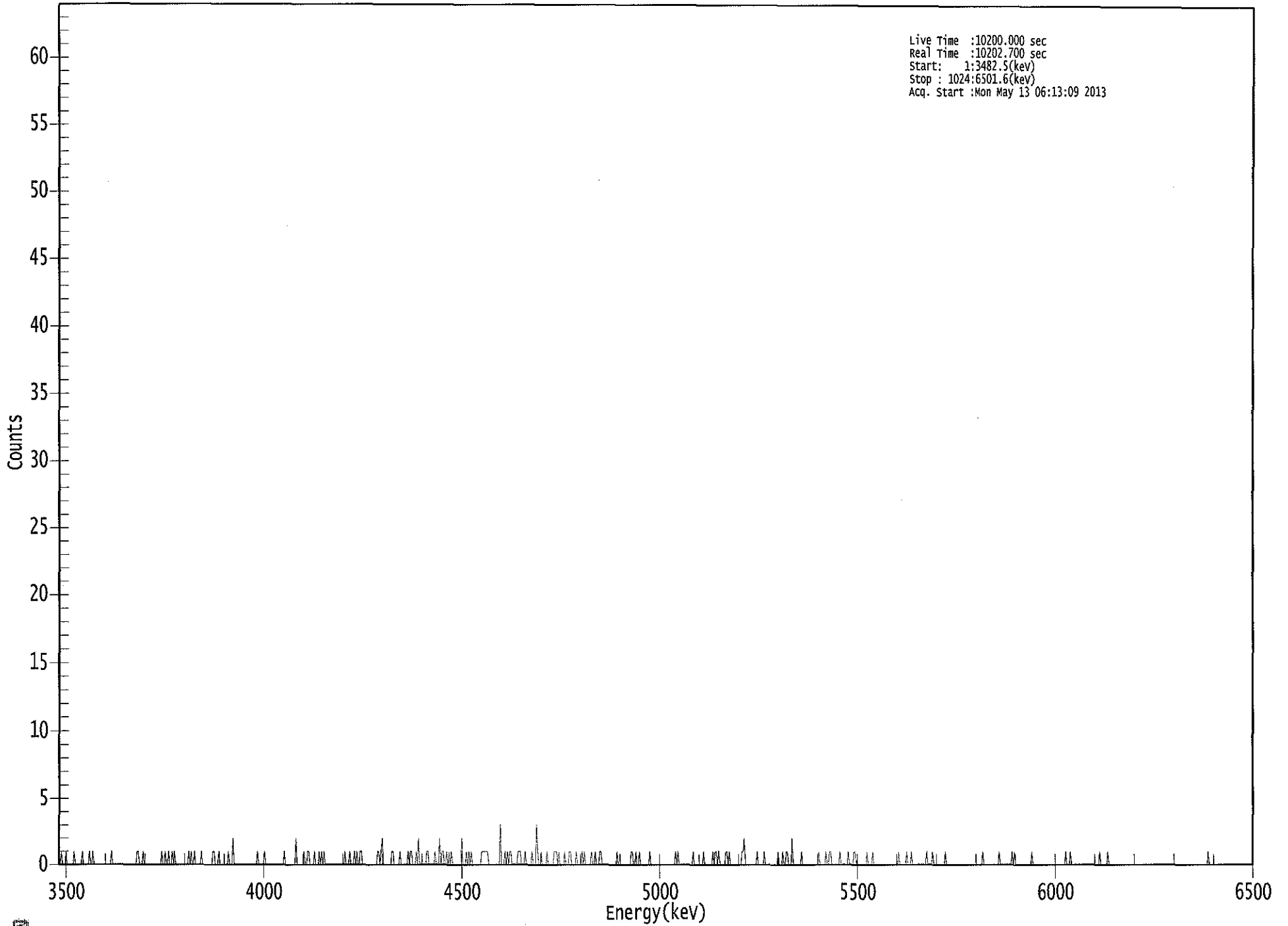
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.965	5685.50*	8.92E-001 +/- 6.68E+002	2.91E-001 +/- 2.18E+002
RA-226	0.954	4785.00*	1.79E+000 +/- 4.87E-001	1.76E-001 +/- 6.05E-003

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Live Time :10200.000 sec
Real Time :10202.700 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :Mon May 13 06:13:09 2013



US EPA ARCHIVE DOCUMENT

0385

ROI Type: 1

 ***** 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: 10203

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 12

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

801: 0 0 0 0 0 1 0 0

Sample Title: 12

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

5/17/13

Sample Description: I-73 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 13
 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: 2.940E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:11 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9146 +/- 0.0000
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Effective Efficiency: 0.1797 +/- 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	5.530	8.64	72.56	1.36	0.00E+000	3.0
RA-226	4.588	36.15	33.04	0.85	0.00E+000	4.5

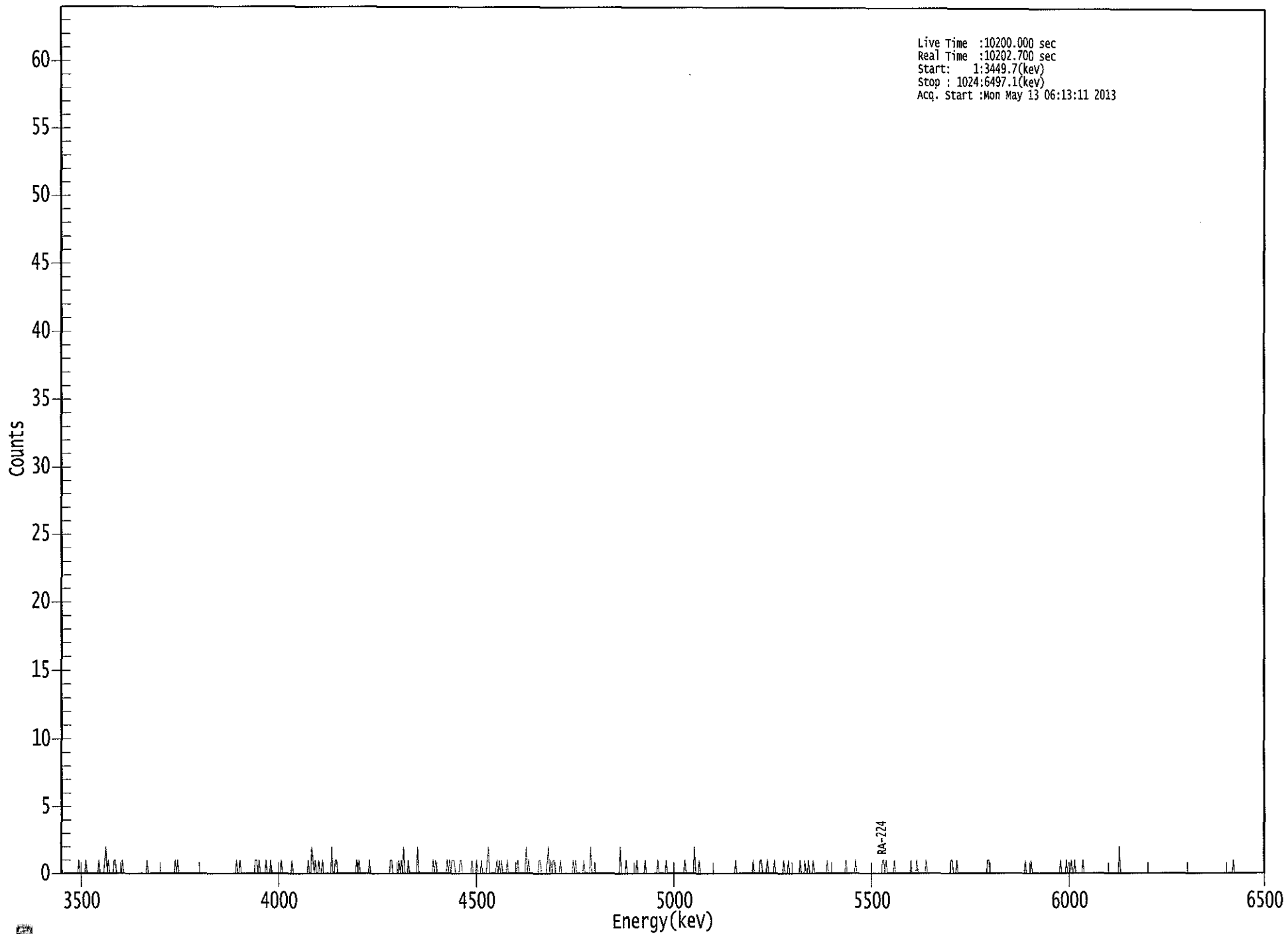
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.966	5685.50*	4.54E-001 +/- 3.40E+002	3.60E-001 +/- 2.69E+002
RA-226	0.950	4785.00*	1.04E+000 +/- 3.47E-001	1.73E-001 +/- 5.87E-003

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US EPA ARCHIVE DOCUMENT

0000057877.CNF



0520

ROI Type: 1

 ***** 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: 10203

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

369: 0 0 1 0 1 0 1 0

Sample Title: 13

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	1	0	0	0	0
385:	0	0	0	0	1	0	0	0
393:	0	0	0	2	0	1	0	0
401:	0	0	0	0	0	0	1	1
409:	0	0	0	0	0	1	2	0
417:	1	0	1	1	0	0	0	0
425:	1	0	0	0	0	0	0	0
433:	0	0	0	1	0	1	0	0
441:	0	0	0	0	1	0	0	0
449:	0	0	2	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	2	0	0	0	0
481:	1	0	0	0	0	0	0	0
489:	0	1	0	0	0	0	0	0
497:	1	0	0	0	0	0	0	0
505:	0	0	0	1	0	0	0	0
513:	0	0	1	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	1	0	0	0	0	0
537:	0	0	2	0	0	0	1	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	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	1	0	0	0
593:	0	0	1	1	0	0	0	0
601:	1	0	0	0	0	0	1	0
609:	0	0	0	0	0	0	1	0
617:	0	0	1	0	0	0	0	0
625:	0	0	0	0	1	0	0	0
633:	1	0	0	1	0	0	0	1
641:	0	0	0	0	0	0	0	0
649:	0	0	0	1	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	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	0
697:	0	0	1	1	0	1	0	0
705:	0	0	0	0	1	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	1	0	0	0	0	1
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	1	1	0	0
761:	0	1	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	1	1	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 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	1	0	0	0	0
825:	1	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	1	0
857:	0	0	1	0	0	1	0	0
865:	0	0	0	0	1	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	2	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	1	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

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16710

Sample Description: PZ-113-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 14
 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: 2.740E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:12 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9390 +/- 0.0000
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Effective Efficiency: 0.1784 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

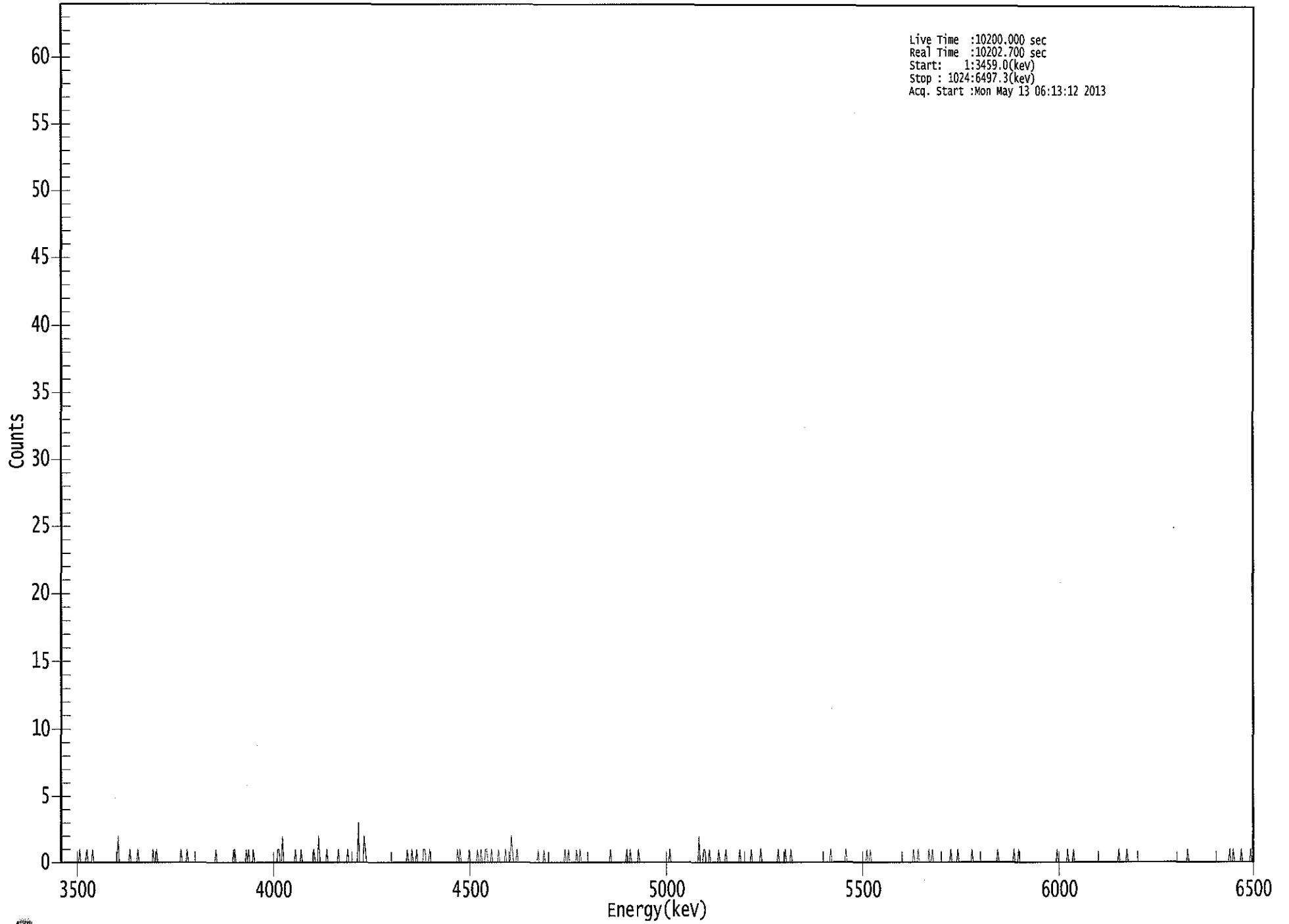
 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.566	7.83	70.93	0.17	0.00E+000	3.0
RA-226	4.578	22.49	41.87	0.51	0.00E+000	4.5

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.978	5685.50*	3.86E-001 +/- 2.89E+002	2.06E-001 +/- 1.54E+002
RA-226	0.946	4785.00*	6.10E-001 +/- 2.56E-001	1.42E-001 +/- 4.84E-003

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5/13/13



0395

ROI Type: 1

 ***** 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: 10203

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

369: 0 1 0 0 0 0 0 0 1

Sample Title: 14

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

Sample Title: 14

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	1	0	0	0	1	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	1	0
857:	0	0	0	0	0	0	0	1
865:	0	0	0	0	1	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	1	0	0	0	0
913:	0	0	1	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	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	1	0	0	1	0	0
1009:	0	0	0	0	1	0	0	0
1017:	0	0	0	0	1	0	0	0



5117117

Sample Description: PZ-113-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 15
 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: 2.690E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:14 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8814 +/- 0.0000
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Effective Efficiency: 0.1744 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

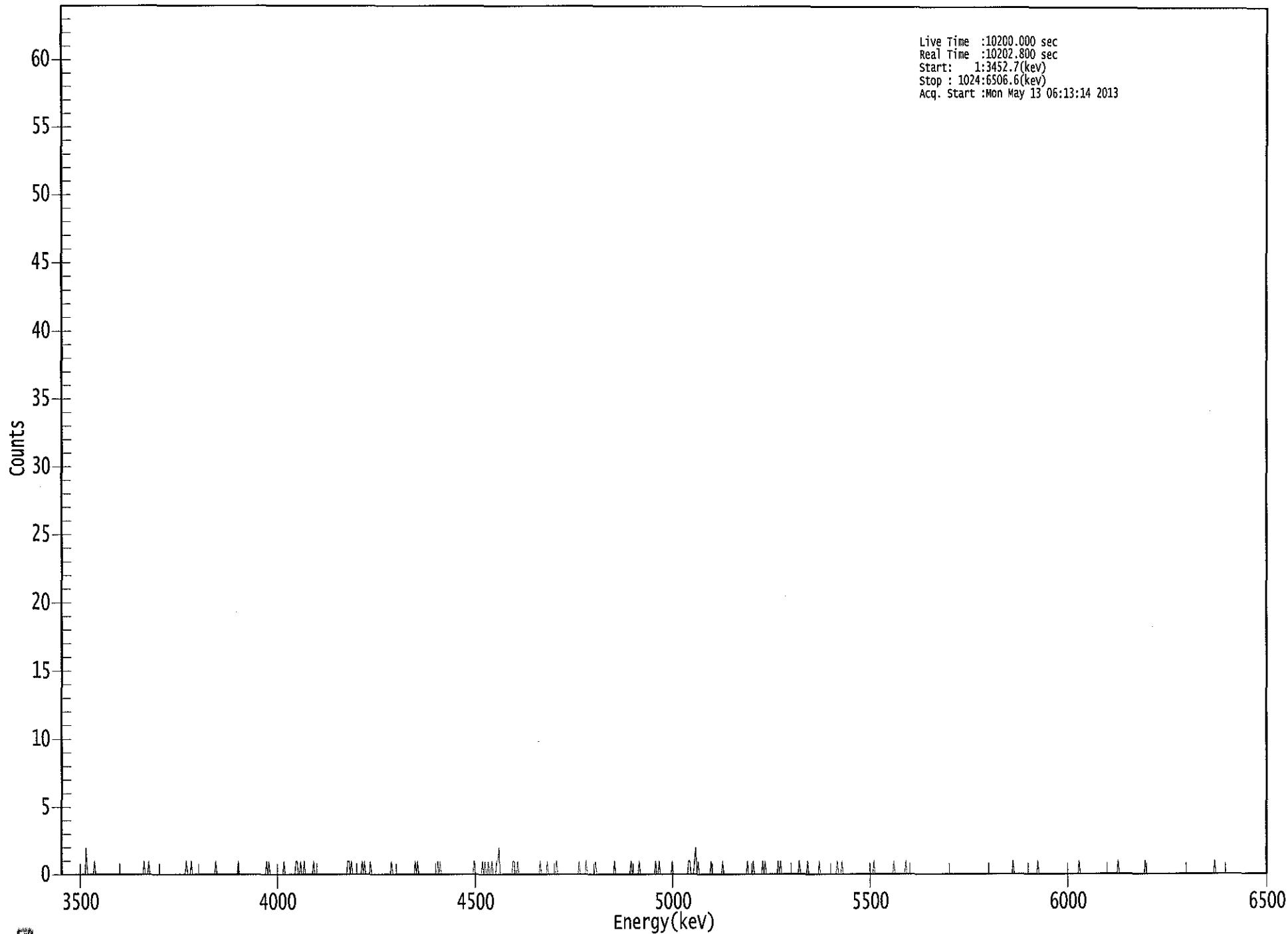
 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.480	5.15	94.34	0.85	0.00E+000	3.0
RA-226	4.593	18.13	48.73	1.87	0.00E+000	4.5

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.943	5685.50*	2.55E-001 +/- 1.91E+002	2.96E-001 +/- 2.22E+002
RA-226	0.953	4785.00*	4.94E-001 +/- 2.41E-001	2.06E-001 +/- 6.98E-003

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 5/13/13



0070

ROI Type: 1

 ***** 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: 10203

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

369: 0 1 1 2 0 0 0 0

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	1
385:	1	0	0	1	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	1	0	0	0
417:	0	0	0	0	1	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	1
441:	0	0	0	0	0	1	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:	0	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	0	1	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	1	0	0	1	0	0	0	0
513:	0	0	0	0	0	0	1	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	1	1	0	0
537:	0	1	2	0	1	0	0	0
545:	0	0	0	0	0	0	0	1
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	1	0
585:	0	0	0	1	0	0	0	0
593:	0	0	0	1	0	1	0	0
601:	0	0	0	0	0	0	0	0
609:	1	0	1	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	1	0	0	0	0	0
633:	0	1	0	0	0	0	0	0
641:	0	0	0	1	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	1	0	0	0	1	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	1	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	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	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 1

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	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	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:	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	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	1	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



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5/17/13

Sample Description: PZ-107-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 16
 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: 2.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:15 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.4679 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Effective Efficiency: 0.0864 +/- 0.0015

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

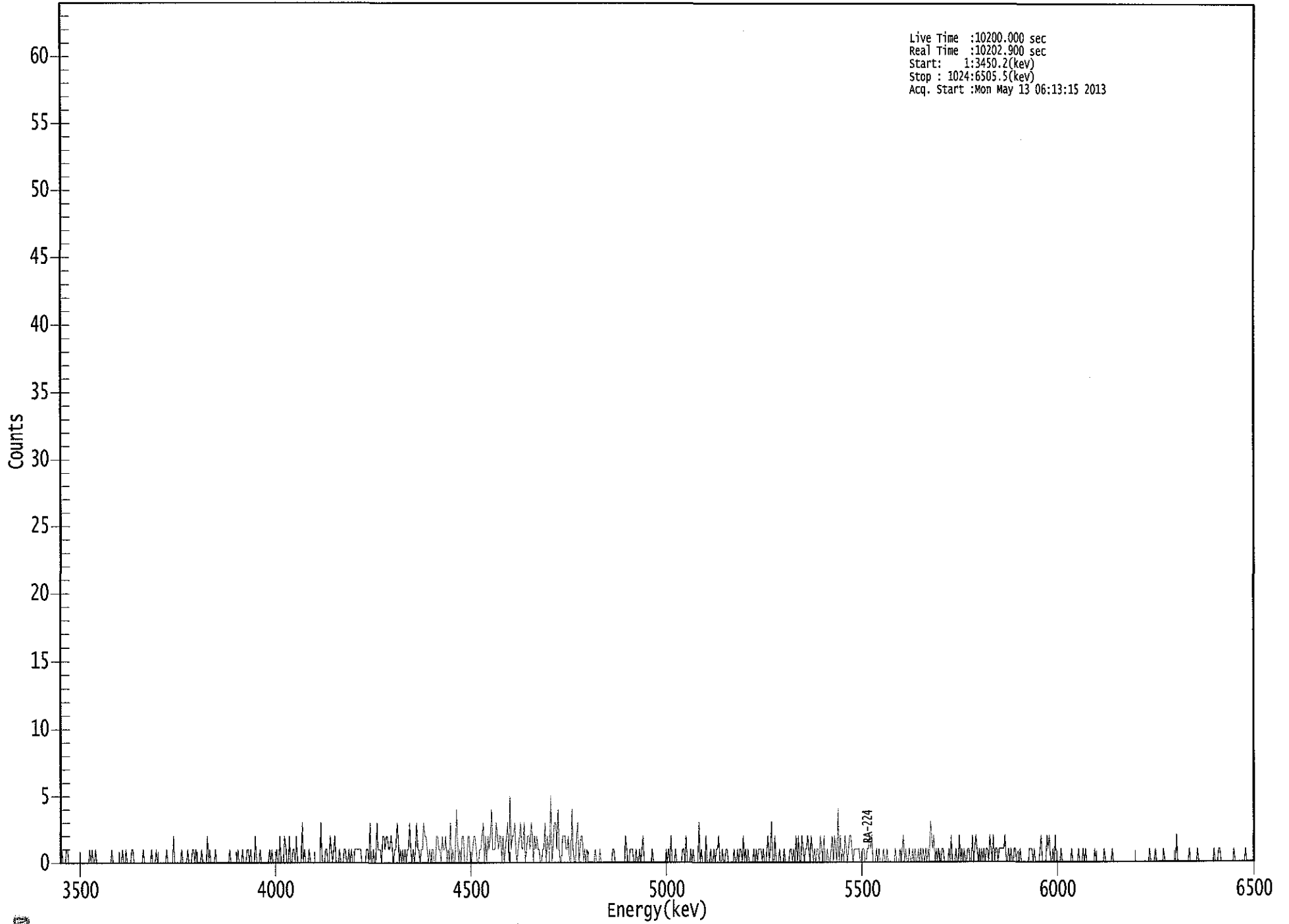
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.518	71.49	23.28	0.51	0.00E+000	3.0
RA-226	4.597	188.83	14.27	0.17	0.00E+000	3.4

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.961	5685.50*	5.31E+000 +/- 3.98E+003	3.90E-001 +/- 2.92E+002
RA-226	0.955	4785.00*	7.72E+000 +/- 1.13E+000	1.71E-001 +/- 5.82E-003

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US EPA ARCHIVE DOCUMENT



5070

ROI Type: 1

 ***** 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: 10203

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

369: 2 4 1 1 1 3 2 1

Sample Title: 16

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

801: 0 1 1 0 1 1 1 1

Sample Title: 16

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



5/17/13

Sample Description: PZ-107-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 17
 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: 2.840E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:17 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
 Effective Efficiency: 0.1902 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

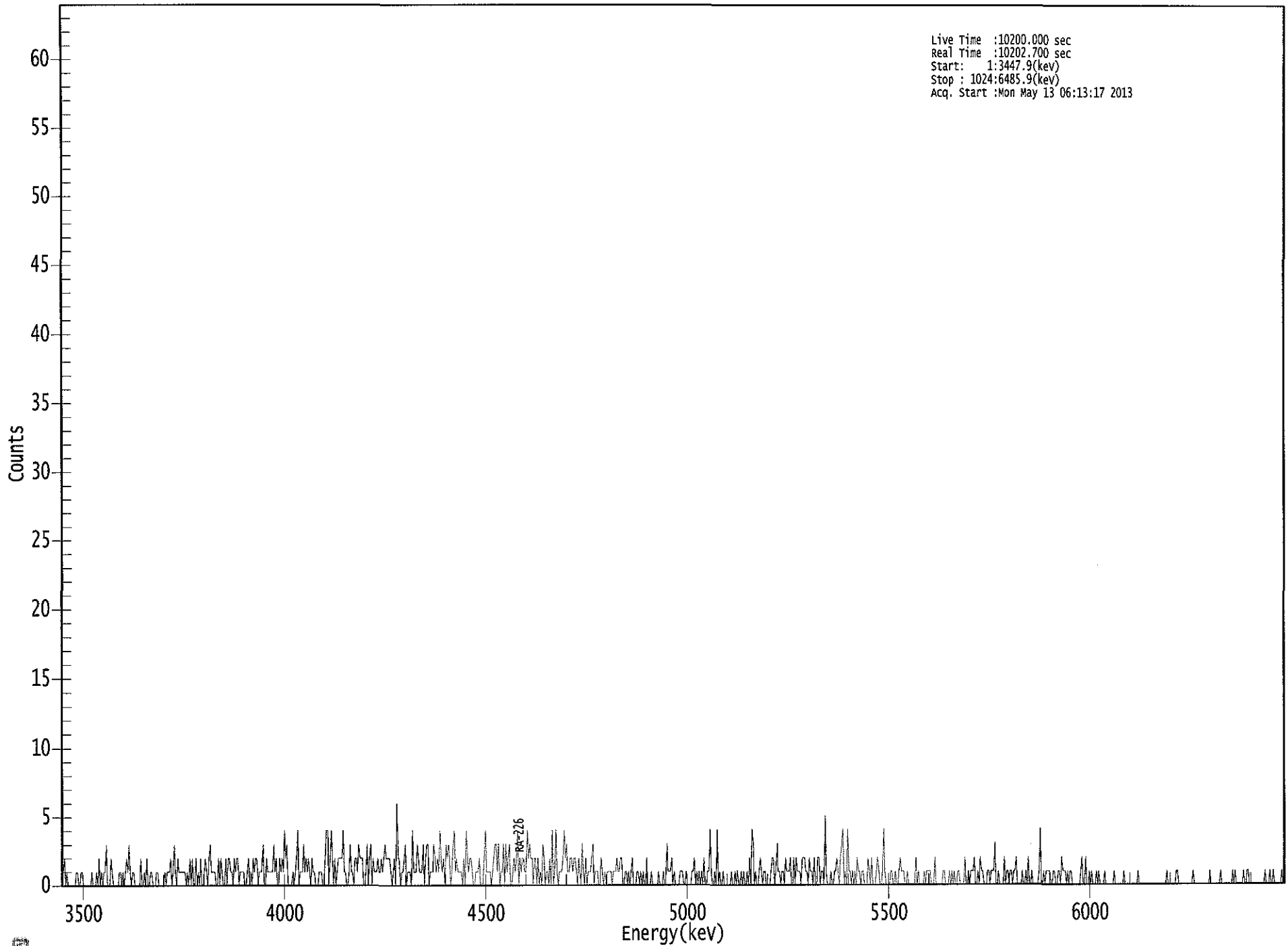
 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.494	70.32	23.50	0.68	0.00E+000	7.4
RA-226	4.585	219.83	13.23	0.17	0.00E+000	4.9

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.950	5685.50*	3.37E+000 +/- 2.52E+003	2.70E-001 +/- 2.02E+002
RA-226	0.949	4785.00*	5.80E+000 +/- 7.92E-001	1.10E-001 +/- 3.76E-003

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 5/13/13



Live Time :10200.000 sec
Real Time :10202.700 sec
Start: 1:3447.9(kev)
Stop : 1024:6485.9(kev)
Acq. Start :Mon May 13 06:13:17 2013

0170

ROI Type: 1

 ***** 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: 10203

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

369: 1 3 0 3 1 2 3 0

Sample Title: 17

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

801: 0 0 0 1 0 0 1 0

Sample Title: 17

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



C
J117117

Sample Description: PZ-116-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_045
 Chamber Serial Number: 04026482A
 Detector Serial Number: 91131
 Env. Background: System Bkgd 46594
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.690E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:19 AM
 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

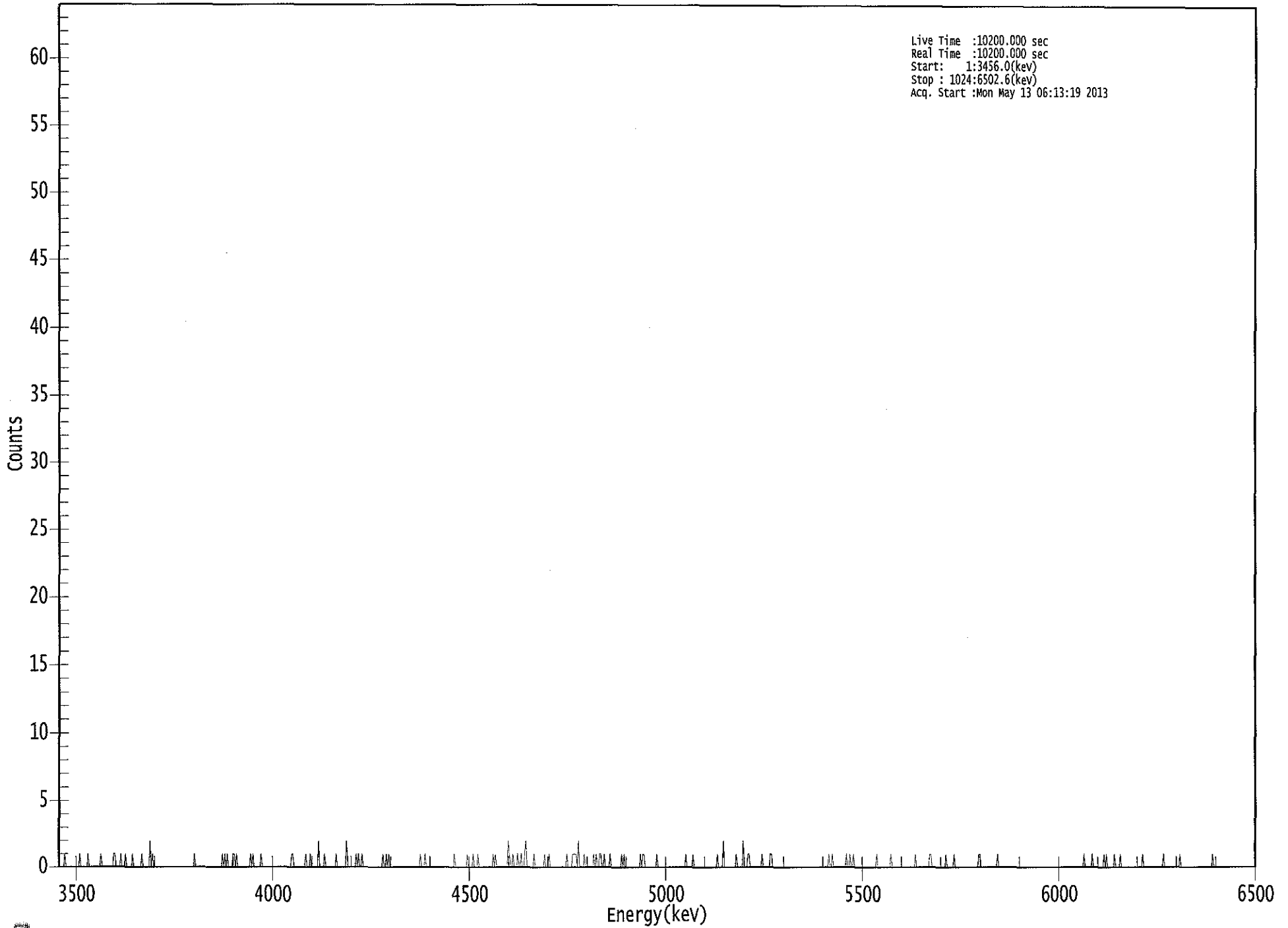
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.534	10.00	65.01	0.00	0.00E+000	3.0
RA-226	4.657	31.32	35.46	0.68	0.00E+000	4.5

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	4.82E-001 +/- 3.61E+002	2.89E-001 +/- 2.16E+002
RA-226	0.979	4785.00*	8.31E-001 +/- 2.96E-001	1.50E-001 +/- 5.27E-003

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US EPA ARCHIVE DOCUMENT



5140

ROI Type: 1

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

369: 0 0 0 1 0 1 0 0

Sample Title: 18

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	2	1	0	0	1	0	0	0
393:	1	0	0	1	0	0	1	2
401:	0	0	0	0	0	0	1	0
409:	0	0	0	0	0	0	0	1
417:	0	0	0	1	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	1	0	0	0	0	1
441:	1	1	1	0	2	0	0	0
449:	0	1	0	0	0	0	0	0
457:	0	1	0	1	0	0	1	1
465:	0	0	1	0	0	0	0	1
473:	0	0	0	0	0	0	0	0
481:	0	1	0	1	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	1	0	1	1	0	0	0
505:	0	0	0	0	0	0	0	1
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	1	0	0	0	0	0	1	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	1	0	0	0	0
569:	2	0	0	0	0	0	0	0
577:	0	0	0	1	0	0	0	0
585:	0	2	0	0	0	1	1	0
593:	0	0	0	0	0	0	0	0
601:	0	1	0	0	0	0	0	0
609:	1	1	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	1	0	0	1	0	0
665:	0	0	0	0	0	0	0	0
673:	0	1	0	0	1	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	1	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	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	1	1	0	0	0	0	0	0
753:	0	0	0	0	0	0	1	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	1	1	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 1 0 0 0 0 0

Sample Title: 18

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



5117117

Sample Description: PZ-116-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000578
 Batch Identification: 1304131A-RA
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_046
 Chamber Serial Number: 04026482B
 Detector Serial Number: 58762
 Env. Background: System Bkgd 56990
 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: 5/10/2013 8:55:47 AM
 Acquisition Date/Time: 5/13/2013 6:13:21 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Effective Efficiency: 0.1789 +/- 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	5.484	3.83	102.72	0.17	0.00E+000	3.0
RA-226	4.622	8.32	71.13	0.68	0.00E+000	3.0

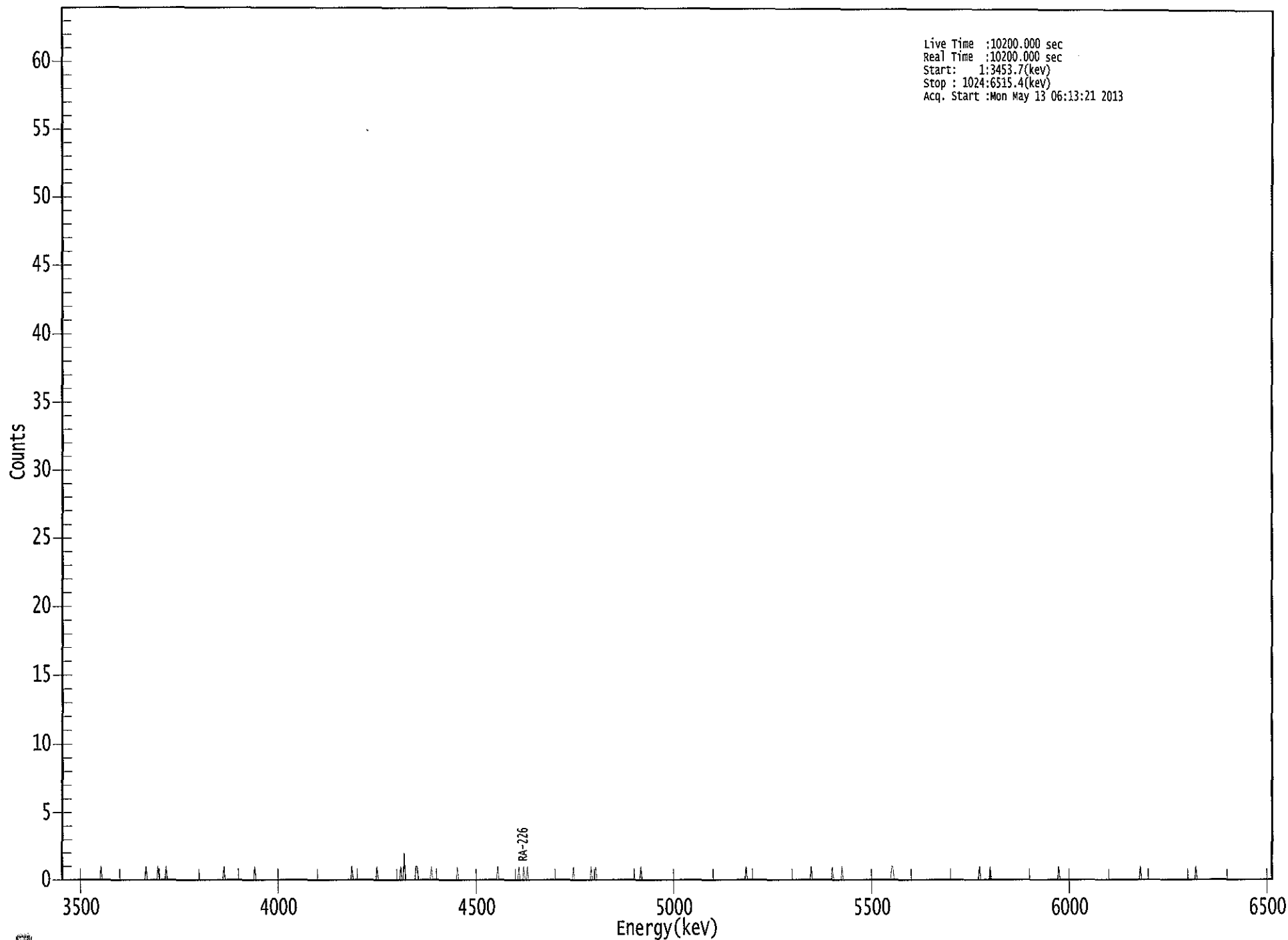
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.945	5685.50*	1.79E-001 +/- 1.34E+002	1.95E-001 +/- 1.46E+002
RA-226	0.966	4785.00*	2.14E-001 +/- 1.53E-001	1.45E-001 +/- 5.00E-003

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 5/13/13

US EPA ARCHIVE DOCUMENT

0000057869.CNF



0420

ROI Type: 1

 ***** 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	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	0	0	0
65:	0	0	0	0	0	0	0	1
73:	0	0	0	0	0	0	0	0
81:	0	1	0	0	0	0	0	0
89:	1	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	1	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	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	1	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	1	0
289:	0	2	0	0	0	0	0	0
297:	0	0	0	1	1	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	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: 1 0 0 0 0 0 0 0

Sample Title: 19

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	1	0	0	0	1	0
393:	0	1	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	1	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	1
449:	0	0	0	1	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	1	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	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	1	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	0	0	0	0
649:	0	0	0	1	0	0	0	0
657:	0	0	0	1	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	1	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	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	1
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: 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	1	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	1
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	1	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 5/13/2013
Time : 5:51:45 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	5/13/2013 5:26:18 AM
Alpha 004	21f	ALL	Passed	5/13/2013 5:26:19 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	5/13/2013 5:26:20 AM
Alpha 011	21f	ALL	Passed	5/13/2013 5:26:21 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	5/13/2013 5:26:21 AM
Alpha 014	21f	ALL	Passed	5/13/2013 5:26:22 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	5/13/2013 5:26:23 AM
Alpha 019	AIM730	ALL	Passed	5/13/2013 5:26:24 AM
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	5/13/2013 5:26:25 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	5/13/2013 5:26:26 AM
Alpha 025	AIM730	ALL	Passed	5/13/2013 5:26:26 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	5/13/2013 5:26:27 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	5/13/2013 5:26:28 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Not Done	
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:29 AM
Alpha 034	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:31 AM
Alpha 035	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:32 AM
Alpha 036	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:33 AM
Alpha 037	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:35 AM
Alpha 038	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:36 AM
Alpha 039	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:38 AM
Alpha 040	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:39 AM
Alpha 041	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:41 AM
Alpha 042	Alpha AnalystI00DC	ALL	Passed	5/13/2013 5:26:43 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	5/13/2013 5:26:44 AM
Alpha 045	Alpha Analyst100DC	ALL	Passed	5/13/2013 5:26:46 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	5/13/2013 5:26:48 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	5/13/2013 5:26:50 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	5/13/2013 5:26:51 AM

APPROVED BY: C APPROVAL DATE: 5/17/13

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

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

SECTION XI
ANALYTICAL DATA (RADIUM-228)

US EPA ARCHIVE DOCUMENT

Work Order	13-04131
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	I
Matrix	WA
Method	EPA 904.0 Modified
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	1008.134
Carrier	Yttrium
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	PZ-208-SS TOT	37	04/12/13 09:10	1.5000E+00
04	DO	PZ-208-SS TOT	37	04/12/13 09:10	1.5000E+00
05	TRG	PZ-208-SS DIS	37	04/12/13 09:10	1.5000E+00
06	TRG	PZ-101-SS TOT	43	04/12/13 09:15	1.5000E+00
07	TRG	PZ-101-SS DIS	43	04/12/13 09:15	1.5000E+00
08	TRG	MW-1204 TOT	42	04/12/13 09:26	1.5000E+00
09	TRG	MW-1204 DIS	42	04/12/13 09:26	1.5000E+00
10	TRG	PZ-113-SS TOT	39	04/12/13 09:40	1.5000E+00
11	TRG	PZ-113-SS DIS	39	04/12/13 09:40	1.5000E+00
12	TRG	I-73 TOT	36	04/12/13 10:05	1.5000E+00
13	TRG	I-73 DIS	36	04/12/13 10:05	1.5000E+00
14	TRG	PZ-113-AS TOT	41	04/12/13 10:35	1.5000E+00
15	TRG	PZ-113-AS DIS	41	04/12/13 10:35	1.5000E+00
16	TRG	PZ-107-SS TOT	45	04/12/13 10:40	1.5000E+00
17	TRG	PZ-107-SS DIS	45	04/12/13 10:40	1.5000E+00
18	TRG	PZ-116-SS TOT	40	04/12/13 10:46	1.5000E+00
19	TRG	PZ-116-SS DIS	40	04/12/13 10:46	1.5000E+00

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

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.9122	919.6	421.2	101.68	2.000	0.0965	0.1496	0.0531	78.09	79.40	1.00	1.00
02	MBL	0.9101	917.5	416.3	100.73	2.000	0.0966	0.1501	0.0535	78.68	79.25	1.00	1.00
03	DUP	0.9081	915.5	351.7	85.29	2.000	0.0964	0.1531	0.0567	83.38	71.11	1.00	1.00
04	DO	0.9020	909.3	359.1	87.67	2.000	0.0963	0.1527	0.0564	82.94	72.71	1.00	1.00
05	TRG	0.9020	909.3	389.0	94.97	2.000	0.0961	0.1494	0.0533	78.38	74.44	1.00	1.00
06	TRG	0.8995	906.8	393.3	96.28	2.000	0.0956	0.1509	0.0553	81.32	78.30	1.00	1.00
07	TRG	0.9020	909.3	391.9	95.68	2.000	0.0955	0.1483	0.0528	77.65	74.29	1.00	1.00
08	TRG	0.9046	912.0	151.5	36.88	2.000	0.0964	0.1512	0.0548	80.59	29.72	1.00	1.00
09	TRG	0.9030	910.3	390.6	95.25	2.000	0.0960	0.1509	0.0549	80.74	76.90	1.00	1.00
10	TRG	0.8976	904.9	291.7	71.56	2.000	0.0956	0.1517	0.0561	82.50	59.04	1.00	1.00
11	TRG	0.9028	910.1	353.4	86.20	2.000	0.0966	0.1505	0.0539	79.26	68.33	1.00	1.00
12	TRG	0.9012	908.5	327.3	79.98	2.000	0.0960	0.1526	0.0566	83.24	66.57	1.00	1.00
13	TRG	0.9002	907.5	373.9	91.46	2.000	0.0959	0.1486	0.0527	77.50	70.88	1.00	1.00
14	TRG	0.9024	909.7	384.8	93.90	2.000	0.0963	0.1519	0.0556	81.76	76.78	1.00	1.00
15	TRG	0.9007	908.0	360.5	88.14	2.000	0.0962	0.1509	0.0547	80.44	70.90	1.00	1.00
16	TRG	0.9013	908.6	191.5	46.79	2.000	0.0957	0.1511	0.0554	81.47	38.12	1.00	1.00
17	TRG	0.9048	912.2	424.1	103.22	2.000	0.0966	0.1516	0.0550	80.88	83.48	1.00	1.00
18	TRG	0.9052	912.6	448.9	109.20	2.000	0.0956	0.1516	0.0560	82.35	89.93	1.00	1.00
19	TRG	0.8991	906.4	419.5	102.74	2.000	0.0960	0.1532	0.0572	84.12	86.43	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.

US EPA ARCHIVE DOCUMENT

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Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep 10 Date/Time	Sep 10 By	Sep 11 Date/Time	Sep 11 By
01	LCS			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
02	MBL			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
03	DUP			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
04	DO			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
05	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
06	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
07	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
08	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
09	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
10	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
11	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
12	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
13	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
14	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
15	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
16	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
17	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
18	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH
19	TRG			04/30/13 09:59	JBARNARD	05/10/13 08:55	TSMITH	05/16/13 05:23	TSMITH

US EPA ARCHIVE DOCUMENT

0430

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

Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-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	1.09E+01	1.01E+00	1.13E+00	8.99E+00	121.35	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	8.37E-01	3.85E-01	7.18E-01					OK	OK
03	RA-228	DUP	PZ-208-SS TOT	pCi/l	1.11E+00	5.24E-01	1.00E+00				NA	OK	
04	RA-228	DO	PZ-208-SS TOT	pCi/l	1.31E+00	5.55E-01	1.05E+00					OK	
05	RA-228	TRG	PZ-208-SS DIS	pCi/l	1.19E+00	4.89E-01	9.11E-01					OK	
06	RA-228	TRG	PZ-101-SS TOT	pCi/l	2.12E+00	5.21E-01	8.90E-01					OK	
07	RA-228	TRG	PZ-101-SS DIS	pCi/l	2.49E+00	5.82E-01	9.98E-01					OK	
08	RA-228	TRG	MW-1204 TOT	pCi/l	2.93E+00	1.16E+00	2.13E+00					INV	
09	RA-228	TRG	MW-1204 DIS	pCi/l	1.96E+00	5.80E-01	1.05E+00					OK	
10	RA-228	TRG	PZ-113-SS TOT	pCi/l	2.04E+00	6.97E-01	1.28E+00					OK	
11	RA-228	TRG	PZ-113-SS DIS	pCi/l	1.60E+00	5.40E-01	9.74E-01					OK	
12	RA-228	TRG	I-73 TOT	pCi/l	2.55E+00	6.95E-01	1.24E+00					OK	
13	RA-228	TRG	I-73 DIS	pCi/l	1.03E+00	5.24E-01	1.01E+00					OK	
14	RA-228	TRG	PZ-113-AS TOT	pCi/l	2.36E+00	5.57E-01	9.42E-01					OK	
15	RA-228	TRG	PZ-113-AS DIS	pCi/l	1.34E+00	5.28E-01	9.78E-01					OK	
16	RA-228	TRG	PZ-107-SS TOT	pCi/l	3.36E+00	1.02E+00	1.81E+00					OK	
17	RA-228	TRG	PZ-107-SS DIS	pCi/l	1.88E+00	4.89E-01	8.44E-01					OK	
18	RA-228	TRG	PZ-116-SS TOT	pCi/l	7.65E-01	4.18E-01	8.12E-01					OK	
19	RA-228	TRG	PZ-116-SS DIS	pCi/l	1.29E+00	3.83E-01	6.57E-01					OK	

 Client Engineering Management Support, Inc.	Eberline Services Work Order	13-04131
	Analysis Code	Ra228
Run	1	

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	04/18/13 00:00	1.00E+00	101.68	78.09	79.40	1.00	5/10/2013 8:55	5/16/2013 5:23
02	RA-228	MBL	04/18/13 00:00	1.50E+00	100.73	78.68	79.25	1.00	5/10/2013 8:55	5/16/2013 5:23
03	RA-228	DUP	04/12/13 09:10	1.50E+00	85.29	83.38	71.11	1.00	5/10/2013 8:55	5/16/2013 5:23
04	RA-228	DO	04/12/13 09:10	1.50E+00	87.67	82.94	72.71	1.00	5/10/2013 8:55	5/16/2013 5:23
05	RA-228	TRG	04/12/13 09:10	1.50E+00	94.97	78.38	74.44	1.00	5/10/2013 8:55	5/16/2013 5:23
06	RA-228	TRG	04/12/13 09:15	1.50E+00	96.28	81.32	78.30	1.00	5/10/2013 8:55	5/16/2013 5:23
07	RA-228	TRG	04/12/13 09:15	1.50E+00	95.68	77.65	74.29	1.00	5/10/2013 8:55	5/16/2013 5:23
08	RA-228	TRG	04/12/13 09:26	1.50E+00	36.88	80.59	29.72	1.00	5/10/2013 8:55	5/16/2013 5:23
09	RA-228	TRG	04/12/13 09:26	1.50E+00	95.25	80.74	76.90	1.00	5/10/2013 8:55	5/16/2013 5:23
10	RA-228	TRG	04/12/13 09:40	1.50E+00	71.56	82.50	59.04	1.00	5/10/2013 8:55	5/16/2013 5:23
11	RA-228	TRG	04/12/13 09:40	1.50E+00	86.20	79.26	68.33	1.00	5/10/2013 8:55	5/16/2013 5:23
12	RA-228	TRG	04/12/13 10:05	1.50E+00	79.98	83.24	66.57	1.00	5/10/2013 8:55	5/16/2013 5:23
13	RA-228	TRG	04/12/13 10:05	1.50E+00	91.46	77.50	70.88	1.00	5/10/2013 8:55	5/16/2013 5:23
14	RA-228	TRG	04/12/13 10:35	1.50E+00	93.90	81.76	76.78	1.00	5/10/2013 8:55	5/16/2013 5:23
15	RA-228	TRG	04/12/13 10:35	1.50E+00	88.14	80.44	70.90	1.00	5/10/2013 8:55	5/16/2013 5:23
16	RA-228	TRG	04/12/13 10:40	1.50E+00	46.79	81.47	38.12	1.00	5/10/2013 8:55	5/16/2013 5:23
17	RA-228	TRG	04/12/13 10:40	1.50E+00	103.22	80.88	83.48	1.00	5/10/2013 8:55	5/16/2013 5:23
18	RA-228	TRG	04/12/13 10:46	1.50E+00	109.20	82.35	89.93	1.00	5/10/2013 8:55	5/16/2013 5:23
19	RA-228	TRG	04/12/13 10:46	1.50E+00	102.74	84.12	86.43	1.00	5/10/2013 8:55	5/16/2013 5:23

	Run	1
	Analysis Code	Ra228
Eberline Services Work Order	13-04131	
Client	Engineering Management Support, Inc.	

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Preliminary Data Report & Analytical Calculations
Work Order: 13-04131-Ra228-1

	
Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-04131
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	05/16/13 09:28		LB4110R	A1	120	735	0.966666667	0.4776
02	RA-228	MBL	05/16/13 09:28		LB4110R	A2	120	170	0.833333333	0.4699
03	RA-228	DUP	05/16/13 09:28		LB4110R	A4	120	246	1.35	0.4732
04	RA-228	DO	05/16/13 09:28		LB4110R	B1	120	292	1.583333333	0.4754
05	RA-228	TRG	05/16/13 09:28		LB4110R	B2	120	235	1.183333333	0.4658
06	RA-228	TRG	05/16/13 09:28		LB4110R	B3	120	330	1.283333333	0.4713
07	RA-228	TRG	05/16/13 09:28		LB4110R	B4	120	378	1.5	0.4773
08	RA-228	TRG	05/16/13 09:28		LB4110R	C1	120	218	1.05	0.4705
09	RA-228	TRG	05/16/13 09:28		LB4110R	C2	120	364	1.716666667	0.4676
10	RA-228	TRG	05/16/13 09:28		LB4110R	C3	120	299	1.45	0.4614
11	RA-228	TRG	05/16/13 09:28		LB4110R	C4	120	256	1.166666667	0.4714
12	RA-228	TRG	05/16/13 09:32		LB4110A	B1	120	383	1.733333333	0.4626
13	RA-228	TRG	05/16/13 09:32		LB4110A	B2	120	234	1.316666667	0.4691
14	RA-228	TRG	05/16/13 09:32		LB4110A	B3	120	329	1.233333333	0.449
15	RA-228	TRG	05/16/13 09:32		LB4110A	B4	120	242	1.2	0.4619
16	RA-228	TRG	05/16/13 09:32		LB4110A	C1	120	279	1.216666667	0.4667
17	RA-228	TRG	05/16/13 09:32		LB4110A	C2	120	306	1.216666667	0.4578
18	RA-228	TRG	05/16/13 09:32		LB4110A	C3	120	238	1.383333333	0.4699
19	RA-228	TRG	05/16/13 09:32		LB4110A	D4	120	218	0.833333333	0.4741

US EPA ARCHIVE DOCUMENT

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	0.9122	919.6198	421.2000	101.68	1.00	1.00
02	MBL	BLANK	04/18/13 00:00	1.5000	0.9101	917.5028	416.3000	100.73	1.00	1.00
03	DUP	PZ-208-SS TOT	04/12/13 09:10	1.5000	0.9081	915.4865	351.7000	85.29	1.00	1.00
04	DO	PZ-208-SS TOT	04/12/13 09:10	1.5000	0.9020	909.3369	359.1000	87.67	1.00	1.00
05	TRG	PZ-208-SS DIS	04/12/13 09:10	1.5000	0.9020	909.3369	389.0000	94.97	1.00	1.00
06	TRG	PZ-101-SS TOT	04/12/13 09:15	1.5000	0.8995	906.8165	393.3000	96.28	1.00	1.00
07	TRG	PZ-101-SS DIS	04/12/13 09:15	1.5000	0.9020	909.3369	391.9000	95.68	1.00	1.00
08	TRG	MW-1204 TOT	04/12/13 09:26	1.5000	0.9046	911.9580	151.5000	36.88	1.00	1.00
09	TRG	MW-1204 DIS	04/12/13 09:26	1.5000	0.9030	910.3450	390.6000	95.25	1.00	1.00
10	TRG	PZ-113-SS TOT	04/12/13 09:40	1.5000	0.8976	904.9011	291.7000	71.56	1.00	1.00
11	TRG	PZ-113-SS DIS	04/12/13 09:40	1.5000	0.9028	910.1434	353.4000	86.20	1.00	1.00
12	TRG	I-73 TOT	04/12/13 10:05	1.5000	0.9012	908.5304	327.3000	79.98	1.00	1.00
13	TRG	I-73 DIS	04/12/13 10:05	1.5000	0.9002	907.5222	373.9000	91.46	1.00	1.00
14	TRG	PZ-113-AS TOT	04/12/13 10:35	1.5000	0.9024	909.7401	384.8000	93.90	1.00	1.00
15	TRG	PZ-113-AS DIS	04/12/13 10:35	1.5000	0.9007	908.0263	360.5000	88.14	1.00	1.00
16	TRG	PZ-107-SS TOT	04/12/13 10:40	1.5000	0.9013	908.6312	191.5000	46.79	1.00	1.00
17	TRG	PZ-107-SS DIS	04/12/13 10:40	1.5000	0.9048	912.1596	424.1000	103.22	1.00	1.00
18	TRG	PZ-116-SS TOT	04/12/13 10:46	1.5000	0.9052	912.5629	448.9000	109.20	1.00	1.00
19	TRG	PZ-116-SS DIS	04/12/13 10:46	1.5000	0.8991	906.4133	419.5000	102.74	1.00	1.00

Aliquot Worksheet

US EPA ARCHIVE DOCUMENT

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04131	1	Ra228	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	PZ-208-SS TOT	DUP					1.5000E+00	1.5000E+00				
04	PZ-208-SS TOT	DO					1.5000E+00	1.5000E+00				
05	PZ-208-SS DIS	TRG					1.5000E+00	1.5000E+00				
06	PZ-101-SS TOT	TRG					1.5000E+00	1.5000E+00				
07	PZ-101-SS DIS	TRG					1.5000E+00	1.5000E+00				
08	MW-1204 TOT	TRG					1.5000E+00	1.5000E+00				
09	MW-1204 DIS	TRG					1.5000E+00	1.5000E+00				
10	PZ-113-SS TOT	TRG					1.5000E+00	1.5000E+00				
11	PZ-113-SS DIS	TRG					1.5000E+00	1.5000E+00				
12	I-73 TOT	TRG					1.5000E+00	1.5000E+00				
13	I-73 DIS	TRG					1.5000E+00	1.5000E+00				
14	PZ-113-AS TOT	TRG					1.5000E+00	1.5000E+00				
15	PZ-113-AS DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-107-SS TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-107-SS DIS	TRG					1.5000E+00	1.5000E+00				
18	PZ-116-SS TOT	TRG					1.5000E+00	1.5000E+00				
19	PZ-116-SS DIS	TRG					1.5000E+00	1.5000E+00				

Comments	
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Technician: _____

[Signature] Date: 4/30/13

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-04131	1	Ra228	Yttirum	34.0000	TSMITH

TRetec	Engineering Management Support, Inc.	Sample	Carrier Data			Filter Data			Gravimetric % Recovery
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)			
Fraction	Client ID	Type							
01	LCS	LCS	2.0000	0.0965	0.1496	0.0531	78.09		
02	BLANK	MBL	2.0000	0.0966	0.1501	0.0535	78.68		
03	DUP	DUP	2.0000	0.0964	0.1531	0.0567	83.38		
04	PZ-208-SS TOT	DO	2.0000	0.0963	0.1527	0.0564	82.94		
05	PZ-208-SS DIS	TRG	2.0000	0.0961	0.1494	0.0533	78.38		
06	PZ-101-SS TOT	TRG	2.0000	0.0956	0.1509	0.0553	81.32		
07	PZ-101-SS DIS	TRG	2.0000	0.0955	0.1483	0.0528	77.65		
08	MW-1204 TOT	TRG	2.0000	0.0964	0.1512	0.0548	80.59		
09	MW-1204 DIS	TRG	2.0000	0.0960	0.1509	0.0549	80.74		
10	PZ-113-SS TOT	TRG	2.0000	0.0956	0.1517	0.0561	82.50		
11	PZ-113-SS DIS	TRG	2.0000	0.0966	0.1505	0.0539	79.26		
12	I-73 TOT	TRG	2.0000	0.0960	0.1526	0.0566	83.24		
13	I-73 DIS	TRG	2.0000	0.0959	0.1486	0.0527	77.50		
14	PZ-113-AS TOT	TRG	2.0000	0.0963	0.1519	0.0556	81.76		
15	PZ-113-AS DIS	TRG	2.0000	0.0962	0.1509	0.0547	80.44		
16	PZ-107-SS TOT	TRG	2.0000	0.0957	0.1511	0.0554	81.47		
17	PZ-107-SS DIS	TRG	2.0000	0.0966	0.1516	0.0550	80.88		
18	PZ-116-SS TOT	TRG	2.0000	0.0956	0.1516	0.0560	82.35		
19	PZ-116-SS DIS	TRG	2.0000	0.0960	0.1532	0.0572	84.12		

Technician: *T Smith*

Date: 5, 16, 13

AG
5/16/13

(A)

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
B1	1304131-12	28	383	120	1400	5/16/13 11:32
B2	1304131-13	15	234	120	1400	5/16/13 11:32
B3	1304131-14	37	329	120	1400	5/16/13 11:32
B4	1304131-15	18	242	120	1400	5/16/13 11:32
C1	1304131-16	18	279	120	1400	5/16/13 11:32
C2	1304131-17	19	306	120	1400	5/16/13 11:32
C3	1304131-18	15	238	120	1400	5/16/13 11:32
D4	1304131-19	18	218	120	1400	5/16/13 11:32

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5/16/13

②

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1304131-08	10	218	120	1400	5/16/13 11:28
C2	1304131-09	16	364	120	1400	5/16/13 11:28
C3	1304131-10	17	299	120	1400	5/16/13 11:28
A1	1304131-01	34	735	120	1400	5/16/13 11:28
C4	1304131-11	18	256	120	1400	5/16/13 11:28
A2	1304131-02	19	170	120	1400	5/16/13 11:28
A4	1304131-03	20	246	120	1400	5/16/13 11:28
B1	1304131-04	31	292	120	1400	5/16/13 11:28
B2	1304131-05	27	235	120	1400	5/16/13 11:28
B3	1304131-06	16	330	120	1400	5/16/13 11:28
B4	1304131-07	17	378	120	1400	5/16/13 11:28

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	5/16/2013	6.67E-02	P	-2.18E+01	2.92E-01	2.23E+01
LB4110A - A2	Alpha	11/18/2007	5/16/2013	8.33E-02	P	-1.85E+01	2.61E-01	1.90E+01
LB4110A - A3	Alpha	11/18/2007	5/16/2013	3.33E-02	P	-1.80E+01	2.23E-01	1.84E+01
LB4110A - A4	Alpha	11/18/2007	5/16/2013	3.33E-02	P	-1.91E+01	2.44E-01	1.96E+01
LB4110A - B1	Alpha	11/18/2007	5/16/2013	1.17E-01	P	-9.85E-02	7.51E-02	2.49E-01
LB4110A - B2	Alpha	11/18/2007	5/16/2013	1.00E-01	P	-7.91E-02	7.28E-02	2.25E-01
LB4110A - B3	Alpha	11/18/2007	5/16/2013	5.00E-02	P	-6.39E-02	5.33E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	5/16/2013	1.00E-01	P	-1.43E-01	7.92E-02	3.02E-01
LB4110A - C1	Alpha	11/18/2007	5/16/2013	6.67E-02	P	-1.52E-01	8.92E-02	3.31E-01
LB4110A - C2	Alpha	11/18/2007	5/16/2013	8.33E-02	P	-1.80E-01	8.82E-02	3.56E-01
LB4110A - C3	Alpha	11/18/2007	5/16/2013	1.17E-01	P	-1.75E-01	1.01E-01	3.78E-01
LB4110A - C4	Alpha	11/18/2007	5/16/2013	2.17E-01	F	-6.31E-02	6.89E-02	2.01E-01
LB4110A - D1	Alpha	11/18/2007	5/16/2013	5.00E-02	P	-5.36E-02	8.40E-02	2.22E-01
LB4110A - D2	Alpha	11/18/2007	5/16/2013	2.33E-01	F	-7.09E-02	6.07E-02	1.92E-01
LB4110A - D3	Alpha	11/18/2007	5/16/2013	3.33E-02	P	-4.77E-02	7.18E-02	1.91E-01
LB4110A - D4	Alpha	11/18/2007	5/16/2013	1.00E-01	P	-5.73E-02	7.09E-02	1.99E-01
LB4110R - A1	Alpha	11/24/2006	5/16/2013	1.50E-01	P	-1.01E-01	1.01E-01	3.03E-01
LB4110R - A2	Alpha	11/24/2006	5/16/2013	5.00E-02	P	-8.99E-02	7.74E-02	2.45E-01
LB4110R - A3	Alpha	11/24/2006	5/16/2013	3.00E-01	F	-7.44E-02	7.71E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	5/16/2013	5.00E-02	P	-5.30E-02	7.16E-02	1.96E-01
LB4110R - B1	Alpha	11/24/2006	5/16/2013	1.67E-02	P	-9.57E-02	6.20E-02	2.20E-01
LB4110R - B2	Alpha	11/24/2006	5/16/2013	3.33E-02	P	-6.94E-02	6.42E-02	1.98E-01
LB4110R - B3	Alpha	11/24/2006	5/16/2013	1.67E-02	P	-6.53E-02	7.00E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	5/16/2013	8.33E-02	P	-6.46E-02	7.08E-02	2.06E-01
LB4110R - C1	Alpha	11/24/2006	5/16/2013	5.00E-02	P	-7.78E-02	7.43E-02	2.26E-01
LB4110R - C2	Alpha	11/24/2006	5/16/2013	5.00E-02	P	-7.53E-02	7.21E-02	2.20E-01
LB4110R - C3	Alpha	11/24/2006	5/16/2013	8.33E-02	P	-8.89E-02	8.47E-02	2.58E-01
LB4110R - C4	Alpha	11/24/2006	5/16/2013	8.33E-02	P	-6.21E-02	8.20E-02	2.26E-01
LB4110R - D1	Alpha	11/24/2006	5/16/2013	0.00E+00	P	-9.96E-02	7.28E-02	2.45E-01
LB4110R - D2	Alpha	11/24/2006	5/16/2013	0.00E+00	P	-7.38E-02	7.22E-02	2.18E-01
LB4110R - D3	Alpha	11/24/2006	5/16/2013	0.00E+00	P	-7.91E-02	7.19E-02	2.23E-01
LB4110R - D4	Alpha	11/24/2006	5/16/2013	0.00E+00	P	-7.06E-02	7.68E-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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5/16/13

c
Stillborn

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	5/16/2013	7.97E+00	P	-2.95E+02	7.63E+00	3.11E+02
LB4110A - A2	Beta	11/18/2007	5/16/2013	3.50E+00	P	-3.11E+01	2.55E+00	3.62E+01
LB4110A - A3	Beta	11/18/2007	5/16/2013	1.18E+00	P	-5.12E+01	2.67E+00	5.65E+01
LB4110A - A4	Beta	11/18/2007	5/16/2013	6.93E+00	P	-3.33E+01	3.05E+00	3.93E+01
LB4110A - B1	Beta	11/18/2007	5/16/2013	1.73E+00	P	-1.04E+01	3.25E+00	1.69E+01
LB4110A - B2	Beta	11/18/2007	5/16/2013	1.32E+00	P	-7.53E+00	1.99E+00	1.15E+01
LB4110A - B3	Beta	11/18/2007	5/16/2013	1.23E+00	P	1.07E-01	1.36E+00	2.62E+00
LB4110A - B4	Beta	11/18/2007	5/16/2013	1.20E+00	P	-7.59E+00	1.97E+00	1.15E+01
LB4110A - C1	Beta	11/18/2007	5/16/2013	1.22E+00	P	-5.49E+00	2.15E+00	9.80E+00
LB4110A - C2	Beta	11/18/2007	5/16/2013	1.22E+00	P	3.80E-01	1.27E+00	2.16E+00
LB4110A - C3	Beta	11/18/2007	5/16/2013	1.38E+00	P	4.70E-01	1.47E+00	2.46E+00
LB4110A - C4	Beta	11/18/2007	5/16/2013	1.60E+00	P	-1.77E+00	2.13E+00	6.04E+00
LB4110A - D1	Beta	11/18/2007	5/16/2013	2.17E+00	P	-2.38E+00	2.58E+00	7.54E+00
LB4110A - D2	Beta	11/18/2007	5/16/2013	1.72E+00	P	-6.77E-01	1.57E+00	3.81E+00
LB4110A - D3	Beta	11/18/2007	5/16/2013	4.17E+00	P	1.23E+00	4.47E+00	7.72E+00
LB4110A - D4	Beta	11/18/2007	5/16/2013	8.33E-01	P	-4.49E-01	1.37E+00	3.20E+00
LB4110R - A1	Beta	11/24/2006	5/16/2013	9.67E-01	P	-6.19E+01	3.76E+00	6.94E+01
LB4110R - A2	Beta	11/24/2006	5/16/2013	8.33E-01	P	-4.92E+01	2.05E+00	5.33E+01
LB4110R - A3	Beta	11/24/2006	5/16/2013	1.33E+00	P	-4.55E+01	2.79E+00	5.11E+01
LB4110R - A4	Beta	11/24/2006	5/16/2013	1.35E+00	P	-4.54E+01	2.02E+00	4.94E+01
LB4110R - B1	Beta	11/24/2006	5/16/2013	1.58E+00	P	-4.78E+01	2.05E+00	5.19E+01
LB4110R - B2	Beta	11/24/2006	5/16/2013	1.18E+00	P	-4.78E+01	2.08E+00	5.19E+01
LB4110R - B3	Beta	11/24/2006	5/16/2013	1.28E+00	P	-4.75E+01	2.70E+00	5.29E+01
LB4110R - B4	Beta	11/24/2006	5/16/2013	1.50E+00	P	-4.79E+01	1.95E+00	5.18E+01
LB4110R - C1	Beta	11/24/2006	5/16/2013	1.05E+00	P	-4.77E+01	3.03E+00	5.37E+01
LB4110R - C2	Beta	11/24/2006	5/16/2013	1.72E+00	P	-4.76E+01	2.75E+00	5.31E+01
LB4110R - C3	Beta	11/24/2006	5/16/2013	1.45E+00	P	-4.81E+01	2.55E+00	5.32E+01
LB4110R - C4	Beta	11/24/2006	5/16/2013	1.17E+00	P	-5.43E+01	2.98E+00	6.03E+01
LB4110R - D1	Beta	11/24/2006	5/16/2013	0.00E+00	P	-4.51E+01	5.76E+00	5.66E+01
LB4110R - D2	Beta	11/24/2006	5/16/2013	0.00E+00	P	-4.86E+01	1.94E+00	5.25E+01
LB4110R - D3	Beta	11/24/2006	5/16/2013	0.00E+00	P	-5.19E+01	5.73E+00	6.34E+01
LB4110R - D4	Beta	11/24/2006	5/16/2013	0.00E+00	P	-4.83E+01	2.31E+00	5.29E+01
LB5100 - 1	Beta	7/10/2006	10/26/2007	4.52E+00	F	-3.19E-01	1.58E+00	3.48E+00

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	5/16/2013	0.2468	P	-0.0183	0.2148	0.4479
LB4110A - A2	Alpha	11/18/2007	5/16/2013	0.2017	P	-0.0557	0.1727	0.4011
LB4110A - A3	Alpha	11/18/2007	5/16/2013	0.2136	P	-0.0793	0.1616	0.4025
LB4110A - A4	Alpha	11/18/2007	5/16/2013	0.2219	P	-0.0577	0.1805	0.4187
LB4110A - B1	Alpha	11/18/2007	5/16/2013	0.2187	P	0.1944	0.2246	0.2549
LB4110A - B2	Alpha	11/18/2007	5/16/2013	0.2184	P	0.1929	0.2218	0.2506
LB4110A - B3	Alpha	11/18/2007	5/16/2013	0.2320	P	0.1295	0.2326	0.3357
LB4110A - B4	Alpha	11/18/2007	5/16/2013	0.2304	P	0.2090	0.2367	0.2643
LB4110A - C1	Alpha	11/18/2007	5/16/2013	0.2237	P	0.1974	0.2208	0.2443
LB4110A - C2	Alpha	11/18/2007	5/16/2013	0.2244	P	0.1967	0.2252	0.2538
LB4110A - C3	Alpha	11/18/2007	5/16/2013	0.2529	P	0.2229	0.2494	0.2759
LB4110A - C4	Alpha	11/18/2007	5/16/2013	0.2236	P	0.1966	0.2258	0.2550
LB4110A - D1	Alpha	11/18/2007	5/16/2013	0.2215	P	0.2035	0.2334	0.2632
LB4110A - D2	Alpha	11/18/2007	5/16/2013	0.2476	P	0.2278	0.2584	0.2890
LB4110A - D3	Alpha	11/18/2007	5/16/2013	0.2498	P	0.2314	0.2639	0.2963
LB4110A - D4	Alpha	11/18/2007	5/16/2013	0.1822	P	0.1650	0.1998	0.2347
LB4110R - A1	Alpha	11/24/2006	5/16/2013	0.2474	P	0.2032	0.2389	0.2747
LB4110R - A2	Alpha	11/24/2006	5/16/2013	0.2061	P	0.1899	0.2206	0.2514
LB4110R - A3	Alpha	11/24/2006	5/16/2013	0.2211	P	0.1964	0.2249	0.2533
LB4110R - A4	Alpha	11/24/2006	5/16/2013	0.2468	P	0.2160	0.2457	0.2754
LB4110R - B1	Alpha	11/24/2006	5/16/2013	0.2241	P	0.1878	0.2261	0.2644
LB4110R - B2	Alpha	11/24/2006	5/16/2013	0.2068	P	0.1801	0.2175	0.2549
LB4110R - B3	Alpha	11/24/2006	5/16/2013	0.2492	P	0.2068	0.2440	0.2813
LB4110R - B4	Alpha	11/24/2006	5/16/2013	0.2185	P	0.1938	0.2320	0.2702
LB4110R - C1	Alpha	11/24/2006	5/16/2013	0.2114	P	0.1861	0.2153	0.2444
LB4110R - C2	Alpha	11/24/2006	5/16/2013	0.2178	P	0.1963	0.2248	0.2533
LB4110R - C3	Alpha	11/24/2006	5/16/2013	0.2335	P	0.2064	0.2397	0.2731
LB4110R - C4	Alpha	11/24/2006	5/16/2013	0.2103	P	0.1858	0.2229	0.2600
LB4110R - D1	Alpha	11/24/2006	5/16/2013	0.0000	F	0.0350	0.2066	0.3783
LB4110R - D2	Alpha	11/24/2006	5/16/2013	0.0000	F	0.0405	0.2350	0.4294
LB4110R - D3	Alpha	11/24/2006	5/16/2013	0.0000	F	0.0398	0.2308	0.4218
LB4110R - D4	Alpha	11/24/2006	5/16/2013	0.0000	F	0.0304	0.1860	0.3416
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

5/16/13

US EPA ARCHIVE DOCUMENT

0442

SECTION XII
BARIUM-133 ANALYTICAL TRACER DATA

KB
5/10/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 14:31:54.20

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413101_GE3_BAFIL_191431.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : SPIKE
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 14:16:33
Sample ID : 1304131-01 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:03.73 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	4	30.89	2255	91	1.50	31.21	26	20	2.51E+00	2.2	7.98E+00
2	4	35.13	533	79	1.58	35.45	26	20	5.92E-01	5.2	
3	4	53.05	66	112	1.99	53.37	49	24	7.31E-02	28.1	5.10E+00
4	4	61.84	242	100	1.86	62.16	49	24	2.69E-01	9.1	
5	4	65.74	152	91	2.02	66.06	49	24	1.69E-01	13.9	
6	4	69.29	24	86	2.03	69.61	49	24	2.64E-02	73.5	
7	0	81.21	879	186	1.91	81.52	77	10	9.76E-01	4.5	
8	0	92.47	42	88	1.05	92.78	90	6	4.69E-02	38.4	
9	0	111.67	232	119	1.48	111.99	107	8	2.58E-01	10.5	
10	0	160.95	56	65	1.87	161.27	157	10	6.22E-02	30.1	
11	0	247.81	17	102	10.38	248.12	234	16	1.86E-02	138.5	
12	0	276.79	52	37	1.22	277.10	273	7	5.83E-02	23.6	
13	3	302.94	183	8	1.65	303.25	300	16	2.03E-01	7.6	4.01E+00
14	3	307.15	25	8	2.19	307.46	300	16	2.79E-02	43.5	
15	3	312.15	20	7	2.19	312.46	300	16	2.27E-02	34.7	
16	0	333.96	89	26	1.37	334.27	330	7	9.84E-02	14.3	
17	0	356.24	565	33	1.92	356.54	352	11	6.27E-01	4.7	
18	0	365.70	9	22	1.47	366.00	363	6	9.44E-03	90.6	
19	2	376.69	20	18	2.05	376.99	373	23	2.17E-02	35.6	5.19E+00
20	2	384.05	140	16	2.06	384.36	373	23	1.55E-01	9.7	
21	2	386.95	194	10	1.82	387.26	373	23	2.15E-01	8.3	
22	2	390.78	56	10	1.91	391.08	373	23	6.26E-02	22.2	
23	1	414.75	39	8	1.89	415.06	411	15	4.37E-02	19.7	1.49E+00
24	1	418.53	33	5	1.90	418.83	411	15	3.67E-02	24.8	
25	1	421.53	12	4	1.90	421.83	411	15	1.29E-02	63.7	
26	0	437.23	114	3	1.87	437.53	435	8	1.27E-01	9.6	
27	2	464.64	7	0	2.12	464.94	463	12	8.10E-03	38.8	1.99E+00
28	2	468.07	27	0	2.13	468.37	463	12	3.04E-02	20.7	
29	0	511.69	15	3	1.80	511.98	508	7	1.63E-02	33.5	
30	0	582.41	10	0	1.96	582.70	579	7	1.11E-02	31.6	

Summary of Nuclide Activity

Sample ID : 1304131-01

Acquisition date : 10-MAY-2013 14:16:33

Total number of lines in spectrum 30
 Number of unidentified lines 26
 Number of lines tentatively identified by NID 4 13.33%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	4.211E+02	4.212E+02	0.765E+02	18.17	
Total Activity :			4.211E+02	4.212E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
TH-234	4.47E+09Y	1.00	7.220E+02	7.220E+02	1.396E+02	19.34	
Total Activity :			7.220E+02	7.220E+02			

Grand Total Activity : 1.143E+03 1.143E+03

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	4.211E+02	4.212E+02	18.17	OK
	302.84	17.80	6.222E+00	4.958E+02	4.959E+02	25.65	OK
	356.01	60.00	5.860E+00	4.823E+02	4.824E+02	16.54	OK

Final Mean for 3 Valid Peaks = 4.212E+02 +/- 7.651E+01 (18.17%)

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	7.220E+02	7.220E+02	19.34	OK

Final Mean for 1 Valid Peaks = 7.220E+02 +/- 1.396E+02 (19.34%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.212E+02	7.651E+01	2.225E+01	3.402E+00	18.931
TH-234	7.220E+02	1.396E+02	1.432E+02	7.689E+00	5.043

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.538E+00	5.893E+00	9.792E+00	1.119E+00	-0.259
CD-109	-9.004E-01	1.329E+02	1.875E+02	1.546E+01	-0.005
PA-231	2.712E+00	1.639E+00	3.279E+00	4.663E-02	0.827
PA-234	5.011E+00	1.573E+00	3.053E+00	4.342E-02	1.641
NP-237	-4.377E-01	4.138E+01	5.810E+01	4.697E+00	-0.008
AM-241	1.870E+01	9.322E+00	1.773E+01	8.720E-01	1.054

KB
5/10/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 14:32:14.56

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413102_GE5_BAFIL_191432.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : BLANK
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 14:16:56
Sample ID : 1304131-02 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.12 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	8.04	21	13	0.59	82.52	71	16	2.33E-02	43.2	
2	0	14.92	18	7	0.83	148.56	141	14	2.00E-02	39.1	
3	0	21.33	107	22	0.52	210.03	202	17	1.19E-01	14.4	
4	0	31.13	2085	102	0.76	304.09	291	25	2.32E+00	2.5	
5	0	35.41	510	65	0.63	345.18	330	29	5.66E-01	6.4	
6	0	53.54	40	25	0.61	519.10	510	16	4.43E-02	33.4	
7	0	62.00	290	52	0.80	600.37	585	34	3.23E-01	8.7	
8	1	65.78	49	29	0.72	636.63	629	32	5.42E-02	26.7	3.94E+00
9	1	66.24	111	29	0.66	641.00	629	32	1.23E-01	13.8	
10	0	77.50	17	2	0.13	749.06	742	13	1.89E-02	28.6	
11	3	79.91	40	2	0.92	772.20	761	35	4.50E-02	42.1	7.27E-01
12	3	81.36	825	17	0.75	786.11	761	35	9.16E-01	3.6	
13	0	102.43	18	4	0.40	988.29	981	15	1.97E-02	33.1	
14	1	112.17	156	55	0.84	1081.74	1068	27	1.73E-01	13.9	1.65E+00
15	1	112.51	37	42	0.77	1085.00	1068	27	4.15E-02	52.6	
16	0	116.56	50	18	0.52	1123.84	1114	19	5.57E-02	22.6	
17	1	276.85	10	10	1.03	2662.00	2651	24	1.16E-02	92.3	9.63E+00
18	1	277.38	105	9	1.03	2667.00	2651	24	1.17E-01	8.0	
19	0	303.66	102	5	0.77	2919.19	2904	27	1.13E-01	10.9	
20	0	334.56	55	8	0.48	3215.68	3202	27	6.11E-02	16.7	
21	2	356.16	33	5	1.13	3423.00	3413	30	3.64E-02	51.2	1.13E+00
22	2	356.96	313	10	0.91	3430.66	3413	30	3.48E-01	6.3	
23	0	384.89	94	6	0.81	3698.64	3682	29	1.05E-01	11.5	
24	0	387.77	123	15	1.01	3726.36	3714	23	1.36E-01	10.8	
25	0	391.98	39	7	0.90	3766.68	3747	31	4.32E-02	20.8	
26	1	415.25	43	1	1.19	3990.00	3980	28	4.80E-02	13.7	1.09E+00
27	1	416.19	27	2	1.19	3999.00	3980	28	2.97E-02	23.7	

Total number of lines in spectrum 27
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 6 22.22%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.163E+02	4.163E+02	0.704E+02	16.91	
Total Activity :			4.163E+02	4.163E+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-234	4.47E+09Y	1.00	4.954E+00	4.954E+00	1.441E+00	29.08	
TH-234	4.47E+09Y	1.00	2.623E+02	2.623E+02	0.467E+02	17.80	
Total Activity :			2.672E+02	2.672E+02			

Grand Total Activity : 6.835E+02 6.835E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	4.163E+02	4.163E+02	16.91	OK
	302.84	17.80	2.575E+00	6.656E+02	6.656E+02	34.18	OK
	356.01	60.00	4.312E+00	3.808E+01	3.808E+01	103.40	OK

Final Mean for 3 Valid Peaks = 4.163E+02 +/- 7.039E+01 (16.91%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
PA-234	9.89	89.00	1.000E+02	7.081E-01	7.081E-01	86.40	OK
	21.72	64.90*	1.000E+02	4.954E+00	4.954E+00	29.08	OK
	37.93	23.75	1.000E+02	-----	Line Not Found	-----	Absent
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 4.954E+00 +/- 1.441E+00 (29.08%)

TH-234	63.29	3.80*	8.750E+01	2.623E+02	2.623E+02	17.80	OK
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Final Mean for 1 Valid Peaks = 2.623E+02 +/- 4.669E+01 (17.80%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.163E+02	7.039E+01	1.312E+01	1.932E+00	31.720
PA-234	4.954E+00	1.441E+00	1.046E+00	1.177E-02	4.738
TH-234	2.623E+02	4.669E+01	2.907E+01	3.740E-01	9.021

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	5.839E+00		1.558E+01	2.977E+01	1.009E+01	0.196
CD-109	-2.671E+01		8.626E+01	1.522E+02	1.465E+01	-0.175
PA-231	1.500E+00	+	1.296E+00	1.589E+00	1.789E-02	0.944
NP-237	-3.423E+01		2.694E+01	3.980E+01	3.511E+00	-0.860
AM-241	9.893E-01		1.287E+00	2.301E+00	2.590E-02	0.430

10/5/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 14:48:45.85

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413103_GE2_BAFIL_191433.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-208-SS TOT
 Deposition Date :
 Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 14:33:29
 Sample ID : 1304131-03 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.05	36	153	1.66	28.16	26	15	3.98E-02	65.2	1.29E+01
2	3	30.99	1770	115	1.39	31.11	26	15	1.97E+00	2.5	
3	3	35.05	440	129	1.68	35.17	26	15	4.89E-01	6.3	
4	0	52.72	46	191	1.41	52.84	49	9	5.12E-02	56.2	
5	2	61.78	194	86	1.60	61.90	58	12	2.15E-01	10.0	1.29E+00
6	2	66.03	83	68	1.61	66.14	58	12	9.21E-02	19.3	
7	0	81.06	695	125	1.54	81.18	76	10	7.72E-01	4.8	
8	0	111.79	161	90	1.60	111.91	108	7	1.79E-01	12.6	
9	1	183.04	16	23	1.65	183.15	182	9	1.83E-02	43.3	1.73E+00
10	1	186.04	28	34	1.65	186.15	182	9	3.14E-02	38.9	
11	0	239.47	14	40	1.10	239.58	237	6	1.60E-02	74.4	
12	0	254.10	19	20	2.48	254.21	251	7	2.06E-02	47.0	
13	0	261.34	17	19	3.19	261.45	258	7	1.85E-02	50.2	
14	0	276.64	48	32	1.56	276.75	273	9	5.31E-02	25.7	
15	2	295.23	12	24	1.95	295.34	290	21	1.32E-02	73.0	3.08E+00
16	2	303.01	161	19	1.80	303.12	290	21	1.79E-01	8.5	
17	2	307.23	28	21	1.97	307.33	290	21	3.09E-02	37.0	
18	0	333.76	62	36	1.39	333.87	330	8	6.94E-02	20.6	
19	0	338.65	20	11	1.94	338.76	337	6	2.20E-02	37.0	
20	1	352.06	10	2	1.83	352.17	350	12	1.09E-02	31.1	1.63E+00
21	1	356.06	475	5	1.50	356.17	350	12	5.28E-01	4.7	
22	0	365.54	12	20	1.16	365.65	362	8	1.29E-02	73.0	
23	1	377.06	10	15	1.85	377.17	374	25	1.10E-02	61.2	4.84E+00
24	1	384.06	130	12	1.86	384.17	374	25	1.44E-01	9.4	
25	1	387.00	128	6	1.64	387.11	374	25	1.42E-01	10.1	
26	1	391.72	42	4	1.86	391.83	374	25	4.63E-02	20.0	
27	1	414.85	42	16	1.88	414.96	412	10	4.64E-02	20.8	3.04E+00
28	1	418.72	16	18	1.89	418.83	412	10	1.81E-02	47.9	
29	0	437.22	86	9	1.55	437.32	434	7	9.57E-02	12.2	
30	0	469.24	25	9	2.03	469.35	464	11	2.77E-02	32.1	
31	0	511.15	22	2	2.42	511.26	506	11	2.39E-02	26.1	
32	0	563.12	9	0	1.77	563.22	561	5	1.00E-02	33.3	
33	0	584.49	5	7	2.74	584.60	579	9	5.83E-03	99.3	
34	0	609.27	14	2	2.81	609.37	605	8	1.56E-02	31.9	
35	0	706.64	6	4	2.75	706.73	703	7	7.11E-03	62.7	

Total number of lines in spectrum 35
 Number of unidentified lines 31
 Number of lines tentatively identified by NID 4 11.43%

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	3.516E+02	3.517E+02	0.703E+02	19.99	
Total Activity :			3.516E+02	3.517E+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	6.644E+02	6.644E+02	1.457E+02	21.92	
Total Activity :			6.644E+02	6.644E+02			

Grand Total Activity : 1.016E+03 1.016E+03

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	3.516E+02	3.517E+02	19.99	OK
	302.84	17.80	7.560E+00	3.598E+02	3.598E+02	34.43	OK
	356.01	60.00	7.170E+00	3.315E+02	3.315E+02	17.78	OK

Final Mean for 3 Valid Peaks = 3.517E+02+/- 7.031E+01 (19.99%)

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	6.644E+02	6.644E+02	21.92	OK

Final Mean for 1 Valid Peaks = 6.644E+02+/- 1.457E+02 (21.92%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.517E+02	7.031E+01	1.766E+01	3.007E+00	19.912
TH-234	6.644E+02	1.457E+02	1.480E+02	1.223E+01	4.490

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.338E+00	5.089E+00	8.715E+00	1.338E+00	-0.154
CD-109	-1.470E+01	1.081E+02	1.735E+02	1.992E+01	-0.085
PA-231	3.380E+01	5.242E+00	1.004E+01	1.912E-01	3.366
PA-234	4.649E+00	1.818E+00	3.406E+00	7.025E-02	1.365
NP-237	1.460E+01	2.974E+01	5.143E+01	5.807E+00	0.284
AM-241	2.006E+01	1.054E+01	1.923E+01	1.489E+00	1.043

KPS
5/10/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 15:04:53.67

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413104_GE2_BAFIL_191436.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-208-SS TOT
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 14:49:14
Sample ID : 1304131-04 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.97	1865	103	1.45	31.09	27	18	2.07E+00	2.4	5.68E+00
2	3	35.22	484	92	1.68	35.34	27	18	5.38E-01	5.6	
3	0	47.15	21	119	1.69	47.27	44	6	2.33E-02	85.0	
4	0	52.58	50	116	2.39	52.69	50	6	5.55E-02	37.0	
5	1	61.90	167	78	1.46	62.02	57	17	1.85E-01	10.6	1.31E+00
6	1	66.02	83	66	1.47	66.13	57	17	9.24E-02	18.1	
7	0	81.11	710	129	1.47	81.22	77	9	7.88E-01	4.7	
8	0	92.55	72	74	1.45	92.66	88	10	8.03E-02	25.3	
9	0	100.49	30	61	3.33	100.60	98	7	3.31E-02	46.9	
10	4	111.96	163	60	1.68	112.07	108	12	1.81E-01	10.6	4.29E-01
11	4	115.91	60	51	1.80	116.03	108	12	6.72E-02	24.8	
12	0	159.90	15	73	0.97	160.01	159	6	1.70E-02	91.1	
13	2	276.61	50	14	1.81	276.72	273	13	5.57E-02	18.6	3.77E+00
14	2	282.55	9	15	1.94	282.66	273	13	1.01E-02	78.8	
15	2	302.91	184	6	1.67	303.02	298	21	2.04E-01	7.5	2.84E+00
16	2	307.23	17	7	1.97	307.34	298	21	1.86E-02	48.2	
17	0	333.78	67	12	1.62	333.89	331	6	7.42E-02	14.7	
18	0	338.44	26	13	1.86	338.55	337	6	2.90E-02	29.5	
19	0	356.10	441	35	1.48	356.21	352	9	4.90E-01	5.4	
20	5	364.99	26	12	2.70	365.10	362	9	2.93E-02	27.5	1.70E+01
21	5	368.29	8	15	2.20	368.40	362	9	9.11E-03	79.6	
22	5	383.90	75	31	2.22	384.00	381	9	8.28E-02	23.2	4.02E+00
23	5	386.93	146	32	1.56	387.03	381	9	1.62E-01	10.4	
24	0	391.58	32	30	1.67	391.69	390	6	3.54E-02	33.4	
25	1	414.72	37	8	1.88	414.83	412	16	4.12E-02	21.5	1.28E+00
26	1	417.92	17	10	1.89	418.02	412	16	1.87E-02	50.2	
27	1	421.04	11	11	1.89	421.14	412	16	1.23E-02	63.5	
28	0	437.14	83	12	1.40	437.25	433	8	9.22E-02	13.1	
29	3	468.11	21	2	2.33	468.21	463	16	2.38E-02	29.5	1.48E+00
30	3	475.68	6	3	2.34	475.78	463	16	7.05E-03	57.0	
31	0	510.47	16	3	1.19	510.57	507	6	1.82E-02	29.6	
32	0	555.24	6	4	3.18	555.34	552	7	6.78E-03	65.8	

Summary of Nuclide Activity

Sample ID : 1304131-04

Acquisition date : 10-MAY-2013 14:49:14

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	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
BA-133	10.50Y	1.00	3.590E+02	3.591E+02	0.714E+02	19.90		
Total Activity :			3.590E+02	3.591E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
PA-231	3.28E+04Y	1.00	3.172E+03	3.172E+03	1.011E+03	31.86		
TH-234	4.47E+09Y	1.00	5.724E+02	5.724E+02	1.320E+02	23.07		
Total Activity :			3.745E+03	3.745E+03				

Grand Total Activity : 4.104E+03 4.104E+03

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	3.590E+02	3.591E+02	19.90	OK
	302.84	17.80	7.560E+00	4.100E+02	4.100E+02	33.43	OK
	356.01	60.00	7.170E+00	3.077E+02	3.077E+02	18.55	OK

Final Mean for 3 Valid Peaks = 3.591E+02 +/- 7.144E+01 (19.90%)

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	2.210E+02	2.210E+02	160.01	OK
	302.67	2.30	7.562E+00	3.172E+03	3.172E+03	31.86	OK

Final Mean for 2 Valid Peaks = 3.172E+03 +/- 1.011E+03 (31.86%)

TH-234	63.29	3.80*	2.305E+01	5.724E+02	5.724E+02	23.07	OK
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Final Mean for 1 Valid Peaks = 5.724E+02 +/- 1.320E+02 (23.07%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.591E+02	7.144E+01	1.766E+01	3.007E+00	20.331
PA-231	3.172E+03	1.011E+03	9.769E+00	1.861E-01	324.707
TH-234	5.724E+02	1.320E+02	1.405E+02	1.161E+01	4.075

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.032E+00	5.280E+00	8.862E+00	1.361E+00	0.116
CD-109	3.105E+01	1.090E+02	1.654E+02	1.899E+01	0.188
PA-234	2.836E+00	1.641E+00	3.138E+00	6.472E-02	0.904
NP-237	1.328E+01	3.041E+01	4.745E+01	5.357E+00	0.280
AM-241	2.046E+01	1.016E+01	1.877E+01	1.453E+00	1.090

208
5/10/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 14:49:17.93

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413105_GE3_BAFIL_191434.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-208-SS DIS
 Deposition Date :
 Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 14:33:56
 Sample ID : 1304131-05 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:03.95 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	30.90	2091	92	1.42	31.22	27	14	2.32E+00	2.3	1.06E+01
2	2	34.96	475	84	1.59	35.28	27	14	5.28E-01	5.7	
3	0	52.22	63	123	2.18	52.54	49	7	6.95E-02	32.0	
4	2	61.80	272	87	1.48	62.11	58	13	3.02E-01	7.6	3.04E+00
5	2	65.95	114	106	1.67	66.27	58	13	1.27E-01	16.2	
6	0	81.05	812	123	1.93	81.37	78	8	9.02E-01	4.2	
7	5	108.56	16	30	2.32	108.87	107	15	1.79E-02	49.7	1.95E+00
8	5	111.94	230	48	1.82	112.26	107	15	2.55E-01	7.9	
9	5	116.36	43	55	2.13	116.67	107	15	4.73E-02	37.9	
10	0	161.82	39	58	1.01	162.13	160	6	4.38E-02	34.3	
11	0	191.01	28	119	7.83	191.32	188	12	3.14E-02	79.0	
12	0	276.58	46	36	1.28	276.89	274	7	5.11E-02	26.0	
13	2	302.87	163	25	1.56	303.18	298	17	1.81E-01	8.6	6.10E+00
14	2	307.48	29	20	1.99	307.79	298	17	3.22E-02	33.2	
15	2	311.75	13	16	1.99	312.05	298	17	1.40E-02	67.2	
16	1	333.86	74	17	1.83	334.17	330	11	8.21E-02	14.4	1.32E+00
17	1	337.53	26	8	1.83	337.83	330	11	2.87E-02	35.1	
18	0	356.04	540	17	1.87	356.34	351	11	6.00E-01	4.5	
19	1	364.53	19	13	1.85	364.83	362	11	2.12E-02	36.1	2.07E+00
20	1	369.53	10	14	1.86	369.83	362	11	1.09E-02	66.8	
21	0	377.96	10	21	1.73	378.27	375	5	1.12E-02	69.2	
22	1	383.77	105	35	1.60	384.08	382	9	1.16E-01	14.3	2.58E+01
23	1	386.87	206	68	1.85	387.17	382	9	2.29E-01	10.1	
24	1	414.54	52	12	1.89	414.84	412	14	5.82E-02	17.8	3.39E+00
25	1	417.53	33	12	1.90	417.83	412	14	3.62E-02	30.4	
26	1	421.68	9	12	1.90	421.98	412	14	1.01E-02	68.0	
27	0	437.13	112	10	1.96	437.43	433	8	1.24E-01	10.7	
28	2	467.84	24	0	2.13	468.14	465	12	2.64E-02	21.9	9.17E-01
29	2	472.44	13	0	2.13	472.73	465	12	1.44E-02	32.8	
30	0	510.06	16	2	3.45	510.36	506	9	1.74E-02	30.7	

Total number of lines in spectrum 30
 Number of unidentified lines 26
 Number of lines tentatively identified by NID 4 13.33%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.890E+02	3.890E+02	0.697E+02	17.92	
Total Activity :			3.890E+02	3.890E+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	8.108E+02	8.108E+02	1.348E+02	16.62	
Total Activity :			8.108E+02	8.108E+02			

Grand Total Activity : 1.200E+03 1.200E+03

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	3.890E+02	3.890E+02	17.92	OK
	302.84	17.80	6.222E+00	4.412E+02	4.412E+02	26.86	OK
	356.01	60.00	5.860E+00	4.615E+02	4.616E+02	16.39	OK

Final Mean for 3 Valid Peaks = 3.890E+02+/- 6.972E+01 (17.92%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	8.108E+02	8.108E+02	16.62	OK

Final Mean for 1 Valid Peaks = 8.108E+02+/- 1.348E+02 (16.62%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.890E+02	6.972E+01	1.915E+01	2.929E+00	20.313
TH-234	8.108E+02	1.348E+02	1.424E+02	7.650E+00	5.693

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.720E-01	6.378E+00	1.035E+01	1.182E+00	0.046
CD-109	2.082E+01	1.273E+02	2.065E+02	1.702E+01	0.101
PA-231	2.219E+00	1.640E+00	3.221E+00	4.581E-02	0.689
PA-234	3.127E+00	1.374E+00	2.711E+00	3.856E-02	1.153
NP-237	1.956E+01	3.531E+01	5.959E+01	4.817E+00	0.328
AM-241	2.388E+01	9.649E+00	1.861E+01	9.152E-01	1.283

W5
5/20/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 14:49:38.53

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413106_GE5_BAFIL_191435.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-101-SS TOT
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 14:34:22
Sample ID : 1304131-06 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.25 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	21.39	67	39	0.62	210.66	203	16	7.41E-02	25.9	
2	0	31.13	1950	118	0.70	304.05	292	28	2.17E+00	2.8	
3	3	35.27	424	34	0.73	343.86	334	28	4.71E-01	6.0	1.58E+00
4	3	36.11	115	32	0.69	351.86	334	28	1.28E-01	21.7	
5	2	52.59	19	16	0.62	510.00	493	32	2.14E-02	61.9	1.16E+00
6	2	53.53	40	16	0.60	519.01	493	32	4.46E-02	24.3	
7	0	56.49	16	14	0.63	547.41	539	14	1.81E-02	48.7	
8	0	61.98	236	47	0.91	600.16	586	28	2.63E-01	9.5	
9	2	65.33	14	0	0.53	632.24	630	26	1.59E-02	27.6	2.01E+00
10	2	66.07	79	18	0.80	639.33	630	26	8.82E-02	17.8	
11	1	79.86	23	49	0.76	771.67	761	37	2.60E-02	68.2	8.39E-01
12	1	81.38	779	26	0.71	786.28	761	37	8.65E-01	3.8	
13	0	84.23	25	9	0.80	813.65	804	17	2.82E-02	30.0	
14	0	112.29	172	24	0.91	1082.93	1072	22	1.91E-01	9.9	
15	1	115.92	28	14	0.85	1117.74	1110	20	3.16E-02	30.0	2.02E+00
16	1	116.47	21	11	0.77	1123.00	1110	20	2.30E-02	40.7	
17	0	197.12	12	17	1.27	1896.89	1881	23	1.32E-02	74.9	
18	0	277.21	55	6	0.59	2665.44	2652	22	6.08E-02	16.0	
19	2	303.35	93	7	1.22	2916.22	2904	26	1.03E-01	12.8	3.38E+00
20	2	304.05	102	5	1.06	2923.00	2904	26	1.13E-01	9.2	
21	5	307.99	30	6	1.56	2960.77	2947	24	3.36E-02	20.7	1.12E+00
22	5	308.59	15	2	0.78	2966.52	2947	24	1.64E-02	31.0	
23	1	334.17	11	7	1.10	3212.00	3198	26	1.24E-02	73.3	1.78E+01
24	1	334.69	120	5	1.10	3217.00	3198	26	1.34E-01	5.6	
25	0	356.93	352	18	0.90	3430.34	3414	29	3.91E-01	5.9	
26	0	384.79	78	8	0.89	3697.71	3681	27	8.72E-02	13.2	
27	3	387.22	51	5	1.16	3721.00	3712	26	5.66E-02	21.1	1.41E+00
28	3	387.99	108	3	0.85	3728.41	3712	26	1.20E-01	12.3	
29	3	388.57	13	0	1.16	3734.00	3712	26	1.44E-02	61.2	
30	0	391.98	34	2	0.18	3766.70	3752	25	3.77E-02	19.2	

Total number of lines in spectrum 30
 Number of unidentified lines 24
 Number of lines tentatively identified by NID 6 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	3.932E+02	3.933E+02	0.672E+02	17.09	
Total Activity :			3.932E+02	3.933E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	2.135E+02	2.135E+02	0.414E+02	19.40	
Total Activity :			2.135E+02	2.135E+02			

Grand Total Activity : 6.067E+02 6.067E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.932E+02	3.933E+02	17.09	OK
	302.84	17.80	2.575E+00	6.068E+02	6.069E+02	36.79	OK
	356.01	60.00	4.312E+00	4.081E+02	4.081E+02	18.65	OK

Final Mean for 3 Valid Peaks = 3.933E+02+/- 6.720E+01 (17.09%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.135E+02	2.135E+02	19.40	OK

Final Mean for 1 Valid Peaks = 2.135E+02+/- 4.141E+01 (19.40%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.933E+02	6.720E+01	1.252E+01	1.844E+00	31.410
TH-234	2.135E+02	4.141E+01	2.735E+01	3.519E-01	7.804

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.268E+00		1.282E+01	2.296E+01	7.782E+00	-0.142
CD-109	5.108E+00		9.774E+01	1.798E+02	1.730E+01	0.028
PA-231	-2.463E-01		7.977E-01	1.410E+00	1.587E-02	-0.175
PA-234	3.085E+00	+	1.603E+00	2.188E+00	2.462E-02	1.410
NP-237	-5.693E+00		2.695E+01	4.327E+01	3.817E+00	-0.132
AM-241	8.780E-01		1.628E+00	2.687E+00	3.025E-02	0.327

K3
5/10/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 15:39:01.99

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413107_GE3_BAFIL_191443.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-101-SS DIS
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 15:23:40
Sample ID : 1304131-07 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:03.76 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	6	28.09	48	111	1.73	28.41	26	14	5.34E-02	40.3	9.99E+01
2	6	30.96	1994	78	1.42	31.28	26	14	2.22E+00	2.3	
3	6	34.76	601	105	2.33	35.08	26	14	6.68E-01	6.5	
4	0	52.57	65	117	2.55	52.89	49	7	7.26E-02	30.1	
5	4	61.93	285	76	1.69	62.25	58	12	3.17E-01	7.5	1.22E+00
6	4	66.14	139	92	2.02	66.46	58	12	1.54E-01	15.6	
7	0	81.18	818	149	1.95	81.50	77	10	9.08E-01	4.5	
8	2	111.99	220	55	1.75	112.30	108	15	2.45E-01	8.4	3.38E+00
9	2	115.99	40	55	1.76	116.30	108	15	4.49E-02	32.9	
10	0	161.73	16	73	1.79	162.05	158	6	1.81E-02	86.7	
11	0	258.84	22	31	1.11	259.15	255	7	2.45E-02	47.2	
12	0	276.72	51	24	1.16	277.03	274	6	5.65E-02	20.7	
13	2	303.00	137	13	1.66	303.30	300	11	1.52E-01	9.3	5.90E+00
14	2	307.67	22	23	1.99	307.98	300	11	2.47E-02	34.1	
15	0	333.86	74	30	1.39	334.17	330	7	8.19E-02	16.9	
16	0	338.34	24	18	1.74	338.64	337	5	2.71E-02	32.3	
17	0	356.15	523	30	1.93	356.46	352	10	5.81E-01	4.8	
18	1	383.83	125	15	1.87	384.14	381	15	1.39E-01	10.5	9.54E+00
19	1	386.87	188	15	1.87	387.17	381	15	2.09E-01	9.8	
20	1	391.53	35	15	1.88	391.83	381	15	3.88E-02	27.0	
21	2	414.72	39	14	2.08	415.02	410	15	4.28E-02	23.0	1.64E+00
22	2	417.73	20	16	2.09	418.04	410	15	2.25E-02	47.3	
23	0	437.00	117	11	1.99	437.30	432	11	1.30E-01	10.8	
24	0	468.63	12	15	2.12	468.93	463	10	1.32E-02	67.6	
25	2	510.33	16	2	2.16	510.63	507	11	1.81E-02	29.5	5.26E-01
26	2	513.72	5	1	2.16	514.02	507	11	6.07E-03	86.3	
27	0	609.39	9	4	2.13	609.68	606	7	1.05E-02	46.2	

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	3.919E+02	3.919E+02	0.713E+02	18.18	
Total Activity :			3.919E+02	3.919E+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	8.518E+02	8.518E+02	1.397E+02	16.40	
Total Activity :			8.518E+02	8.518E+02			

Grand Total Activity : 1.244E+03 1.244E+03

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	3.919E+02	3.919E+02	18.18	OK
	302.84	17.80	6.222E+00	3.704E+02	3.705E+02	27.82	OK
	356.01	60.00	5.860E+00	4.467E+02	4.467E+02	16.67	OK

Final Mean for 3 Valid Peaks = 3.919E+02+/- 7.125E+01 (18.18%)

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	8.518E+02	8.518E+02	16.40	OK

Final Mean for 1 Valid Peaks = 8.518E+02+/- 1.397E+02 (16.40%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.919E+02	7.125E+01	1.871E+01	2.861E+00	20.950
TH-234	8.518E+02	1.397E+02	1.387E+02	7.449E+00	6.142

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	8.983E-01	6.516E+00	1.063E+01	1.214E+00	0.085
CD-109	7.561E+01	1.141E+02	1.960E+02	1.616E+01	0.386
PA-231	3.150E+00	1.601E+00	3.272E+00	4.654E-02	0.963
PA-234	3.736E+00	1.531E+00	2.881E+00	4.097E-02	1.297
NP-237	-1.527E+01	3.401E+01	5.191E+01	4.196E+00	-0.294
AM-241	2.151E+01	9.298E+00	1.792E+01	8.813E-01	1.200

10/3
5/20/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 15:39:49.51

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413108_GE5_BAFIL_191444.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : MW-1204 TOT
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 15:24:08
Sample ID : 1304131-08 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.05 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4.24	7	18	0.14	46.08	41	8	8.13E-03	110.1	
2	0	21.33	30	14	0.30	210.06	202	14	3.35E-02	32.0	
3	0	31.12	731	59	0.77	304.00	292	24	8.12E-01	4.6	
4	4	35.28	139	28	0.69	343.88	335	23	1.55E-01	12.2	1.82E+00
5	4	36.33	27	8	0.50	354.04	335	23	2.96E-02	27.9	
6	0	61.91	81	11	0.64	599.41	588	23	8.96E-02	14.5	
7	0	81.31	300	16	0.63	785.59	773	23	3.33E-01	6.5	
8	0	112.06	92	3	0.47	1080.66	1069	21	1.02E-01	11.3	
9	0	116.31	26	12	0.84	1121.50	1109	20	2.84E-02	35.5	
10	0	303.79	34	3	0.42	2920.49	2907	21	3.83E-02	18.7	
11	0	356.90	153	3	0.77	3430.06	3413	30	1.70E-01	8.4	
12	0	384.60	27	2	0.49	3695.91	3681	23	3.04E-02	21.4	
13	1	387.95	86	5	1.16	3728.00	3711	27	9.59E-02	9.6	4.05E+00
14	1	388.36	12	1	1.16	3732.00	3711	27	1.31E-02	54.9	

Summary of Nuclide Activity

Sample ID : 1304131-08

Acquisition date : 10-MAY-2013 15:24:08

Total number of lines in spectrum 14
 Number of unidentified lines 8
 Number of lines tentatively identified by NID 6 42.86%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	1.515E+02	1.515E+02	0.303E+02	19.98		
Total Activity :			1.515E+02	1.515E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
TH-234	4.47E+09Y	1.00	7.284E+01	7.284E+01	2.129E+01	29.23		
Total Activity :			7.284E+01	7.284E+01				

Grand Total Activity : 2.243E+02 2.244E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	1.515E+02	1.515E+02	19.98	OK
	302.84	17.80	2.575E+00	2.255E+02	2.255E+02	45.77	OK
	356.01	60.00	4.312E+00	1.781E+02	1.781E+02	22.13	OK

Final Mean for 3 Valid Peaks = 1.515E+02+/- 3.028E+01 (19.98%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	7.284E+01	7.284E+01	29.23	OK

Final Mean for 1 Valid Peaks = 7.284E+01+/- 2.129E+01 (29.23%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	1.515E+02	3.028E+01	1.106E+01	1.629E+00	13.698
TH-234	7.284E+01	2.129E+01	1.871E+01	2.408E-01	3.892

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.326E+00		1.108E+01	2.197E+01	7.446E+00	0.106
CD-109	-1.023E+01		6.800E+01	1.264E+02	1.216E+01	-0.081
PA-231	-5.651E-02		5.807E-01	1.112E+00	1.251E-02	-0.051
PA-234	1.394E+00	+	8.943E-01	1.445E+00	1.627E-02	0.965
NP-237	-7.706E+00		1.633E+01	2.861E+01	2.524E+00	-0.269
AM-241	3.652E-01		1.003E+00	1.755E+00	1.975E-02	0.208

ES 10/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 15:54:29.45

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413109_GE3_BAFIL_191445.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : MW-1204 DIS
 Deposition Date :
 Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 15:39:11
 Sample ID : 1304131-09 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 00:15:03.76 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	4	30.88	2096	93	1.55	31.20	26	19	2.33E+00	2.3	1.08E+01
2	4	35.12	495	89	1.61	35.44	26	19	5.50E-01	5.4	
3	0	53.21	51	125	2.26	53.53	50	8	5.71E-02	40.2	
4	2	61.77	255	84	1.66	62.08	58	13	2.83E-01	8.5	3.29E+00
5	2	65.73	117	96	1.67	66.05	58	13	1.30E-01	15.3	
6	0	81.19	815	139	1.91	81.51	78	9	9.05E-01	4.4	
7	0	93.21	51	142	1.44	93.53	89	10	5.70E-02	45.6	
8	4	111.96	229	61	1.62	112.28	108	13	2.54E-01	8.3	2.20E+00
9	4	116.36	40	54	2.13	116.67	108	13	4.41E-02	43.3	
10	0	276.69	58	24	1.25	277.00	273	8	6.44E-02	19.7	
11	2	302.89	129	25	1.58	303.19	298	14	1.43E-01	10.3	2.34E+00
12	2	307.47	16	32	1.99	307.78	298	14	1.81E-02	58.5	
13	1	333.72	64	17	1.83	334.02	329	13	7.08E-02	16.1	3.22E+00
14	1	337.71	19	19	1.83	338.02	329	13	2.15E-02	47.9	
15	3	356.16	516	10	1.50	356.46	351	29	5.73E-01	4.5	1.64E+00
16	3	376.39	12	7	2.26	376.70	351	29	1.35E-02	56.6	
17	3	383.92	92	34	2.26	384.22	380	11	1.02E-01	19.8	1.59E+01
18	3	386.99	163	68	1.85	387.30	380	11	1.81E-01	10.5	
19	0	391.39	45	18	2.66	391.69	391	5	4.97E-02	23.8	
20	3	414.93	23	15	2.29	415.23	411	17	2.54E-02	42.3	7.32E-01
21	3	417.96	33	16	2.29	418.26	411	17	3.68E-02	31.2	
22	0	437.15	96	7	1.77	437.45	433	9	1.07E-01	11.3	
23	0	468.49	27	9	1.42	468.79	464	7	2.99E-02	27.4	
24	0	511.09	16	2	1.67	511.39	508	7	1.80E-02	28.4	

Total number of lines in spectrum 24
 Number of unidentified lines 20
 Number of lines tentatively identified by NID 4 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	3.905E+02	3.906E+02	0.706E+02	18.08	
Total Activity :			3.905E+02	3.906E+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	7.608E+02	7.608E+02	1.386E+02	18.22	
Total Activity :			7.608E+02	7.608E+02			

Grand Total Activity : 1.151E+03 1.151E+03

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	3.905E+02	3.906E+02	18.08	OK
	302.84	17.80	6.222E+00	3.493E+02	3.494E+02	29.14	OK
	356.01	60.00	5.860E+00	4.406E+02	4.407E+02	16.33	OK

Final Mean for 3 Valid Peaks = 3.906E+02+/- 7.061E+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	7.608E+02	7.608E+02	18.22	OK

Final Mean for 1 Valid Peaks = 7.608E+02+/- 1.386E+02 (18.22%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.906E+02	7.061E+01	2.083E+01	3.185E+00	18.752
TH-234	7.608E+02	1.386E+02	1.351E+02	7.256E+00	5.632

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.486E+00		6.669E+00	1.148E+01	1.311E+00	0.391
CD-109	1.212E+01		1.338E+02	1.913E+02	1.577E+01	0.063
PA-231	1.316E+00		1.557E+00	2.981E+00	4.240E-02	0.442
PA-234	4.176E+00		1.380E+00	2.730E+00	3.883E-02	1.530
NP-237	-2.366E+00		3.817E+01	5.348E+01	4.323E+00	-0.044
AM-241	2.633E+01		9.962E+00	1.854E+01	9.116E-01	1.420

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VAX/VMS Peak Search Report Generated 10-MAY-2013 15:20:34.79

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413110_GE2_BAFIL_191439.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-113-SS TOT
 Deposition Date :
 Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 15:05:19
 Sample ID : 1304131-10 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.26 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	4	30.95	1596	94	1.46	31.06	26	17	1.77E+00	2.6	5.29E+00
2	4	35.20	347	118	1.59	35.32	26	17	3.85E-01	7.1	
3	0	44.84	46	128	4.54	44.95	42	7	5.11E-02	43.3	
4	0	52.17	72	129	2.47	52.28	49	8	7.97E-02	30.0	
5	0	60.73	80	190	1.42	60.85	58	8	8.84E-02	31.9	
6	0	81.13	576	127	1.60	81.24	77	9	6.40E-01	5.4	
7	4	112.03	147	50	1.73	112.14	107	15	1.63E-01	10.9	8.30E-01
8	4	116.31	35	62	2.07	116.42	107	15	3.85E-02	44.3	
9	0	186.57	30	39	1.00	186.68	185	5	3.37E-02	36.2	
10	0	210.78	17	30	3.08	210.89	208	6	1.93E-02	55.9	
11	0	239.69	15	21	1.93	239.80	236	6	1.65E-02	55.3	
12	0	276.95	51	36	1.96	277.06	272	9	5.68E-02	25.3	
13	0	303.37	84	58	1.43	303.48	299	9	9.37E-02	19.4	
14	0	334.82	25	37	1.23	334.92	330	7	2.81E-02	44.4	
15	0	338.67	18	20	1.56	338.78	337	6	2.02E-02	47.3	
16	0	356.09	389	18	1.48	356.20	351	10	4.33E-01	5.5	
17	0	376.79	15	4	1.21	376.90	373	8	1.67E-02	34.6	
18	1	383.72	104	7	1.86	383.83	380	15	1.16E-01	11.4	4.69E+00
19	1	387.06	128	10	1.86	387.17	380	15	1.43E-01	11.6	
20	1	391.72	27	12	1.86	391.83	380	15	2.97E-02	28.4	
21	1	414.72	37	9	1.88	414.83	411	17	4.12E-02	20.4	2.63E+00
22	1	418.07	16	7	1.89	418.17	411	17	1.78E-02	49.6	
23	1	433.88	9	0	1.90	433.99	432	9	9.94E-03	37.1	4.14E+00
24	1	437.07	63	2	1.90	437.17	432	9	6.98E-02	12.8	
25	0	444.33	15	4	1.83	444.43	441	8	1.67E-02	34.6	
26	0	511.30	22	9	1.52	511.41	506	10	2.46E-02	33.8	
27	0	609.54	11	0	3.16	609.64	606	8	1.22E-02	30.2	
28	0	693.03	8	0	1.66	693.12	690	7	8.89E-03	35.4	
29	0	708.69	13	2	1.13	708.79	705	8	1.47E-02	32.9	

Summary of Nuclide Activity

Sample ID : 1304131-10

Acquisition date : 10-MAY-2013 15:05:19

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	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
BA-133	10.50Y	1.00	2.917E+02	2.917E+02	0.601E+02		20.61	
Total Activity :			2.917E+02	2.917E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
AM-241	432.20Y	1.00	2.703E+01	2.703E+01	1.739E+01		64.32	
Total Activity :			2.703E+01	2.703E+01				

Grand Total Activity : 3.187E+02 3.187E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	2.917E+02	2.917E+02	20.61	OK
	302.84	17.80	7.560E+00	1.882E+02	1.882E+02	49.04	OK
	356.01	60.00	7.170E+00	2.719E+02	2.719E+02	18.66	OK

Final Mean for 3 Valid Peaks = 2.917E+02+/- 6.011E+01 (20.61%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
AM-241	59.54	35.90*	2.461E+01	2.703E+01	2.703E+01	64.32	OK

Final Mean for 1 Valid Peaks = 2.703E+01+/- 1.739E+01 (64.32%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	2.917E+02	6.011E+01	2.023E+01	3.445E+00	14.419
AM-241	2.703E+01	1.739E+01	1.726E+01	1.336E+00	1.566

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-4.160E-01	5.525E+00	8.912E+00	1.369E+00	-0.047
CD-109	1.176E+01	9.871E+01	1.645E+02	1.889E+01	0.071
PA-231	3.320E+01	5.073E+00	9.773E+00	1.861E-01	3.397
PA-234	1.592E+00	1.695E+00	2.949E+00	6.082E-02	0.540
TH-234	2.074E+02	1.224E+02	2.159E+02	1.784E+01	0.960
NP-237	1.770E+01	3.048E+01	5.302E+01	5.986E+00	0.334

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VAX/VMS Peak Search Report Generated 10-MAY-2013 15:22:20.13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413111_GE3_BAFIL_191440.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-113-SS DIS
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 15:06:57
Sample ID : 1304131-11 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.11 0.5%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.86	1878	75	1.58	31.18	26	17	2.09E+00	2.4	2.44E+01
2	2	34.96	425	65	1.59	35.28	26	17	4.72E-01	5.9	
3	0	52.59	33	107	1.90	52.91	50	7	3.71E-02	53.8	
4	1	61.80	149	90	1.51	62.12	57	14	1.66E-01	12.5	1.97E+00
5	1	65.75	57	95	1.52	66.07	57	14	6.38E-02	29.4	
6	0	81.20	737	129	1.95	81.52	77	10	8.19E-01	4.7	
7	0	93.72	19	96	1.50	94.04	90	8	2.16E-02	90.0	
8	3	111.83	155	37	1.93	112.15	107	15	1.72E-01	10.5	2.40E+00
9	3	116.16	28	38	1.93	116.48	107	15	3.16E-02	42.2	
10	0	188.58	40	90	3.05	188.89	184	13	4.47E-02	50.7	
11	0	238.76	21	15	2.08	239.07	236	6	2.33E-02	36.4	
12	0	254.61	16	19	1.89	254.92	251	7	1.76E-02	52.4	
13	1	276.53	56	6	1.78	276.84	271	16	6.20E-02	15.6	1.74E+00
14	1	283.69	8	5	1.79	284.00	271	16	9.43E-03	55.0	
15	4	302.93	122	9	1.73	303.24	300	15	1.36E-01	9.5	2.33E+00
16	4	307.18	30	4	2.40	307.49	300	15	3.32E-02	33.0	
17	4	311.58	17	1	2.41	311.89	300	15	1.84E-02	44.0	
18	0	333.99	49	19	1.41	334.29	331	6	5.39E-02	20.3	
19	0	356.05	414	8	1.84	356.35	351	11	4.60E-01	5.1	
20	5	383.92	79	4	1.56	384.22	382	12	8.82E-02	13.7	8.97E+00
21	5	387.00	127	4	1.88	387.30	382	12	1.41E-01	11.9	
22	1	414.79	23	6	1.89	415.09	412	9	2.59E-02	27.2	8.07E+00
23	1	417.72	15	10	1.90	418.02	412	9	1.64E-02	48.6	
24	0	437.26	59	5	2.02	437.56	434	10	6.56E-02	14.8	
25	0	512.42	7	6	2.23	512.71	509	6	7.78E-03	67.0	
26	0	582.99	7	0	2.09	583.29	581	5	7.78E-03	37.8	

Total number of lines in spectrum 26
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 5 19.23%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.533E+02	3.534E+02	0.650E+02	18.38	
Total Activity :			3.533E+02	3.534E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
PA-231	3.28E+04Y	1.00	2.560E+03	2.560E+03	0.669E+03	26.14	
TH-234	4.47E+09Y	1.00	4.446E+02	4.446E+02	1.151E+02	25.89	
Total Activity :			3.004E+03	3.004E+03			

Grand Total Activity : 3.357E+03 3.358E+03

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	3.533E+02	3.534E+02	18.38	OK
	302.84	17.80	6.222E+00	3.308E+02	3.308E+02	28.02	OK
	356.01	60.00	5.860E+00	3.532E+02	3.533E+02	17.04	OK

Final Mean for 3 Valid Peaks = 3.534E+02 +/- 6.497E+01 (18.38%)

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	2.487E+02	2.487E+02	111.48	OK
	302.67	2.30	6.224E+00	2.560E+03	2.560E+03	26.14	OK

Final Mean for 2 Valid Peaks = 2.560E+03 +/- 6.690E+02 (26.14%)

TH-234	63.29	3.80*	2.648E+01	4.446E+02	4.446E+02	25.89	OK
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Final Mean for 1 Valid Peaks = 4.446E+02 +/- 1.151E+02 (25.89%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.534E+02	6.497E+01	1.886E+01	2.884E+00	18.741
PA-231	2.560E+03	6.690E+02	3.039E+00	4.322E-02	842.251
TH-234	4.446E+02	1.151E+02	1.253E+02	6.732E+00	3.547

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.112E+00	5.716E+00	8.777E+00	1.003E+00	-0.241
CD-109	-2.355E+01	1.196E+02	1.648E+02	1.359E+01	-0.143
PA-234	3.461E+00	1.337E+00	2.601E+00	3.700E-02	1.331
NP-237	2.928E+01	3.083E+01	5.083E+01	4.109E+00	0.576
AM-241	1.552E+01	8.671E+00	1.580E+01	7.769E-01	0.983

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VAX/VMS Peak Search Report Generated 10-MAY-2013 15:22:45.85

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413112_GE5_BAFIL_191441.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-73 TOT
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 15:07:27
Sample ID : 1304131-12 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.08 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	6.99	7	6	0.78	72.43	64	12	7.78E-03	79.5	
2	0	21.16	91	4	0.80	208.45	200	17	1.01E-01	11.7	
3	0	28.19	15	14	0.45	275.90	271	9	1.61E-02	52.7	
4	0	31.12	1625	66	0.81	304.02	292	24	1.81E+00	2.8	
5	2	35.28	360	26	0.68	343.88	334	27	4.00E-01	6.4	1.40E+00
6	2	36.13	65	13	0.64	352.05	334	27	7.23E-02	30.9	
7	0	53.66	35	17	0.55	520.32	507	22	3.84E-02	31.6	
8	0	62.00	194	32	0.78	600.35	586	27	2.16E-01	9.9	
9	3	66.15	74	19	0.88	640.09	628	27	8.21E-02	19.0	8.36E-01
10	3	67.18	27	11	0.66	650.00	628	27	3.01E-02	27.6	
11	6	79.90	27	9	0.73	772.07	766	30	3.05E-02	27.6	1.32E+00
12	6	81.38	648	17	0.76	786.32	766	30	7.20E-01	4.1	
13	0	112.39	119	47	0.67	1083.87	1070	23	1.32E-01	15.5	
14	0	116.64	32	20	0.41	1124.61	1111	20	3.50E-02	34.6	
15	0	276.97	46	3	0.52	2663.08	2647	27	5.14E-02	16.8	
16	2	303.01	24	7	1.17	2912.98	2903	26	2.70E-02	40.4	6.22E-01
17	2	303.65	70	6	0.90	2919.15	2903	26	7.77E-02	14.5	
18	0	334.47	38	5	0.49	3214.83	3199	25	4.22E-02	19.6	
19	1	356.37	67	7	1.13	3425.00	3413	30	7.45E-02	27.4	1.53E+01
20	1	357.20	366	13	1.13	3433.00	3413	30	4.06E-01	4.9	
21	0	384.85	58	5	0.69	3698.34	3682	29	6.45E-02	15.4	
22	1	387.11	12	8	1.16	3720.00	3712	28	1.31E-02	74.3	1.82E+00
23	1	387.64	105	11	1.28	3725.09	3712	28	1.16E-01	12.0	

Summary of Nuclide Activity

Sample ID : 1304131-12

Acquisition date : 10-MAY-2013 15:07:27

Total number of lines in spectrum 23
 Number of unidentified lines 17
 Number of lines tentatively identified by NID 6 26.09%

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	3.273E+02	3.273E+02	0.567E+02	17.33	
Total Activity :			3.273E+02	3.273E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	1.755E+02	1.755E+02	0.354E+02	20.18	
Total Activity :			1.755E+02	1.755E+02			

Grand Total Activity : 5.028E+02 5.028E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.273E+02	3.273E+02	17.33	OK
	302.84	17.80	2.575E+00	1.590E+02	1.590E+02	84.95	OK
	356.01	60.00	4.312E+00	7.787E+01	7.788E+01	56.60	OK

Final Mean for 3 Valid Peaks = 3.273E+02+/- 5.672E+01 (17.33%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.755E+02	1.755E+02	20.18	OK

Final Mean for 1 Valid Peaks = 1.755E+02+/- 3.542E+01 (20.18%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.273E+02	5.672E+01	1.188E+01	1.750E+00	27.547
TH-234	1.755E+02	3.542E+01	2.209E+01	2.842E-01	7.944

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.631E+00		1.173E+01	2.170E+01	7.357E+00	-0.075
CD-109	1.021E+01		8.016E+01	1.528E+02	1.470E+01	0.067
PA-231	4.346E-02		8.216E-01	1.539E+00	1.733E-02	0.028
PA-234	4.204E+00	+	9.994E-01	1.937E+00	2.180E-02	2.171
NP-237	-2.445E+01		2.363E+01	3.629E+01	3.201E+00	-0.674
AM-241	1.435E+00		1.289E+00	2.424E+00	2.729E-02	0.592

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VAX/VMS Peak Search Report Generated 10-MAY-2013 15:55:15.60

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413113_GE5_BAFIL_191446.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-73 DIS
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 15:39:57
Sample ID : 1304131-13 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.20 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	7.09	8	10	0.14	73.38	68	10	8.89E-03	82.0	
2	0	18.13	12	6	0.45	179.38	174	9	1.31E-02	49.0	
3	0	21.34	71	26	0.68	210.12	203	14	7.92E-02	19.6	
4	0	25.51	24	18	1.04	250.15	238	24	2.66E-02	51.2	
5	0	31.12	2053	75	0.79	304.04	291	24	2.28E+00	2.5	
6	0	35.20	370	80	0.56	343.15	335	15	4.11E-01	7.6	
7	0	36.42	29	76	0.23	354.81	349	10	3.18E-02	65.8	
8	2	52.14	38	16	0.75	505.75	494	36	4.17E-02	29.7	8.56E-01
9	2	53.42	29	4	0.51	518.02	494	36	3.25E-02	30.4	
10	2	54.30	17	0	0.51	526.47	494	36	1.85E-02	24.1	
11	0	61.95	209	26	1.04	599.87	586	24	2.33E-01	8.7	
12	0	66.19	89	59	0.57	640.54	626	24	9.84E-02	22.7	
13	3	79.50	18	27	0.92	768.22	758	42	2.03E-02	64.2	1.18E+00
14	3	80.00	36	25	0.69	773.00	758	42	3.95E-02	41.8	
15	3	81.32	740	15	0.67	785.68	758	42	8.23E-01	3.9	
16	0	112.28	193	58	0.60	1082.80	1070	23	2.15E-01	11.2	
17	5	116.37	56	34	0.77	1122.00	1112	20	6.18E-02	24.3	3.79E+00
18	5	117.12	9	10	0.46	1129.19	1112	20	9.66E-03	53.9	
19	0	277.04	47	6	0.59	2663.75	2648	28	5.20E-02	18.8	
20	0	303.59	99	5	0.92	2918.56	2904	26	1.10E-01	10.9	
21	0	334.43	47	18	0.80	3214.51	3198	27	5.27E-02	22.7	
22	0	356.83	405	8	0.83	3429.45	3413	29	4.51E-01	5.2	
23	0	384.75	84	8	0.83	3697.32	3681	29	9.38E-02	12.8	
24	6	387.32	54	13	1.16	3722.00	3711	27	5.97E-02	23.8	1.35E+00
25	6	387.96	64	8	0.62	3728.16	3711	27	7.13E-02	20.2	
26	6	388.69	20	1	0.62	3735.10	3711	27	2.25E-02	23.6	

Total number of lines in spectrum 26
 Number of unidentified lines 20
 Number of lines tentatively identified by NID 6 23.08%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.738E+02	3.739E+02	0.642E+02	17.18	
Total Activity :			3.738E+02	3.739E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
TH-234	4.47E+09Y	1.00	1.891E+02	1.891E+02	0.338E+02	17.88	
Total Activity :			1.891E+02	1.891E+02			

Grand Total Activity : 5.629E+02 5.630E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.738E+02	3.739E+02	17.18	OK
	302.84	17.80	2.575E+00	6.511E+02	6.512E+02	34.25	OK
	356.01	60.00	4.312E+00	4.707E+02	4.708E+02	17.77	OK

Final Mean for 3 Valid Peaks = 3.739E+02+/- 6.422E+01 (17.18%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.891E+02	1.891E+02	17.88	OK

Final Mean for 1 Valid Peaks = 1.891E+02+/- 3.381E+01 (17.88%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.739E+02	6.422E+01	1.240E+01	1.825E+00	30.159
TH-234	1.891E+02	3.381E+01	2.063E+01	2.655E-01	9.164

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.392E+01		1.678E+01	2.578E+01	8.739E+00	-0.540
CD-109	-4.890E+01		9.206E+01	1.560E+02	1.501E+01	-0.314
PA-231	7.689E-02		7.126E-01	1.376E+00	1.549E-02	0.056
PA-234	3.299E+00	+	1.300E+00	2.068E+00	2.328E-02	1.595
NP-237	-2.770E+01		2.613E+01	4.023E+01	3.549E+00	-0.689
AM-241	1.779E+00		1.387E+00	2.620E+00	2.950E-02	0.679

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5/10/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 16:11:16.12

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Configuration      : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413114_GE3_BAFIL_191447.CN
Analyses by       : PEAK V16.9  PEAKEFF V2.2
Client ID        : PZ-113-AS TOT
Deposition Date   :
Sample Date      : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 15:55:58
Sample ID       : 1304131-14 Sample Quantity : 1.00000E+00 filter
Sample type     : FILTER Sample Geometry : 0
Detector name   : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.00 0.4%
Start channel   : 25 End channel : 4096
Sensitivity     : 3.00000 Gaussian : 10.00000
Critical level  : No

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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.93	2077	119	1.53	31.25	27	14	2.31E+00	2.3	1.15E+01
2	4	35.18	512	90	1.65	35.50	27	14	5.69E-01	5.3	
3	0	52.56	67	85	1.89	52.88	50	6	7.45E-02	25.0	
4	1	61.82	256	124	1.50	62.14	58	12	2.84E-01	9.0	5.70E+00
5	1	65.68	99	140	1.52	66.00	58	12	1.10E-01	19.9	
6	0	81.07	803	147	1.92	81.38	77	10	8.92E-01	4.5	
7	0	92.02	55	104	1.40	92.33	88	8	6.13E-02	34.9	
8	1	111.83	195	62	1.59	112.14	108	14	2.16E-01	9.8	2.36E+00
9	1	116.54	55	57	1.60	116.85	108	14	6.06E-02	25.0	
10	0	160.17	13	74	2.40	160.48	157	7	1.40E-02	116.9	
11	0	194.91	9	69	1.86	195.22	191	8	1.03E-02	158.6	
12	0	276.95	53	35	1.20	277.25	273	8	5.88E-02	23.9	
13	0	282.79	13	23	2.63	283.10	281	7	1.42E-02	68.0	
14	4	303.02	158	15	1.65	303.32	299	22	1.75E-01	8.6	1.25E+00
15	4	307.71	33	17	2.40	308.01	299	22	3.65E-02	37.4	
16	4	311.29	12	15	2.19	311.59	299	22	1.29E-02	79.9	
17	0	335.02	36	52	1.44	335.33	330	8	3.96E-02	38.9	
18	0	338.57	23	25	2.14	338.88	337	6	2.55E-02	40.4	
19	0	356.15	481	41	1.94	356.45	351	11	5.34E-01	5.2	
20	2	383.65	95	14	1.82	383.95	381	14	1.05E-01	12.0	1.22E+01
21	2	386.95	217	10	2.06	387.25	381	14	2.41E-01	8.5	
22	2	391.37	45	4	2.06	391.68	381	14	5.02E-02	19.3	
23	2	414.72	47	2	2.08	415.02	411	15	5.25E-02	16.6	1.10E+00
24	2	418.06	28	6	2.09	418.36	411	15	3.16E-02	31.9	
25	0	437.23	98	12	1.39	437.53	434	8	1.09E-01	12.0	
26	1	467.80	24	5	1.93	468.10	464	13	2.71E-02	24.9	5.74E-01
27	1	472.82	12	4	1.94	473.12	464	13	1.32E-02	42.6	
28	0	512.82	7	6	2.58	513.11	508	7	7.44E-03	75.1	

Total number of lines in spectrum 28
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 5 17.86%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.848E+02	3.848E+02	0.700E+02	18.20	
Total Activity :			3.848E+02	3.848E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
PA-231	3.28E+04Y	1.00	3.310E+03	3.310E+03	0.824E+03	24.89	
TH-234	4.47E+09Y	1.00	7.638E+02	7.638E+02	1.463E+02	19.15	
Total Activity :			4.074E+03	4.074E+03			

Grand Total Activity : 4.458E+03 4.458E+03

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	3.848E+02	3.848E+02	18.20	OK
	302.84	17.80	6.222E+00	4.278E+02	4.278E+02	26.87	OK
	356.01	60.00	5.860E+00	4.106E+02	4.107E+02	17.21	OK

Final Mean for 3 Valid Peaks = 3.848E+02 +/- 7.004E+01 (18.20%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
PA-231	9.28	42.00*	1.000E+02	----- Line Out Of Range	-----	----	Absent
	10.11	20.20	1.000E+02	----- Line Out Of Range	-----	----	Absent
	283.67	1.60	6.406E+00	3.752E+02	3.752E+02	137.16	OK
	302.67	2.30	6.224E+00	3.310E+03	3.310E+03	24.89	OK

Final Mean for 2 Valid Peaks = 3.310E+03 +/- 8.239E+02 (24.89%)

TH-234	63.29	3.80*	2.648E+01	7.638E+02	7.638E+02	19.15	OK
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Final Mean for 1 Valid Peaks = 7.638E+02 +/- 1.463E+02 (19.15%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.848E+02	7.004E+01	1.996E+01	3.053E+00	19.277
PA-231	3.310E+03	8.239E+02	2.987E+00	4.249E-02	1107.950
TH-234	7.638E+02	1.463E+02	1.538E+02	8.259E+00	4.968

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	6.614E-01		6.198E+00	1.012E+01	1.156E+00	0.065
CD-109	4.634E+01		1.363E+02	2.008E+02	1.656E+01	0.231
PA-234	3.148E+00		1.416E+00	2.774E+00	3.946E-02	1.135
NP-237	1.532E+01		3.944E+01	5.846E+01	4.726E+00	0.262
AM-241	2.150E+01		1.005E+01	1.902E+01	9.353E-01	1.130

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VAX/VMS Peak Search Report Generated 10-MAY-2013 16:11:40.93

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413115_GE5_BAFIL_191448.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-113-AS DIS
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 15:56:25
Sample ID : 1304131-15 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.22 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	16.52	12	6	0.74	163.88	155	13	1.28E-02	54.1	
2	0	21.38	76	34	0.71	210.52	202	16	8.49E-02	20.8	
3	0	31.13	1986	120	0.77	304.14	292	32	2.21E+00	2.9	
4	0	35.43	503	39	0.69	345.32	333	29	5.59E-01	5.8	
5	0	47.24	13	3	0.13	458.69	452	12	1.45E-02	38.4	
6	0	53.63	35	38	0.14	519.97	508	21	3.91E-02	41.0	
7	0	61.96	217	34	0.93	599.90	589	20	2.41E-01	8.8	
8	1	65.93	95	24	0.66	638.00	629	28	1.05E-01	14.2	4.11E+00
9	1	66.55	42	15	0.66	644.00	629	28	4.70E-02	32.6	
10	5	79.84	24	26	1.12	771.48	761	39	2.69E-02	49.3	2.30E+00
11	5	79.89	19	26	0.69	772.00	761	39	2.14E-02	67.5	
12	5	81.37	714	14	0.61	786.15	761	39	7.93E-01	4.0	
13	0	84.17	19	11	0.52	813.02	802	18	2.07E-02	43.5	
14	0	112.22	183	26	0.93	1082.24	1068	26	2.03E-01	9.8	
15	0	116.75	72	17	0.89	1125.70	1112	28	8.05E-02	18.3	
16	0	160.98	31	12	0.72	1550.08	1540	20	3.40E-02	28.1	
17	1	276.96	73	6	1.03	2663.00	2652	22	8.15E-02	10.6	6.07E+00
18	1	277.56	14	1	0.93	2668.79	2652	22	1.51E-02	43.5	
19	0	303.63	102	10	1.08	2918.92	2903	28	1.13E-01	11.8	
20	0	334.44	65	0	1.05	3214.55	3201	26	7.22E-02	12.4	
21	0	356.82	373	24	0.75	3429.37	3413	34	4.14E-01	5.9	
22	1	384.30	15	5	1.16	3693.00	3682	25	1.62E-02	63.9	1.25E+00
23	1	384.92	69	8	1.16	3699.00	3682	25	7.70E-02	13.2	
24	0	387.79	130	27	0.79	3726.47	3709	29	1.44E-01	11.8	

Total number of lines in spectrum 24
 Number of unidentified lines 19
 Number of lines tentatively identified by NID 5 20.83%

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	3.605E+02	3.605E+02	0.622E+02	17.26	
Total Activity :			3.605E+02	3.605E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	1.963E+02	1.963E+02	0.353E+02	18.01	
Total Activity :			1.963E+02	1.963E+02			

Grand Total Activity : 5.567E+02 5.568E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.605E+02	3.605E+02	17.26	OK
	302.84	17.80	2.575E+00	6.651E+02	6.652E+02	35.40	OK
	356.01	60.00	4.312E+00	4.327E+02	4.328E+02	18.62	OK

Final Mean for 3 Valid Peaks = 3.605E+02 +/- 6.222E+01 (17.26%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.963E+02	1.963E+02	18.01	OK

Final Mean for 1 Valid Peaks = 1.963E+02 +/- 3.535E+01 (18.01%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.605E+02	6.222E+01	1.351E+01	1.989E+00	26.683
TH-234	1.963E+02	3.535E+01	2.419E+01	3.112E-01	8.116

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.883E+00		1.539E+01	2.775E+01	9.406E+00	-0.068
CD-109	-1.271E+01		8.373E+01	1.520E+02	1.463E+01	-0.084
PA-231	5.435E-01		9.523E-01	1.872E+00	2.107E-02	0.290
PA-234	3.537E+00	+	1.482E+00	2.161E+00	2.433E-02	1.637
NP-237	-4.980E+00		2.462E+01	4.072E+01	3.592E+00	-0.122
AM-241	8.647E-01		1.676E+00	2.804E+00	3.156E-02	0.308

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5/10/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 16:28:48.77

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413116_GE3_BAFIL_191450.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-107-SS TOT
 Deposition Date :
 Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 16:13:29
 Sample ID : 1304131-16 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 00:15:04.29 0.5%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.90	1007	59	1.59	31.22	27	16	1.12E+00	3.3	9.13E+00
2	3	35.24	274	60	1.68	35.56	27	16	3.05E-01	7.4	
3	0	52.81	39	103	2.80	53.13	50	8	4.35E-02	47.5	
4	6	61.95	145	77	1.93	62.27	58	13	1.61E-01	12.5	1.37E+00
5	6	66.04	72	84	2.44	66.36	58	13	7.98E-02	26.3	
6	0	81.19	400	104	1.97	81.50	77	10	4.44E-01	6.9	
7	2	111.86	102	33	1.75	112.18	108	12	1.13E-01	13.5	2.74E+00
8	2	115.99	21	27	1.76	116.30	108	12	2.38E-02	48.0	
9	0	276.74	21	18	1.19	277.04	274	7	2.32E-02	40.0	
10	4	302.90	55	13	1.74	303.20	299	15	6.13E-02	17.4	3.35E+00
11	4	307.22	20	10	2.40	307.52	299	15	2.24E-02	45.3	
12	0	333.63	49	16	1.55	333.93	329	8	5.40E-02	20.3	
13	0	338.42	20	2	1.71	338.73	337	5	2.18E-02	26.3	
14	0	356.24	241	1	1.90	356.54	354	8	2.67E-01	6.5	
15	0	364.14	15	8	2.23	364.44	362	7	1.63E-02	40.5	
16	2	383.82	57	9	2.06	384.13	381	9	6.38E-02	17.0	7.45E+00
17	2	386.71	88	8	1.70	387.02	381	9	9.80E-02	14.5	
18	0	416.83	55	7	4.46	417.13	411	14	6.11E-02	16.9	
19	0	437.41	54	5	1.93	437.71	435	8	5.96E-02	15.7	
20	0	468.89	9	14	1.62	469.19	466	9	9.54E-03	85.1	
21	0	511.53	19	3	2.75	511.83	508	8	2.06E-02	29.5	

Total number of lines in spectrum 21
 Number of unidentified lines 17
 Number of lines tentatively identified by NID 4 19.05%

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	1.915E+02	1.915E+02	0.403E+02	21.02	
Total Activity :			1.915E+02	1.915E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	4.334E+02	4.334E+02	1.120E+02	25.84	
Total Activity :			4.334E+02	4.334E+02			

Grand Total Activity : 6.249E+02 6.249E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	1.915E+02	1.915E+02	21.02	OK
	302.84	17.80	6.222E+00	1.496E+02	1.496E+02	40.42	OK
	356.01	60.00	5.860E+00	2.056E+02	2.056E+02	18.87	OK

Final Mean for 3 Valid Peaks = 1.915E+02+/- 4.026E+01 (21.02%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	4.334E+02	4.334E+02	25.84	OK

Final Mean for 1 Valid Peaks = 4.334E+02+/- 1.120E+02 (25.84%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	1.915E+02	4.026E+01	1.856E+01	2.838E+00	10.321
TH-234	4.334E+02	1.120E+02	1.029E+02	5.527E+00	4.212

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.250E+00	5.033E+00	8.567E+00	9.787E-01	0.146
CD-109	8.295E+00	1.039E+02	1.698E+02	1.400E+01	0.049
PA-231	1.665E+00	1.578E+00	3.058E+00	4.350E-02	0.544
PA-234	2.489E+00	1.116E+00	2.276E+00	3.237E-02	1.094
NP-237	1.940E+01	2.901E+01	5.074E+01	4.102E+00	0.382
AM-241	1.624E+01	7.525E+00	1.440E+01	7.082E-01	1.127

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VAX/VMS Peak Search Report Generated 10-MAY-2013 16:29:12.74

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130413117_GE5_BAFIL_191451.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-107-SS DIS
Deposition Date :
Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 16:13:57
Sample ID : 1304131-17 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.17 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	5	3.46	17	7	0.32	38.61	38	9	1.89E-02	21.5	1.73E+00
2	5	4.04	9	13	0.35	44.13	38	9	9.95E-03	90.9	
3	0	19.01	9	7	0.18	187.83	182	10	9.86E-03	66.4	
4	0	21.29	86	43	0.77	209.64	200	21	9.60E-02	22.5	
5	0	27.82	11	15	0.26	272.34	267	9	1.26E-02	69.1	
6	0	28.72	28	27	0.64	281.02	275	12	3.09E-02	41.9	
7	0	31.11	1975	142	0.74	303.87	292	25	2.19E+00	2.8	
8	0	35.19	361	115	0.66	343.02	334	18	4.01E-01	8.9	
9	0	36.33	45	34	0.28	353.98	351	10	4.94E-02	31.5	
10	0	43.05	12	3	0.34	418.43	413	11	1.34E-02	39.3	
11	0	53.88	30	47	0.80	522.38	507	20	3.36E-02	50.4	
12	0	61.98	237	20	1.00	600.14	589	26	2.64E-01	7.9	
13	4	66.12	85	22	0.96	639.81	629	29	9.49E-02	17.2	2.77E+00
14	4	66.53	22	12	0.43	643.77	629	29	2.50E-02	47.5	
15	4	67.18	29	17	0.66	650.00	629	29	3.25E-02	37.9	
16	3	80.02	57	15	0.92	773.21	761	39	6.36E-02	38.5	1.01E+00
17	3	81.33	840	7	0.77	785.82	761	39	9.33E-01	3.6	
18	0	102.53	23	2	0.71	989.25	982	16	2.52E-02	24.9	
19	0	112.24	198	31	0.75	1082.36	1071	21	2.20E-01	9.3	
20	0	116.51	34	33	0.85	1123.35	1108	24	3.76E-02	42.9	
21	0	134.66	15	10	1.09	1297.58	1288	15	1.71E-02	46.0	
22	0	161.25	31	15	1.09	1552.72	1538	24	3.40E-02	31.1	
23	0	197.78	13	12	0.26	1903.24	1889	20	1.40E-02	59.7	
24	0	277.30	22	20	0.65	2666.23	2649	23	2.47E-02	44.9	
25	0	303.57	114	8	0.96	2918.33	2902	26	1.26E-01	10.5	
26	0	334.45	63	8	0.72	3214.71	3199	27	7.03E-02	15.2	
27	0	339.05	10	13	0.36	3258.80	3242	18	1.13E-02	66.3	
28	0	356.78	404	4	1.10	3428.94	3411	34	4.49E-01	5.1	
29	0	384.70	76	8	0.52	3696.88	3682	26	8.44E-02	13.4	
30	0	387.65	148	11	0.63	3725.19	3711	27	1.65E-01	9.2	

Total number of lines in spectrum 30
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 7 23.33%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.241E+02	4.241E+02	0.714E+02	16.83	
Total Activity :			4.241E+02	4.241E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	2.144E+02	2.144E+02	0.350E+02	16.33	
Total Activity :			2.144E+02	2.144E+02			

Grand Total Activity : 6.385E+02 6.385E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	4.241E+02	4.241E+02	16.83	OK
	302.84	17.80	2.575E+00	7.444E+02	7.445E+02	33.73	OK
	356.01	60.00	4.312E+00	4.695E+02	4.695E+02	17.66	OK

Final Mean for 3 Valid Peaks = 4.241E+02+/- 7.139E+01 (16.83%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.144E+02	2.144E+02	16.33	OK

Final Mean for 1 Valid Peaks = 2.144E+02+/- 3.502E+01 (16.33%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.241E+02	7.139E+01	1.359E+01	2.000E+00	31.218
TH-234	2.144E+02	3.502E+01	1.619E+01	2.083E-01	13.241

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.907E+00		1.372E+01	2.462E+01	8.345E+00	-0.118
CD-109	-1.235E+01		9.522E+01	1.713E+02	1.649E+01	-0.072
PA-231	-6.649E-01		9.565E-01	1.565E+00	1.761E-02	-0.425
PA-234	3.997E+00	+	1.805E+00	2.180E+00	2.454E-02	1.834
NP-237	-6.718E+00		2.621E+01	4.630E+01	4.084E+00	-0.145
AM-241	5.702E-02		1.381E+00	2.204E+00	2.481E-02	0.026

KP
5/16/13

VAX/VMS Peak Search Report Generated 10-MAY-2013 16:46:37.57

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130413118_GE3_BAFIL_191452.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-116-SS TOT
 Deposition Date :
 Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 16:31:11
 Sample ID : 1304131-18 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.67 0.5%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.93	2173	98	1.45	31.25	26	24	2.41E+00	2.2	4.82E+00
2	4	35.16	566	90	1.73	35.48	26	24	6.28E-01	5.0	
3	0	52.43	85	142	3.25	52.75	49	9	9.49E-02	27.2	
4	6	61.82	295	87	1.56	62.14	58	12	3.27E-01	7.4	3.79E+00
5	6	66.01	164	118	2.18	66.32	58	12	1.83E-01	14.4	
6	0	81.14	937	149	1.93	81.46	76	11	1.04E+00	4.1	
7	0	91.80	36	77	1.31	92.11	90	6	4.04E-02	41.3	
8	0	111.77	268	103	1.90	112.08	107	8	2.98E-01	8.9	
9	0	160.51	29	51	1.27	160.82	159	6	3.23E-02	42.4	
10	0	276.88	52	50	1.28	277.18	273	8	5.79E-02	27.3	
11	0	302.99	165	27	1.76	303.30	300	7	1.83E-01	9.4	
12	0	307.62	22	26	1.20	307.93	307	5	2.47E-02	40.4	
13	3	333.60	100	17	1.87	333.91	330	16	1.11E-01	12.2	2.31E+00
14	3	338.14	28	18	2.22	338.45	330	16	3.12E-02	37.1	
15	0	356.16	502	41	1.93	356.46	351	11	5.57E-01	5.1	
16	0	365.91	7	15	1.37	366.22	363	6	8.08E-03	89.4	
17	4	383.91	103	21	1.70	384.22	382	8	1.15E-01	12.2	2.31E+01
18	4	387.03	211	23	1.80	387.34	382	8	2.34E-01	7.9	
19	0	391.42	49	13	2.54	391.72	391	4	5.40E-02	20.2	
20	0	406.21	15	4	4.31	406.51	403	7	1.71E-02	32.6	
21	2	414.80	31	9	2.08	415.10	411	14	3.49E-02	24.6	1.80E+00
22	2	417.72	22	9	2.09	418.02	411	14	2.49E-02	39.3	
23	0	437.31	116	10	1.89	437.61	434	7	1.28E-01	10.4	
24	0	467.67	26	5	1.75	467.97	463	8	2.94E-02	23.6	
25	0	511.37	21	0	1.76	511.67	508	8	2.33E-02	21.8	

Summary of Nuclide Activity

Sample ID : 1304131-18

Acquisition date : 10-MAY-2013 16:31:11

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	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
			pCi/filter	pCi/filter	2-Sigma Error	%Error	
BA-133	10.50Y	1.00	4.488E+02	4.489E+02	0.800E+02	17.83	
Total Activity :			4.488E+02	4.489E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
			pCi/filter	pCi/filter	2-Sigma Error	%Error	
TH-234	4.47E+09Y	1.00	8.795E+02	8.795E+02	1.431E+02	16.28	
Total Activity :			8.795E+02	8.795E+02			

Grand Total Activity : 1.328E+03 1.328E+03

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "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	4.488E+02	4.489E+02	17.83	OK
	302.84	17.80	6.222E+00	4.467E+02	4.467E+02	27.84	OK
	356.01	60.00	5.860E+00	4.284E+02	4.285E+02	17.05	OK

Final Mean for 3 Valid Peaks = 4.489E+02+/- 8.005E+01 (17.83%)

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	8.795E+02	8.795E+02	16.28	OK

Final Mean for 1 Valid Peaks = 8.795E+02+/- 1.431E+02 (16.28%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.489E+02	8.005E+01	1.915E+01	2.929E+00	23.440
TH-234	8.795E+02	1.431E+02	1.298E+02	6.970E+00	6.777

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.593E+00		5.984E+00	1.012E+01	1.157E+00	-0.157
CD-109	6.430E+01		1.142E+02	1.770E+02	1.460E+01	0.363
PA-231	2.452E+00		1.704E+00	3.345E+00	4.758E-02	0.733
PA-234	4.504E+00		1.507E+00	2.923E+00	4.157E-02	1.541
NP-237	1.963E+00		3.848E+01	5.474E+01	4.425E+00	0.036
AM-241	2.823E+01		9.820E+00	1.853E+01	9.109E-01	1.524

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VAX/VMS Peak Search Report Generated 10-MAY-2013 16:46:58.75

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE] SMP_130413119_GE5_BAFIL_191453.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-116-SS DIS
 Deposition Date :
 Sample Date : 10-MAY-2013 00:00:00 Acquisition date : 10-MAY-2013 16:31:38
 Sample ID : 1304131-19 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.18 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	13.08	6	12	0.18	130.87	119	13	6.60E-03	130.6	
2	0	21.47	52	28	0.16	211.36	206	12	5.77E-02	27.1	
3	0	31.11	1975	88	0.74	303.92	291	25	2.19E+00	2.6	
4	0	35.45	453	37	0.71	345.53	336	25	5.04E-01	6.3	
5	4	52.06	48	2	0.91	504.93	496	29	5.28E-02	18.6	9.97E-01
6	4	53.52	49	5	0.53	518.96	496	29	5.49E-02	17.0	
7	2	61.65	62	36	0.64	596.94	586	26	6.90E-02	30.5	8.17E-01
8	2	62.18	156	40	0.68	602.06	586	26	1.74E-01	12.8	
9	0	66.21	86	23	0.37	640.70	629	19	9.60E-02	15.5	
10	0	81.35	831	69	0.65	786.03	774	22	9.23E-01	4.1	
11	0	84.38	22	11	0.57	815.03	808	14	2.40E-02	36.0	
12	0	112.33	176	47	0.68	1083.26	1072	22	1.95E-01	11.5	
13	1	116.05	16	24	0.77	1119.00	1112	21	1.77E-02	68.8	2.18E+00
14	1	116.47	24	40	0.77	1123.00	1112	21	2.68E-02	59.1	
15	0	161.03	38	7	1.02	1550.60	1540	20	4.19E-02	21.2	
16	0	276.96	53	2	0.96	2662.97	2649	24	5.83E-02	15.2	
17	1	303.01	11	6	1.06	2913.00	2904	24	1.20E-02	97.9	5.00E+01
18	1	303.53	329	5	1.06	2918.00	2904	24	3.65E-01	3.3	
19	0	334.39	55	8	0.73	3214.10	3198	25	6.11E-02	16.4	
20	0	338.76	13	3	0.48	3255.99	3243	20	1.43E-02	38.1	
21	0	356.69	393	11	0.95	3428.10	3411	35	4.37E-01	5.3	
22	0	384.69	68	12	0.89	3696.77	3680	27	7.59E-02	15.3	
23	0	387.53	169	13	0.52	3724.02	3709	27	1.88E-01	8.8	

Total number of lines in spectrum 23
 Number of unidentified lines 18
 Number of lines tentatively identified by NID 5 21.74%

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	4.194E+02	4.195E+02	0.725E+02	17.29	
Total Activity :			4.194E+02	4.195E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	1.411E+02	1.411E+02	0.366E+02	25.95	
Total Activity :			1.411E+02	1.411E+02			

Grand Total Activity : 5.606E+02 5.606E+02

Flags: "K" = Keyline not found
 "E" = Manually edited

"M" = Manually accepted
 "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	4.194E+02	4.195E+02	17.29	OK
	302.84	17.80	2.575E+00	7.077E+01	7.078E+01	197.53	OK
	356.01	60.00	4.312E+00	4.567E+02	4.567E+02	17.97	OK

Final Mean for 3 Valid Peaks = 4.195E+02+/- 7.253E+01 (17.29%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.411E+02	1.411E+02	25.95	OK

Final Mean for 1 Valid Peaks = 1.411E+02+/- 3.663E+01 (25.95%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.195E+02	7.253E+01	2.013E+01	2.963E+00	20.842
TH-234	1.411E+02	3.663E+01	2.307E+01	2.968E-01	6.117

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-8.784E+00		1.423E+01	2.323E+01	7.874E+00	-0.378
CD-109	8.429E+01		1.011E+02	2.020E+02	1.944E+01	0.417
PA-231	-4.080E-01		9.006E-01	1.539E+00	1.733E-02	-0.265
PA-234	2.401E+00	+	1.303E+00	2.012E+00	2.265E-02	1.193
NP-237	-2.479E+01		3.119E+01	4.270E+01	3.767E+00	-0.581
AM-241	1.842E+00		1.447E+00	2.701E+00	3.041E-02	0.682