

US EPA ARCHIVE DOCUMENT

ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

**STANDARD LEVEL IV
REPORT OF ANALYSIS**

WORK ORDER #13-04106-OR

May 16, 2013

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

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

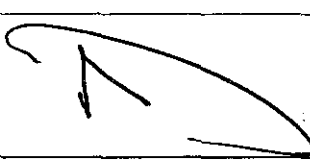
MP-001-3


Eberline Services Work Order # 13-04106

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

Date for Partial	Initials	Date	Initials	Checklist Items
	KBS	4/16/13	KC	Sample Log-In
	5/15/13	5/10/13	KBS	Data Compilation
		5-15-13	MT	First Technical Data Review
		5/5/13	MSA	Second Technical Data Review
		5/15/13	G	Data Entry/Electronic Deliverable
		5/15/13	G	Case Narrative
		5/16/13	KBS	Electronic Deliverable Proof
		5/16/13	MSA	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		5/16/13	MSA	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by:  Laboratory Manager

 Date

5/16/13

Copy No. _____

Radiochemistry Services

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SECTION I
CHAIN OF CUSTODY
&
pH CHECK SHEET



EBERLINE
SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04106
Lab Deadline	5/7/2013
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	43	P1.0
	05	43	P1.0
	06	45	P1.0
	07	45	P1.0
	08	40	P1.0
	09	40	P1.0
	10	47	P1.0
	11	47	P1.0
	12	39	P1.0
	13	39	P1.0
	14	45	P1.0
	15	45	P1.0
	16	44	P1.0
	17	44	P1.0
	18	42	P1.0
	19	42	P1.0

	Location (circle one)					Initials	Date
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	4/25/13 0500
Relinquished by	Sample Storage	Rough Prep	<u>Prep</u>	Separations	Count Room	<i>[Signature]</i>	4/26/13 1000
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	JRD	4/26/13 1200
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	0925	PM 4/30/13
Received by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>	<i>[Signature]</i>	4/27/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>	<i>[Signature]</i>	4/27/13 0540
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-04106

Lab Deadline

See Comments

Analysis

UIISO - Level 4

Sample Matrix

WA

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Re-Analysis: 2 Fxns 04, 06, 08, 10, 12, 14, 16 & 18 are TOTAL Fxns 05, 07, 09, 11, 13, 15, 17 & 19 are DISSOLVED KBB 5/1/13</p> <p>Original Lab Deadline: 05/14/13 Rerun Lab Deadline: 05/14/13</p>	04	43	P1.0
	05	43	P1.0
	06	45	P1.0
	07	45	P1.0
	08	40	P1.0
	09	40	P1.0
	10	47	P1.0
	11	47	P1.0
	12	39	P1.0
	13	39	P1.0
	14	45	P1.0
	15	45	P1.0
	16	44	P1.0
	17	44	P1.0
	18	42	P1.0
	19	42	P1.0

	Location (circle one)						Technician Initials	
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			

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0008



Internal Chain of Custody

Work Order #	13-04106
Lab Deadline	5/7/2013
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	43	P1.0
	05	43	P1.0
	06	45	P1.0
	07	45	P1.0
	08	40	P1.0
	09	40	P1.0
	10	47	P1.0
	11	47	P1.0
	12	39	P1.0
	13	39	P1.0
	14	45	P1.0
	15	45	P1.0
	16	44	P1.0
	17	44	P1.0
	18	42	P1.0
	19	42	P1.0

	Location (circle one)					Initials	Date
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	4/16/13
Relinquished by	Sample Storage	Rough Prep	<u>Prep</u>	Separations	Count Room	<i>[Signature]</i>	4/22/13
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	<i>[Signature]</i>	08/15 PM 4/22/13
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	<i>[Signature]</i>	09/15 PM 5/1/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	09/15
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>[Signature]</i>	5/24/13
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-04106

Lab Deadline

5/7/2013

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	43	P1.0
	05	43	P1.0
	06	45	P1.0
	07	45	P1.0
	08	40	P1.0
	09	40	P1.0
	10	47	P1.0
	11	47	P1.0
	12	39	P1.0
	13	39	P1.0
	14	45	P1.0
	15	45	P1.0
	16	44	P1.0
	17	44	P1.0
	18	42	P1.0
	19	42	P1.0

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	BJ	4/28/13 OSD
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/26/13 1940
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/30/13 1315
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	5/2/13 1620
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	5/2/13 1623
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	5/3/13 1128
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04106
Lab Deadline	5/7/2013
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	43	P1.0
	05	43	P1.0
	06	45	P1.0
	07	45	P1.0
	08	40	P1.0
	09	40	P1.0
	10	47	P1.0
	11	47	P1.0
	12	39	P1.0
	13	39	P1.0
	14	45	P1.0
	15	45	P1.0
	16	44	P1.0
	17	44	P1.0
	18	42	P1.0
	19	42	P1.0

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JBT	4/25/13 0520
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/26/13 1940
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/30/13 1315
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	5/2/13 1620
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KCS	5/2/13 1623
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KCS	5/3/13 1128
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	5/3/13 1240
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0935 PM	5/14/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KCS	5/14/13 0936
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KCS	5/14/13 1217
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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Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order

13-04106

Received By

KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	P1.0		
02	BLANK	0		WA	P1.0		
03	DUP	0		WA	P1.0		
04	PZ-111-KS TOT ✓	1		WA	P1.0	9.50	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	43
05	PZ-111-KS DIS ✓	1		WA	P1.0	0.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				43
06	D-6 TOT ✓	1		WA	P1.0	9.50	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	45
07	D-6 DIS ✓	1		WA	P1.0	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				45
08	D-83 TOT ✓	1		WA	P1.0	9.50	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	40
09	D-83 DIS ✓	1		WA	P1.0	0.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				40
10	DUP 05 TOT ✓	1		WA	P1.0	9.50	47
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	47
11	DUP 05 DIS ✓	1		WA	P1.0	0.00	47
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				47
12	PZ-102-SS TOT ✓	1		WA	P1.0	9.50	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	39
13	PZ-102-SS DIS ✓	1		WA	P1.0	0.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				39
14	PZ-102R-SS TOT ✓	1		WA	P1.0	9.50	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	45
15	PZ-102R-SS DIS ✓	1		WA	P1.0	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				45
16	PZ-104-SD TOT ✓	1		WA	P1.0	9.50	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	44
17	PZ-104-SD DIS ✓	1		WA	P1.0	0.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				44
18	PZ-104-SS TOT ✓	1		WA	P1.0	9.50	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	42
19	PZ-104-SS DIS ✓	1		WA	P1.0	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				42

*147
04/16/13*

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Received by: Kristen Coulston Date: 4/16/13

SECTION II
SAMPLE ACKNOWLEDGEMENT



Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 13-04106

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"/>	N	
If aqueous, properly preserved	<input checked="" type="radio"/>	N	N/A

WERE CHAIN OF CUSTODY SEALS:

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

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

REMARKS: _____

SIGNATURE: Kristen Coulsten DATE: 4/16/13

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**SECTION III
CASE NARRATIVE**



EBS-OR-35568

May 16, 2013

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

CASE NARRATIVE
Work Order # 13-04106-OR

SAMPLE RECEIPT

This work order contains eight water samples received 04/16/2013. 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-111-KS TOT	13-04106-04	PZ-102-SS TOT	13-04106-12
PZ-111-KS DIS	13-04106-05	PZ-102-SS DIS	13-04106-13
D-6 TOT	13-04106-06	PZ-102R-SS TOT	13-04106-14
D-6 DIS	13-04106-07	PZ-102R-SS DIS	13-04106-15
D-83 TOT	13-04106-08	PZ-104-SD TOT	13-04106-16
D-83 DIS	13-04106-09	PZ-104-SD DIS	13-04106-17
DUP 05 TOT	13-04106-10	PZ-104-SS TOT	13-04106-18
DUP 05 DIS	13-04106-11	PZ-104-SS DIS	13-04106-19

ANALYTICAL METHODS

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

Laboratory qualifiers are as follows:

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

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

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

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ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM

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

1st Analytical Attempt

Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was low for sample fraction -16 (Client ID: PZ-104-SD TOT). Chemical recovery was acceptable for all other samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 and Uranium-238 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-235 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-234 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

2nd Analytical Attempt

Sample fraction -16 (Client ID: PZ-104-SD TOT) was reanalyzed due to a low chemical recovery. Sample demonstrated acceptable results for all Uranium analyses. Chemical recovery was acceptable for all samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 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 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 and Thorium-232 method blank demonstrated acceptable results. The Thorium-230 method blank demonstrated results slightly greater than the detection limit. Results for the Thorium-228 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-230 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Thorium-228, Thorium-230 and Thorium-232 laboratory control sample demonstrated an acceptable percent recovery.

ANALYTICAL RESULTS CONTINUED

RADIUM-226

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

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

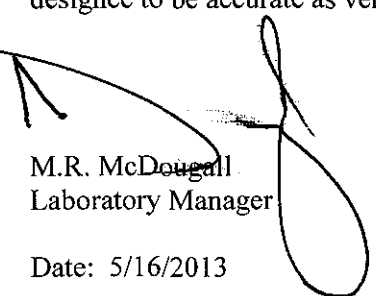
RADIUM-228

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

Samples demonstrated acceptable results for all Radium-228 analyses. Due to slightly low chemical recoveries for sample fractions -12 and -14 (Client ID: PZ-102-SS TOT and PZ-102R-SS TOT), samples demonstrated slightly high detection limits. In each 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 a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

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



M.R. McDougall
Laboratory Manager

Date: 5/16/2013

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: 1304106
 Received: 04/16/2013
 Matrix: Water

Final Report of Analysis
 Date: 5/16/2013
 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>
LCS13-04106-01	13-04106-01	05/03/2013 05:44:14	Radium-226	E903.0	10.44	1.16	0.20		pCi/l
LCS13-04106-01	13-04106-01	05/14/2013 09:50:16	Radium-228	E904.0	7.23	0.86	1.14		pCi/l
LCS13-04106-01	13-04106-01	05/01/2013 12:48:31	Thorium-228	HASL 300, 4.5.2	5.84	0.88	0.12		pCi/l
LCS13-04106-01	13-04106-01	05/01/2013 12:48:31	Thorium-230	HASL 300, 4.5.2	5.38	0.83	0.09		pCi/l
LCS13-04106-01	13-04106-01	05/01/2013 12:48:31	Thorium-232	HASL 300, 4.5.2	5.42	0.83	0.09		pCi/l
LCS13-04106-01	13-04106-01	04/30/2013 14:35:21	Uranium-234	HASL 300, 4.5.2	6.55	0.94	0.07		pCi/l
LCS13-04106-01	13-04106-01	05/06/2013 09:42:03	Uranium-234	HASL 300, 4.5.2	7.21	0.97	0.08		pCi/l
LCS13-04106-01	13-04106-01	04/30/2013 14:35:21	Uranium-235	HASL 300, 4.5.2	0.60	0.21	0.07		pCi/l
LCS13-04106-01	13-04106-01	05/06/2013 09:42:03	Uranium-235	HASL 300, 4.5.2	0.47	0.18	0.08		pCi/l
LCS13-04106-01	13-04106-01	04/30/2013 14:35:21	Uranium-238	HASL 300, 4.5.2	7.05	1.00	0.07		pCi/l
LCS13-04106-01	13-04106-01	05/06/2013 09:42:03	Uranium-238	HASL 300, 4.5.2	7.39	0.99	0.11		pCi/l
BLANK13-04106-02	13-04106-02	05/03/2013 05:44:15	Radium-226	E903.0	0.01	0.06	0.13	U	pCi/l
BLANK13-04106-02	13-04106-02	05/14/2013 09:50:16	Radium-228	E904.0	0.70	0.37	0.71	J	pCi/l
BLANK13-04106-02	13-04106-02	05/01/2013 12:48:32	Thorium-228	HASL 300, 4.5.2	0.01	0.06	0.12	U	pCi/l
BLANK13-04106-02	13-04106-02	05/01/2013 12:48:32	Thorium-230	HASL 300, 4.5.2	0.25	0.12	0.08		pCi/l
BLANK13-04106-02	13-04106-02	05/01/2013 12:48:32	Thorium-232	HASL 300, 4.5.2	0.05	0.05	0.07	U	pCi/l
BLANK13-04106-02	13-04106-02	04/30/2013 14:35:22	Uranium-234	HASL 300, 4.5.2	0.03	0.04	0.06	U	pCi/l
BLANK13-04106-02	13-04106-02	05/06/2013 09:42:05	Uranium-234	HASL 300, 4.5.2	0.03	0.05	0.07	U	pCi/l
BLANK13-04106-02	13-04106-02	04/30/2013 14:35:22	Uranium-235	HASL 300, 4.5.2	0.02	0.04	0.07	U	pCi/l
BLANK13-04106-02	13-04106-02	05/06/2013 09:42:05	Uranium-235	HASL 300, 4.5.2	0.01	0.03	0.07	U	pCi/l
BLANK13-04106-02	13-04106-02	04/30/2013 14:35:22	Uranium-238	HASL 300, 4.5.2	0.03	0.05	0.08	U	pCi/l
BLANK13-04106-02	13-04106-02	05/06/2013 09:42:05	Uranium-238	HASL 300, 4.5.2	0.04	0.05	0.06	U	pCi/l
PZ-111-KS TOT DUP	13-04106-03	05/03/2013 05:44:09	Radium-226	E903.0	0.29	0.17	0.17	J	pCi/l
PZ-111-KS TOT DUP	13-04106-03	05/14/2013 09:50:17	Radium-228	E904.0	0.26	0.47	0.98	U	pCi/l
PZ-111-KS TOT DUP	13-04106-03	05/01/2013 12:48:27	Thorium-228	HASL 300, 4.5.2	0.16	0.10	0.11	J	pCi/l
PZ-111-KS TOT DUP	13-04106-03	05/01/2013 12:48:27	Thorium-230	HASL 300, 4.5.2	0.18	0.10	0.08		pCi/l
PZ-111-KS TOT DUP	13-04106-03	05/01/2013 12:48:27	Thorium-232	HASL 300, 4.5.2	0.09	0.07	0.07	J	pCi/l
PZ-102R-SS TOT DUP	13-04106-03	04/30/2013 14:42:51	Uranium-234	HASL 300, 4.5.2	4.66	0.64	0.07		pCi/l
PZ-104-SD TOT DUP	13-04106-03	05/06/2013 09:42:00	Uranium-234	HASL 300, 4.5.2	0.55	0.61	0.83	U	pCi/l
PZ-102R-SS TOT DUP	13-04106-03	04/30/2013 14:42:51	Uranium-235	HASL 300, 4.5.2	0.20	0.10	0.06		pCi/l
PZ-104-SD TOT DUP	13-04106-03	05/06/2013 09:42:00	Uranium-235	HASL 300, 4.5.2	0.25	0.48	0.89	U	pCi/l
PZ-102R-SS TOT DUP	13-04106-03	04/30/2013 14:42:51	Uranium-238	HASL 300, 4.5.2	3.53	0.52	0.06		pCi/l
PZ-104-SD TOT DUP	13-04106-03	05/06/2013 09:42:00	Uranium-238	HASL 300, 4.5.2	0.25	0.39	0.57	U	pCi/l

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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

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Project: West Lake OU-1
 SDG: 1304106
 Received: 04/16/2013
 Matrix: Water

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 Date: 5/16/2013
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<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-111-KS TOT	13-04106-04	05/03/2013 05:44:10	Radium-226	E903.0	0.35	0.17	0.11		pCi/l
PZ-111-KS TOT	13-04106-04	05/14/2013 09:50:17	Radium-228	E904.0	1.08	0.41	0.75	J	pCi/l
PZ-111-KS TOT	13-04106-04	05/01/2013 12:48:28	Thorium-228	HASL 300, 4.5.2	0.11	0.08	0.09	J	pCi/l
PZ-111-KS TOT	13-04106-04	05/01/2013 12:48:28	Thorium-230	HASL 300, 4.5.2	0.20	0.10	0.05		pCi/l
PZ-111-KS TOT	13-04106-04	05/01/2013 12:48:28	Thorium-232	HASL 300, 4.5.2	0.13	0.08	0.06	J	pCi/l
PZ-111-KS TOT	13-04106-04	04/30/2013 14:42:53	Uranium-234	HASL 300, 4.5.2	7.07	0.92	0.05		pCi/l
PZ-111-KS TOT	13-04106-04	04/30/2013 14:42:53	Uranium-235	HASL 300, 4.5.2	0.30	0.13	0.07		pCi/l
PZ-111-KS TOT	13-04106-04	04/30/2013 14:42:53	Uranium-238	HASL 300, 4.5.2	3.10	0.49	0.05		pCi/l
PZ-111-KS DIS	13-04106-05	05/03/2013 05:44:11	Radium-226	E903.0	0.31	0.17	0.13		pCi/l
PZ-111-KS DIS	13-04106-05	05/14/2013 09:53:22	Radium-228	E904.0	0.73	0.48	0.94	J	pCi/l
PZ-111-KS DIS	13-04106-05	05/01/2013 12:48:29	Thorium-228	HASL 300, 4.5.2	-0.01	0.06	0.14	U	pCi/l
PZ-111-KS DIS	13-04106-05	05/01/2013 12:48:29	Thorium-230	HASL 300, 4.5.2	0.14	0.09	0.08	J	pCi/l
PZ-111-KS DIS	13-04106-05	05/01/2013 12:48:29	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.08	U	pCi/l
PZ-111-KS DIS	13-04106-05	04/30/2013 14:42:54	Uranium-234	HASL 300, 4.5.2	7.01	0.89	0.05		pCi/l
PZ-111-KS DIS	13-04106-05	04/30/2013 14:42:54	Uranium-235	HASL 300, 4.5.2	0.26	0.12	0.06		pCi/l
PZ-111-KS DIS	13-04106-05	04/30/2013 14:42:54	Uranium-238	HASL 300, 4.5.2	2.79	0.44	0.04		pCi/l
D-6 TOT	13-04106-06	05/03/2013 05:44:13	Radium-226	E903.0	1.91	0.50	0.21		pCi/l
D-6 TOT	13-04106-06	05/14/2013 09:53:22	Radium-228	E904.0	5.89	1.05	1.66		pCi/l
D-6 TOT	13-04106-06	05/01/2013 12:48:30	Thorium-228	HASL 300, 4.5.2	0.14	0.10	0.13	J	pCi/l
D-6 TOT	13-04106-06	05/01/2013 12:48:30	Thorium-230	HASL 300, 4.5.2	0.13	0.08	0.07	J	pCi/l
D-6 TOT	13-04106-06	05/01/2013 12:48:30	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.07	U	pCi/l
D-6 TOT	13-04106-06	04/30/2013 14:42:56	Uranium-234	HASL 300, 4.5.2	0.22	0.12	0.08		pCi/l
D-6 TOT	13-04106-06	04/30/2013 14:42:56	Uranium-235	HASL 300, 4.5.2	0.02	0.06	0.13	U	pCi/l
D-6 TOT	13-04106-06	04/30/2013 14:42:56	Uranium-238	HASL 300, 4.5.2	0.12	0.09	0.07	J	pCi/l
D-6 DIS	13-04106-07	05/03/2013 05:44:51	Radium-226	E903.0	1.75	0.47	0.24		pCi/l
D-6 DIS	13-04106-07	05/14/2013 09:53:23	Radium-228	E904.0	2.70	0.60	1.01		pCi/l
D-6 DIS	13-04106-07	05/01/2013 12:49:00	Thorium-228	HASL 300, 4.5.2	0.02	0.05	0.10	U	pCi/l
D-6 DIS	13-04106-07	05/01/2013 12:49:00	Thorium-230	HASL 300, 4.5.2	0.07	0.06	0.08	J	pCi/l
D-6 DIS	13-04106-07	05/01/2013 12:49:00	Thorium-232	HASL 300, 4.5.2	0.02	0.04	0.08	U	pCi/l
D-6 DIS	13-04106-07	04/30/2013 14:42:57	Uranium-234	HASL 300, 4.5.2	0.25	0.12	0.06		pCi/l
D-6 DIS	13-04106-07	04/30/2013 14:42:57	Uranium-235	HASL 300, 4.5.2	0.00	0.03	0.07	U	pCi/l
D-6 DIS	13-04106-07	04/30/2013 14:42:57	Uranium-238	HASL 300, 4.5.2	0.25	0.12	0.06		pCi/l

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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

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Project: West Lake OU-1
 SDG: 1304106
 Received: 04/16/2013
 Matrix: Water

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<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>
D-83 TOT	13-04106-08	05/03/2013 05:44:52	Radium-226	E903.0	3.17	0.72	0.32		pCi/l
D-83 TOT	13-04106-08	05/14/2013 09:53:24	Radium-228	E904.0	5.53	0.67	0.89		pCi/l
D-83 TOT	13-04106-08	05/01/2013 12:49:01	Thorium-228	HASL 300, 4.5.2	0.20	0.13	0.14	J	pCi/l
D-83 TOT	13-04106-08	05/01/2013 12:49:01	Thorium-230	HASL 300, 4.5.2	0.47	0.19	0.10		pCi/l
D-83 TOT	13-04106-08	05/01/2013 12:49:01	Thorium-232	HASL 300, 4.5.2	-0.01	0.03	0.10	U	pCi/l
D-83 TOT	13-04106-08	04/30/2013 14:42:59	Uranium-234	HASL 300, 4.5.2	0.03	0.08	0.16	U	pCi/l
D-83 TOT	13-04106-08	04/30/2013 14:42:59	Uranium-235	HASL 300, 4.5.2	-0.02	0.07	0.18	U	pCi/l
D-83 TOT	13-04106-08	04/30/2013 14:42:59	Uranium-238	HASL 300, 4.5.2	-0.05	0.09	0.27	U	pCi/l
D-83 DIS	13-04106-09	05/03/2013 05:44:54	Radium-226	E903.0	1.79	0.49	0.16		pCi/l
D-83 DIS	13-04106-09	05/14/2013 09:53:26	Radium-228	E904.0	3.78	0.74	1.20		pCi/l
D-83 DIS	13-04106-09	05/01/2013 12:49:03	Thorium-228	HASL 300, 4.5.2	0.03	0.07	0.13	U	pCi/l
D-83 DIS	13-04106-09	05/01/2013 12:49:03	Thorium-230	HASL 300, 4.5.2	0.21	0.12	0.08		pCi/l
D-83 DIS	13-04106-09	05/01/2013 12:49:03	Thorium-232	HASL 300, 4.5.2	-0.02	0.04	0.11	U	pCi/l
D-83 DIS	13-04106-09	04/30/2013 14:43:01	Uranium-234	HASL 300, 4.5.2	0.04	0.08	0.15	U	pCi/l
D-83 DIS	13-04106-09	04/30/2013 14:43:01	Uranium-235	HASL 300, 4.5.2	0.02	0.07	0.19	U	pCi/l
D-83 DIS	13-04106-09	04/30/2013 14:43:01	Uranium-238	HASL 300, 4.5.2	0.05	0.08	0.14	U	pCi/l
DUP 05 TOT	13-04106-10	05/03/2013 05:44:55	Radium-226	E903.0	1.27	0.44	0.24		pCi/l
DUP 05 TOT	13-04106-10	05/14/2013 09:53:27	Radium-228	E904.0	2.45	0.64	1.12		pCi/l
DUP 05 TOT	13-04106-10	05/01/2013 12:49:04	Thorium-228	HASL 300, 4.5.2	0.05	0.06	0.08	U	pCi/l
DUP 05 TOT	13-04106-10	05/01/2013 12:49:04	Thorium-230	HASL 300, 4.5.2	0.13	0.08	0.07	J	pCi/l
DUP 05 TOT	13-04106-10	05/01/2013 12:49:04	Thorium-232	HASL 300, 4.5.2	0.03	0.04	0.07	U	pCi/l
DUP 05 TOT	13-04106-10	04/30/2013 14:43:03	Uranium-234	HASL 300, 4.5.2	0.29	0.16	0.09		pCi/l
DUP 05 TOT	13-04106-10	04/30/2013 14:43:03	Uranium-235	HASL 300, 4.5.2	0.10	0.12	0.16	U	pCi/l
DUP 05 TOT	13-04106-10	04/30/2013 14:43:03	Uranium-238	HASL 300, 4.5.2	0.21	0.14	0.13	J	pCi/l
DUP 05 DIS	13-04106-11	05/03/2013 05:44:56	Radium-226	E903.0	0.85	0.34	0.23		pCi/l
DUP 05 DIS	13-04106-11	05/14/2013 09:53:27	Radium-228	E904.0	1.79	0.71	1.31	J	pCi/l
DUP 05 DIS	13-04106-11	05/01/2013 12:49:05	Thorium-228	HASL 300, 4.5.2	0.06	0.08	0.13	U	pCi/l
DUP 05 DIS	13-04106-11	05/01/2013 12:49:05	Thorium-230	HASL 300, 4.5.2	0.09	0.08	0.10	J	pCi/l
DUP 05 DIS	13-04106-11	05/01/2013 12:49:05	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.09	U	pCi/l
DUP 05 DIS	13-04106-11	04/30/2013 14:43:05	Uranium-234	HASL 300, 4.5.2	0.14	0.12	0.14	J	pCi/l
DUP 05 DIS	13-04106-11	04/30/2013 14:43:05	Uranium-235	HASL 300, 4.5.2	0.06	0.10	0.17	U	pCi/l
DUP 05 DIS	13-04106-11	04/30/2013 14:43:05	Uranium-238	HASL 300, 4.5.2	0.13	0.11	0.10	J	pCi/l

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601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

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 Received: 04/16/2013
 Matrix: Water

Final Report of Analysis
 Date: 5/16/2013
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<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-102-SS TOT	13-04106-12	05/03/2013 05:44:57	Radium-226	E903.0	8.05	0.95	0.18		pCi/l
PZ-102-SS TOT	13-04106-12	05/14/2013 09:53:32	Radium-228	E904.0	7.98	1.61	2.67		pCi/l
PZ-102-SS TOT	13-04106-12	05/01/2013 12:49:06	Thorium-228	HASL 300, 4.5.2	3.24	0.71	0.13		pCi/l
PZ-102-SS TOT	13-04106-12	05/01/2013 12:49:06	Thorium-230	HASL 300, 4.5.2	3.03	0.67	0.09		pCi/l
PZ-102-SS TOT	13-04106-12	05/01/2013 12:49:06	Thorium-232	HASL 300, 4.5.2	4.35	0.91	0.09		pCi/l
PZ-102-SS TOT	13-04106-12	04/30/2013 14:43:07	Uranium-234	HASL 300, 4.5.2	5.70	0.81	0.06		pCi/l
PZ-102-SS TOT	13-04106-12	04/30/2013 14:43:07	Uranium-235	HASL 300, 4.5.2	0.33	0.14	0.07		pCi/l
PZ-102-SS TOT	13-04106-12	04/30/2013 14:43:07	Uranium-238	HASL 300, 4.5.2	4.73	0.70	0.05		pCi/l
PZ-102-SS DIS	13-04106-13	05/03/2013 08:20:23	Radium-226	E903.0	4.58	0.66	0.13		pCi/l
PZ-102-SS DIS	13-04106-13	05/14/2013 09:53:33	Radium-228	E904.0	2.35	0.61	1.04		pCi/l
PZ-102-SS DIS	13-04106-13	05/01/2013 12:49:46	Thorium-228	HASL 300, 4.5.2	0.10	0.07	0.07	J	pCi/l
PZ-102-SS DIS	13-04106-13	05/01/2013 12:49:46	Thorium-230	HASL 300, 4.5.2	0.12	0.08	0.06	J	pCi/l
PZ-102-SS DIS	13-04106-13	05/01/2013 12:49:46	Thorium-232	HASL 300, 4.5.2	0.03	0.04	0.07	U	pCi/l
PZ-102-SS DIS	13-04106-13	04/30/2013 14:43:08	Uranium-234	HASL 300, 4.5.2	5.76	0.84	0.08		pCi/l
PZ-102-SS DIS	13-04106-13	04/30/2013 14:43:08	Uranium-235	HASL 300, 4.5.2	0.25	0.13	0.10		pCi/l
PZ-102-SS DIS	13-04106-13	04/30/2013 14:43:08	Uranium-238	HASL 300, 4.5.2	3.35	0.56	0.08		pCi/l
PZ-102R-SS TOT	13-04106-14	05/03/2013 08:20:24	Radium-226	E903.0	3.18	1.11	0.57		pCi/l
PZ-102R-SS TOT	13-04106-14	05/14/2013 10:11:48	Radium-228	E904.0	0.40	2.08	4.41	U	pCi/l
PZ-102R-SS TOT	13-04106-14	05/01/2013 12:49:49	Thorium-228	HASL 300, 4.5.2	0.25	0.12	0.06		pCi/l
PZ-102R-SS TOT	13-04106-14	05/01/2013 12:49:49	Thorium-230	HASL 300, 4.5.2	0.27	0.13	0.08		pCi/l
PZ-102R-SS TOT	13-04106-14	05/01/2013 12:49:49	Thorium-232	HASL 300, 4.5.2	0.36	0.15	0.07		pCi/l
PZ-102R-SS TOT	13-04106-14	04/30/2013 16:24:43	Uranium-234	HASL 300, 4.5.2	4.85	0.68	0.06		pCi/l
PZ-102R-SS TOT	13-04106-14	04/30/2013 16:24:43	Uranium-235	HASL 300, 4.5.2	0.30	0.13	0.09		pCi/l
PZ-102R-SS TOT	13-04106-14	04/30/2013 16:24:43	Uranium-238	HASL 300, 4.5.2	3.17	0.50	0.09		pCi/l
PZ-102R-SS DIS	13-04106-15	05/03/2013 08:20:19	Radium-226	E903.0	1.88	0.43	0.13		pCi/l
PZ-102R-SS DIS	13-04106-15	05/14/2013 10:11:49	Radium-228	E904.0	1.50	0.95	1.87	J	pCi/l
PZ-102R-SS DIS	13-04106-15	05/01/2013 12:49:43	Thorium-228	HASL 300, 4.5.2	0.01	0.02	0.06	U	pCi/l
PZ-102R-SS DIS	13-04106-15	05/01/2013 12:49:43	Thorium-230	HASL 300, 4.5.2	0.06	0.05	0.06	J	pCi/l
PZ-102R-SS DIS	13-04106-15	05/01/2013 12:49:43	Thorium-232	HASL 300, 4.5.2	0.01	0.02	0.05	U	pCi/l
PZ-102R-SS DIS	13-04106-15	04/30/2013 16:24:44	Uranium-234	HASL 300, 4.5.2	5.54	0.77	0.07		pCi/l
PZ-102R-SS DIS	13-04106-15	04/30/2013 16:24:44	Uranium-235	HASL 300, 4.5.2	0.44	0.17	0.09		pCi/l
PZ-102R-SS DIS	13-04106-15	04/30/2013 16:24:44	Uranium-238	HASL 300, 4.5.2	3.40	0.54	0.06		pCi/l

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EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

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

Project: West Lake OU-1
 SDG: 1304106
 Received: 04/16/2013
 Matrix: Water

Final Report of Analysis
 Date: 5/16/2013
 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-104-SD TOT	13-04106-16	05/03/2013 08:20:21	Radium-226	E903.0	5.72	0.88	0.16		pCi/l
PZ-104-SD TOT	13-04106-16	05/14/2013 10:11:49	Radium-228	E904.0	2.72	1.02	1.88	J	pCi/l
PZ-104-SD TOT	13-04106-16	05/01/2013 12:49:45	Thorium-228	HASL 300, 4.5.2	0.05	0.06	0.07	U	pCi/l
PZ-104-SD TOT	13-04106-16	05/01/2013 12:49:45	Thorium-230	HASL 300, 4.5.2	0.17	0.11	0.08	J	pCi/l
PZ-104-SD TOT	13-04106-16	05/01/2013 12:49:45	Thorium-232	HASL 300, 4.5.2	0.02	0.04	0.10	U	pCi/l
PZ-104-SD TOT	13-04106-16	05/06/2013 09:42:02	Uranium-234	HASL 300, 4.5.2	0.18	0.35	0.65	U	pCi/l
PZ-104-SD TOT	13-04106-16	05/06/2013 09:42:02	Uranium-235	HASL 300, 4.5.2	0.46	0.60	0.91	U	pCi/l
PZ-104-SD TOT	13-04106-16	05/06/2013 09:42:02	Uranium-238	HASL 300, 4.5.2	0.20	0.35	0.59	U	pCi/l
PZ-104-SD DIS	13-04106-17	05/03/2013 08:20:30	Radium-226	E903.0	3.76	0.63	0.14		pCi/l
PZ-104-SD DIS	13-04106-17	05/14/2013 10:11:49	Radium-228	E904.0	1.90	0.50	0.85		pCi/l
PZ-104-SD DIS	13-04106-17	05/01/2013 12:49:54	Thorium-228	HASL 300, 4.5.2	0.02	0.04	0.07	U	pCi/l
PZ-104-SD DIS	13-04106-17	05/01/2013 12:49:54	Thorium-230	HASL 300, 4.5.2	0.16	0.10	0.07	J	pCi/l
PZ-104-SD DIS	13-04106-17	05/01/2013 12:49:54	Thorium-232	HASL 300, 4.5.2	0.00	0.03	0.07	U	pCi/l
PZ-104-SD DIS	13-04106-17	04/30/2013 16:24:46	Uranium-234	HASL 300, 4.5.2	0.26	0.24	0.28	J	pCi/l
PZ-104-SD DIS	13-04106-17	04/30/2013 16:24:46	Uranium-235	HASL 300, 4.5.2	0.05	0.12	0.25	U	pCi/l
PZ-104-SD DIS	13-04106-17	04/30/2013 16:24:46	Uranium-238	HASL 300, 4.5.2	0.23	0.22	0.23	J	pCi/l
PZ-104-SS TOT	13-04106-18	05/03/2013 08:20:26	Radium-226	E903.0	1.19	0.32	0.14		pCi/l
PZ-104-SS TOT	13-04106-18	05/14/2013 10:11:40	Radium-228	E904.0	0.80	0.46	0.90	J	pCi/l
PZ-104-SS TOT	13-04106-18	05/01/2013 12:49:51	Thorium-228	HASL 300, 4.5.2	0.05	0.05	0.06	U	pCi/l
PZ-104-SS TOT	13-04106-18	05/01/2013 12:49:51	Thorium-230	HASL 300, 4.5.2	0.16	0.09	0.08	J	pCi/l
PZ-104-SS TOT	13-04106-18	05/01/2013 12:49:51	Thorium-232	HASL 300, 4.5.2	-0.03	0.03	0.10	U	pCi/l
PZ-104-SS TOT	13-04106-18	04/30/2013 16:24:47	Uranium-234	HASL 300, 4.5.2	0.22	0.10	0.07		pCi/l
PZ-104-SS TOT	13-04106-18	04/30/2013 16:24:47	Uranium-235	HASL 300, 4.5.2	0.01	0.03	0.07	U	pCi/l
PZ-104-SS TOT	13-04106-18	04/30/2013 16:24:47	Uranium-238	HASL 300, 4.5.2	0.09	0.07	0.07	J	pCi/l
PZ-104-SS DIS	13-04106-19	05/03/2013 08:20:28	Radium-226	E903.0	0.81	0.27	0.14		pCi/l
PZ-104-SS DIS	13-04106-19	05/14/2013 10:11:40	Radium-228	E904.0	1.58	0.62	1.17	J	pCi/l
PZ-104-SS DIS	13-04106-19	05/01/2013 16:16:51	Thorium-228	HASL 300, 4.5.2	0.03	0.06	0.12	U	pCi/l
PZ-104-SS DIS	13-04106-19	05/01/2013 16:16:51	Thorium-230	HASL 300, 4.5.2	0.08	0.07	0.09	J	pCi/l
PZ-104-SS DIS	13-04106-19	05/01/2013 16:16:51	Thorium-232	HASL 300, 4.5.2	-0.02	0.03	0.08	U	pCi/l
PZ-104-SS DIS	13-04106-19	04/30/2013 16:24:48	Uranium-234	HASL 300, 4.5.2	0.13	0.08	0.06	J	pCi/l
PZ-104-SS DIS	13-04106-19	04/30/2013 16:24:48	Uranium-235	HASL 300, 4.5.2	0.02	0.04	0.07	U	pCi/l
PZ-104-SS DIS	13-04106-19	04/30/2013 16:24:48	Uranium-238	HASL 300, 4.5.2	0.17	0.08	0.04		pCi/l

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EBERLINE ANALYTICAL CORPORATION

601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

SECTION V
ANALYTICAL STANDARDS

u-8

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

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclide: U-238NAT
Half Life: $(4.468 \pm 0.005) \times 10^9$ years
Catalog No.: 7338
Source No.: 479-50

Customer: TMA EBERLINE
P.O.No.: OR2778
Reference Date: January 1 1995 12:00 PST.
Contained Radioactivity: (Total U) 8.016 μ Ci
Contained Radioactivity: (Total U) 297 kBq

Description of Solution

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

Radioimpurities Refer to attached technical data sheet

Radioactive Daughters Refer to attached technical data sheet

Radionuclide Concentration

(Total U) 0.1228 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).

[Signature]
ERIC ALLAS
QUALITY CONTROL

29 DECEMBER 1994
Date Signed



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



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

Solution Reference # MP-009 Date 9/6/2012 0:00
IPL 479-50 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. 1.7796E+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 % = 48.239 U-238 = 71.182 dpm/ml X 0.48249 = 34.345 dpm/ml
U-235 Atom % = 2.25 U-235 = 71.182 dpm/ml X 0.0225 = 1.602 dpm/ml
U-234 Atom % = 49.501 U-238 = 71.182 dpm/ml X 0.49501 = 35.236 dpm/ml
All values +/- 3.6%
Isotopic ratios from manufacturer's data sheet

Expiration Date: September 6, 2013

Verified & Approved By [Signature] Date: 9/26/2012 0:00
QC Approval [Signature] Date: 9/26/12

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RECORD COPY

Tracer Solution for Environmental Analysis & Disequilibrium Studies

Product Description & Measurement Certificate

Description Principal radionuclide: uranium 232 (U-232) Product code: UDP10050
Daughter Nuclide: Th-228 Batch Number: 92/232/67

Measurement Reference date: 01 March 2000
Radioactive concentration U-232 6.739E+03 becquerels per gram of solution
which is equivalent to 1.821E-01 microcuries per gram of solution
Mass of solution 5.356 grams
Volume of solution 5.035 millilitres
Total activity of U-232 3.61E+04 becquerels
which is equivalent to 9.76E-01 microcuries

Accuracy Method of measurement (see reverse of this certificate)
Random uncertainty is: $\pm 0.7\%$ 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.

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

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

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

Not measured

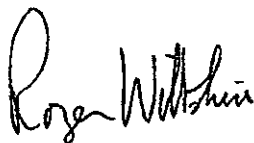
Chemical Composition Calculated weight of U-232, 4.42E-08 grams, as 2M HNO₃ solution in a flame sealed glass vial.
This Tracer solution has been produced 'carrier free'.

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

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

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

Approved
Signatory



Roger Wiltshire

Project Ref. AE2315

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



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

SOLUTION REFERENCE # AEA/Amersham 92/232/67 CURRENT DATE 12/13/2012 0:00
SOLUTION # U-10

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

Radionuclide ²³²U Reference Date 3/1/2000 0:00
Certified Activity 9.760E-01 μCi
Certified Concentration $\mu\text{Ci per gram}$

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/Amer sham 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: ²³²U 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 HNO₃**

SECONDARY VOLUMETRIC DILUTION

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

Expiration Date: **December 7, 2013**

Verified & Approved By 

Date: 12/13/2012 0:00

QC Approval 

Date: 12/13/12

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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	Customer:	TMA EBERLINE
Half Life:	$(7.54 \pm 0.03) \times 10^4$ years	P.O.No.:	TT4944
Catalog No.:	7230	Reference Date:	November 1 1991 12:00 PST.
Source No.:	388-116	Contained Radioactivity:	1.036 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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EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

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

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

Radionuclide of Interest ²³⁰Thorium Reference Date 11/1/1991 0:00
Parent Solution Conc. 2.30E+03 dpm/ml

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
Total Activity: 2.2999E+04 dpm Final Activity Concentration: 2.2999E+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.

Expiration Date: March 4, 2014

Recertified By: [Signature]

Date: 3/21/2013 0:00

Verified & Approved By: [Signature]

Date: 3/21/13

QC Approval: [Signature]

Date: 3/21/13

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

SOLUTION REFERENCE # IPL 388-116 CURRENT DATE 3/4/2013 0:00
SOLUTION # Th-1

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

Radionuclide ²³⁰Thorium Reference Date 11/1/1991 0:00
Certified Activity 1.036E+00 μCi
Certified Concentration $\mu\text{Ci per gram}$

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 [Signature]

Date: 3/21/2013 0:00

QC Approval [Signature]

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(NO ₃) 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:	±3.0%
b. Random uncertainty in assay:	±0.0%
c. Random uncertainty in weighing(s):	±2.0%
d. Total uncertainty at the 99% confidence level:	±3.6%

NIST Traceability

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

Leak Test(s)

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

Notes

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



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

Anna U. Khan

 QUALITY CONTROL

Nov. 8, 1993

Date Signed



QUALITY CONTROL PROGRAM
MP-009

Rev.8; 1/10/03
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EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

SOLUTION REFERENCE # IPL 435-104-2 CURRENT DATE 10/9/2012 0:00
SOLUTION # Th-8

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

Radionuclide ²³² & ²²⁸Th Reference Date 11/17/1993 0:00
Certified Activity 9.330E-02 μCi
Certified Concentration $\mu\text{Ci per gram}$

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 [Signature]

Date: 10/9/2012 0:00

QC Approval [Signature]

Date: 11/12/12

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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
Principal Radionuclide		Half Life, Years	Solution #	Th-8b
228 & 232 Th		1.405E+10	Half Life, Days	5.132E+12
Radionuclide of Interest	228 & 232 Th	Reference Date	11/1/1993 0:00	
Parent Solution Conc.	2.07E+02 dpm/ml			
Chemical Composition of Standard Solution				
Th(NO ₃) ₄ in 1% HNO ₃				

Dilution Instructions: Dilution Solvent Used 1% Nitric Acid

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 500.0000 ml
 Total Activity: 1.0365E+05 dpm
 Final Volume: 1000.00 ml
 Final Activity Concentration: 1.0365E+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

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.

Radiopurities:

None detected (daughters in equilibrium)

Radionuclide Concentration: 0.2020 μCi/g, 7.474 kBq/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in μCi/g was determined using gamma ray spectrometry.

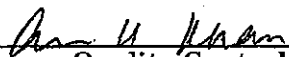
Peak energy used for integration:	193.5 keV
Branching ratio used:	0.0441 gammas per decay

Uncertainty of Measurement:

A. Type A (random) uncertainty:	± 0.7 %
B. Type B (systematic) uncertainty:	± 3.0 %
C. Uncertainty in aliquot weighing:	± 0.0 %
D. Total uncertainty at the 99% confidence level:	± 3.1 %

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
- Nuclear data was taken from IAEA Technical Report Series No. 261.
- This solution has a working life of 5 years.


Quality Control

9-Jan-02
Date Signed

IPL Ref. No.: 867-54

ISO 9001 CERTIFIED



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 μCi per gram

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

Chemical Composition of Standard Solution

²²⁸Th(NO₃)₄ in 0.1M HNO₃

Dilution Instructions: Dilution Solvent Used 0.1 M 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; 9/29/89
Title: Radioactive Reference Standards Solutions & Records

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

Solution Reference # MP-009 Date 11/9/2012 0:00
IPL 867-54 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 Activity Concentration: 2.2490E+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.

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

Ba-6
(+6a)



National Institute of Standards & Technology

Certificate

Standard Reference Material 4251C Barium-133 Radioactivity Standard

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

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 SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
QCP 009-1

SOLUTION REFERENCE # NIST SRM4251C CURRENT DATE 9/20/2012 0:00
SOLUTION # Ba-6

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

Radionuclide ¹³³Barium Reference Date 9/17/1993 0:00
Certified Activity μ Ci
Certified Concentration 1.318E+01 μ Ci per gram

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

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 μ Ci 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 [Signature]
QC Approval [Signature]

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		Date 9/20/12
NIST SRM4251C		Solution # Ba-6a
Principal Radionuclide ¹³³Ba	Half Life, Years 1.048E+01	Half Life, Days 3.828E+03
Radionuclide of Interest ¹³³Ba	Parent Solution Conc. 1.48E+05 dpm/ml	Reference Date 9/1/1993 0:00
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	Final Activity Concentration:	3.6950E+03 dpm/ml
Total Activity:	3.6950E+06 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: **September 20, 2013**

Verified & Approved By 
QC Approval 

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

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Ra-226
QA/QC REVIEWED
Date *2/8/94* Initials *W*

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

Description of Solution

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

Radioimpurities: None detected (other than daughters)

Radioactive Daughters

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

Radionuclide Concentration

(Ra-226) 0.1929 µCi/g.

Method of Calibration

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

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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



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

Ana 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

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

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 $\mu\text{Ci per gram}$

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

Chemical Composition of Standard Solution
²²⁶Ra(NO₃)₂ in 1M HNO₃


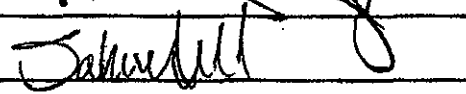
Dilution Instructions: Dilution Solvent Used 1M HNO₃

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 
QC Approval 

Date: 11/9/2012
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
²²⁶Radium

Half Life, Years
1.600E+03

Half Life, Days
5.844E+05

Radionuclide of Interest: ²²⁶Radium
Parent Solution Conc. 2.22E+03 dpm/ml

Reference Date 2/1/1994 0:00

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:

PCW 11/7/01

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



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 ²²⁶Ra Half Life, Years 5.750E+00 Half Life, Days 2.100E+03

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

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

Chemical Composition of Standard Solution
²²⁶Ra(NO₃)₂ in 0.5 M HCl

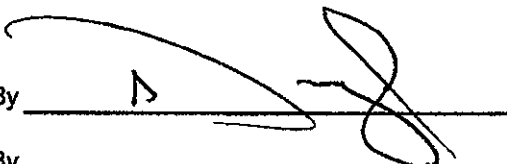
Dilution Instructions: Dilution Solvent Used 0.5 M HCl

Dilute to a volume of 1000.00 milliliters

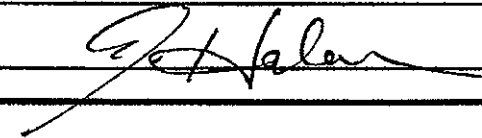
Certified Total Activity of 0.0699 μCi Which Equals 1.551E+05 dpm at the date listed above

And after dilution the activity of this solution is 1.551E+02 dpm/ml This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: April 12, 2013

Recertified By  Date: 4/16/12

Verified & Approved By _____ Date: _____

QC Approval  Date: 4/16/12

US EPA ARCHIVE DOCUMENT

SECTION VI
QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	UISO	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	2.85	80.82%	16.06%	100.00%	3.60%	8.10E+00	2.92E-01	6.55E+00	1.05E+00	U-8a	3.52E+01	3.60E+00	5.10E-01
U-238	1.46	89.28%	15.87%	100.00%	3.60%	7.90E+00	2.84E-01	7.05E+00	1.12E+00	U-8a	3.44E+01	3.60E+00	5.10E-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

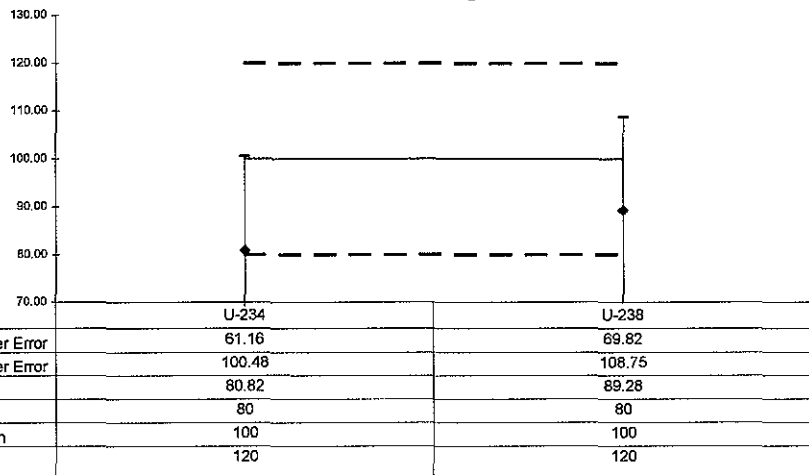
QC Summary

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	0.37	4.17	4.85E+00	7.66E-01	4.66E+00	7.24E-01	0.81	OK	OK			NA	OK
U-238	0.88	10.68	3.17E+00	5.48E-01	3.53E+00	5.81E-01	0.89	OK	OK			NA	OK
U-235	1.16	40.90	3.01E-01	1.36E-01	1.99E-01	1.05E-01		OK	OK			NA	OK

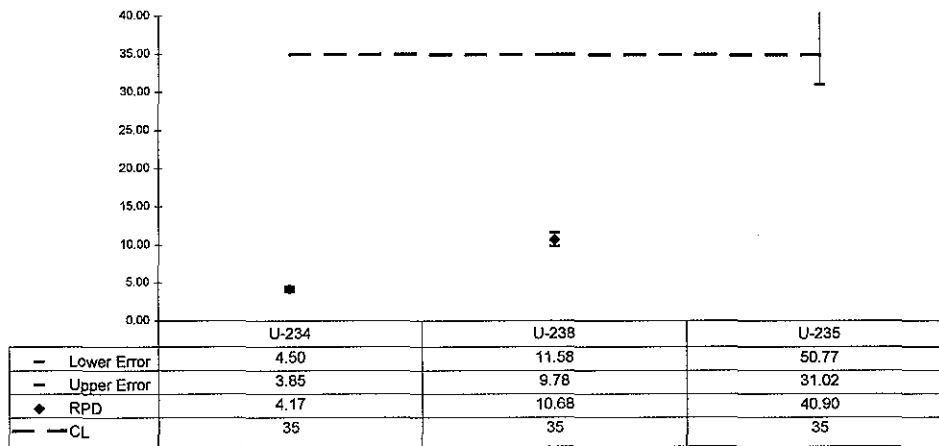
US EPA ARCHIVE DOCUMENT

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	UIISO	1	pCi	I	Engineering Management Support, Inc.

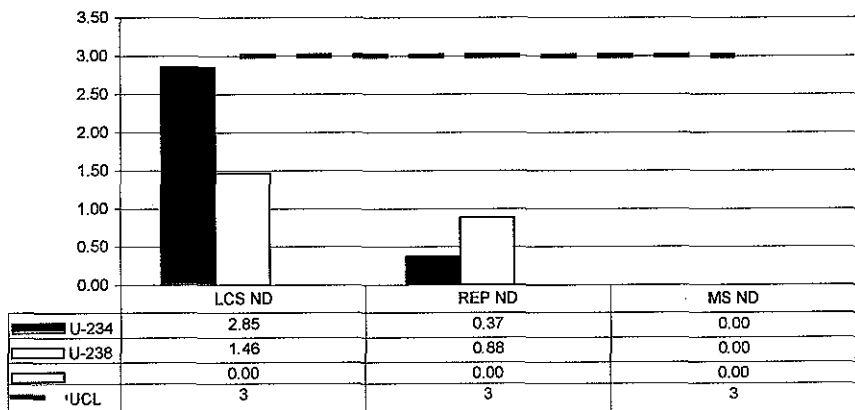
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	UUISO	2	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	1.69	88.19%	15.29%	100.00%	3.60%	8.17E+00	2.94E-01	7.21E+00	1.10E+00	U-8a	3.52E+01	3.60E+00	5.15E-01
U-238	0.98	92.83%	15.23%	100.00%	3.60%	7.96E+00	2.87E-01	7.39E+00	1.13E+00	U-8a	3.44E+01	3.60E+00	5.15E-01

Matrix Spike

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

Replicate Sample

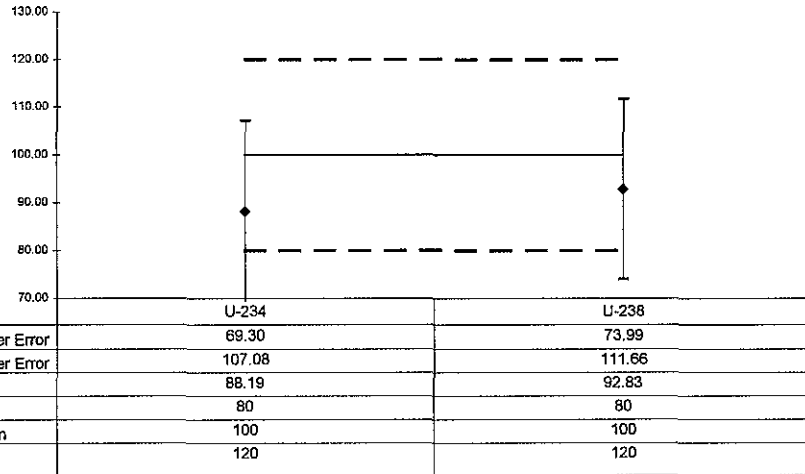
QC Summary

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	1.02	99.84	1.84E-01	3.51E-01	5.51E-01	6.12E-01	0.88	OK	OK			NA	OK
U-238	0.18	20.57	2.04E-01	3.48E-01	2.51E-01	3.86E-01	0.93	OK	OK			NA	OK
U-235	0.52	57.43	4.57E-01	6.03E-01	2.53E-01	4.83E-01		OK	OK			NA	OK

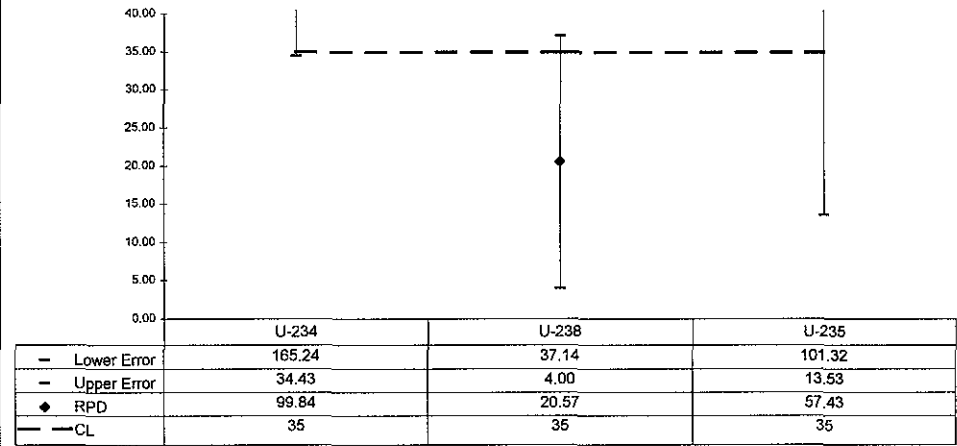
US EPA ARCHIVE DOCUMENT

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	UUISO	2	pCi	I	Engineering Management Support, Inc.

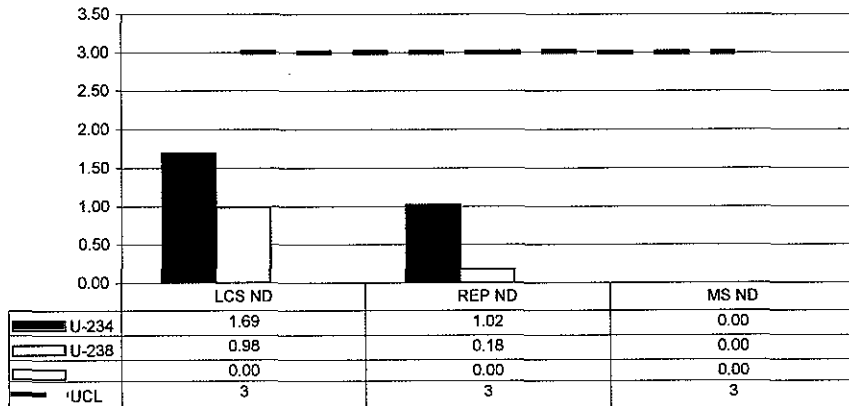
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

US EPA ARCHIVE DOCUMENT

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	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	1.92	121.36%	17.83%	100.00%	3.60%	4.81E+00	1.73E-01	5.84E+00	1.04E+00	Th-8b	1.04E+02	3.60E+00	1.03E-01
TH-230	0.11	98.93%	19.73%	100.00%	2.70%	5.44E+00	1.47E-01	5.38E+00	1.06E+00	Th-1b	2.35E+01	2.70E+00	5.14E-01
TH-232	1.22	112.51%	17.70%	100.00%	3.60%	4.81E+00	1.73E-01	5.42E+00	9.59E-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

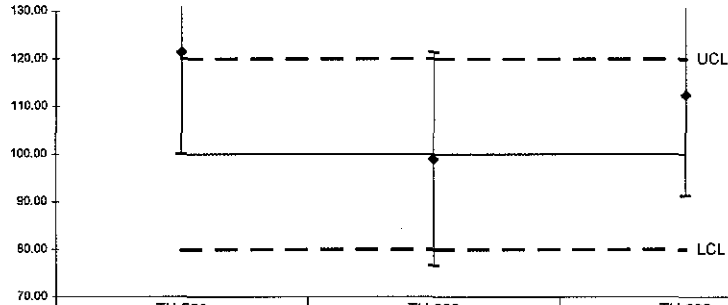
QC Summary

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	0.70	33.94	1.11E-01	7.92E-02	1.57E-01	9.91E-02	1.21	OK	OK			NA	OK
TH-230	0.29	10.65	2.04E-01	1.01E-01	1.83E-01	9.87E-02	0.99	OK	OK			NA	OK
TH-232	0.76	37.36	1.25E-01	7.74E-02	8.59E-02	6.70E-02	1.13	OK	OK			NA	OK

US EPA ARCHIVE DOCUMENT

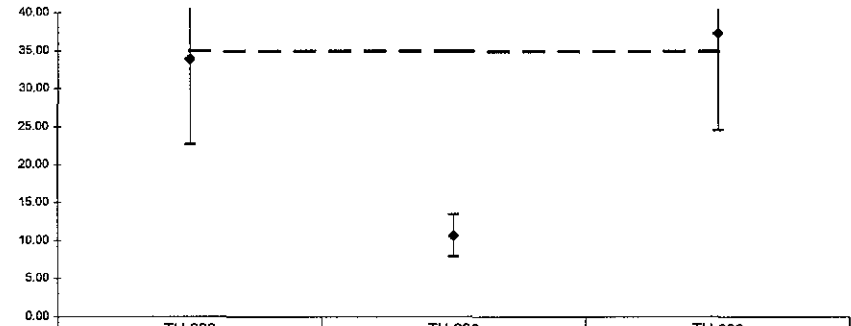
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	ThISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



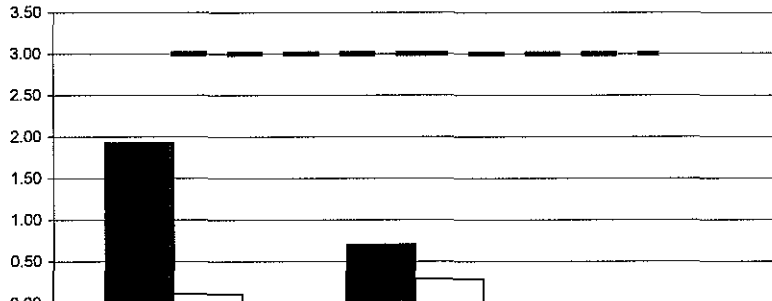
	TH-228	TH-230	TH-232
Lower Error	99.93	76.50	91.21
Upper Error	142.79	121.36	133.81
%R	121.36	98.93	112.51
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	45.25	13.40	50.13
Upper Error	22.63	7.90	24.59
RPD	33.94	10.65	37.36
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	1.92	0.70	0.00
TH-230	0.11	0.29	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	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	0.17	102.12%	23.87%	100.00%	4.60%	1.02E+01	4.70E-01	1.04E+01	2.49E+00	Ra-5b	4.41E+01	4.60E+00	5.15E-01

Matrix Spike

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

Replicate Sample

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	0.40	16.46	3.48E-01	1.87E-01	2.95E-01	1.79E-01	1.02	OK	OK			OK	OK

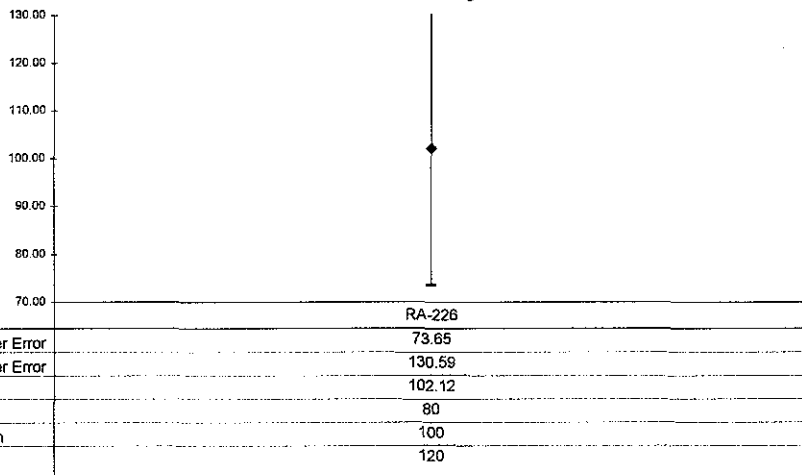
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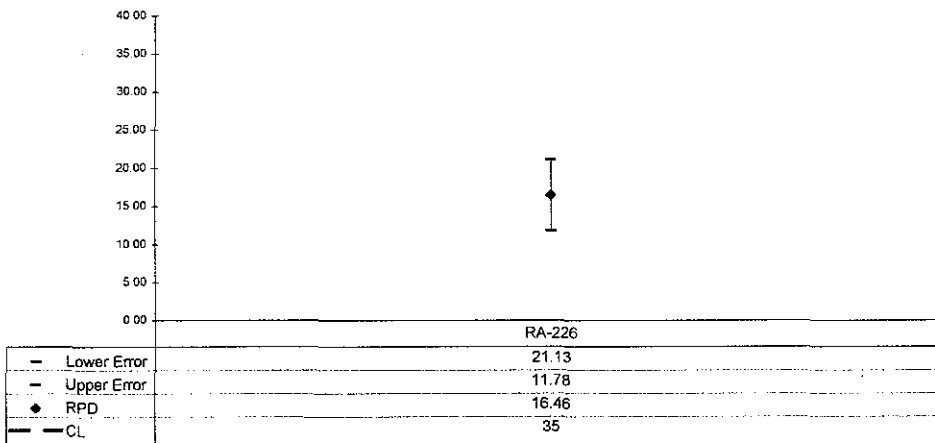
Version

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	Ra226	1	pCi	1	Engineering Management Support, Inc.

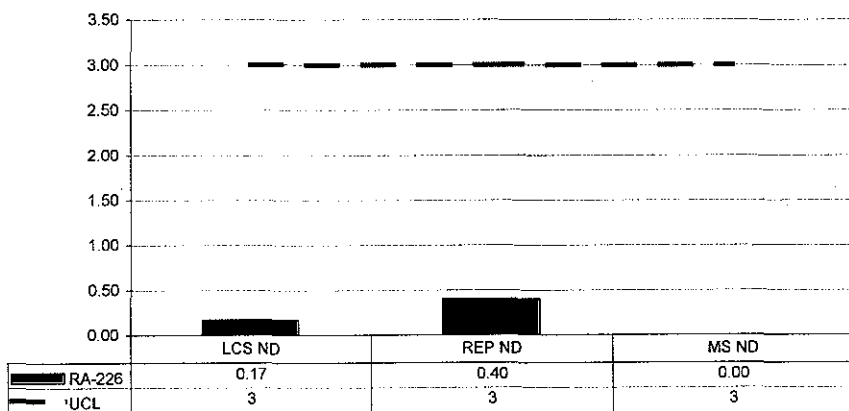
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	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	1.81	80.70%	25.57%	100.00%	5.10%	8.96E+00	4.57E-01	7.23E+00	1.85E+00	Ra-11	3.89E+01	5.10E+00	5.11E-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

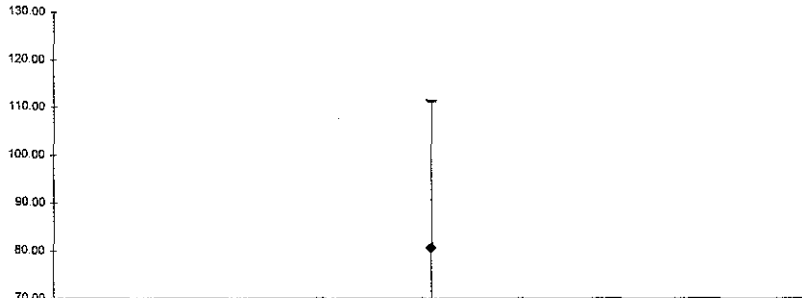
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-228	2.38	121.84	1.08E+00	4.79E-01	2.62E-01	4.74E-01	0.81	OK	OK			NA	OK

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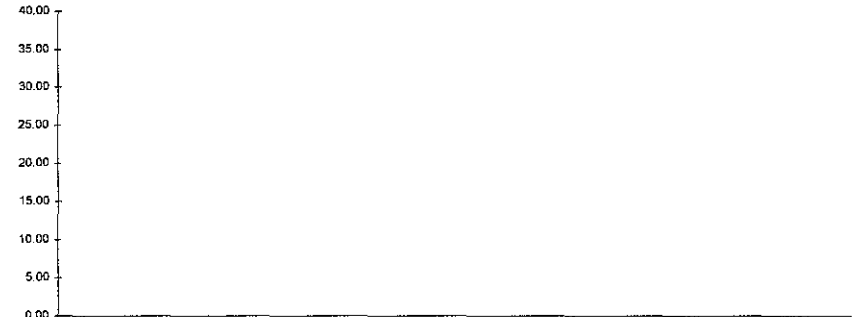
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04106	Ra228	1	pCi	1	Engineering Management Support, Inc.

LCS % Recovery



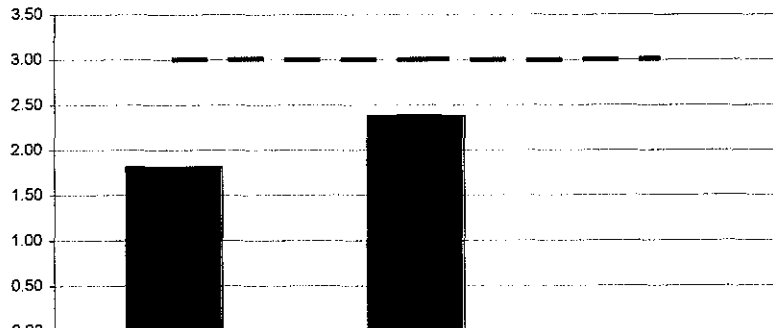
RA-228	
Lower Error	50.03
Upper Error	111.37
%R	80.70
LCL	80
Mean	100
UCL	120

Replicate Sample RPD



RA-228	
Lower Error	165.06
Upper Error	78.61
RPD	35
CL	121.84

Normalized Difference



	LCS ND	REP ND	MS ND
RA-228	1.81	2.38	0.00
UCL	3	3	3

No Matrix Spike

SECTION VII
LABORATORY TECHNICIAN'S NOTES


**ISO U NOTES
Run 1**

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04106
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:14	PREP	JBARNARD	ALIUQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN

JB
4/25/13


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 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04106
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:14	PREP	JBARNARD	ALIUQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/29/13 18:10	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
4/29/13

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 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	13-04106
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:14	PREP	JBARNARD	ALIUQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/29/13 18:10	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to 35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl - 0.1N NH4I, 35 ml of 6.5N HCl - 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.
3	04/30/13 05:37	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.

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~~KA~~
 4/30/13

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Reagents Used in an Analysis

Internal Work Order

13-04106

Analysis Code

Run

UUISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/25/2013
013666P	Anion Exchange Resin	Reagent Grade	JDEMELAS	4/29/2013
013794S	HCl - HF	6.5N - 0.04N	JDEMELAS	4/29/2013
013675D01	Hydrochloric Acid	0.5N	JDEMELAS	4/29/2013
013734S	Hydrochloric Acid	6.5N	JDEMELAS	4/29/2013
013675P	Hydrochloric Acid	Reagent Grade	JDEMELAS	4/29/2013
013800S	Hydrochloric Acid	8N	JDEMELAS	4/29/2013
013810S	HCl - NH4I	8N - 0.1M	JDEMELAS	4/29/2013
013246S	Carbon substrate	Solution	RMARTZ	4/30/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	4/30/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	4/30/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	4/30/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	4/30/2013

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Alpha #1

Date	Sample #	Client	Trade Item	CT Office	Analysis	Stand
4/24/13	Daily Pulse	WAB	0504	10m	NA	-
4/24/13	1704176A(1-6)	URBNCO	0542	2hr	UWZSO	-
4/24/13	1704052A(1-2)	Engn	0855	2hr	Thrs	-
4/24/13	1704057A(4-7)	HY PE	0856	2hr	UWZSO	-
4/24/13	1704057A(1-2)	Engn	0857	2hr	UWZSO	-
4/24/13	1704087A(7)	Engn	1157	2hr	UWZSO	-
4/24/13	1704174A(1-4)	UWON	1156	2hr	UWZSO	-
4/24/13	1704053A(1)	Engn	1156	2hr	Thrs	-
4/24/13	Daily Pulse	WAB	0520	10m	NA	-
4/24/13	1704080B(1-7)	Engn	0852	2hr	UWZSO	-
4/24/13	1704081A(1)	Unitech	0857	2hr	UWZSO	-
4/25/13	1304103A(1-6)	Accutest	1156	2hr 50m	Rate	KB
4/25/13	1304113A(1-4)	UWON	1451	2hr 50m	Rate	KB
4/26/13	Daily Pulse	WAB	0517	10m	NA	-
4/26/13	SECCAL	WAB	0519	2hr	NA	-
4/26/13	1704110A(1-4,8)	UWON	1055	2hr	Pulse	-
4/26/13	1704117A(1)	UWON	1055	2hr	Thrs	-
4/26/13	System Bkqd	Lab	1456	16.40 hr	-	KB
4/27/13	Daily Pulse	Lab	1028	10mins	NA	KB
4/27/13	1304104A(1-6)	Eng. Manag. Su.	1047	2hr 50m	UW	KB
4/29/13	Daily Pulse	WAB	0529	10m	NA	-
4/29/13	1304105A(1-6)	Engn	0559	2hr 50m	UWZSO	-
4/29/13	1304104A(5-10)	Eng. Manag. Su.	1258	2hr 50m	Th	KB
4/29/13	1304104A(7-12)	Eng. Manag. Su.	1620	2hr 50m	Rate	KB
4/29/13	Daily Pulse	WAB	0521	10m	NA	-
4/29/13	1704116A(1-4)	UWON	0848	2hr	Auth	-
4/29/13	1704116A(1-7)	UWON	0848	2hr	Auth	-
4/29/13	1704124A(1-5)	UWON	1141	2hr	Auth	-
4/29/13	1704124A(1-4)	UWON	1142	2hr	Pulse	-
4/30/13	1304105A(16-19)	Eng. Manag. Su.	1435	2hr 50m	Th	KB
4/30/13	1304104A(1-2)	Eng. Manag. Su.	1436	2hr 50m	UW	KB


Alpha Bank #12

Date	Sample #	Client	Instr. #	CT Time	Analysis	Goal
4/12/12	1704126A(7-12)	U/BENCO	0149	2hr	UW20	C
4/12/12	1704087A(3-8)	Eng. Man	0887	2hr	UW20	C
4/12/12	1704087A(9-7)	Eng. Man	1157	2hr	7L250	C
4/12/12	Daily Pulse	LAB	0122	10m	NA	C
4/28/12	1704081A(2-4)	Unitech	0817	2hr	UW20	C
4/28/12	1704081A(11-7)	Unitech	0854	2hr	Pulse	C
4/25/13	1304103A(7-11)	Accubest	1156	2hr 50m	Rate	KB
4/25/13	Daily Pulse	LAB	0117	10m	NA	C
4/26/13	1704117A(1-4)	U/lon	0902	2hr	UW20	C
4/26/13	1704117A(1-4)	U/lon	0907	2hr	UW20	C
4/26/13	SECCAL	LAB	1202	2hr	NA	C
4/26/13	System Bkgd	Lab	1458	16:40 hrs	2	KB
4/27/13	Daily Pulse	Lab	1028	10mins	NA	KB
4/27/13	1304104A(7-12)	Eng. Manag. Su	1048	2hr 50m	UW	KB
4/29/13	Daily Pulse	LAB	0129	10m	NA	C
4/29/13	1704107A(7-12)	Eng. Man	1000	2hr	UW20	C
4/29/13	1304104A(11-16)	Eng. Manag. Su	1258	2hr 50m	Th	KB
4/17/12	Daily Pulse	LAB	0121	10m	NA	C
4/17/12	1704166A(1-4)	U/lon	0970	2hr	NA272	C
4/17/12	1704121A(1-2)	U/lon	0971	2hr	NA272	C
4/30/13	1304105A(10-15)	Eng. Manag. Su	1243	2hr 50m	Th	KB
4/30/13	1304106A(14-19)	Eng. Manag. Su	1624	2hr 50m	UW	KB

Alpha #3

Date	Sample #	Client	Location	CTD	Analysis	Spec
4/27/13	1304104A(13-19)	Eng. Manag. Su	1049	2hr 50m	UU	KB
4/27/13	1304113A(1-4)	UCOR	1049	2hr 50m	Np	KB
4/29/13	Partly Pulver	US	0521	1m	W	-
4/29/13	1304105A(17-19)	Eng. Man	1000	2hr	4hr 20m	c
4/29/13	1304104A(1-4)	Eng. Man	1000	2hr	7hr 30m	c
4/29/13	1304104A(17-19)	Eng. Manag. Su	1259	2hr 50m	TH	KB
4/29/13	1304113A(4)	UCOR	1700	2hr 50m	TH	KB
4/29/13	1304113A(4)	UCOR	1701	2hr 50m	THNT	KB
4/29/13	1704104A(1-6)	Eng. Man	1701	2hr	Rub	c
4/29/13	1304104A(13)	Eng. Manag. Su	1620	2hr 50m	Rate	KB
4/29/13	1304104A(13-19)	Eng. Manag. Su	1620	2hr 50m	Rate	KB
4/29/13	Partly Pulver	US	0521	1m	W	c
4/29/13	1304116A(2,4)	UCOR	0848	2hr	Au 20	c
4/29/13	1304116A(1-4)	UCOR	0848	2hr	Au 20	c
4/29/13	1304121A(1-4)	UCOR	0848	2hr	Au 20	c
4/29/13	1304121A(7)	UCOR	1147	2hr	Pu 30	c
4/29/13	1704121A(4)	UCOR	1148	2hr	Pu 27	c
4/29/13	1704105A(4-9)	Eng. Man	1148	2hr	Th 30	c
4/30/13	1304106A(3-13)	Eng. Manag. Su	1443	2hr 50m	UU	KB

ISO U NOTES
Run 2

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04106
		Analysis Code	UISO
		Run Number	2

#	Date	Dept	User	Notes
1	05/02/13 09:53	PREP	JBARNARD	ALIQOTED AND ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN

JB
5/2/13

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 <p>EBERLINE SERVICES Work Order Analysis Notes</p>	<p>Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com</p>	Internal Work Order	13-04106
		Analysis Code	UUISO
		Run Number	2

#	Date	Dept	User	Notes
1	05/02/13 09:53	PREP	JBARNARD	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	05/03/13 17:48	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 Jones
5/3/13


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 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04106
		Analysis Code	UUISO
		Run Number	2

#	Date	Dept	User	Notes
1	05/02/13 09:53	PREP	JBARNARD	ALIQOTED AND ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	05/03/13 17:48	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	05/06/13 05:33	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.

Handwritten signature: RMARTZ


US EPA ARCHIVE DOCUMENT

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04106
		Analysis Code	UUISO
		Run Number	2

#	Date	Dept	User	Notes
1	05/02/13 09:53	PREP	JBARNARD	ALIQUTED AND ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	05/03/13 17:48	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	05/06/13 05:33	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
5/6/13*

US EPA ARCHIVE DOCUMENT

 Reagents Used in an Analysis		Internal Work Order		
		13-04106		
		Analysis Code		Run
		UUISO		2
Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	5/2/2013
013804S	HCl - HF	6.5N - 0.04N	JDEMELAS	5/3/2013
013734S	Hydrochloric Acid	6.5N	JDEMELAS	5/3/2013
013813S	Hydrochloric Acid	8N	JDEMELAS	5/3/2013
013809P	Hydrochloric Acid	Reagent Grade	JDEMELAS	5/3/2013
013708P	Anion Exchange Resin	Reagent Grade	JDEMELAS	5/3/2013
013831S	HCl - NH4I	8N - 0.1M	JDEMELAS	5/3/2013
013675D02	Hydrochloric Acid	0.5N	JDEMELAS	5/3/2013
013246S	Carbon substrate	Solution	RMARTZ	5/6/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	5/6/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	5/6/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	5/6/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	5/6/2013

Date	Sample #	Client	Location	CT (Time)	Analysis	Tech
5/12/13	1704121A(1-4)	Ucon	1238	2hr	TL250	C
5/12/13	1704121A(1-4)	Ucon	1239	2hr	TLNT	C
5/12/13	1704107A(1-4)	Eng	1239	2hr	TL250	C
5/2/13	1304107A(13-19)	Eng. Manag. Sw	1629	2hr 50mins	Th	ICB
5/17/13	DailyPulser	Lab	0521	1hr	NH	C
5/17/13	SECCAL	Lab	0545	2hr	NH	C
5/17/13	1704106A(17-18)	Eng	0820	2hr	Rel	C
5/17/13	1704178A(7-4)	United	0924	2hr	Am241	C
5/17/13	1705001A(17-18)	Ucon	0924	2hr	Am241	C
5/17/13	1705001A(17-18)	Ucon	1115	2hr	Am241	C
5/17/13	1705001A(1-4)	Ucon	1115	2hr	Pu239	C
5/3/13	1304178A(1-4)	United	1217	2hr 50min	Pu	ICB
5/3/13	1305001A(1-4,6)	Ucon	1411	2hr 50mins	Th	ICB
5/3/13	1305001A(1-4,6)	Ucon	1411	2hr 50mins	ThNT	ICB
5/3/13	System Bkgd	Lab	1702	16.40 hrs		ICB
5/14/13	DailyPulser	Lab	1123	1hr	NH	C
5/14/13	1704178A(7-4)	United	1150	2hr	U235	C
5/14/13	1704178A(1-4)	United	1151	2hr 50min	TL250	C
5/14/13	1704178A(1-4)	United	1151	2hr	NP232	C
5/16/13	DailyPulser	Lab	0521	1hr	NH	C
5/16/13	1704108A(1-7)	Eng	0527	2hr	U235	C
5/16/13	1704108A(1-4)	Eng	0547	2hr	TL250	C
5/16/13	1704195A(7-4)	Ucon	0822	2hr	Am241	C
5/16/13	1704171A(1-4)	Ucon	0927	2hr	Am241	C
5/16/13	1704106A(1-7,16)	Eng	0942	2hr	U235	C


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	13-04106
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:14	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN

BL
 4/25/13

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	13-04106
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:14	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/30/13 17:42	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.

J. Demelas
 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	13-04106
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:14	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/30/13 17:42	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	05/01/13 06:04	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.

Handwritten signature and date:
 [Signature]
 5/1/13



Reagents Used in an Analysis

Internal Work Order

13-04106

Analysis Code

Run

ThISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/25/2013
013721P	Anion Exchange Resin	Reagent Grade	JDEMELAS	4/30/2013
013800S	Hydrochloric Acid	8N	JDEMELAS	4/30/2013
013675P	Hydrochloric Acid	Reagent Grade	JDEMELAS	4/30/2013
013803S	Nitric Acid	8N	JDEMELAS	4/30/2013
013624P	Nitric Acid	Reagent Grade	JDEMELAS	4/30/2013
013246S	Carbon substrate	Solution	RMARTZ	5/1/2013
013017S	Cerrium Carrier	0.1mg/ml	RMARTZ	5/1/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	5/1/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	5/1/2013

US EPA ARCHIVE DOCUMENT

Alpha Bank #2

Date	Sample #	Client	Instrument	CT Time	Analysis	Result
4/24/13	1704176A(7-17)	U/RB/CO	0849	2hrs	U/RB	C
4/24/13	1704017A(7-8)	Eng/Man	0857	2hrs	U/RB	C
4/24/13	1704057A(7-7)	Eng/Man	1157	2hrs	7LZ10	C
4/25/13	Daily Pulse	LAB	0822	1hr	NA	C
4/25/13	1704081A(12)	United	0817	2hrs	U/RB	C
4/25/13	1704081A(11-7)	United	0854	2hrs	Pulse	C
4/25/13	1304103A(7-11)	Accutest	1156	2hr 50m	Rate	KB
4/26/13	Daily Pulse	LAB	0177	1hr	NA	C
4/26/13	1704117A(1-4)	U/Low	0902	2hrs	U/RB	C
4/26/13	1704117A(1-4)	U/Low	0907	2hrs	U/RB	C
4/26/13	SECCAL	LAB	1202	2hrs	NA	C
4/26/13	System Bkgd	Lab	1458	16.40 hrs		KB
4/27/13	Daily Pulse	Lab	1028	10mins	NA	KB
4/27/13	1304104A(7-12)	Eng. Manag. Su	1048	2hr 50m	UU	KB
4/29/13	Daily Pulse	LAB	0529	1hr	NA	C
4/29/13	1704108A(7-7)	Eng/Man	1000	2hrs	U/RB	C
4/29/13	1304104A(11-16)	Eng. Manag. Su	1258	2hr 50m	Th	KB
4/29/13	Daily Pulse	LAB	0521	1hr	NA	C
4/29/13	1704166A(1-4)	U/Low	0970	2hrs	NA/77	C
4/29/13	1704121A(1-2)	U/Low	0971	2hrs	NA/77	C
4/30/13	1304105A(10-15)	Eng. Manag. Su	1243	2hr 50m	Th	KB
4/30/13	1304106A(14-19)	Eng. Manag. Su	1624	2hr 50m	UU	KB
5/1/13	Daily Pulse	LAB	0526	1hr	NA	C
5/1/13	1704166A(7-4)	U/Low	0940	2hrs	Pulse	C
5/1/13	1704166A(1-4)	U/Low	0940	2hrs	Pulse	C
5/1/13	1304166A(1-2)	U/Low	0940	2hrs	Th/20	C
5/1/13	1304104A(7-12)	Eng. Manag. Su	1249	2hr 50m	Th	KB

Alphabet


Date	Sample #	Client	Location	CTD	Analysis	Spec
4/27/13	1304104A(13-19)	Eng. Manag. Sv.	1049	2hr 50m	UU	KB
4/28/13	1304113A(1-4)	UCOR	1049	2hr 50m	Np	KB
4/29/13	Daily Pulse	US	0521	1m	W	-
4/29/13	1304105A(17-19)	Eng. Manag. Sv.	1000	2hr	4hr 20m	c
4/29/13	1304104A(1-4)	Eng. Manag. Sv.	1000	2hr	7hr 30m	c
4/29/13	1304104A(17-19)	Eng. Manag. Sv.	1259	2hr 50m	TH	KB
4/29/13	1304113A(4)	UCOR	1700	2hr 50m	TH	KB
4/29/13	1304113A(4)	UCOR	1701	2hr 50m	THNT	KB
4/29/13	1704104A(1-6)	Eng. Manag. Sv.	1701	2hr	Rate	c
4/29/13	1304104A(13-19)	Eng. Manag. Sv.	KB 4/29/13	2hr 50m	Rate	KB
4/29/13	1304104A(13-19)	Eng. Manag. Sv.	1620	2hr 50m	Rate	KB
4/29/13	Daily Pulse	US	0521	1m	W	c
4/29/13	1304116A(7-4)	UCOR	0848	2hr	Rate	c
4/29/13	1304116A(1-4)	UCOR	0849	2hr	Rate	c
4/29/13	1304116A(1-4)	UCOR	0849	2hr	Rate	c
4/29/13	1304116A(7)	UCOR	1147	2hr	Rate	c
4/29/13	1304116A(NT(4)	UCOR	1147	2hr	Rate	c
4/29/13	1304105A(4-9)	Eng. Manag. Sv.	1149	2hr	Rate	c
4/30/13	1304106A(3-13)	Eng. Manag. Sv.	1443	2hr 50m	UU	KB
5/1/13	Daily Pulse	US	0526	1m	W	-
5/1/13	1704108A(1-4)	UCOR	0854	2hr	Rate	c
5/1/13	1304116A(1-4)	UCOR	0941	2hr	Rate	c
5/1/13	1304116A(NT(4)	UCOR	0941	2hr	Rate	c
5/1/13	1704116A(1-4)	UCOR	0941	2hr	Rate	c
5/1/13	1304121A(1-4)	UCOR	1206	2hr 50m	Rate	KB
5/1/13	13041089A(1)	UCOR	1247	2hr 50m	Rate	KB
5/1/13	1304106A(13-17)	Eng. Manag. Sv.	1249	2hr 50m	TH	KB

RA-226 NOTES

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04106
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:13	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTION 12 DOWN AND DIGESTED DUE TO SAMPLES BEING VERY DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIPITATION SEPARATIONS

JB 13
4/25/13
4/25/13
JB

 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	13-04106
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:13	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTION 12 DOWN AND DIGESTED DUE TO SAMPLES BEING VERY DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	04/30/13 13:27	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	05/02/13 16:02	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.8 IN AP-006 REV 12 FOR RA 226 ANALYSIS (SYRINGE FILTERED- PRECIP-FILTERED-DRIED-OBTAIN FINAL WEIGHT) SUBMIT TO COUNT ROOM.
4	05/02/13 16:17	PREP	LWALKER	WHILE SYRINGE FILTERING FRACTION #14 SOME OF THE ORGANICS IN THE BOTTOM OF C-TUBE FLOATED TO THE TOP WHILE POURING INTO SYRINGE. HAD TO USE SEVERAL FILTERS IN ORDER TO FILTER ALL THE SAMPLE COMPLETELY.

L. Walker
 5/2/13

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-04106

Analysis Code

Run

Ra226

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/25/2013
013575D01	Ammonium Sulfate	200 mg/ml	JBARNARD	4/25/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	4/25/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/25/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/25/2013
013416P	Perchloric Acid	Reagent Grade	JBARNARD	4/25/2013
009098P	Sulfuric Acid	Reagent Grade	JBARNARD	4/25/2013
013811S	EDTA	0.25M	LWALKER	4/30/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	5/2/2013
013575D02	Ammonium Sulfate	200 mg/ml	LWALKER	5/2/2013

US EPA ARCHIVE DOCUMENT


Date	Sample #	Client	Location	C TO Fin	Analysis	Peak
5/1/13	1304106A(1-6)	Eng. Manag. Sw	1278	2hr50-	TH	KB
5/1/13	1304106A(19)	Eng. Manag. Sw	1616	2hr50-	TH	KB
5/1/13	1304106A(4)	UWR	1617	2hr50-	PU	KB
5/1/13	1304105A(1-4)	Eng. Manag. Sw	1618	2hr50-	Ray	KB
5/2/13	Daily Pulse	UWR	0515	1hr	MT	-
5/2/13	1704107A(18-19)	Eng. Man	0522	2hr	Rel	C
5/2/13	1704108A(1-4)	M/A	0522	2hr	Rel	C
5/2/13	1704107A(7-14)	UWR	0915	2hr	UWR	-
5/2/13	1704107A(1-4)	Eng. Man	0915	2hr	UWR	-
5/2/13	5660A(1-3)	UWR	1235	2hr	Rel	C
5/2/13	1704107A(11-13)	Eng. Man	1237	2hr	UWR	C
5/2/13	1304107A(7-12)	Eng. Manag. Sw	1629	2hr50-	TH	KB
5/7/13	Daily Pulse	UWR	0520	1hr	MT	-
5/7/13	1704106A(1-6)	Eng. Man	0544	2hr	Rel	C

US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Sample ID	CTO/Rep	Analysis	Reck
5/24	1704121A(11-4)	UWA	1238	UWA	TLZSO	C
5/24/12	1704121A(11-4)	UWA	1239	UWA	TLNT	C
5/24/12	1704107A(11-4)	Eng. Manag. Sw	1239	UWA	TLZSO	C
5/2/13	1304107A(13-19)	Eng. Manag. Sw	1629	Chr S D'Amico	TR	ICB
5/17/10	P. 14 P. 15	UWA	0521	UWA	N/A	C
5/17/10	SPECIAL	UWA	0545	UWA	N/A	C
5/17/10	1704106A(17-18)	Eng. Manag. Sw	0820	UWA	Reck	C

US EPA ARCHIVE DOCUMENT

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	13-04106
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:13	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTION 12 DOWN AND DIGESTED DUE TO SAMPLES BEING VERY DIRTY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIPITATE TO SEPARATIONS


JB
4/25/13

 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	13-04106
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:13	PREP	JBARNARD	ALIUQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTION 12 DOWN AND DIGESTED DUE TO SAMPLES BEING VERY DITRY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIPA TO SEPARATIONS
2	05/03/13 12:53	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	05/10/13 14:14	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)

J. Walker
 5/10/13

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	13-04106
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	04/25/13 09:13	PREP	JBARNARD	ALIQUTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- DRIED FRACTION 12 DOWN AND DIGESTED DUE TO SAMPLES BEING VERY DITRY- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIPA TO SEPARATIONS
2	05/03/13 12:53	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	05/10/13 14:14	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)
4	05/14/13 09:27	CHEM	RMARTZ	followed procedure Ap-007 rev. 18 step 12.8-12.15 and submitted to count room.

US EPA ARCHIVE DOCUMENT

RA
~~5/14/13~~



Reagents Used in an Analysis

Internal Work Order

13-04106

Analysis Code

Run

Ra228

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/25/2013
013575D01	Ammonium Sulfate	200 mg/ml	JBARNARD	4/25/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	4/25/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/25/2013
013416P	Perchloric Acid	Reagent Grade	JBARNARD	4/25/2013
009098P	Sulfuric Acid	Reagent Grade	JBARNARD	4/25/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/25/2013
011504D22	Ammonium Sulfide	2%	LWALKER	5/10/2013
012729D08	Lead Carrier	1.5 mg/ml	LWALKER	5/10/2013
013797P	Nitric Acid	Reagent Grade	LWALKER	5/10/2013
013690S	Sodium Hydroxide	10M	LWALKER	5/10/2013
013801S	Yttrium Carrier	9 mg/ml	LWALKER	5/10/2013
012717D04	Ammonium Oxalate	5%	RMARTZ	5/14/2013
013751D01	Ammonium Sulfate	200 mg/ml	RMARTZ	5/14/2013
013624D03	Nitric Acid	1N	RMARTZ	5/14/2013
013686S	Nitric Acid	6N	RMARTZ	5/14/2013

US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Institution	CT	Time	Analysis	Spec.
5/9/10	1705017SN(1-4)	UConn	0840	2h	SN707	C	
5/9/10	1704187SN(1-4)	Univ of Conn	0840	2h	SN707	C	
5/9/10	1705017SN(1-4)	UConn	1046	1h	SN707	C	
5/9/10	1704477SN(1-4)	UConn	1046	1h	SN707	C	
5/9/10	1704105SN(1-4)	Emory	1111	2h	RA8	C	
5/9/13	1304170CL(1-3,5)	UCOR	1540	30mins	CL36	KB	
5/9/13	1304192CL(1-3,5)	UCOR	1541	30mins	CL36	KB	
5/9/13	1305005CL(1-3,5)	UCOR	1542	30mins	CL36	KB	
5/10/13	EF7ae	WV	0870	7a	1A	C	
5/10/13	Bilgdae	WV	0857	6a	1A	C	
5/10/13	1705017RA(2-4)	UConn	0811	7h	RA8	C	
5/10/13	1704177RA(2-9)	Emory	0811	2h	RA8	C	
5/10/13	170412954(1-7)	ERA	1014	2h	SN9014	C	
5/10/13	1705017PB(2-4)	UConn	1014	2h	PB-20	C	
5/10/13	1304129SR(1)	ERA	1221	30mins	TOT SR	KB	
5/10/13	1304096RA(1)	New York PE	1510	30mins	RA8	KB	
5/10/13	1304096RA(2-9)	New York PE	1511	2 hrs	RA8	KB	
5/11/13	Weekly Blood	Lab	1250	12 hrs	DB	AG	
5/17/13	EF7ae	WV	0507	7a	1A	C	
5/17/13	Buanae	WV	0547	6a	1A	C	
5/17/13	1705075SN(1-4)	UConn	0749	2h	SN707	C	
5/17/13	170417054(1-4)	UConn	0749	2h	SN9014	C	
5/13/13	1304124RA(1-11)	Utah Div of	1402	2 hr	RA-228	AG	
5/14/13	EF7ae	WV	0808	7a	1A	C	
5/14/13	Bilgdae	WV	0834	6a	1A	C	
5/14/13	1705073SN(1)	UConn	0808	7a	SN707	C	
5/14/13	1705073SN(2-4)	UConn	0808	2h	SN707	C	
5/14/13	1705073SN(5)	UConn	0840	7a	CL36	C	
5/14/13	1704105RA(1-4)	Emory	0917	2h	RA8	C	
5/14/13	1704105RA(1-4)	Emory	0917	2h	RA8	C	

Date	Sample #	Client	Location	CYOT	Analysis	Depth
5/10/17	1704125546(5)	ERA	1702	2h	SN707	C
5/10/17	1704125546(6)	ERA	1226	2hrs	TOT S	LB
5/11/17	Weekly BGD	LAB	1248	12hr	αB	AG
5/17/17	Buena	LAB	0507	6am	LID	C
5/17/17	BTZAC	LAB	0616	7am	LID	C
5/17/17	1704170546	Ulow	0749	7h	SN504	C
5/17/17	PL20 RECEPT	LAB	1005	15min	SN504	C
5/14/17	Buena	LAB	0505	6am	LID	C
5/14/17	BTZAC	LAB	0610	7am	LID	C
5/14/17	1704175546(5-4-16)	Ulow	0746	7h	SN504	C
5/14/17	170410644(5-4-17)	Engin	0956	7h	NAV	C

US EPA ARCHIVE DOCUMENT

**SECTION VIII
ANALYTICAL DATA (ISOTOPIC URANIUM)**

RUN 1

Work Order	13-04106	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	UIISO	01	LCS	LCS		04/16/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		04/16/13 00:00	1.0000E+00
Date Received	4/16/2013	03	DUP	PZ-102R-SS TOT	45	04/11/13 11:30	1.0000E+00
Lab Deadline	5/7/2013	04	TRG	PZ-111-KS TOT	43	04/09/13 15:35	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-111-KS DIS	43	04/09/13 15:35	1.0000E+00
Project	West Lake OU-1	06	TRG	D-6 TOT	45	04/09/13 15:45	1.0000E+00
Report Level	4	07	TRG	D-6 DIS	45	04/09/13 15:45	1.0000E+00
Activity Units	pCi	08	TRG	D-83 TOT	40	04/09/13 16:16	1.0000E+00
Aliquot Units	I	09	TRG	D-83 DIS	40	04/09/13 16:16	1.0000E+00
Matrix	WA	10	TRG	DUP 05 TOT	47	04/09/13 00:00	1.0000E+00
Method	NAS NS-3050 Modified	11	TRG	DUP 05 DIS	47	04/09/13 00:00	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	PZ-102-SS TOT	39	04/11/13 09:10	1.0000E+00
Radiometric Tracer	U-232	13	TRG	PZ-102-SS DIS	39	04/11/13 09:10	1.0000E+00
Radiometric Sol#	U-10a	14	DO	PZ-102R-SS TOT	45	04/11/13 11:30	1.0000E+00
Tracer Act (dpm/g)	19.093	15	TRG	PZ-102R-SS DIS	45	04/11/13 11:30	1.0000E+00
Carrier		16	TRG	PZ-104-SD TOT	44	04/11/13 11:38	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-104-SD DIS	44	04/11/13 11:38	1.0000E+00
		18	TRG	PZ-104-SS TOT	42	04/11/13 12:59	1.0000E+00
		19	TRG	PZ-104-SS DIS	42	04/11/13 12:59	1.0000E+00

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

US EPA ARCHIVE DOCUMENT

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.6068	11.6		0.00								
02	MBL	0.6030	11.5		0.00								
03	DUP	0.6009	11.5		0.00								
04	TRG	0.5979	11.4		0.00								
05	TRG	0.6001	11.5		0.00								
06	TRG	0.5999	11.5		0.00								
07	TRG	0.5982	11.4		0.00								
08	TRG	0.5986	11.4		0.00								
09	TRG	0.5987	11.4		0.00								
10	TRG	0.5964	11.4		0.00								
11	TRG	0.5800	11.1		0.00								
12	TRG	0.5651	10.8		0.00								
13	TRG	0.5723	10.9		0.00								
14	DO	0.6005	11.5		0.00								
15	TRG	0.6005	11.5		0.00								
16	TRG	0.5995	11.4		0.00								
17	TRG	0.5497	10.5		0.00								
18	TRG	0.6018	11.5		0.00								
19	TRG	0.6026	11.5		0.00								

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

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			04/25/13 09:03	JBARNARD				
02	MBL			04/25/13 09:03	JBARNARD				
03	DUP			04/25/13 09:03	JBARNARD				
04	TRG			04/25/13 09:03	JBARNARD				
05	TRG			04/25/13 09:03	JBARNARD				
06	TRG			04/25/13 09:03	JBARNARD				
07	TRG			04/25/13 09:03	JBARNARD				
08	TRG			04/25/13 09:03	JBARNARD				
09	TRG			04/25/13 09:03	JBARNARD				
10	TRG			04/25/13 09:03	JBARNARD				
11	TRG			04/25/13 09:03	JBARNARD				
12	TRG			04/25/13 09:03	JBARNARD				
13	TRG			04/25/13 09:03	JBARNARD				
14	DO			04/25/13 09:03	JBARNARD				
15	TRG			04/25/13 09:03	JBARNARD				
16	TRG			04/25/13 09:03	JBARNARD				
17	TRG			04/25/13 09:03	JBARNARD				
18	TRG			04/25/13 09:03	JBARNARD				
19	TRG			04/25/13 09:03	JBARNARD				

US EPA ARCHIVE DOCUMENT

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* 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: 13-04106-UUISO-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	U-234	LCS	LCS	pCi/l	6.55E+00	9.42E-01	7.36E-02	8.10E+00	80.82	OK		OK	
02	U-234	MBL	BLANK	pCi/l	2.66E-02	3.98E-02	6.47E-02					OK	OK
03	U-234	DUP	PZ-102R-SS TOT	pCi/l	4.66E+00	6.44E-01	6.51E-02				NA	OK	
04	U-234	TRG	PZ-111-KS TOT	pCi/l	7.07E+00	9.17E-01	4.76E-02					OK	
05	U-234	TRG	PZ-111-KS DIS	pCi/l	7.01E+00	8.86E-01	5.14E-02					OK	
06	U-234	TRG	D-6 TOT	pCi/l	2.16E-01	1.23E-01	8.14E-02					OK	
07	U-234	TRG	D-6 DIS	pCi/l	2.50E-01	1.20E-01	5.86E-02					OK	
08	U-234	TRG	D-83 TOT	pCi/l	3.15E-02	7.89E-02	1.64E-01					OK	
09	U-234	TRG	D-83 DIS	pCi/l	4.32E-02	8.24E-02	1.52E-01					OK	
10	U-234	TRG	DUP 05 TOT	pCi/l	2.92E-01	1.60E-01	8.81E-02					OK	
11	U-234	TRG	DUP 05 DIS	pCi/l	1.39E-01	1.22E-01	1.39E-01					OK	
12	U-234	TRG	PZ-102-SS TOT	pCi/l	5.70E+00	8.10E-01	6.49E-02					OK	
13	U-234	TRG	PZ-102-SS DIS	pCi/l	5.76E+00	8.42E-01	7.98E-02					OK	
14	U-234	DO	PZ-102R-SS TOT	pCi/l	4.85E+00	6.83E-01	6.50E-02					OK	
15	U-234	TRG	PZ-102R-SS DIS	pCi/l	5.54E+00	7.75E-01	7.26E-02					OK	
16	U-234	TRG	PZ-104-SD TOT	pCi/l	2.26E-01	7.01E-01	1.64E+00					INV	
17	U-234	TRG	PZ-104-SD DIS	pCi/l	2.62E-01	2.45E-01	2.78E-01					OK	
18	U-234	TRG	PZ-104-SS TOT	pCi/l	2.16E-01	1.04E-01	7.12E-02					OK	
19	U-234	TRG	PZ-104-SS DIS	pCi/l	1.34E-01	7.72E-02	6.50E-02					OK	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04106	Analysis Code	UUISO	Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-UIISO-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	U-234	LCS	04/16/13 00:00	1.00E+00	101.22	0.00	0.00			
02	U-234	MBL	04/16/13 00:00	1.00E+00	125.36	0.00	0.00			
03	U-234	DUP	04/11/13 11:30	1.00E+00	134.09	0.00	0.00			
04	U-234	TRG	04/09/13 15:35	1.00E+00	125.35	0.00	0.00			
05	U-234	TRG	04/09/13 15:35	1.00E+00	135.37	0.00	0.00			
06	U-234	TRG	04/09/13 15:45	1.00E+00	87.44	0.00	0.00			
07	U-234	TRG	04/09/13 15:45	1.00E+00	99.46	0.00	0.00			
08	U-234	TRG	04/09/13 16:16	1.00E+00	48.93	0.00	0.00			
09	U-234	TRG	04/09/13 16:16	1.00E+00	49.57	0.00	0.00			
10	U-234	TRG	04/09/13 00:00	1.00E+00	66.12	0.00	0.00			
11	U-234	TRG	04/09/13 00:00	1.00E+00	63.89	0.00	0.00			
12	U-234	TRG	04/11/13 09:10	1.00E+00	117.84	0.00	0.00			
13	U-234	TRG	04/11/13 09:10	1.00E+00	118.78	0.00	0.00			
14	U-234	DO	04/11/13 11:30	1.00E+00	129.75	0.00	0.00			
15	U-234	TRG	04/11/13 11:30	1.00E+00	143.02	0.00	0.00			
16	U-234	TRG	04/11/13 11:38	1.00E+00	4.53	0.00	0.00			
17	U-234	TRG	04/11/13 11:38	1.00E+00	31.07	0.00	0.00			
18	U-234	TRG	04/11/13 12:59	1.00E+00	129.30	0.00	0.00			
19	U-234	TRG	04/11/13 12:59	1.00E+00	132.38	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04106	Analysis Code	UIISO	Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-UUISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	U-234	LCS	04/30/13 14:35		A_Spec	Alpha_013	170	4.66 E+02	3.00 E-03	18.7	
02	U-234	MBL	04/30/13 14:35		A_Spec	Alpha_014	170.02	2.32 E+00	4.00 E-03	18.5	
03	U-234	DUP	04/30/13 14:42		A_Spec	Alpha_033	170	4.29 E+02	0.00 E+00	18.2	
04	U-234	TRG	04/30/13 14:42		A_Spec	Alpha_034	170	6.20 E+02	1.00 E-03	18.6	
05	U-234	TRG	04/30/13 14:42		A_Spec	Alpha_035	170	6.53 E+02	2.00 E-03	18.3	
06	U-234	TRG	04/30/13 14:42		A_Spec	Alpha_037	170	1.27 E+01	2.00 E-03	17.8	
07	U-234	TRG	04/30/13 14:42		A_Spec	Alpha_040	170	1.78 E+01	1.00 E-03	19	
08	U-234	TRG	04/30/13 14:42		A_Spec	Alpha_041	170	1.15 E+00	5.00 E-03	19.8	
09	U-234	TRG	04/30/13 14:43		A_Spec	Alpha_042	170	1.49 E+00	3.00 E-03	18.5	
10	U-234	TRG	04/30/13 14:43		A_Spec	Alpha_044	170	1.38 E+01	1.00 E-03	19	
11	U-234	TRG	04/30/13 14:43		A_Spec	Alpha_046	170	6.00 E+00	0.00 E+00	17.9	
12	U-234	TRG	04/30/13 14:43		A_Spec	Alpha_047	170	4.60 E+02	3.00 E-03	18.2	
13	U-234	TRG	04/30/13 14:43		A_Spec	Alpha_048	170	4.33 E+02	0.00 E+00	16.8	
14	U-234	DO	04/30/13 16:24		A_Spec	Alpha_018	170	4.21 E+02	4.00 E-03	17.8	
15	U-234	TRG	04/30/13 16:24		A_Spec	Alpha_022	170	4.57 E+02	5.00 E-03	15.3	
16	U-234	TRG	04/30/13 16:24		A_Spec	Alpha_024	170	6.60 E-01	2.00 E-03	17.1	
17	U-234	TRG	04/30/13 16:24		A_Spec	Alpha_025	170	5.32 E+00	4.00 E-03	17.4	
18	U-234	TRG	04/30/13 16:24		A_Spec	Alpha_027	170	1.81 E+01	5.00 E-03	17.3	
19	U-234	TRG	04/30/13 16:24		A_Spec	Alpha_029	170	1.30 E+01	6.00 E-03	19.5	

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04106
Client	Engineering Management Support, Inc.

2010

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-UUISO-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	U-238	LCS	LCS	pCi/l	7.05E+00	9.99E-01	7.33E-02	7.90E+00	89.28	OK		OK	
02	U-238	MBL	BLANK	pCi/l	3.21E-02	4.60E-02	7.53E-02					OK	OK
03	U-238	DUP	PZ-102R-SS TOT	pCi/l	3.53E+00	5.23E-01	6.48E-02				NA	OK	
04	U-238	TRG	PZ-111-KS TOT	pCi/l	3.10E+00	4.87E-01	5.43E-02					OK	
05	U-238	TRG	PZ-111-KS DIS	pCi/l	2.79E+00	4.39E-01	4.46E-02					OK	
06	U-238	TRG	D-6 TOT	pCi/l	1.16E-01	8.92E-02	7.08E-02					OK	
07	U-238	TRG	D-6 DIS	pCi/l	2.49E-01	1.20E-01	5.84E-02					OK	
08	U-238	TRG	D-83 TOT	pCi/l	-5.22E-02	8.77E-02	2.66E-01					OK	
09	U-238	TRG	D-83 DIS	pCi/l	4.79E-02	8.16E-02	1.38E-01					OK	
10	U-238	TRG	DUP 05 TOT	pCi/l	2.10E-01	1.40E-01	1.26E-01					OK	
11	U-238	TRG	DUP 05 DIS	pCi/l	1.35E-01	1.13E-01	9.65E-02					OK	
12	U-238	TRG	PZ-102-SS TOT	pCi/l	4.73E+00	6.99E-01	5.14E-02					OK	
13	U-238	TRG	PZ-102-SS DIS	pCi/l	3.35E+00	5.58E-01	7.94E-02					OK	
14	U-238	DO	PZ-102R-SS TOT	pCi/l	3.17E+00	4.99E-01	9.17E-02					OK	
15	U-238	TRG	PZ-102R-SS DIS	pCi/l	3.40E+00	5.35E-01	6.33E-02					OK	
16	U-238	TRG	PZ-104-SD TOT	pCi/l	-2.32E-01	7.17E-01	1.93E+00					INV	
17	U-238	TRG	PZ-104-SD DIS	pCi/l	2.28E-01	2.21E-01	2.34E-01					OK	
18	U-238	TRG	PZ-104-SS TOT	pCi/l	8.66E-02	6.67E-02	6.68E-02					OK	
19	U-238	TRG	PZ-104-SS DIS	pCi/l	1.73E-01	8.48E-02	4.28E-02					OK	

 Client Engineering Management Support, Inc.	Eberline Services Work Order	Analysis Code	Run
	13-04106	UUISO	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	U-238	LCS	04/16/13 00:00	1.00E+00	101.22	0.00	0.00			
02	U-238	MBL	04/16/13 00:00	1.00E+00	125.36	0.00	0.00			
03	U-238	DUP	04/11/13 11:30	1.00E+00	134.09	0.00	0.00			
04	U-238	TRG	04/09/13 15:35	1.00E+00	125.35	0.00	0.00			
05	U-238	TRG	04/09/13 15:35	1.00E+00	135.37	0.00	0.00			
06	U-238	TRG	04/09/13 15:45	1.00E+00	87.44	0.00	0.00			
07	U-238	TRG	04/09/13 15:45	1.00E+00	99.46	0.00	0.00			
08	U-238	TRG	04/09/13 16:16	1.00E+00	48.93	0.00	0.00			
09	U-238	TRG	04/09/13 16:16	1.00E+00	49.57	0.00	0.00			
10	U-238	TRG	04/09/13 00:00	1.00E+00	66.12	0.00	0.00			
11	U-238	TRG	04/09/13 00:00	1.00E+00	63.89	0.00	0.00			
12	U-238	TRG	04/11/13 09:10	1.00E+00	117.84	0.00	0.00			
13	U-238	TRG	04/11/13 09:10	1.00E+00	118.78	0.00	0.00			
14	U-238	DO	04/11/13 11:30	1.00E+00	129.75	0.00	0.00			
15	U-238	TRG	04/11/13 11:30	1.00E+00	143.02	0.00	0.00			
16	U-238	TRG	04/11/13 11:38	1.00E+00	4.53	0.00	0.00			
17	U-238	TRG	04/11/13 11:38	1.00E+00	31.07	0.00	0.00			
18	U-238	TRG	04/11/13 12:59	1.00E+00	129.30	0.00	0.00			
19	U-238	TRG	04/11/13 12:59	1.00E+00	132.38	0.00	0.00			

 Eberline Services Work Order 13-04106	Analysis Code UIISO	Run 1
	Client Engineering Management Support, Inc.	

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-UIISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	U-238	LCS	04/30/13 14:35		A_Spec	Alpha_013	170	5.04 E+02	3.00 E-03	18.7	
02	U-238	MBL	04/30/13 14:35		A_Spec	Alpha_014	170.02	2.81 E+00	7.00 E-03	18.5	
03	U-238	DUP	04/30/13 14:42		A_Spec	Alpha_033	170	3.27 E+02	0.00 E+00	18.2	
04	U-238	TRG	04/30/13 14:42		A_Spec	Alpha_034	170	2.73 E+02	2.00 E-03	18.6	
05	U-238	TRG	04/30/13 14:42		A_Spec	Alpha_035	170	2.61 E+02	1.00 E-03	18.3	
06	U-238	TRG	04/30/13 14:42		A_Spec	Alpha_037	170	6.83 E+00	1.00 E-03	17.8	
07	U-238	TRG	04/30/13 14:42		A_Spec	Alpha_040	170	1.78 E+01	1.00 E-03	19	
08	U-238	TRG	04/30/13 14:42		A_Spec	Alpha_041	170	-1.91 E+00	2.30 E-02	19.8	
09	U-238	TRG	04/30/13 14:43		A_Spec	Alpha_042	170	1.66 E+00	2.00 E-03	18.5	
10	U-238	TRG	04/30/13 14:43		A_Spec	Alpha_044	170	1.00 E+01	0.00 E+00	19	
11	U-238	TRG	04/30/13 14:43		A_Spec	Alpha_046	170	5.83 E+00	1.00 E-03	17.9	
12	U-238	TRG	04/30/13 14:43		A_Spec	Alpha_047	170	3.84 E+02	1.00 E-03	18.2	
13	U-238	TRG	04/30/13 14:43		A_Spec	Alpha_048	170	2.53 E+02	0.00 E+00	16.8	
14	U-238	DO	04/30/13 16:24		A_Spec	Alpha_018	170	2.77 E+02	1.30 E-02	17.8	
15	U-238	TRG	04/30/13 16:24		A_Spec	Alpha_022	170	2.81 E+02	3.00 E-03	15.3	
16	U-238	TRG	04/30/13 16:24		A_Spec	Alpha_024	170	-6.80 E-01	4.00 E-03	17.1	
17	U-238	TRG	04/30/13 16:24		A_Spec	Alpha_025	170	4.66 E+00	2.00 E-03	17.4	
18	U-238	TRG	04/30/13 16:24		A_Spec	Alpha_027	170	7.32 E+00	4.00 E-03	17.3	
19	U-238	TRG	04/30/13 16:24		A_Spec	Alpha_029	170	1.68 E+01	1.00 E-03	19.5	

	Run	1
	Analysis Code	UIISO
Eberline Services Work Order	13-04106	
Client	Engineering Management Support, Inc.	

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-235	LCS	LCS	pCi/l	6.03E-01	2.12E-01	7.23E-02					OK	
02	U-235	MBL	BLANK	pCi/l	2.35E-02	3.99E-02	6.77E-02					OK	OK
03	U-235	DUP	PZ-102R-SS TOT	pCi/l	1.99E-01	1.04E-01	5.59E-02				NA	OK	
04	U-235	TRG	PZ-111-KS TOT	pCi/l	3.05E-01	1.33E-01	6.73E-02					OK	
05	U-235	TRG	PZ-111-KS DIS	pCi/l	2.63E-01	1.19E-01	5.53E-02					OK	
06	U-235	TRG	D-6 TOT	pCi/l	2.10E-02	5.83E-02	1.26E-01					OK	
07	U-235	TRG	D-6 DIS	pCi/l	-2.95E-03	3.45E-02	7.23E-02					OK	
08	U-235	TRG	D-83 TOT	pCi/l	-1.73E-02	6.92E-02	1.78E-01					OK	
09	U-235	TRG	D-83 DIS	pCi/l	1.75E-02	7.32E-02	1.88E-01					OK	
10	U-235	TRG	DUP 05 TOT	pCi/l	1.04E-01	1.15E-01	1.56E-01					OK	
11	U-235	TRG	DUP 05 DIS	pCi/l	5.73E-02	9.76E-02	1.72E-01					OK	
12	U-235	TRG	PZ-102-SS TOT	pCi/l	3.30E-01	1.45E-01	7.29E-02					OK	
13	U-235	TRG	PZ-102-SS DIS	pCi/l	2.46E-01	1.32E-01	9.84E-02					OK	
14	U-235	DO	PZ-102R-SS TOT	pCi/l	3.01E-01	1.35E-01	8.51E-02					OK	
15	U-235	TRG	PZ-102R-SS DIS	pCi/l	4.36E-01	1.67E-01	8.95E-02					OK	
16	U-235	TRG	PZ-104-SD TOT	pCi/l	-1.44E-01	8.56E-01	2.02E+00					INV	
17	U-235	TRG	PZ-104-SD DIS	pCi/l	5.04E-02	1.21E-01	2.53E-01					OK	
18	U-235	TRG	PZ-104-SS TOT	pCi/l	9.68E-03	2.96E-02	7.01E-02					OK	
19	U-235	TRG	PZ-104-SS DIS	pCi/l	1.90E-02	3.61E-02	6.67E-02					OK	

Client	Engineering Management Support, Inc.
	13-04106
Eberline Services Work Order	13-04106
Analysis Code	UISO
Run	1



Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-UUISO-1

	Run	1
	Analysis Code	UUISO
Eberline Services Work Order	13-04106	
Client	Engineering Management Support, Inc.	

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-235	LCS	04/16/13 00:00	1.00E+00	101.22	0.00	0.00			
02	U-235	MBL	04/16/13 00:00	1.00E+00	125.36	0.00	0.00			
03	U-235	DUP	04/11/13 11:30	1.00E+00	134.09	0.00	0.00			
04	U-235	TRG	04/09/13 15:35	1.00E+00	125.35	0.00	0.00			
05	U-235	TRG	04/09/13 15:35	1.00E+00	135.37	0.00	0.00			
06	U-235	TRG	04/09/13 15:45	1.00E+00	87.44	0.00	0.00			
07	U-235	TRG	04/09/13 15:45	1.00E+00	99.46	0.00	0.00			
08	U-235	TRG	04/09/13 16:16	1.00E+00	48.93	0.00	0.00			
09	U-235	TRG	04/09/13 16:16	1.00E+00	49.57	0.00	0.00			
10	U-235	TRG	04/09/13 00:00	1.00E+00	66.12	0.00	0.00			
11	U-235	TRG	04/09/13 00:00	1.00E+00	63.89	0.00	0.00			
12	U-235	TRG	04/11/13 09:10	1.00E+00	117.84	0.00	0.00			
13	U-235	TRG	04/11/13 09:10	1.00E+00	118.78	0.00	0.00			
14	U-235	DO	04/11/13 11:30	1.00E+00	129.75	0.00	0.00			
15	U-235	TRG	04/11/13 11:30	1.00E+00	143.02	0.00	0.00			
16	U-235	TRG	04/11/13 11:38	1.00E+00	4.53	0.00	0.00			
17	U-235	TRG	04/11/13 11:38	1.00E+00	31.07	0.00	0.00			
18	U-235	TRG	04/11/13 12:59	1.00E+00	129.30	0.00	0.00			
19	U-235	TRG	04/11/13 12:59	1.00E+00	132.38	0.00	0.00			

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-UISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff	A to B, Cor
01	U-235	LCS	04/30/13 14:35		A_Spec	Alpha_013	170	3.48 E+01	1.00 E-03	18.7	
02	U-235	MBL	04/30/13 14:35		A_Spec	Alpha_014	170.02	1.66 E+00	2.00 E-03	18.5	
03	U-235	DUP	04/30/13 14:42		A_Spec	Alpha_033	170	1.48 E+01	1.00 E-03	18.2	
04	U-235	TRG	04/30/13 14:42		A_Spec	Alpha_034	170	2.17 E+01	2.00 E-03	18.6	
05	U-235	TRG	04/30/13 14:42		A_Spec	Alpha_035	170	1.98 E+01	1.00 E-03	18.3	
06	U-235	TRG	04/30/13 14:42		A_Spec	Alpha_037	170	1.00 E+00	0.00 E+00	17.8	
07	U-235	TRG	04/30/13 14:42		A_Spec	Alpha_040	170	-1.70 E-01	1.00 E-03	19	
08	U-235	TRG	04/30/13 14:42		A_Spec	Alpha_041	170	-5.10 E-01	3.00 E-03	19.8	
09	U-235	TRG	04/30/13 14:43		A_Spec	Alpha_042	170	4.90 E-01	3.00 E-03	18.5	
10	U-235	TRG	04/30/13 14:43		A_Spec	Alpha_044	170	4.00 E+00	0.00 E+00	19	
11	U-235	TRG	04/30/13 14:43		A_Spec	Alpha_046	170	2.00 E+00	0.00 E+00	17.9	
12	U-235	TRG	04/30/13 14:43		A_Spec	Alpha_047	170	2.17 E+01	2.00 E-03	18.2	
13	U-235	TRG	04/30/13 14:43		A_Spec	Alpha_048	170	1.50 E+01	0.00 E+00	16.8	
14	U-235	DO	04/30/13 16:24		A_Spec	Alpha_018	170	2.11 E+01	5.00 E-03	17.8	
15	U-235	TRG	04/30/13 16:24		A_Spec	Alpha_022	170	2.91 E+01	5.00 E-03	15.3	
16	U-235	TRG	04/30/13 16:24		A_Spec	Alpha_024	170	-3.40 E-01	2.00 E-03	17.1	
17	U-235	TRG	04/30/13 16:24		A_Spec	Alpha_025	170	8.30 E-01	1.00 E-03	17.4	
18	U-235	TRG	04/30/13 16:24		A_Spec	Alpha_027	170	6.60 E-01	2.00 E-03	17.3	
19	U-235	TRG	04/30/13 16:24		A_Spec	Alpha_029	170	1.49 E+00	3.00 E-03	19.5	

Run	1
Analysis Code	UISO
Eberline Services Work Order	13-04106
Client	Engineering Management Support, Inc.

2152

1314
33481

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	04/16/13 00:00	1.0000	0.6068	11.5856		0.00		
02	MBL	BLANK	04/16/13 00:00	1.0000	0.6030	11.5131		0.00		
03	DUP	PZ-102R-SS TOT	04/11/13 11:30	1.0000	0.6009	11.4730		0.00		
04	TRG	PZ-111-KS TOT	04/09/13 15:35	1.0000	0.5979	11.4157		0.00		
05	TRG	PZ-111-KS DIS	04/09/13 15:35	1.0000	0.6001	11.4577		0.00		
06	TRG	D-6 TOT	04/09/13 15:45	1.0000	0.5999	11.4539		0.00		
07	TRG	D-6 DIS	04/09/13 15:45	1.0000	0.5982	11.4214		0.00		
08	TRG	D-83 TOT	04/09/13 16:16	1.0000	0.5986	11.4291		0.00		
09	TRG	D-83 DIS	04/09/13 16:16	1.0000	0.5987	11.4310		0.00		
10	TRG	DUP 05 TOT	04/09/13 00:00	1.0000	0.5964	11.3871		0.00		
11	TRG	DUP 05 DIS	04/09/13 00:00	1.0000	0.5800	11.0739		0.00		
12	TRG	PZ-102-SS TOT	04/11/13 09:10	1.0000	0.5651	10.7895		0.00		
13	TRG	PZ-102-SS DIS	04/11/13 09:10	1.0000	0.5723	10.9269		0.00		
14	DO	PZ-102R-SS TOT	04/11/13 11:30	1.0000	0.6005	11.4653		0.00		
15	TRG	PZ-102R-SS DIS	04/11/13 11:30	1.0000	0.6005	11.4653		0.00		
16	TRG	PZ-104-SD TOT	04/11/13 11:38	1.0000	0.5995	11.4463		0.00		
17	TRG	PZ-104-SD DIS	04/11/13 11:38	1.0000	0.5497	10.4954		0.00		
18	TRG	PZ-104-SS TOT	04/11/13 12:59	1.0000	0.6018	11.4902		0.00		
19	TRG	PZ-104-SS DIS	04/11/13 12:59	1.0000	0.6026	11.5054		0.00		

10-29

0114

Spike and Tracer Worksheet

Internal Work Order					Run	Analysis Code			Date	Technician				Technician Initials		Witness Initials	
13-04106					1	UIISO			4/25/2013 9:01	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	
U-234	U-8a	35.240	4/25/2013	0.500	0.5103				8.10	0.292	0.00	0.000	0.00	0.000	0.00	0.000	
U-238	U-8a	34.350	4/25/2013	0.500	0.5103				7.90	0.284	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	19.093	4/25/2013	0.6068	0.6300										
02	U-232	U-10a	19.093	4/25/2013	0.6030	0.6300										
03	U-232	U-10a	19.093	4/25/2013	0.6009	0.6300										
04	U-232	U-10a	19.093	4/25/2013	0.5979	0.6300										
05	U-232	U-10a	19.093	4/25/2013	0.6001	0.6300										
06	U-232	U-10a	19.093	4/25/2013	0.5999	0.6300										
07	U-232	U-10a	19.093	4/25/2013	0.5982	0.6300										
08	U-232	U-10a	19.093	4/25/2013	0.5986	0.6300										
09	U-232	U-10a	19.093	4/25/2013	0.5987	0.6300										
10	U-232	U-10a	19.093	4/25/2013	0.5964	0.6300										
11	U-232	U-10a	19.093	4/25/2013	0.5800	0.6300										
12	U-232	U-10a	19.093	4/25/2013	0.5651	0.6300										
13	U-232	U-10a	19.093	4/25/2013	0.5723	0.6300										
14	U-232	U-10a	19.093	4/25/2013	0.6005	0.6300										
15	U-232	U-10a	19.093	4/25/2013	0.6005	0.6300										
16	U-232	U-10a	19.093	4/25/2013	0.5995	0.6300										
17	U-232	U-10a	19.093	4/25/2013	0.5497	0.6300										
18	U-232	U-10a	19.093	4/25/2013	0.6018	0.6300										
19	U-232	U-10a	19.093	4/25/2013	0.6026	0.6300										
							0.6068 g					0.5103 g				
							0.6030 g									
							-0.6009 g									
							-0.5979 g									
							-0.6001 g									
							-0.5999 g									
							-0.6001 g									
							-0.5982 g									
							-0.5986 g									
							-0.5987 g									
							-0.5964 g									
							-0.5800 g									
							-0.5651 g									
							-0.5723 g									
							-0.6005 g									
							-0.6005 g									
							-0.5995 g									
							-0.5497 g									
							-0.6018 g									
							-0.6026 g									
												Matrix Spike				



Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04106	1	UUISO	liters	5/7/2013	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 Equip	Aliquot	Net Equip	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-102R-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-111-KS TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-111-KS DIS	TRG					1.0000E+00	1.0000E+00				
06	D-6 TOT	TRG					1.0000E+00	1.0000E+00				
07	D-6 DIS	TRG					1.0000E+00	1.0000E+00				
08	D-83 TOT	TRG					1.0000E+00	1.0000E+00				
09	D-83 DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP 05 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP 05 DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-102-SS TOT	TRG					1.0000E+00	1.0000E+00				
13	PZ-102-SS DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-102R-SS TOT	DO					1.0000E+00	1.0000E+00				
15	PZ-102R-SS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-104-SD TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-104-SD DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-104-SS TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-104-SS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: _____

JB Date: 4/25/13

US EPA ARCHIVE DOCUMENT

C
5/11/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_013
 Chamber Serial Number:
 Detector Serial Number: 13
 Env. Background: System Bkgd 55738
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/30/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:35:21 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: 0.1892 +/- 0.0108
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 1.0122 +/- 0.0606

Control Certificate Name: NatU_U-8A
 Chem. Recov. of Control: U-238 0.870338 +/- 0.068123
 Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

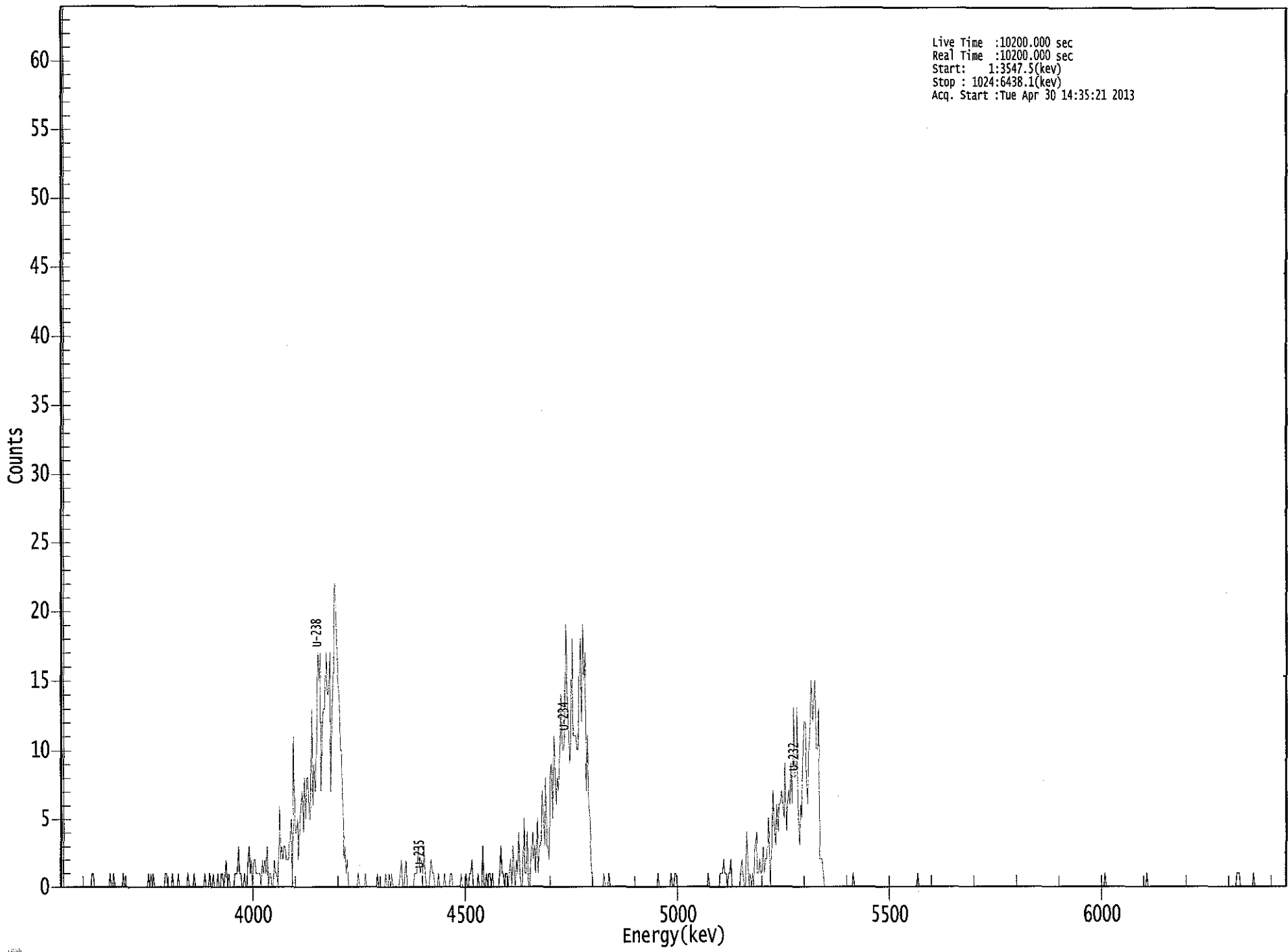
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.278	370.47	10.21	1.53	0.00E+000	25.8
U-234	4.735	466.49	9.08	0.51	0.00E+000	22.6
U-235	4.395	34.83	33.31	0.17	0.00E+000	6.4
U-238	4.153	504.49	8.73	0.51	0.00E+000	20.0

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*	5.20E+000 +/- 5.80E-001	9.98E-002 +/- 1.11E-002
U-234	0.995	4761.50*	6.55E+000 +/- 9.42E-001	7.36E-002 +/- 8.22E-003
U-235	0.999	4385.50*	6.03E-001 +/- 2.12E-001	7.23E-002 +/- 8.06E-003
U-238	0.993	4184.40*	7.05E+000 +/- 9.99E-001	7.33E-002 +/- 8.18E-003

AG
4/31/13



Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3547.5(kev)
Stop : 1024:6438.1(kev)
Acq. Start :Tue Apr 30 14:35:21 2013

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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	1	1	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	1	0	0	1	0	0	0
49:	0	0	0	0	1	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	1	0	1	0	1	0	0
81:	0	0	0	0	0	0	0	1
89:	1	0	0	0	0	1	0	0
97:	0	0	1	0	0	0	0	0
105:	0	0	1	0	0	0	0	1
113:	0	0	0	0	0	0	0	0
121:	1	0	0	0	1	0	0	1
129:	0	0	0	1	0	0	1	1
137:	0	1	2	0	1	0	0	0
145:	0	1	1	1	3	1	1	0
153:	0	1	0	0	2	3	1	2
161:	0	2	2	1	1	1	1	0
169:	2	1	2	1	3	0	1	1
177:	0	0	2	1	1	0	6	2
185:	3	2	3	3	2	2	2	4
193:	5	0	11	4	4	5	2	5
201:	6	7	4	8	5	8	8	5
209:	5	13	6	9	7	10	17	15
217:	17	7	12	13	13	17	14	14
225:	17	7	13	15	22	21	17	15
233:	14	10	10	6	2	3	1	2
241:	0	0	0	0	0	0	0	0
249:	1	0	0	0	0	0	1	0
257:	0	0	0	0	0	0	0	0
265:	1	0	0	0	0	0	0	1
273:	0	0	1	0	1	0	0	0
281:	0	0	0	1	2	0	0	1
289:	2	0	0	0	0	0	0	1
297:	1	1	3	2	1	2	1	3
305:	1	0	0	0	1	2	1	1
313:	0	0	0	1	0	0	0	0
321:	1	0	0	0	0	1	1	0
329:	0	0	0	0	0	0	1	0
337:	0	0	1	0	0	1	1	2
345:	0	0	0	0	1	0	0	0
353:	3	0	0	1	0	1	1	0
361:	1	0	0	0	0	0	1	3

369: 1 1 0 1 1 0 1 2

Sample Title: 01

Channel	1	2	3	4	5	6	7	8
377:	0	3	1	0	2	1	4	1
385:	0	0	5	1	1	4	0	0
393:	2	4	2	3	1	5	1	3
401:	3	7	5	3	8	3	3	2
409:	8	9	5	11	9	6	8	7
417:	10	14	10	10	11	19	15	12
425:	9	11	18	11	11	11	10	10
433:	15	18	12	19	15	17	7	11
441:	6	5	2	1	0	0	0	0
449:	0	0	0	0	0	1	0	0
457:	0	1	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	1	0	0
513:	1	1	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	1	0	0	0
545:	0	0	0	0	0	0	1	1
553:	1	2	1	1	0	1	1	2
561:	0	0	0	0	0	0	0	1
569:	2	1	0	0	4	2	0	1
577:	0	1	0	3	4	1	1	2
585:	1	1	3	1	2	2	5	3
593:	0	4	7	4	3	6	4	6
601:	6	7	6	5	9	4	6	7
609:	6	9	6	13	8	8	13	5
617:	3	6	5	10	12	12	8	6
625:	10	12	15	12	13	15	10	10
633:	13	2	2	2	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	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	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	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 01

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



c
5/11/13

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_014
 Chamber Serial Number:
 Detector Serial Number: 14
 Env. Background: System Bkgd 55739
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/30/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:35:22 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.603 mL
 Effective Efficiency: 0.2314 +/- 0.0122
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 1.2536 +/- 0.0699

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.275	450.28	9.27	2.72	0.00E+000	20.9
U-234	4.672	2.32	149.13	0.68	0.00E+000	2.9
U-235	4.461	1.66	169.38	0.34	0.00E+000	2.9
U-238	4.149	2.81	142.99	1.19	0.00E+000	2.9

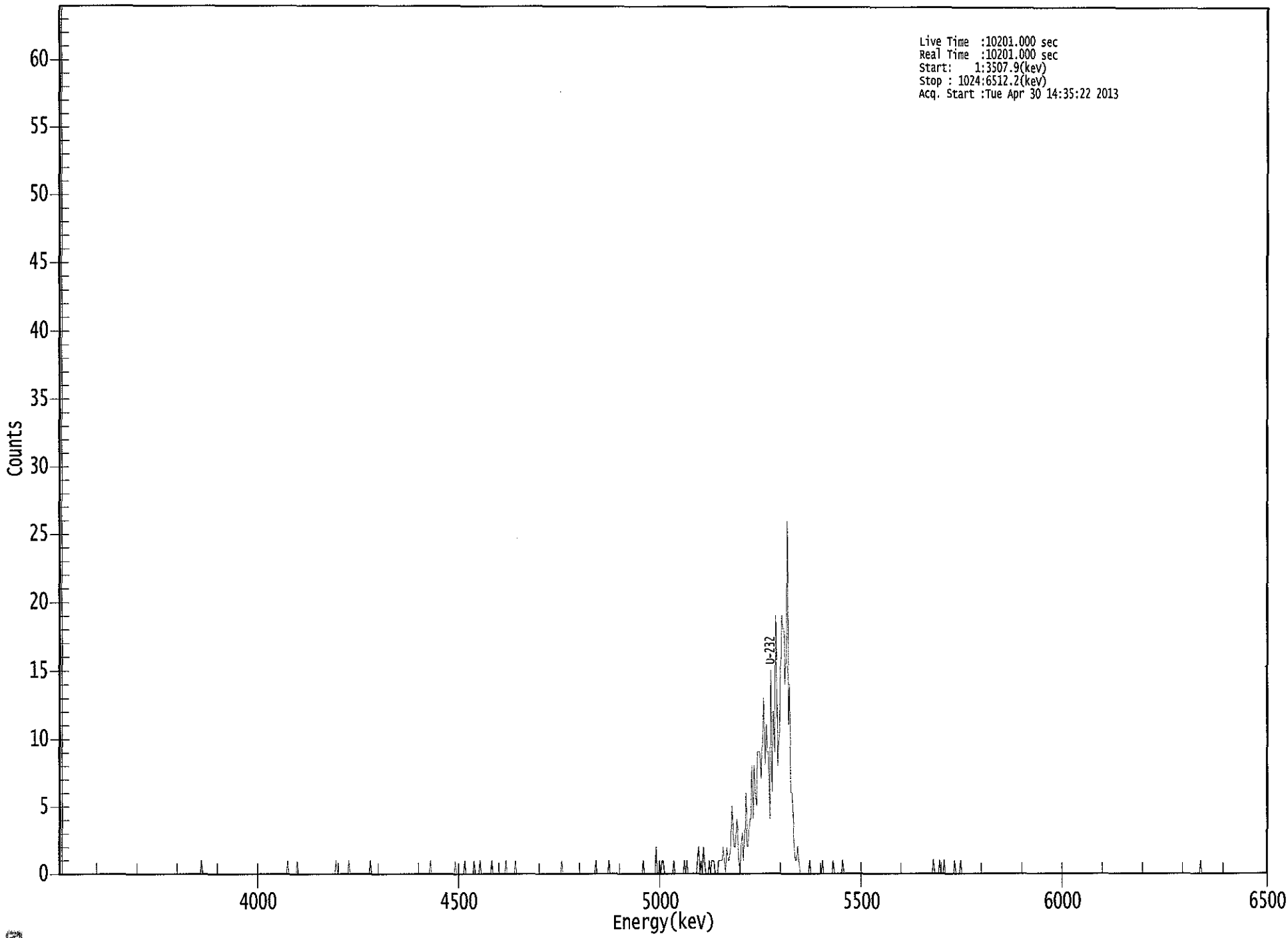
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.17E+000 +/- 5.33E-001	9.84E-002 +/- 1.01E-002
U-234	0.944	4761.50*	2.66E-002 +/- 3.98E-002	6.47E-002 +/- 6.67E-003
U-235	0.960	4385.50*	2.35E-002 +/- 3.99E-002	6.77E-002 +/- 6.98E-003
U-238	0.991	4184.40*	3.21E-002 +/- 4.60E-002	7.53E-002 +/- 7.76E-003

AG
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US EPA ARCHIVE DOCUMENT



Live Time :10201.000 sec
Real Time :10201.000 sec
Start : 1:3507.9(kev)
Stop : 1024:6512.2(kev)
Acq. Start :Tue Apr 30 14:35:22 2013

0123

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: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	1	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	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	1	0	0	0	0	0	0
201:	0	1	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	1	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	1
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	1
337:	0	0	0	0	0	0	0	1
345:	0	0	0	0	0	0	0	1
353:	0	0	0	0	1	0	0	0
361:	0	0	0	0	0	0	1	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 02

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

801: 0 0 0 0 0 0 0 0

Sample Title: 02

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	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	1	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

C
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Sample Description: PZ-102R-SS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_033
 Chamber Serial Number: 04026479A
 Detector Serial Number: 91132
 Env. Background: System Bkgd 55746
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:42:51 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: 0.2447 +/- 0.0126
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
 Chem. Recovery Factor: 1.3409 +/- 0.0728

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.290	474.49	9.00	0.51	0.00E+000	39.7
U-234	4.745	429.00	9.47	0.00	0.00E+000	13.4
U-235	4.400	14.83	51.24	0.17	0.00E+000	3.0
U-238	4.168	327.00	10.86	0.00	0.00E+000	8.6

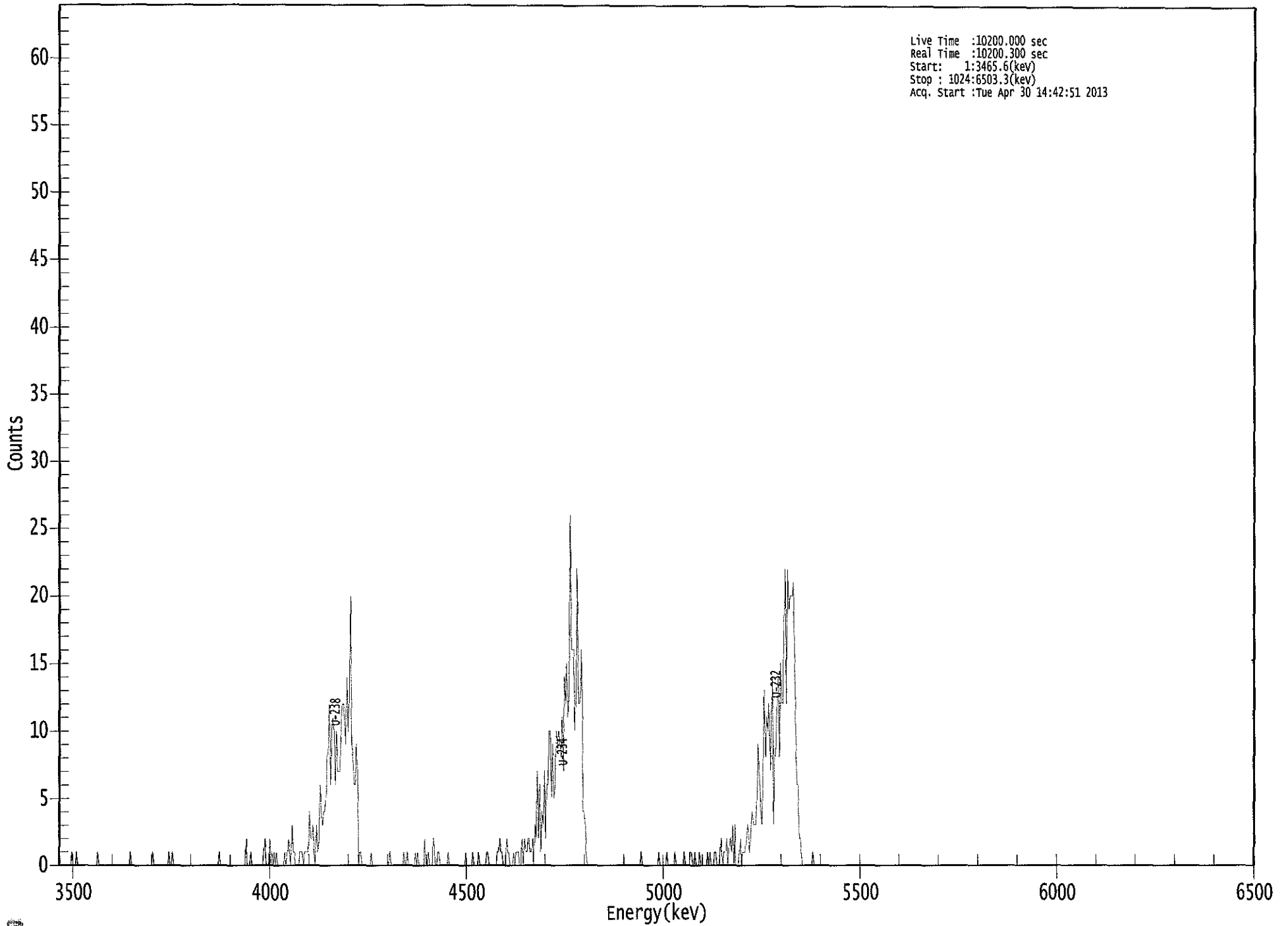
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.15E+000 +/- 5.19E-001	5.70E-002 +/- 5.74E-003
U-234	0.998	4761.50*	4.66E+000 +/- 6.44E-001	6.51E-002 +/- 6.55E-003
U-235	0.998	4385.50*	1.99E-001 +/- 1.04E-001	5.59E-002 +/- 5.63E-003
U-238	0.998	4184.40*	3.53E+000 +/- 5.23E-001	6.48E-002 +/- 6.52E-003

AG
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Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3465.6(kev)
Stop : 1024:6503.3(kev)
Acq. Start :Tue Apr 30 14:42:51 2013



 ***** 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	1	0	0	0	0	1
17:	0	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0	0
33:	0	1	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	1	0	0	0
65:	0	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0	0
81:	1	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	1	0	0
97:	0	1	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	1	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:	2	0	0	0	1	0	0	0	0
169:	0	0	0	0	0	0	0	0	1
177:	2	0	0	0	2	0	1	0	0
185:	1	0	1	0	0	0	0	0	0
193:	0	1	0	1	2	1	0	0	3
201:	1	1	0	0	0	0	1	0	1
209:	1	0	1	1	1	1	4	0	2
217:	2	3	1	0	3	1	2	0	6
225:	4	3	4	4	5	8	9	0	12
233:	6	10	11	10	6	10	7	0	7
241:	7	10	12	12	11	9	14	0	10
249:	12	20	9	8	6	6	9	0	7
257:	0	1	1	0	0	0	0	0	0
265:	0	0	0	1	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	1
297:	0	0	1	0	0	0	0	0	0
305:	0	1	0	1	0	0	0	0	0
313:	0	2	0	0	1	0	0	0	0
321:	2	1	0	0	1	1	0	0	0
329:	0	0	0	0	0	1	0	0	0
337:	0	0	0	0	0	0	0	0	0
345:	0	0	0	0	1	0	0	0	0
353:	0	0	1	0	0	0	0	0	1
361:	0	0	0	0	0	0	1	0	1

369: 0 0 0 0 0 0 0 0 1

Sample Title: 03

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

801: 0 0 0 0 0 0 0 0

Sample Title: 03

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	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-111-KS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_034
 Chamber Serial Number: 04026479B
 Detector Serial Number: 91136
 Env. Background: System Bkgd 55747
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:42:53 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: 0.2326 +/- 0.0122
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 1.2535 +/- 0.0694

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

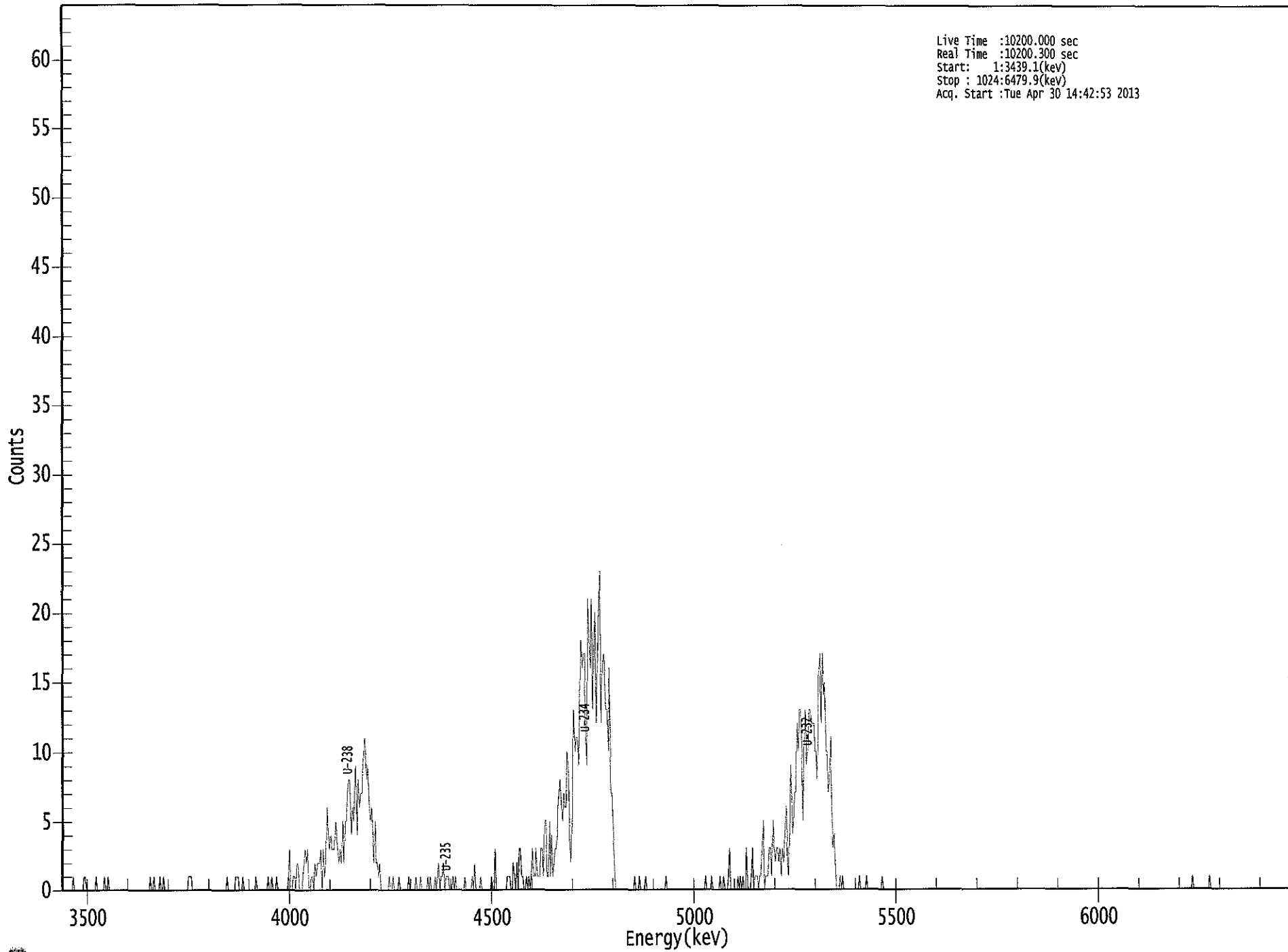
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.281	448.83	9.25	0.17	0.00E+000	25.1
U-234	4.732	619.83	7.87	0.17	0.00E+000	51.4
U-235	4.390	21.66	42.50	0.34	0.00E+000	4.5
U-238	4.145	272.66	11.88	0.34	0.00E+000	30.1

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.13E+000 +/- 5.28E-001	4.77E-002 +/- 4.91E-003
U-234	0.994	4761.50*	7.07E+000 +/- 9.17E-001	4.76E-002 +/- 4.90E-003
U-235	1.000	4385.50*	3.05E-001 +/- 1.33E-001	6.73E-002 +/- 6.93E-003
U-238	0.989	4184.40*	3.10E+000 +/- 4.87E-001	5.43E-002 +/- 5.59E-003

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Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3439.1(keV)
Stop : 1024:6479.9(keV)
Acq. Start :Tue Apr 30 14:42:53 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	1	0	0	0	0	0	0	0
17:	0	0	1	1	0	0	0	0	0
25:	0	0	0	0	1	0	0	0	0
33:	0	0	0	1	0	0	1	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	1	0	0	1	0	0	0	0
81:	0	1	0	0	1	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	1	1	1	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	1	0	0	0	0	0	0	0
145:	1	1	1	0	0	0	1	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	1	0	0	1	0	0
177:	0	0	1	0	0	0	0	0	0
185:	0	0	0	0	1	3	0	0	0
193:	1	1	0	2	2	0	0	0	0
201:	1	2	3	2	3	0	0	1	0
209:	1	0	2	1	2	2	2	3	0
217:	0	3	1	2	6	4	3	4	0
225:	3	3	3	5	4	3	2	3	0
233:	2	5	2	5	5	7	8	8	0
241:	4	6	5	7	9	4	8	6	0
249:	7	7	9	11	10	8	9	6	0
257:	5	6	4	2	5	2	2	1	0
265:	2	0	0	0	0	0	0	0	0
273:	1	0	0	1	0	0	0	0	0
281:	1	0	0	0	0	0	0	0	0
289:	1	0	0	0	0	0	1	0	0
297:	0	0	1	0	0	0	0	0	0
305:	1	0	1	0	0	0	1	0	0
313:	1	2	0	1	1	2	0	1	0
321:	1	1	0	0	0	1	0	1	0
329:	0	0	0	0	0	0	0	1	0
337:	0	0	0	0	0	1	0	2	0
345:	0	0	0	0	1	0	0	0	0
353:	0	0	0	0	0	1	0	0	0
361:	3	0	0	0	0	0	0	0	0

369: 0 0 1 1 1 0 0 2

Sample Title: 04

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

801: 0 0 0 0 0 0 0 0

Sample Title: 04

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



Sample Description: PZ-111-KS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_035
 Chamber Serial Number: 04026477A
 Detector Serial Number: 58771
 Env. Background: System Bkgd 55748
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:42:54 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: 0.2472 +/- 0.0127
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 1.3537 +/- 0.0732

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.289	478.66	8.96	0.34	0.00E+000	31.3
U-234		4.743	652.66	7.67	0.34	0.00E+000	31.1
U-235		4.414	19.83	44.23	0.17	0.00E+000	2.9
U-238		4.167	260.83	12.14	0.17	0.00E+000	11.4

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

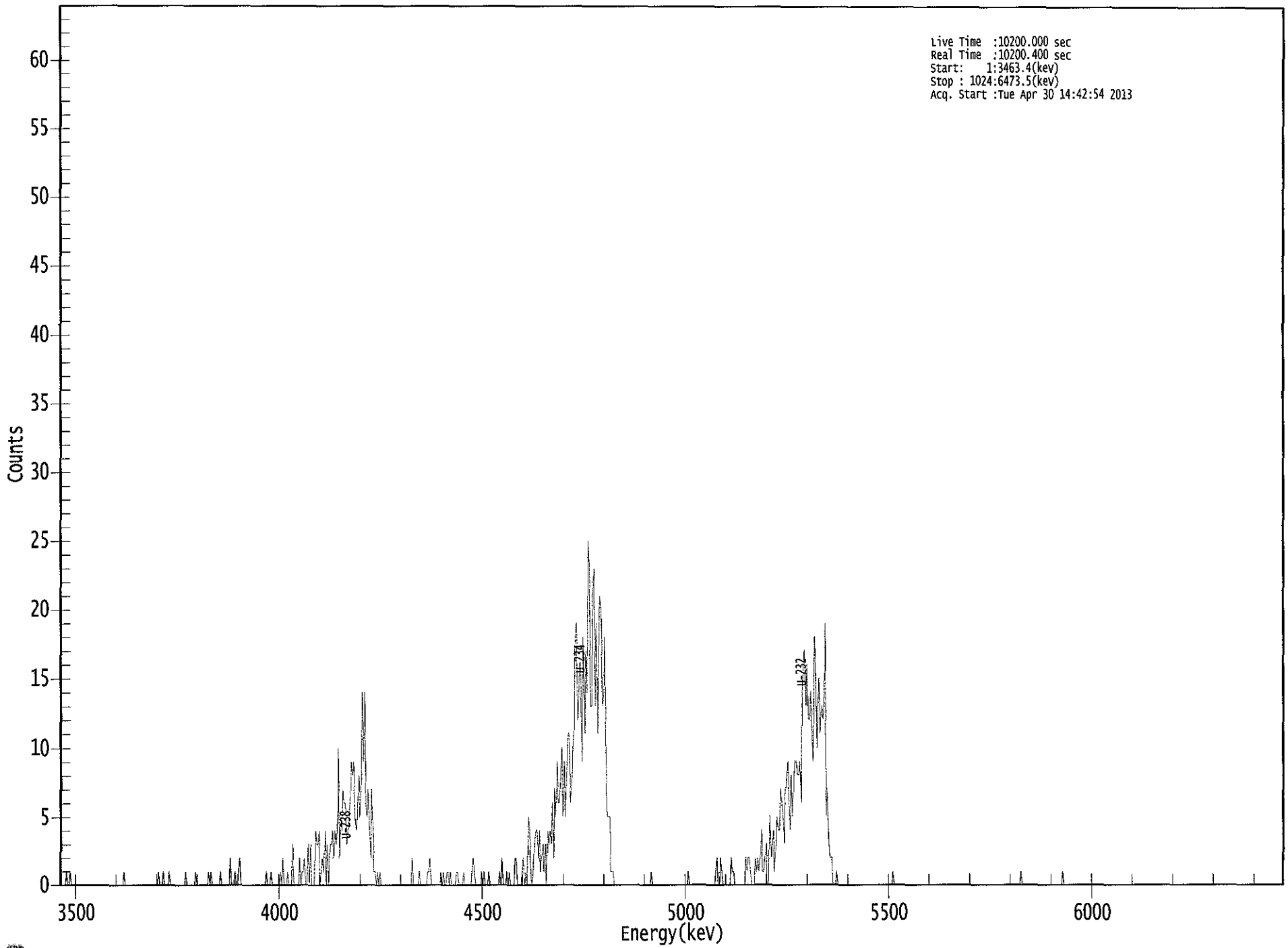
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.14E+000 +/- 5.16E-001	5.14E-002 +/- 5.16E-003
U-234	0.998	4761.50*	7.01E+000 +/- 8.86E-001	5.14E-002 +/- 5.15E-003
U-235	0.994	4385.50*	2.63E-001 +/- 1.19E-001	5.53E-002 +/- 5.55E-003
U-238	0.998	4184.40*	2.79E+000 +/- 4.39E-001	4.46E-002 +/- 4.48E-003

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US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :Tue Apr 30 14:42:54 2013



US EPA ARCHIVE DOCUMENT

0138

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	1	0	0
9:	1	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	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	1	0	0	0	1	0
89:	0	0	0	1	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	0	0	1	0	1	0
129:	0	0	0	0	0	0	1	0
137:	0	0	0	0	0	0	2	0
145:	0	0	1	0	0	1	2	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:	1	0	0	0	0	0	0	0
185:	1	0	2	0	0	0	1	0
193:	0	0	3	0	0	0	0	0
201:	2	0	1	1	2	0	0	3
209:	0	3	0	0	0	4	3	3
217:	4	0	1	2	1	4	0	3
225:	0	3	3	4	2	4	3	4
233:	10	2	5	4	7	6	6	3
241:	4	5	6	9	8	9	5	4
249:	5	8	5	7	14	9	14	6
257:	5	7	4	2	7	4	1	1
265:	0	1	0	1	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	2	0
297:	0	0	0	0	1	0	0	0
305:	0	0	0	1	1	2	0	0
313:	0	0	0	0	0	0	1	0
321:	1	0	0	1	1	0	1	0
329:	0	0	0	1	1	0	0	0
337:	0	1	0	0	0	0	0	0
345:	1	2	1	0	0	0	0	0
353:	1	0	1	0	0	0	1	0
361:	0	0	0	0	0	0	0	1

369: 0 2 0 0 0 1 0 1

Sample Title: 05

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	2	2	0	0
385:	0	0	1	2	0	1	0	5
393:	4	1	0	1	3	4	4	2
401:	4	1	2	3	1	3	0	4
409:	3	4	3	6	2	7	5	9
417:	6	6	8	10	5	9	5	8
425:	11	11	6	7	10	11	18	19
433:	12	14	16	15	9	18	11	17
441:	14	25	23	13	13	22	23	13
449:	19	11	18	21	20	13	14	18
457:	8	5	5	5	1	1	1	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	1	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	1	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	1	2	0	0
553:	2	1	0	0	0	0	0	0
561:	0	2	1	1	0	0	0	0
569:	0	0	0	0	0	2	1	2
577:	2	1	0	0	0	2	1	2
585:	1	2	4	1	1	2	3	0
593:	0	5	2	3	4	1	3	5
601:	4	4	7	6	5	3	7	8
609:	9	6	4	8	5	8	9	9
617:	8	8	9	6	14	16	17	13
625:	16	12	12	14	12	9	18	16
633:	10	13	15	11	13	12	13	19
641:	5	7	3	2	2	2	0	0
649:	0	1	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	1	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	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 1 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	1	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

C
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Sample Description: D-6 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_037
 Chamber Serial Number: 04026478A
 Detector Serial Number: 91133
 Env. Background: System Bkgd 55750
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:42:56 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: 0.1559 +/- 0.0097
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Chem. Recovery Factor: 0.8744 +/- 0.0566

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

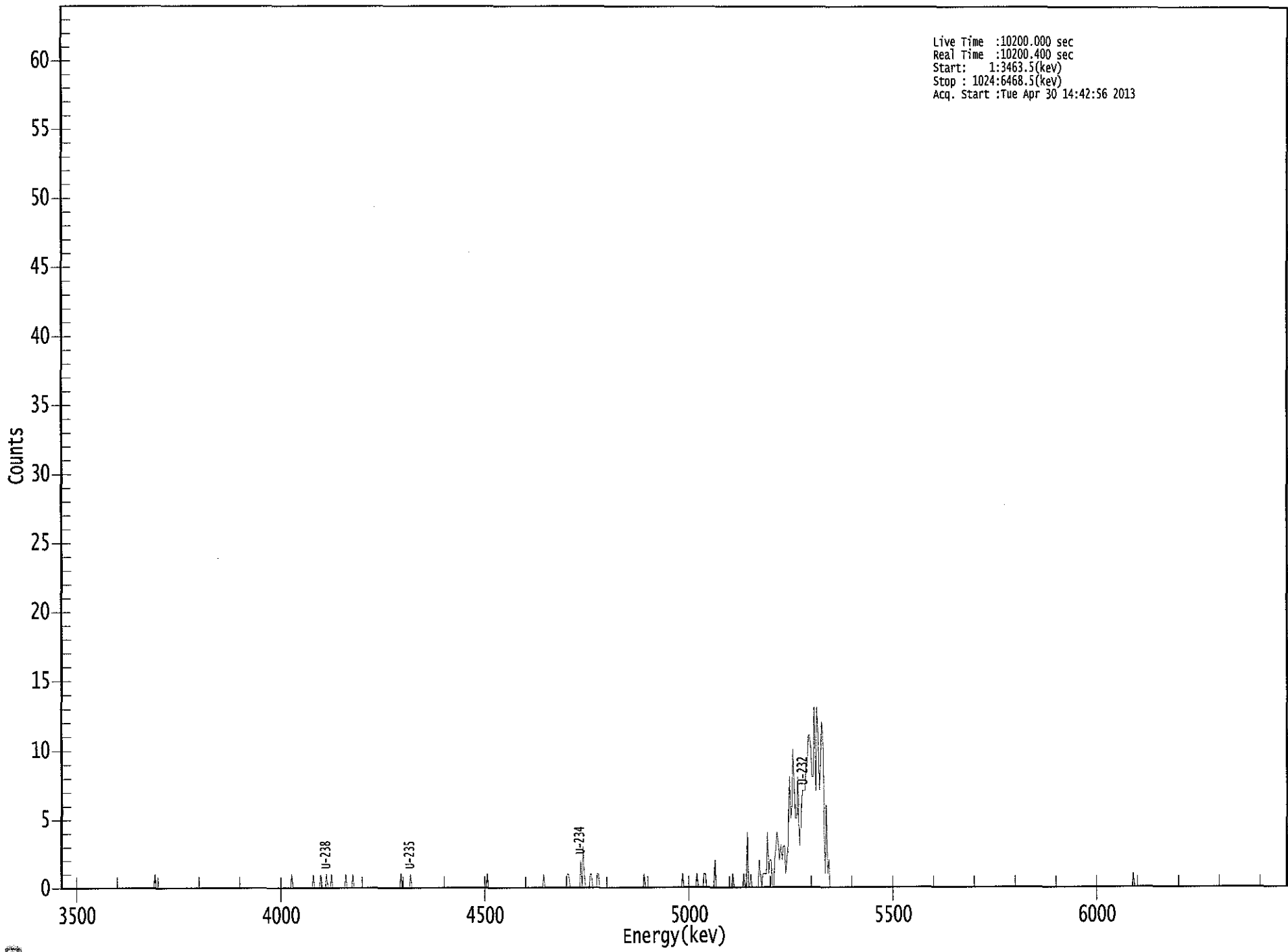
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.281	301.83	11.29	0.17	0.00E+000	53.3
U-234	4.736	12.66	55.94	0.34	0.00E+000	3.7
U-235	4.318	1.00	277.19	0.00	0.00E+000	2.9
U-238	4.111	6.83	76.08	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.14E+000 +/- 6.25E-001	7.11E-002 +/- 8.64E-003
U-234	0.995	4761.50*	2.16E-001 +/- 1.23E-001	8.14E-002 +/- 9.90E-003
U-235	0.968	4385.50*	2.10E-002 +/- 5.83E-002	1.26E-001 +/- 1.53E-002
U-238	0.963	4184.40*	1.16E-001 +/- 8.92E-002	7.08E-002 +/- 8.60E-003

AG
5/1/13



0143

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	1	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	1	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	1	0	0	0	0	0
217:	1	0	0	0	0	1	0	0
225:	0	1	0	0	0	0	0	0
233:	0	0	0	0	0	1	0	0
241:	0	0	0	1	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	1	0	0	0	0
289:	0	0	0	1	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	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: 06

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

801: 0 0 0 0 0 0 0 0

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



e
5/11/13

Sample Description: D-6 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 55752
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:42:57 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: 0.1890 +/- 0.0108
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 0.9946 +/- 0.0595

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	364.83	10.26	0.17	0.00E+000	20.0
U-234	4.729	17.83	46.68	0.17	0.00E+000	3.0
U-235	4.398	-0.17	1169.4	0.17	0.00E+000	0.0
U-238	4.142	17.83	46.68	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

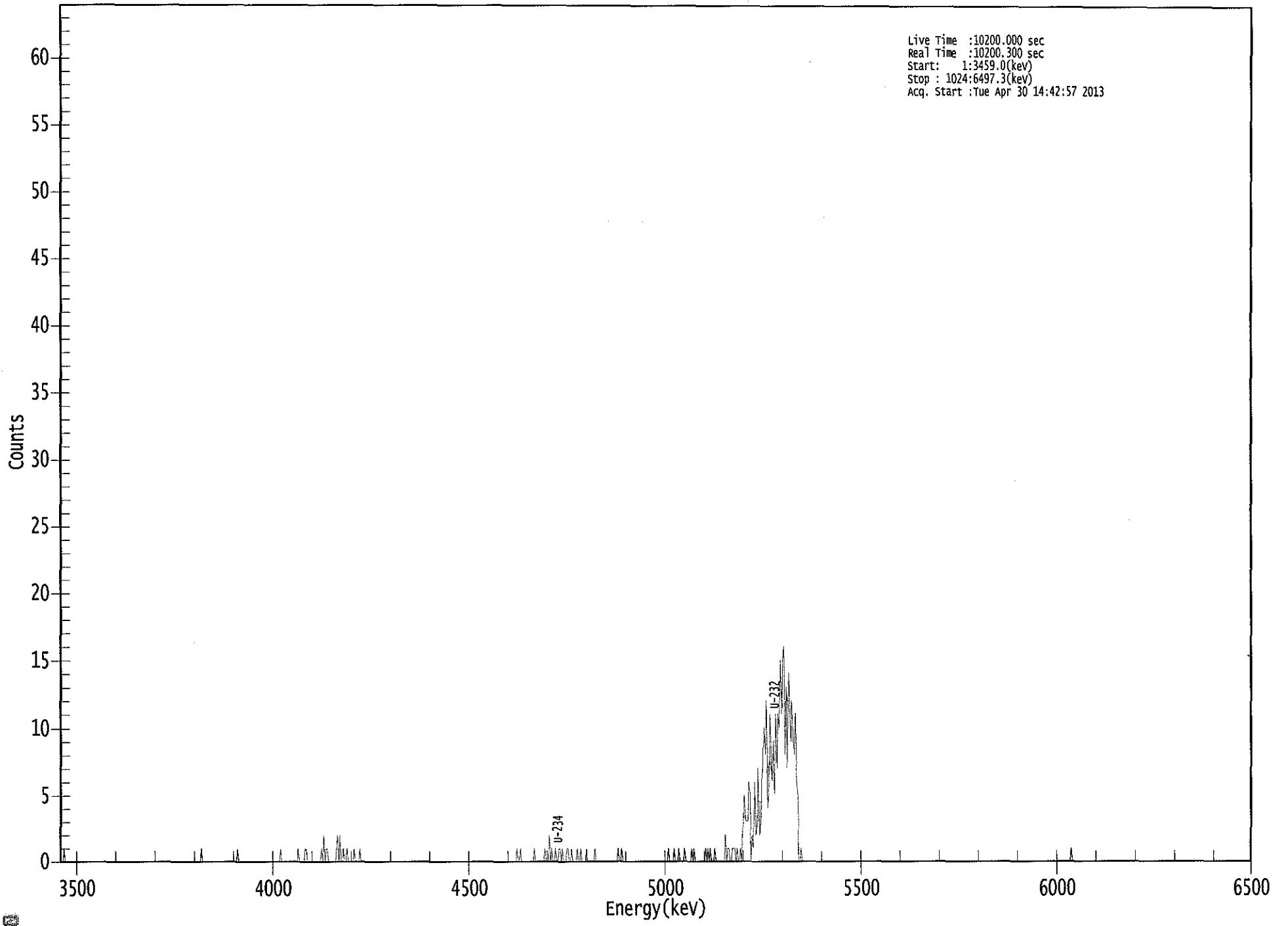
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.13E+000 +/- 5.75E-001	5.87E-002 +/- 6.58E-003
U-234	0.993	4761.50*	2.50E-001 +/- 1.20E-001	5.86E-002 +/- 6.57E-003
U-235	0.999	4385.50*	-2.95E-003 +/- 3.45E-002	7.23E-002 +/- 8.11E-003
U-238	0.987	4184.40*	2.49E-001 +/- 1.20E-001	5.84E-002 +/- 6.55E-003

AG
5/11/13

US EPA ARCHIVE DOCUMENT

Live Time : 10200.000 sec
Real Time : 10200.300 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start : Tue Apr 30 14:42:57 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: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	1	2	3	4	5	6	7	8	9
1:	0	0	0	1	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	0	0	0	0	0	0
113:	0	0	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:	1	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	1	0	0	0
193:	0	0	0	0	0	0	0	0	0
201:	0	0	0	0	1	0	0	0	0
209:	0	0	1	1	0	0	0	0	0
217:	0	0	0	0	0	0	0	0	0
225:	1	0	2	0	1	1	0	0	0
233:	0	0	0	0	0	1	2	0	0
241:	2	0	0	1	0	0	1	0	0
249:	0	0	0	0	1	0	0	0	0
257:	0	1	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 0 0 0 0 0

Sample Title: 07

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:	1	0	0	1	0	0	0	0	0
401:	0	0	0	0	0	0	0	0	1
409:	0	0	0	0	0	0	0	0	0
417:	1	0	0	0	2	0	1	0	0
425:	0	1	0	0	1	1	0	0	1
433:	0	0	0	1	1	0	0	0	1
441:	0	0	0	0	1	0	0	0	1
449:	0	0	0	0	1	0	0	0	0
457:	0	0	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	1
481:	0	0	1	0	0	0	0	0	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	1	0	0	0	0	0	1
529:	0	0	0	1	0	0	0	0	0
537:	1	0	0	0	0	0	1	0	0
545:	1	0	0	0	0	0	0	0	0
553:	0	0	1	0	1	0	1	0	0
561:	0	0	1	0	0	0	0	0	0
569:	0	0	0	2	0	1	1	0	0
577:	0	1	1	1	0	1	0	0	0
585:	1	0	3	5	3	3	3	6	6
593:	5	0	2	1	6	2	3	7	7
601:	2	3	6	7	10	8	12	4	4
609:	5	11	8	6	9	5	11	7	7
617:	11	10	15	11	15	16	8	13	13
625:	7	14	12	9	12	9	8	11	11
633:	6	5	0	0	1	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	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	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: 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	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	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
J1115

Sample Description: D-83 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_041
 Chamber Serial Number: 05026930A
 Detector Serial Number: 91087
 Env. Background: System Bkgd 55753
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:42:59 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: 0.0968 +/- 0.0074
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 0.4893 +/- 0.0385

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.293	187.00	14.37	0.00	0.00E+000	18.1
U-234	4.717	1.15	249.59	0.85	0.00E+000	3.0
U-235	4.396	-0.51	400.63	0.51	0.00E+000	0.0
U-238	4.212	-1.91	167.51	3.91	0.00E+000	3.0

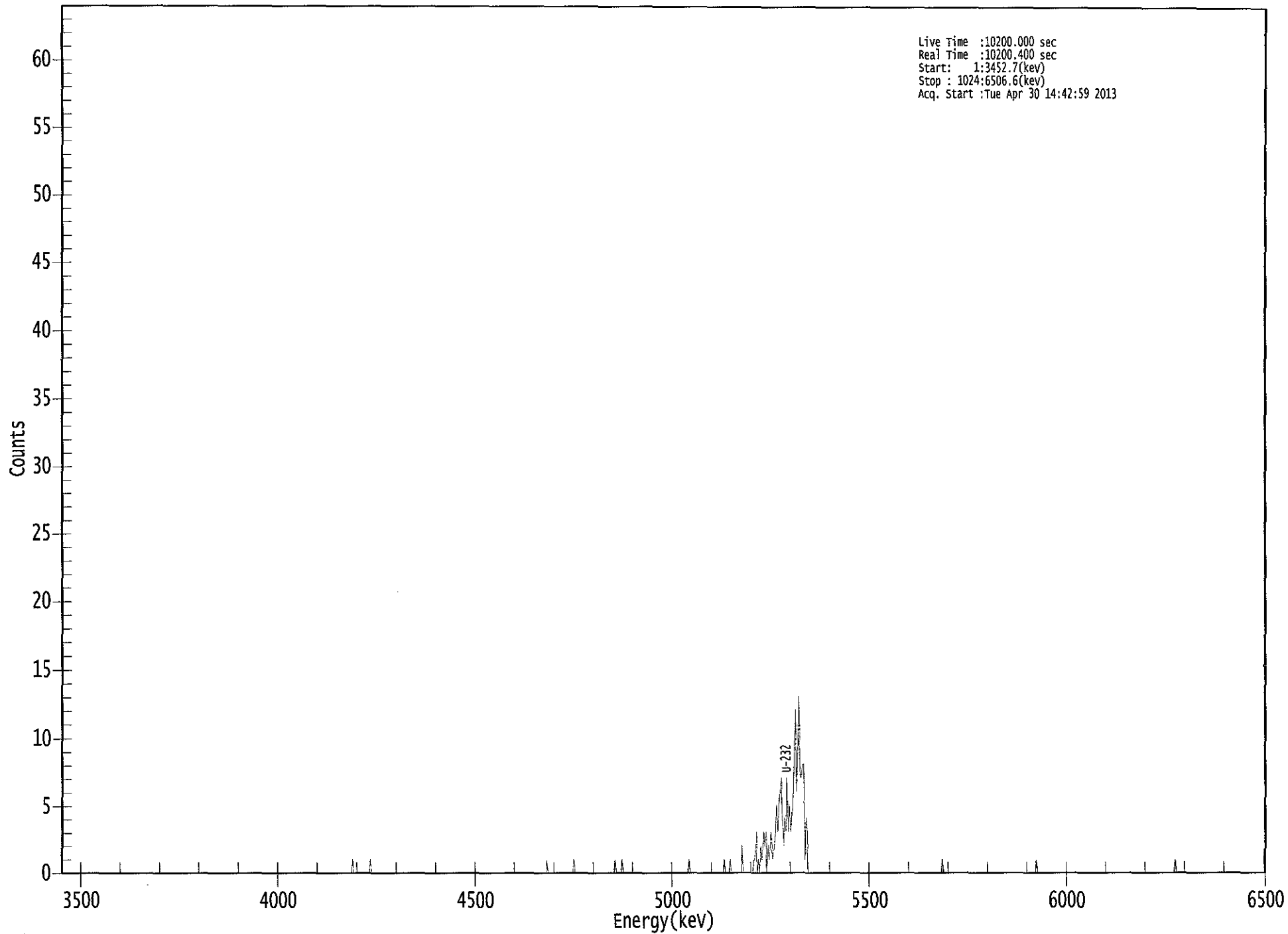
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.13E+000 +/- 7.73E-001	1.65E-001 +/- 2.48E-002
U-234	0.986	4761.50*	3.15E-002 +/- 7.89E-002	1.64E-001 +/- 2.47E-002
U-235	0.999	4385.50*	-1.73E-002 +/- 6.92E-002	1.78E-001 +/- 2.67E-002
U-238	0.994	4184.40*	-5.22E-002 +/- 8.77E-002	2.66E-001 +/- 4.01E-002

AG
5/1/13

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3452.7(kev)
Stop : 1024:6506.6(kev)
Acq. Start :Tue Apr 30 14:42:59 2013



US EPA ARCHIVE DOCUMENT

0153

ROI Type: 1

ROI Type: 3

369: 0 0 0 0 0 0 0 0 0

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	1	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	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
51111

Sample Description: D-83 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_042
 Chamber Serial Number: 05026930B
 Detector Serial Number: 84185
 Env. Background: System Bkgd 55754
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:43:01 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: 0.0915 +/- 0.0072
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 0.4957 +/- 0.0399

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.280	176.83	14.75	0.17	0.00E+000	10.0
U-234	4.719	1.49	190.02	0.51	0.00E+000	3.0
U-235	4.442	0.49	416.98	0.51	0.00E+000	3.0
U-238	4.136	1.66	169.38	0.34	0.00E+000	3.0

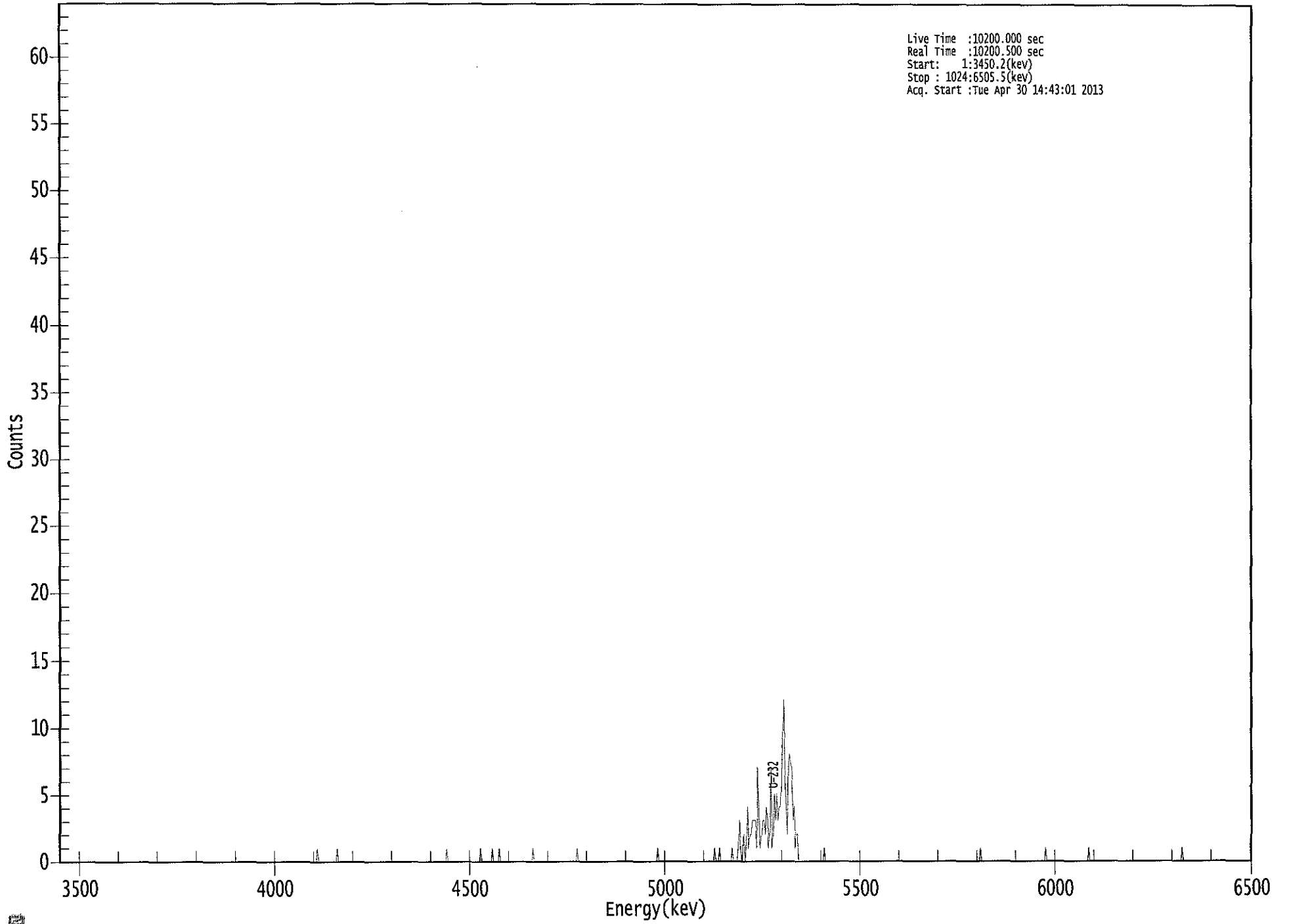
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.13E+000 +/- 7.92E-001	1.21E-001 +/- 1.87E-002
U-234	0.988	4761.50*	4.32E-002 +/- 8.24E-002	1.52E-001 +/- 2.35E-002
U-235	0.978	4385.50*	1.75E-002 +/- 7.32E-002	1.88E-001 +/- 2.90E-002
U-238	0.983	4184.40*	4.79E-002 +/- 8.16E-002	1.38E-001 +/- 2.13E-002

AG
5/1/13

0000056756.CNF



Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Tue Apr 30 14:43:01 2013

0158

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: 10200

Elapsed Real Time: 10201

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

369: 0 0 0 1 0 0 0 0

Sample Title: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	1	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	1	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	1	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	1	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	1	0	0	0	1	0
569:	0	0	0	0	0	0	0	0
577:	0	1	0	0	0	0	1	3
585:	1	0	1	2	0	1	4	1
593:	2	2	3	3	3	3	1	7
601:	2	1	2	3	3	2	4	3
609:	1	2	7	1	2	5	3	5
617:	3	4	4	6	9	12	7	4
625:	2	7	8	7	7	3	4	1
633:	2	2	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	1	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	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	1	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	1	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	1	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	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

e
5/11/13

Sample Description: DUP 05 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_044
 Chamber Serial Number: 04026481B
 Detector Serial Number: 84168
 Env. Background: System Bkgd 55756
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:43:03 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.596 mL
 Effective Efficiency: 0.1257 +/- 0.0086
 Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
 Chem. Recovery Factor: 0.6612 +/- 0.0467

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.280	242.00	12.63	0.00	0.00E+000	29.7
U-234	4.728	13.83	53.08	0.17	0.00E+000	4.5
U-235	4.383	4.00	109.57	0.00	0.00E+000	3.0
U-238	4.126	10.00	65.01	0.00	0.00E+000	3.0

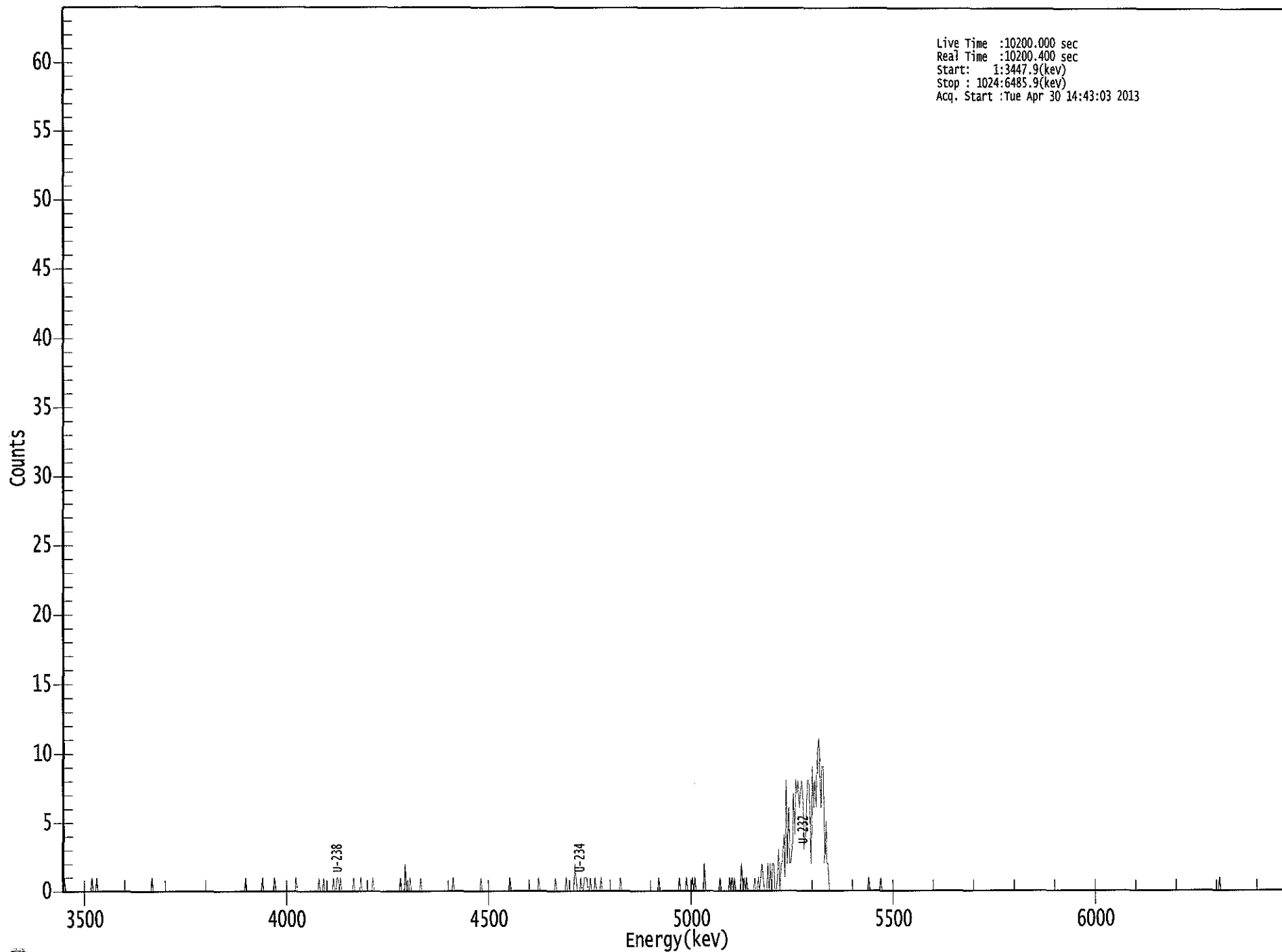
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.11E+000 +/- 6.86E-001	1.27E-001 +/- 1.70E-002
U-234	0.992	4761.50*	2.92E-001 +/- 1.60E-001	8.81E-002 +/- 1.18E-002
U-235	1.000	4385.50*	1.04E-001 +/- 1.15E-001	1.56E-001 +/- 2.09E-002
U-238	0.976	4184.40*	2.10E-001 +/- 1.40E-001	1.26E-001 +/- 1.69E-002

AG
5/11/13

0000056757.CNF



Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3447.9(kev)
Stop : 1024:6485.9(kev)
Acq. Start :Tue Apr 30 14:43:03 2013

0153

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	2	3	4	5	6	7	8	9
1:	0	1	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:	1	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	0	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	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	0	0	0
153:	1	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:	1	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0	0
193:	0	0	1	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	1	0	0	0
217:	0	1	0	0	0	0	0	0	0
225:	0	1	0	0	1	1	0	1	0
233:	0	0	0	0	0	0	0	0	0
241:	0	0	1	0	0	0	0	0	0
249:	1	0	0	0	0	0	0	0	0
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	1	0	0	0	2	0	0	0
289:	0	1	0	0	0	0	0	0	0
297:	0	0	1	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	1	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	1	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: 10

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

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

e
5111D

Sample Description: DUP 05 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_046
 Chamber Serial Number: 04026482B
 Detector Serial Number: 58762
 Env. Background: System Bkgd 55757
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:43:05 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.580 mL
 Effective Efficiency: 0.1143 +/- 0.0083
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Chem. Recovery Factor: 0.6389 +/- 0.0475

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

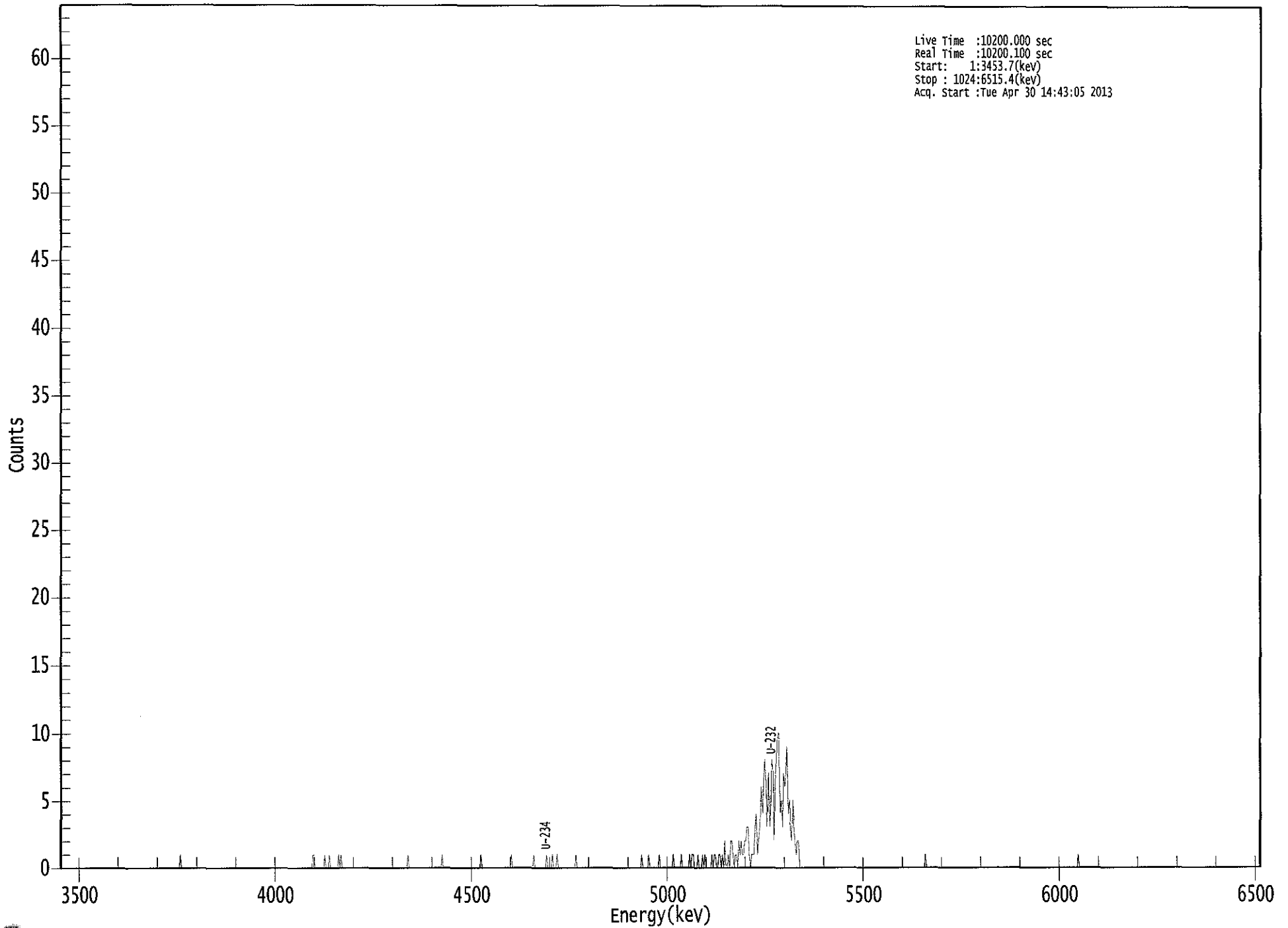
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.266	214.00	13.43	0.00	0.00E+000	12.7
U-234	4.692	6.00	86.43	0.00	0.00E+000	3.0
U-235	4.383	2.00	169.74	0.00	0.00E+000	3.0
U-238	4.133	5.83	82.55	0.17	0.00E+000	6.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.991	5302.50*	4.97E+000 +/- 7.04E-001	1.39E-001 +/- 1.97E-002
U-234	0.966	4761.50*	1.39E-001 +/- 1.22E-001	1.39E-001 +/- 1.97E-002
U-235	1.000	4385.50*	5.73E-002 +/- 9.76E-002	1.72E-001 +/- 2.43E-002
U-238	0.981	4184.40*	1.35E-001 +/- 1.13E-001	9.65E-002 +/- 1.37E-002

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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	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	1	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	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	1
217:	1	0	0	0	0	0	0	0	0
225:	0	1	0	0	0	0	1	0	0
233:	0	0	0	0	0	0	1	0	1
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:	1	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	1	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	1	0
361:	0	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 11

Channel	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	1	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	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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Sample Description: PZ-102-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_047
 Chamber Serial Number: 02030596A
 Detector Serial Number: 91086
 Env. Background: System Bkgd 55758
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:43:07 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.565 mL
 Effective Efficiency: 0.2147 +/- 0.0119
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Chem. Recovery Factor: 1.1784 +/- 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 5.274	391.49	9.91	0.51	0.00E+000	21.6
U-234	4.726	460.49	9.14	0.51	0.00E+000	20.6
U-235	4.415	21.66	42.50	0.34	0.00E+000	2.9
U-238	4.142	383.83	10.01	0.17	0.00E+000	22.6

T = Tracer Peak used for Effective Efficiency

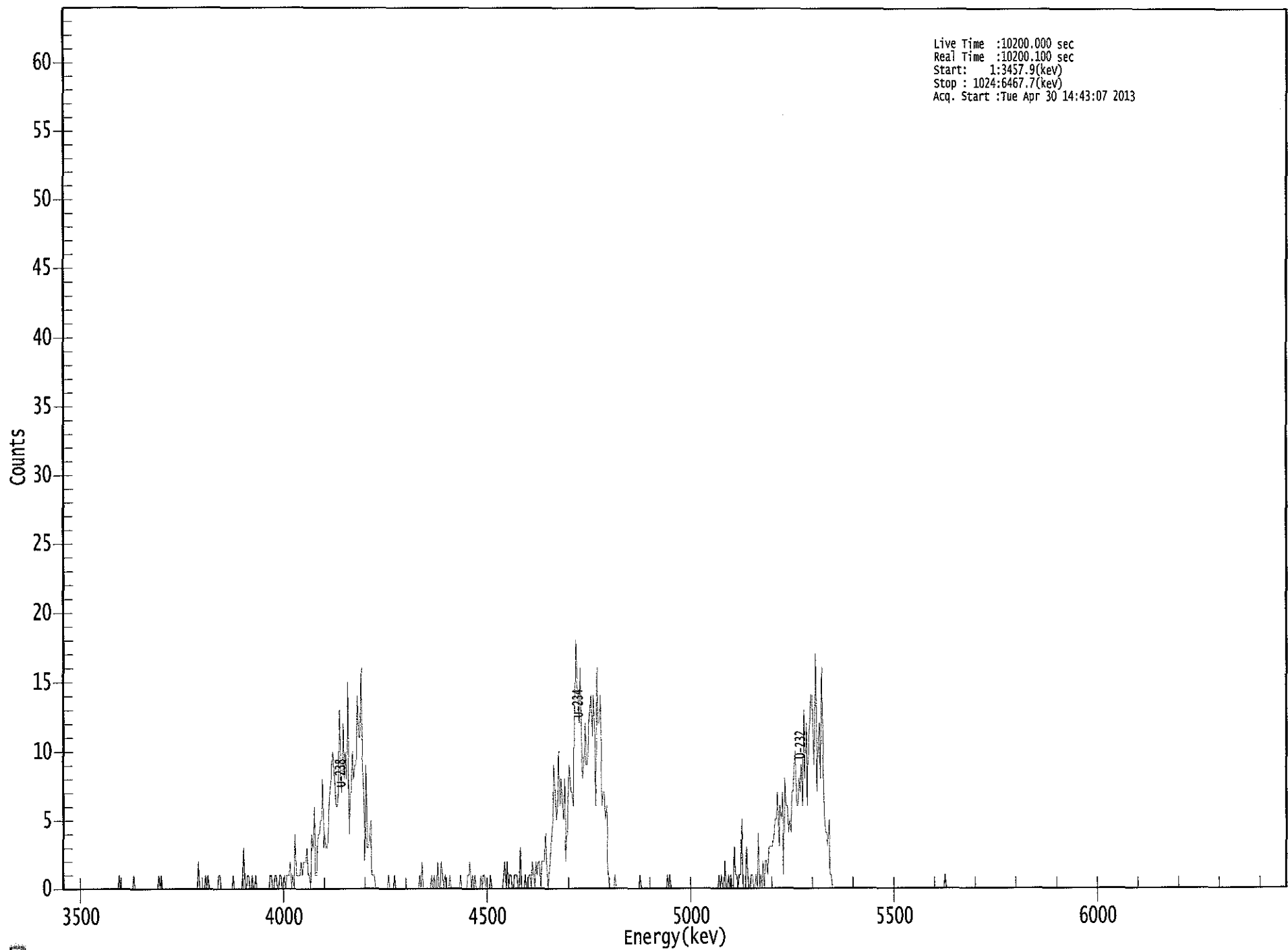
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	4.84E+000 +/- 5.28E-001	6.49E-002 +/- 7.07E-003
U-234	0.991	4761.50*	5.70E+000 +/- 8.10E-001	6.49E-002 +/- 7.07E-003
U-235	0.994	4385.50*	3.30E-001 +/- 1.45E-001	7.29E-002 +/- 7.94E-003
U-238	0.987	4184.40*	4.73E+000 +/- 6.99E-001	5.14E-002 +/- 5.60E-003

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US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Tue Apr 30 14:43:07 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	1
49:	0	0	0	0	0	0	0	0	0
57:	0	0	0	1	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:	1	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	2	0	0	0	0	0	0	1
121:	0	1	0	0	0	0	0	0	0
129:	0	0	1	1	0	0	0	0	0
137:	0	0	0	0	0	0	1	0	0
145:	0	0	0	0	0	0	1	3	0
153:	0	0	1	1	0	0	1	0	0
161:	0	1	0	0	0	0	0	0	0
169:	0	0	0	0	0	1	1	0	0
177:	0	1	1	0	0	1	1	0	0
185:	0	1	0	1	1	1	2	0	0
193:	1	0	4	1	1	1	1	2	0
201:	1	2	2	2	3	1	1	0	0
209:	4	3	6	1	1	4	4	5	0
217:	5	8	3	4	3	3	6	7	0
225:	8	10	9	8	6	6	7	13	0
233:	8	7	12	8	10	8	15	4	0
241:	7	7	10	8	9	9	14	11	0
249:	11	16	10	7	2	9	3	3	0
257:	4	5	1	1	1	0	0	0	0
265:	0	0	0	0	0	0	0	0	0
273:	1	0	0	0	0	1	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	1	0	2	0	0	0	0
305:	0	0	0	0	1	0	1	0	0
313:	0	2	0	0	2	1	0	1	0
321:	0	0	0	1	0	0	0	0	0
329:	0	0	0	0	1	0	0	0	0
337:	0	0	1	1	2	0	1	0	0
345:	1	0	0	0	0	1	0	1	0
353:	1	0	0	0	0	1	0	0	0
361:	0	0	0	0	0	0	0	0	0

369: 1 2 0 2 0 1 1 0

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0

Sample Title: 12

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	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
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Sample Description: PZ-102-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_048
 Chamber Serial Number: 02030596B
 Detector Serial Number: 83111
 Env. Background: System Bkgd 55759
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 2:43:08 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.572 mL
 Effective Efficiency: 0.1995 +/- 0.0114
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Chem. Recovery Factor: 1.1878 +/- 0.0709

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.262	368.49	10.22	0.51	0.00E+000	7.2
U-234	4.719	433.00	9.43	0.00	0.00E+000	28.5
U-235	4.379	15.00	52.27	0.00	0.00E+000	3.0
U-238	4.136	253.00	12.35	0.00	0.00E+000	16.4

T = Tracer Peak used for Effective Efficiency

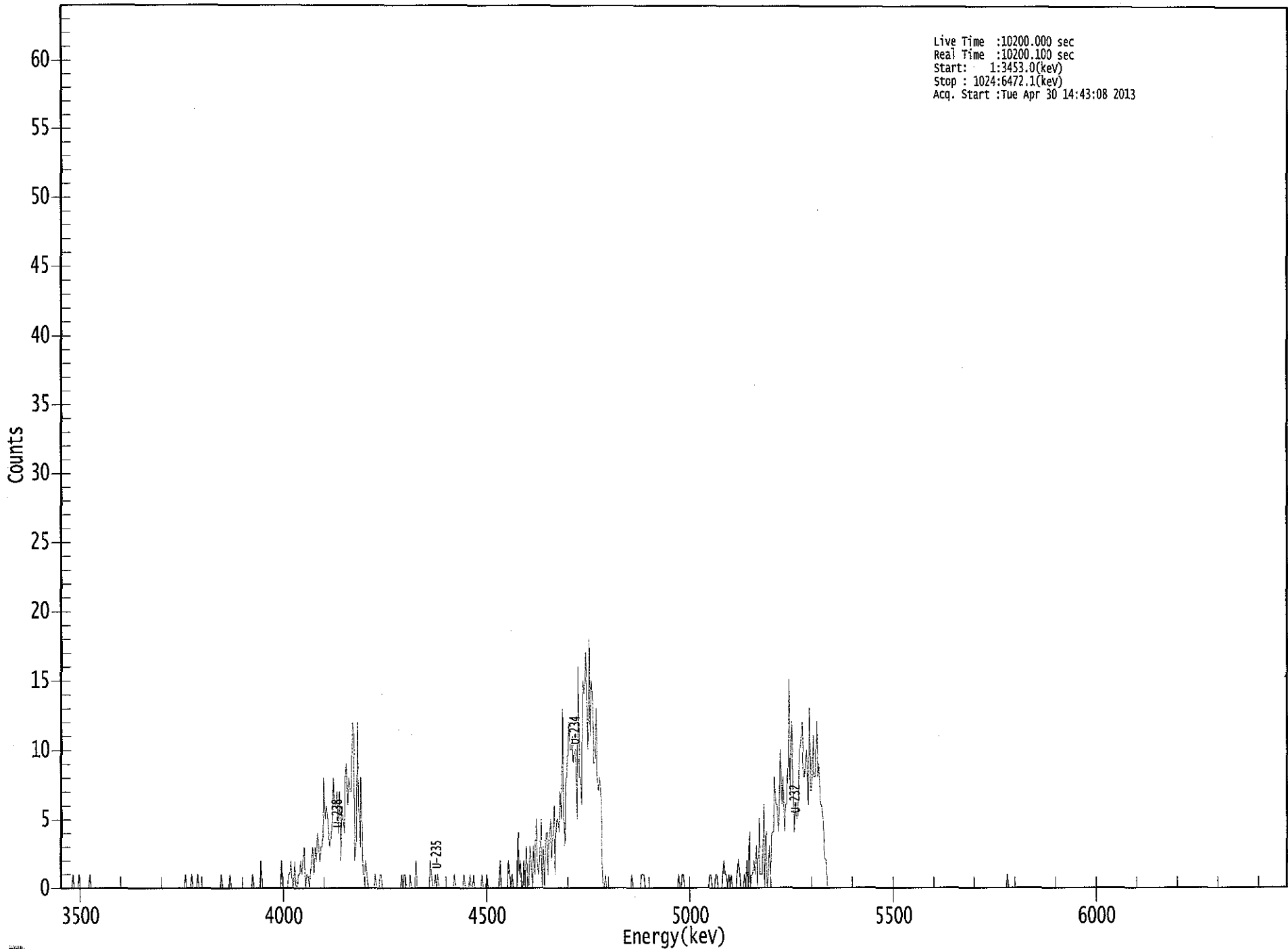
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.988	5302.50*	4.91E+000 +/- 5.48E-001	6.99E-002 +/- 7.80E-003
U-234	0.987	4761.50*	5.76E+000 +/- 8.42E-001	7.98E-002 +/- 8.91E-003
U-235	1.000	4385.50*	2.46E-001 +/- 1.32E-001	9.84E-002 +/- 1.10E-002
U-238	0.983	4184.40*	3.35E+000 +/- 5.58E-001	7.94E-002 +/- 8.87E-003

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US EPA ARCHIVE DOCUMENT

0000056763.CNF



Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.0(keV)
Stop : 1024:6472.1(keV)
Acq. Start :Tue Apr 30 14:43:08 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: 13

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	1	0	0	0	0	0	1
17:	0	0	0	0	0	0	0	0	0
25:	1	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:	1	0	0	0	0	1	0	0	0
113:	0	0	1	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	1	0	0	0
145:	0	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0	0
161:	1	0	0	0	0	0	0	0	2
169:	0	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0	0
185:	2	0	0	0	0	0	1	1	1
193:	2	0	0	2	0	0	1	1	1
201:	2	1	2	3	0	1	1	0	0
209:	1	2	3	1	3	2	4	3	3
217:	2	3	3	8	5	6	5	4	4
225:	3	4	5	8	6	6	7	4	4
233:	7	2	6	5	4	8	9	6	6
241:	8	7	7	12	11	2	3	12	12
249:	6	3	8	3	1	1	2	1	1
257:	0	0	0	0	0	0	1	0	0
265:	0	0	1	1	0	0	0	0	0
273:	0	0	0	0	0	0	0	0	0
281:	0	0	0	0	1	0	1	1	1
289:	0	0	0	1	0	0	0	0	0
297:	2	0	0	0	0	0	0	0	0
305:	0	0	0	0	2	1	0	0	0
313:	1	0	1	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0	0
329:	1	0	0	0	0	0	0	0	0
337:	1	0	0	0	0	1	0	0	0
345:	1	0	0	0	0	0	0	1	1
353:	0	0	0	1	0	0	0	0	0
361:	0	0	0	0	0	0	2	0	0

369: 0 0 0 0 0 2 1 0

Sample Title: 13

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

801: 0 0 0 0 0 0 0 0

Sample Title: 13

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

C
5/11/13

Sample Description: PZ-102R-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_018
 Chamber Serial Number:
 Detector Serial Number: 18
 Env. Background: System Bkgd 55740
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 4:24:43 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: 0.2305 +/- 0.0121
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 1.2975 +/- 0.0725

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.282	446.64	9.29	1.36	0.00E+000	21.1
U-234	4.733	421.32	9.56	0.68	0.00E+000	26.3
U-235	4.407	21.15	43.61	0.85	0.00E+000	3.1
U-238	4.158	276.79	11.84	2.21	0.00E+000	6.9

T = Tracer Peak used for Effective Efficiency

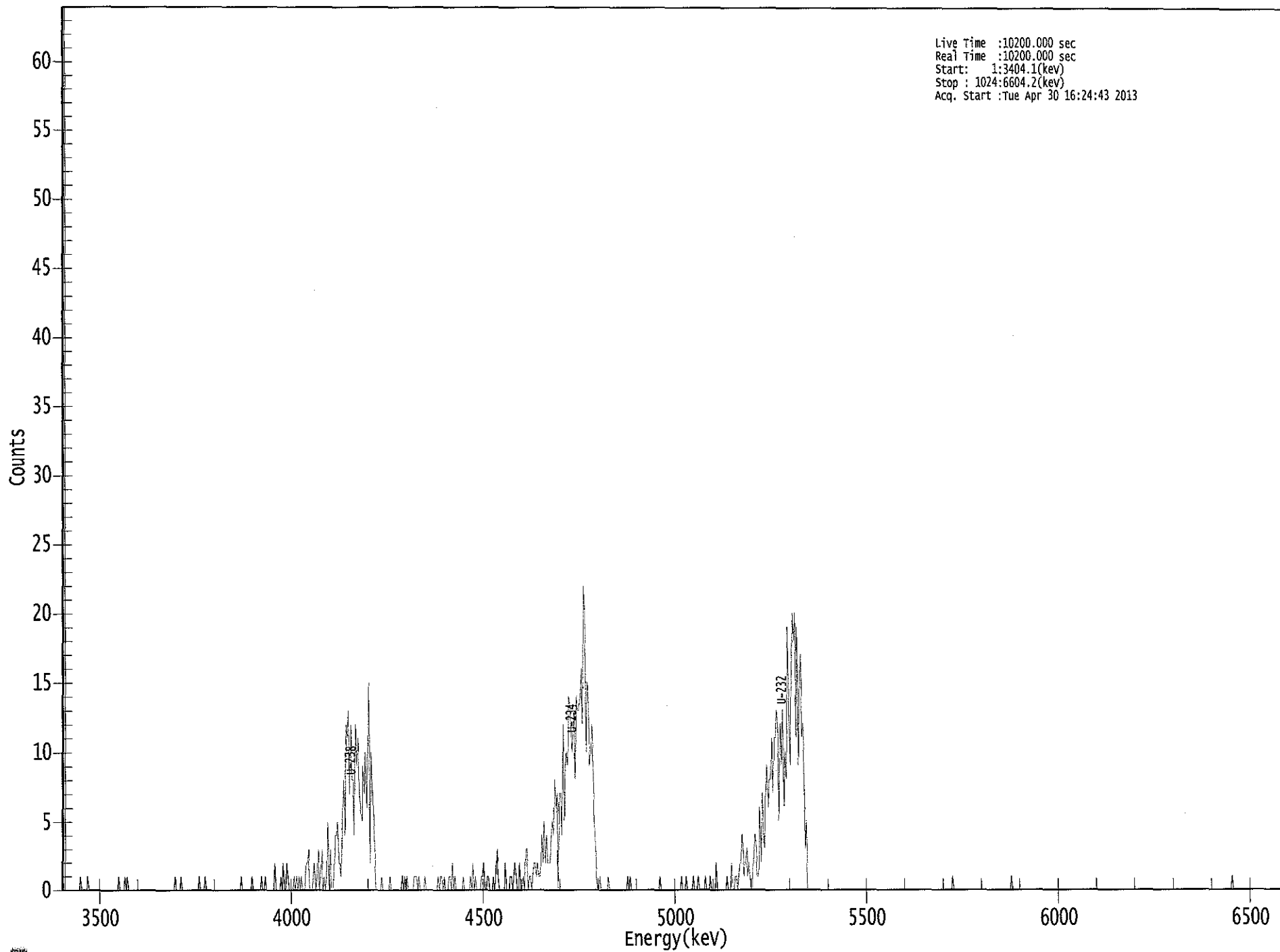
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.15E+000 +/- 5.32E-001	7.90E-002 +/- 8.16E-003
U-234	0.994	4761.50*	4.85E+000 +/- 6.83E-001	6.50E-002 +/- 6.71E-003
U-235	0.997	4385.50*	3.01E-001 +/- 1.35E-001	8.51E-002 +/- 8.79E-003
U-238	0.995	4184.40*	3.17E+000 +/- 4.99E-001	9.17E-002 +/- 9.47E-003

AG
5/1/13

0000056764.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start :Tue Apr 30 16:24:43 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0183

 ***** 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:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	1
17:	0	0	0	0	0	1	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	1
49:	0	0	0	0	1	0	1	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	1	0
97:	0	0	0	1	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	1	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	1	0	0
153:	0	0	0	0	0	0	1	0
161:	0	0	0	0	0	0	1	0
169:	0	1	0	0	0	0	0	0
177:	0	2	0	0	0	0	1	0
185:	2	0	0	2	1	0	0	0
193:	0	1	0	1	0	1	0	1
201:	0	0	0	2	2	3	0	0
209:	0	1	2	0	1	3	0	1
217:	3	0	1	0	1	5	0	3
225:	0	0	1	4	4	5	2	2
233:	1	5	8	4	12	11	13	7
241:	12	8	8	4	12	9	11	7
249:	6	5	9	7	10	6	10	15
257:	2	10	7	5	3	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	1	0	0	0	0	0	0
281:	0	0	0	1	0	1	0	1
289:	0	0	0	0	0	1	1	1
297:	0	1	0	0	0	0	1	0
305:	0	0	0	0	0	0	0	0
313:	0	1	0	1	1	0	1	0
321:	0	0	1	1	0	2	0	1
329:	0	0	0	0	0	0	1	0
337:	0	0	0	0	1	0	2	0
345:	1	0	0	0	0	1	1	2
353:	0	0	1	1	0	0	0	1
361:	0	1	3	1	0	0	0	0

369: 0 2 0 0 0 1 1 0

Sample Title: 14

Channel	1	2	3	4	5	6	7	8	9
377:	1	2	1	0	0	2	0	0	
385:	1	0	3	3	0	1	1	0	
393:	1	2	2	1	2	1	1	4	
401:	2	5	2	4	2	2	2	4	
409:	5	4	8	6	7	0	7	7	
417:	4	12	5	9	10	9	14	13	
425:	10	11	13	8	14	13	13	14	
433:	16	12	22	20	10	15	14	9	
441:	10	12	9	5	3	1	0	0	
449:	1	0	0	0	0	0	0	1	
457:	0	0	0	0	0	0	0	0	
465:	0	0	0	0	0	0	0	1	
473:	0	1	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	0	0	0	1	0	0	0	
521:	1	0	0	0	0	0	1	0	
529:	0	0	1	0	0	0	0	0	
537:	1	0	0	0	1	0	0	0	
545:	0	2	0	0	0	0	0	0	
553:	0	0	1	0	0	0	2	0	
561:	0	1	1	0	1	2	4	3	
569:	1	2	3	1	2	1	0	0	
577:	3	4	3	1	1	6	2	7	
585:	4	3	7	9	6	8	8	11	
593:	7	11	11	13	12	5	12	9	
601:	13	6	10	8	19	13	9	15	
609:	20	18	20	11	19	9	15	17	
617:	11	12	8	3	5	0	0	0	
625:	0	0	0	0	0	0	0	0	
633:	0	0	0	0	0	0	0	0	
641:	0	0	0	0	0	0	0	0	
649:	0	0	0	0	0	0	0	0	
657:	0	0	0	0	0	0	0	0	
665:	0	0	0	0	0	0	0	0	
673:	0	0	0	0	0	0	0	0	
681:	0	0	0	0	0	0	0	0	
689:	0	0	0	0	0	0	0	0	
697:	0	0	0	0	0	0	0	0	
705:	0	0	0	0	0	0	0	0	
713:	0	0	0	0	0	0	0	0	
721:	0	0	0	0	0	0	0	0	
729:	0	0	0	0	0	0	0	0	
737:	0	0	0	0	0	0	1	0	
745:	0	0	0	0	0	0	0	0	
753:	0	0	0	0	0	0	0	0	
761:	0	0	0	0	0	0	0	0	
769:	0	0	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 0 0 0

Sample Title: 14

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	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
51117

Sample Description: PZ-102R-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_022
 Chamber Serial Number:
 Detector Serial Number: 22
 Env. Background: System Bkgd 55741
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 4:24:44 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: 0.2190 +/- 0.0118
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 1.4302 +/- 0.0816

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.275	424.47	9.53	1.53	0.00E+000	20.5
U-234	4.727	457.15	9.18	0.85	0.00E+000	4.9
U-235	4.400	29.15	36.92	0.85	0.00E+000	4.7
U-238	4.146	281.49	11.69	0.51	0.00E+000	24.9

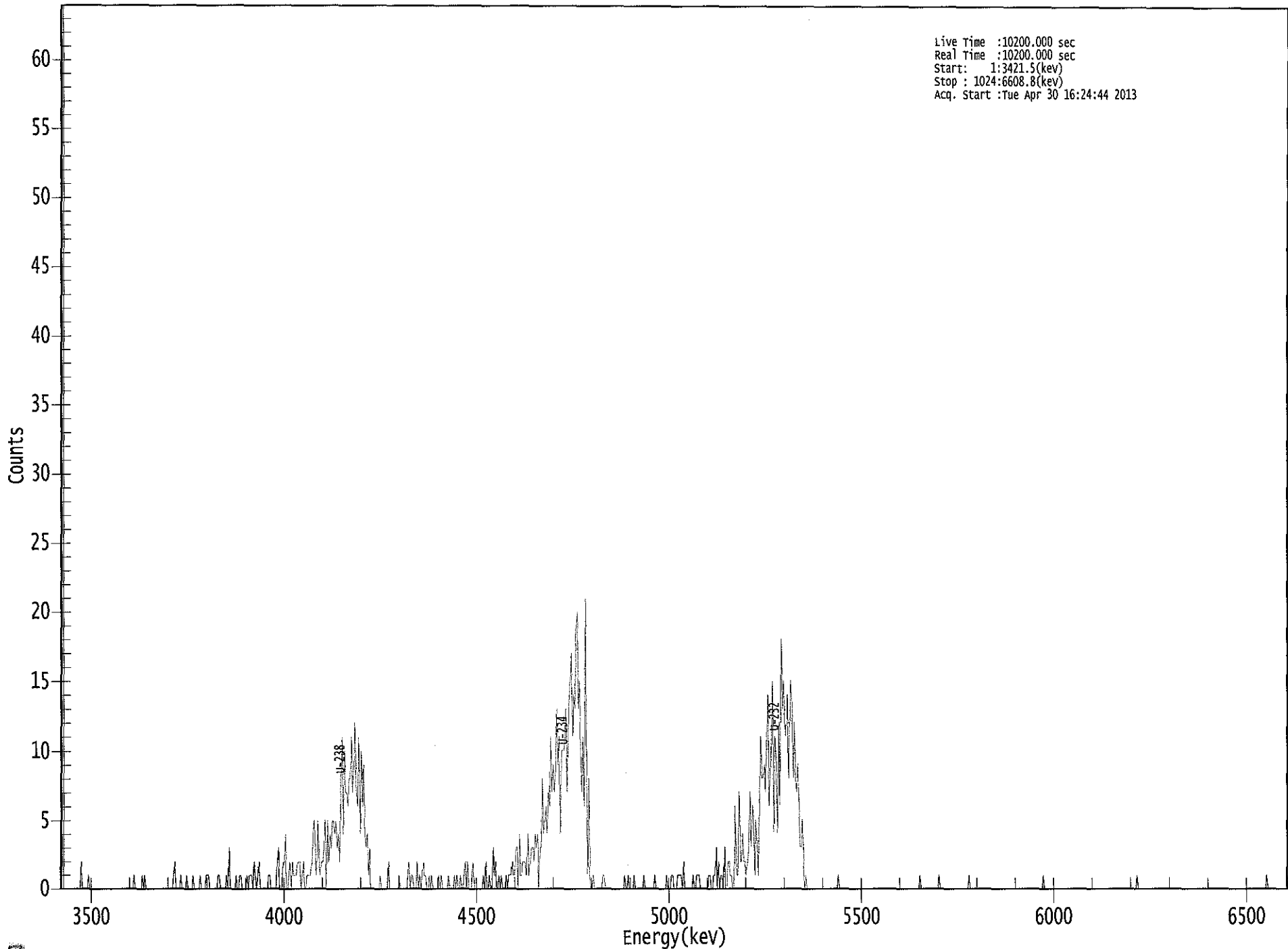
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.15E+000 +/- 5.43E-001	8.62E-002 +/- 9.09E-003
U-234	0.992	4761.50*	5.54E+000 +/- 7.75E-001	7.26E-002 +/- 7.65E-003
U-235	0.999	4385.50*	4.36E-001 +/- 1.67E-001	8.95E-002 +/- 9.44E-003
U-238	0.990	4184.40*	3.40E+000 +/- 5.35E-001	6.33E-002 +/- 6.68E-003

AG
5/11/13

0000056765.CNF



Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3421.5(keV)
Stop : 1024:6608.8(keV)
Acq. Start :Tue Apr 30 16:24:44 2013

0188

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:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	2	0	0	0	0	0	1
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	1	0	0
65:	0	0	0	0	1	0	1	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	1	2
97:	0	0	0	0	1	0	0	0
105:	0	1	0	0	0	0	1	0
113:	0	0	0	0	1	0	0	0
121:	0	1	1	1	0	0	0	0
129:	0	0	0	1	1	0	0	0
137:	0	0	1	0	3	0	0	0
145:	0	0	1	0	0	1	1	0
153:	0	0	0	1	0	1	1	1
161:	0	2	1	0	1	2	0	0
169:	0	0	0	0	0	1	1	0
177:	0	0	0	0	2	3	0	0
185:	0	2	2	4	0	0	1	2
193:	0	2	1	1	1	2	2	2
201:	0	1	2	0	0	1	1	1
209:	1	2	4	5	2	1	5	2
217:	1	2	2	3	5	0	5	2
225:	4	3	5	5	4	5	3	4
233:	2	8	11	4	10	7	7	6
241:	8	8	11	7	9	12	7	6
249:	11	4	10	6	9	4	3	4
257:	1	3	0	0	0	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	2	0	0	0	0	0	0
281:	0	0	1	0	0	0	0	0
289:	0	1	2	0	1	1	0	0
297:	0	2	0	1	0	1	2	1
305:	1	0	0	1	0	1	0	0
313:	0	0	0	1	0	1	0	0
321:	0	0	0	1	0	0	0	0
329:	1	0	1	0	0	1	0	0
337:	1	2	0	2	0	0	0	2
345:	1	0	0	0	0	0	0	0
353:	1	0	2	0	0	1	0	0
361:	3	1	2	0	0	1	0	1

369: 0 0 0 1 0 1 1 1

Sample Title: 15

Channel	1	2	3	4	5	6	7	8
377:	2	1	1	3	3	0	4	1
385:	1	2	2	2	1	4	1	2
393:	3	3	2	4	3	4	0	3
401:	3	8	4	5	6	4	7	6
409:	11	7	9	7	8	13	9	11
417:	4	10	10	10	11	13	7	13
425:	15	17	11	14	13	19	20	13
433:	15	9	7	11	6	21	9	1
441:	8	1	0	0	1	0	0	0
449:	0	0	0	0	1	1	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	1	0
473:	0	1	0	0	0	0	1	0
481:	0	0	0	0	0	0	1	0
489:	0	0	0	0	0	0	0	1
497:	0	0	0	0	0	0	0	0
505:	0	1	0	0	0	1	1	0
513:	0	0	1	1	1	1	0	2
521:	0	0	0	0	0	0	0	1
529:	0	0	1	1	1	0	0	0
537:	0	0	0	0	1	1	0	0
545:	1	1	3	0	2	0	1	1
553:	0	3	0	0	2	2	1	1
561:	0	0	6	1	1	7	2	2
569:	4	2	2	1	2	3	7	3
577:	6	5	1	5	3	1	7	11
585:	8	8	9	7	11	14	6	8
593:	11	15	4	11	9	4	12	6
601:	18	13	15	12	11	14	8	12
609:	15	13	8	12	8	7	9	6
617:	3	3	5	2	0	1	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	1	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	1	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	1	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	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	1	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	1	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	1	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

C
5/1/13

Sample Description: PZ-104-SD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_025
 Chamber Serial Number:
 Detector Serial Number: 25
 Env. Background: System Bkgd 55743
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 4:24:46 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.550 mL
 Effective Efficiency: 0.0539 +/- 0.0057
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Chem. Recovery Factor: 0.3107 +/- 0.0331

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

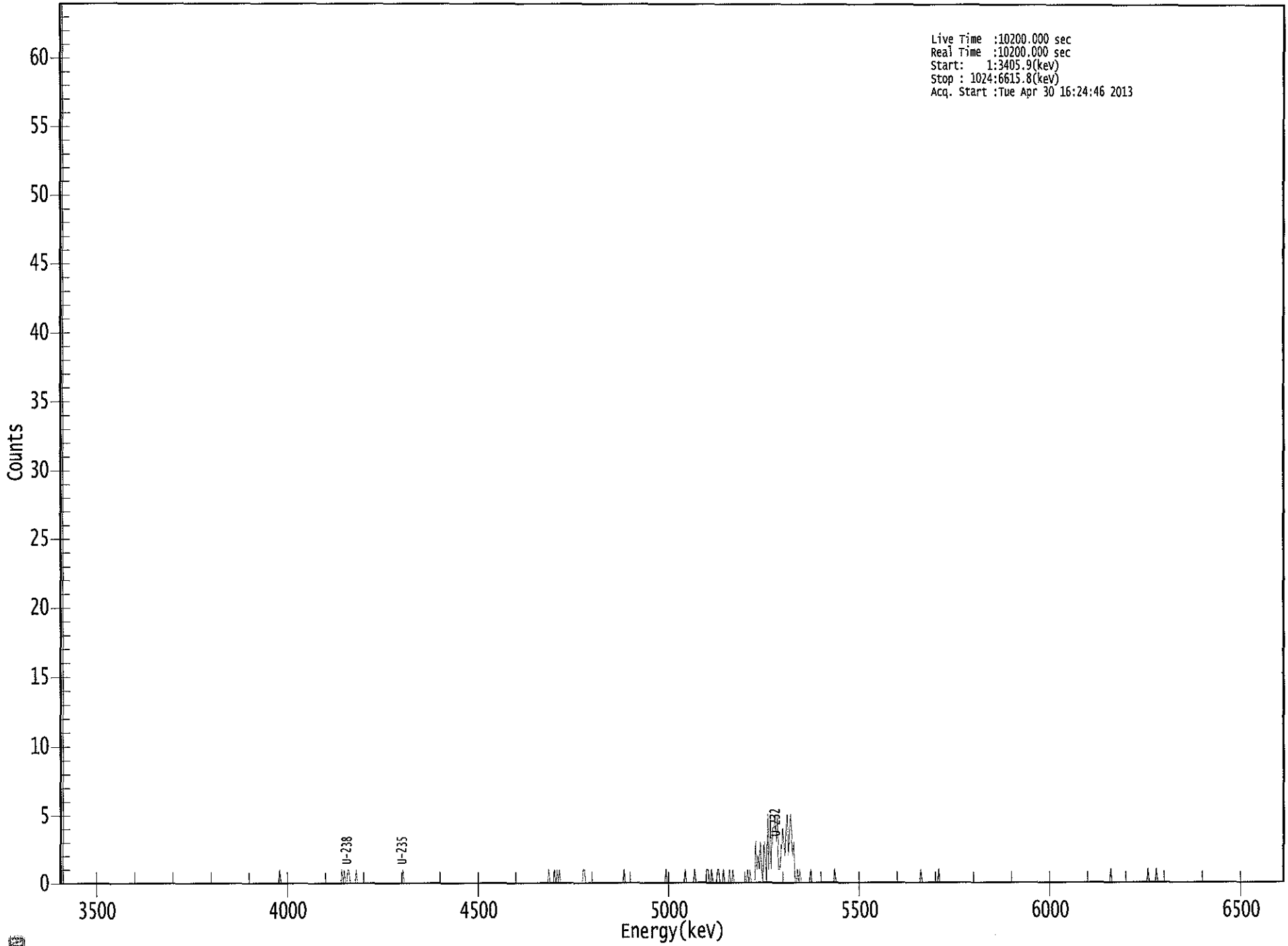
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.282	95.66	20.08	0.34	0.00E+000	3.5
U-234	4.728	5.32	91.11	0.68	0.00E+000	3.1
U-235	4.303	0.83	239.53	0.17	0.00E+000	3.1
U-238	4.159	4.66	94.59	0.34	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	4.71E+000 +/- 9.70E-001	2.36E-001 +/- 4.85E-002
U-234	0.992	4761.50*	2.62E-001 +/- 2.45E-001	2.78E-001 +/- 5.72E-002
U-235	0.953	4385.50*	5.04E-002 +/- 1.21E-001	2.53E-001 +/- 5.22E-002
U-238	0.995	4184.40*	2.28E-001 +/- 2.21E-001	2.34E-001 +/- 4.82E-002

AG
5/1/13



0193

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:	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	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	1
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	1	0	1	0
241:	1	1	0	0	0	0	1
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	1	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: 0 0 0 0 0 0 0 0 0

Sample Title: 17

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

801: 0 0 0 0 0 0 0 0

Sample Title: 17

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

5/11/13

Sample Description: PZ-104-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_027
 Chamber Serial Number:
 Detector Serial Number: 27
 Env. Background: System Bkgd 55744
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 4:24:47 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.602 mL
 Effective Efficiency: 0.2234 +/- 0.0119
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Chem. Recovery Factor: 1.2930 +/- 0.0731

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.269	433.81	9.43	1.19	0.00E+000	33.3
U-234	4.733	18.15	47.25	0.85	0.00E+000	6.4
U-235	4.383	0.66	305.43	0.34	0.00E+000	3.2
U-238	4.101	7.32	76.28	0.68	0.00E+000	4.8

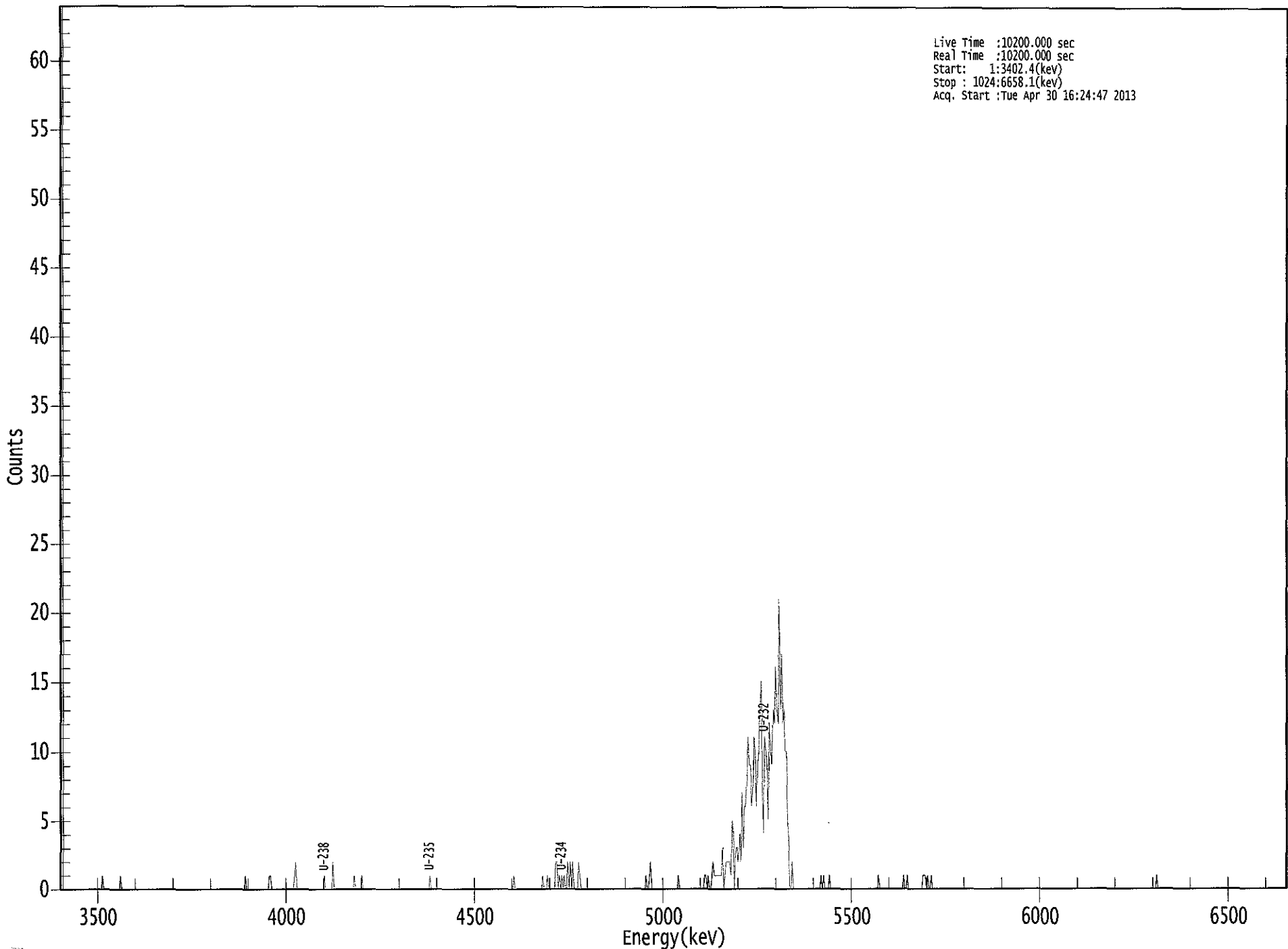
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.992	5302.50*	5.16E+000 +/- 5.39E-001	7.83E-002 +/- 8.19E-003
U-234	0.994	4761.50*	2.16E-001 +/- 1.04E-001	7.12E-002 +/- 7.44E-003
U-235	1.000	4385.50*	9.68E-003 +/- 2.96E-002	7.01E-002 +/- 7.33E-003
U-238	0.952	4184.40*	8.66E-002 +/- 6.67E-002	6.68E-002 +/- 6.98E-003

AG
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US EPA ARCHIVE DOCUMENT



0198

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:	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	1	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	1	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	1	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	1
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	1	2	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	1	0	0	0
225:	0	0	0	2	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	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	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:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 18

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

801: 0 0 0 0 0 0 0 0

Sample Title: 18

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

C
5/11/13

Sample Description: PZ-104-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000567
 Batch Identification: 1304106A-UU
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_029
 Chamber Serial Number:
 Detector Serial Number: 29
 Env. Background: System Bkgd 55745
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:18:03 AM
 Acquisition Date/Time: 4/30/2013 4:24:48 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.603 mL
 Effective Efficiency: 0.2575 +/- 0.0130
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Chem. Recovery Factor: 1.3238 +/- 0.0709

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.284	500.81	8.77	1.19	0.00E+000	5.2
U-234	4.731	12.98	56.85	1.02	0.00E+000	3.1
U-235	4.430	1.49	190.02	0.51	0.00E+000	3.1
U-238	4.151	16.83	48.06	0.17	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

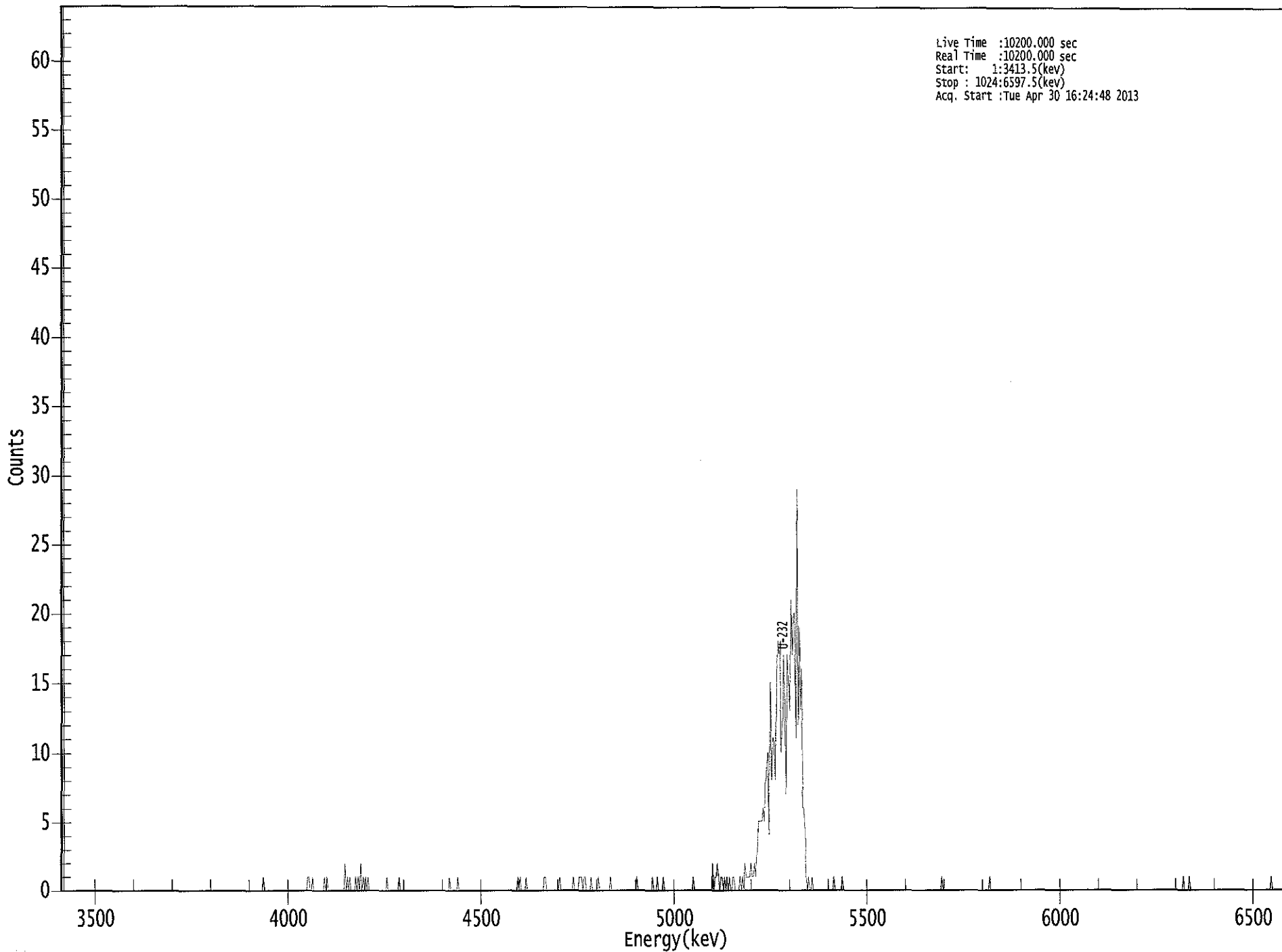
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.17E+000 +/- 5.09E-001	6.80E-002 +/- 6.70E-003
U-234	0.993	4761.50*	1.34E-001 +/- 7.72E-002	6.50E-002 +/- 6.41E-003
U-235	0.986	4385.50*	1.90E-002 +/- 3.61E-002	6.67E-002 +/- 6.58E-003
U-238	0.992	4184.40*	1.73E-001 +/- 8.48E-002	4.28E-002 +/- 4.23E-003

AG
5/11/13

US EPA ARCHIVE DOCUMENT

0000056769.CNF



0203

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:	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:	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	1	1	0
209:	0	1	0	0	0	0	0	0
217:	0	0	0	1	0	1	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	2	0	1	0
241:	1	0	0	0	0	1	0	1
249:	0	2	0	1	0	1	0	1
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	1
273:	0	0	0	0	0	0	0	0
281:	0	1	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	1	0	0	0	0
329:	0	0	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 19

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	1	0	1	0
385:	0	0	0	1	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	1	1	0	0	0	0
409:	0	0	0	0	0	0	0	1
417:	0	0	0	0	0	0	0	0
425:	0	0	1	0	0	0	0	1
433:	1	1	0	1	1	0	0	0
441:	0	1	0	0	0	0	0	1
449:	0	0	0	0	0	0	0	0
457:	0	1	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	1
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	1	0	0	0
497:	1	0	0	0	0	1	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	1	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	2	0
545:	1	1	2	1	0	1	1	0
553:	1	0	1	0	1	0	0	1
561:	1	0	0	0	0	1	0	1
569:	0	2	1	1	1	1	2	1
577:	1	2	1	3	5	5	5	5
585:	6	5	8	9	10	4	15	8
593:	11	11	8	13	18	17	18	10
601:	12	17	13	7	17	15	13	21
609:	17	20	20	11	29	12	19	13
617:	16	6	6	4	1	0	1	0
625:	0	1	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	1	0	0	0	0
649:	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	1	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	1	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0 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	1	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	1
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 : 4/30/2013
Time : 5:44:34 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	4/30/2013 5:21:25 AM
Alpha 004	21f	ALL	Passed	4/30/2013 5:21:26 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	4/30/2013 5:21:27 AM
Alpha 011	21f	ALL	Passed	4/30/2013 5:21:28 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	4/30/2013 5:21:29 AM
Alpha 014	21f	ALL	Passed	4/30/2013 5:21:30 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	4/30/2013 5:21:30 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	4/30/2013 5:21:31 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	4/30/2013 5:21:32 AM
Alpha 025	AIM730	ALL	Passed	4/30/2013 5:21:33 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	4/30/2013 5:21:34 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	4/30/2013 5:21:35 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Not Done	
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:36 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:38 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:39 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:29:59 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:40 AM
Alpha 038	Alpha Analyst100DC	ALL	Not Done	
Alpha 039	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:03 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:42 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:43 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:45 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:09 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:47 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:48 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:50 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	4/30/2013 5:21:52 AM

APPROVED BY: C APPROVAL DATE: 4/17/11

***** 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

RUN 2

US EPA ARCHIVE DOCUMENT

Work Order	13-04106	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	UUISO	01	LCS	LCS		04/16/13 00:00	1.0000E+00
Run	2	02	MBL	BLANK		04/16/13 00:00	1.0000E+00
Date Received	4/16/2013	03	DUP	PZ-104-SD TOT	44	04/11/13 11:38	2.5000E-01
Lab Deadline	5/7/2013	16	DO	PZ-104-SD TOT	44	04/11/13 11:38	2.5000E-01
Client	Engineering Management Support, Inc.						
Project	West Lake OU-1						
Report Level	4						
Activity Units	pCi						
Aliquot Units	1						
Matrix	WA						
Method	NAS NS-3050 Modified						
Instrument Type	Alpha Spectroscopy						
Radiometric Tracer	U-232						
Radiometric Sol#	U-10a						
Tracer Act (dpm/g)	19.09						
Carrier							
Carrier Conc (mg/ml)							

0211

* 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.

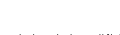
Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-235	LCS	LCS	pCi/l	4.68E-01	1.77E-01	7.55E-02					OK	
02	U-235	MBL	BLANK	pCi/l	1.40E-02	3.35E-02	7.02E-02					OK	OK
03	U-235	DUP	PZ-104-SD TOT	pCi/l	2.53E-01	4.83E-01	8.92E-01				NA	OK	
16	U-235	DO	PZ-104-SD TOT	pCi/l	4.57E-01	6.02E-01	9.14E-01					OK	

Client
Engineering Management Support, Inc.

Eberline Services Work Order
13-04106

Analysis Code
UUISO

Run
2



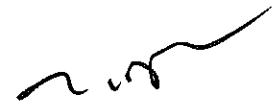
Run		Analysis Code		Eberline Services Work Order		Client				
Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-235	LCS	04/16/13 00:00	1.00E+00	104.82	0.00	0.00			
02	U-235	MBL	04/16/13 00:00	1.00E+00	105.53	0.00	0.00			
03	U-235	DUP	04/11/13 11:38	2.50E-01	42.33	0.00	0.00			
16	U-235	DO	04/11/13 11:38	2.50E-01	51.19	0.00	0.00			

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	05/06/13 09:42		A_Spec	Alpha_041	170	2.97 E+01	2.00 E-03	19.8
02	U-235	MBL	05/06/13 09:42		A_Spec	Alpha_042	170	8.30 E-01	1.00 E-03	18.5
03	U-235	DUP	05/06/13 09:42		A_Spec	Alpha_047	170	1.49 E+00	3.00 E-03	18.2
16	U-235	DO	05/06/13 09:42		A_Spec	Alpha_048	170	3.00 E+00	0.00 E+00	16.8



Run	2
Analysis Code	UUISO
Eberline Services Work Order	13-04106
Client	Engineering Management Support, Inc.

2228



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 <i>41</i>	LCS	LCS	04/16/13 00:00	1.0000	0.6107	11.6583		0.00		
02 <i>42</i>	MBL	BLANK	04/16/13 00:00	1.0000	0.6074	11.5953		0.00		
03 <i>47</i>	DUP	PZ-104-SD TOT	04/11/13 11:38	0.2500	0.6022	11.4960		0.00		
16 <i>48</i>	DO	PZ-104-SD TOT	04/11/13 11:38	0.2500	0.6037	11.5246		0.00		

US EPA ARCHIVE DOCUMENT

014

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04106	2	UUISO	liters	5/7/2013	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-104-SD TOT	DUP					2.5000E-01	2.5000E-01				
16	PZ-104-SD TOT	DO					2.5000E-01	2.5000E-01				

Comments

Technician: JB Date: 5/2/13

US EPA ARCHIVE DOCUMENT

100
5/16/13

Apex-Alpha™

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000572
 Batch Identification: 1304106B-UU
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 5/6/2013 7:38:46 AM
 Acquisition Date/Time: 5/6/2013 9:42:03 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 172.7 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.611 mL
 Effective Efficiency: 0.2074 +/- 0.0113
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 1.0482 +/- 0.0600

Control Certificate Name: NatU_U-8A
 Chem. Recov. of Control: U-238 0.904886 +/- 0.067800
 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	408.66	9.70	0.34	0.00E+000	17.3
U-234	4.733	562.81	8.27	1.19	0.00E+000	7.8
U-235	4.395	29.66	36.23	0.34	0.00E+000	3.0
U-238	4.153	579.94	8.16	3.06	0.00E+000	24.6

T = Tracer Peak used for Effective Efficiency

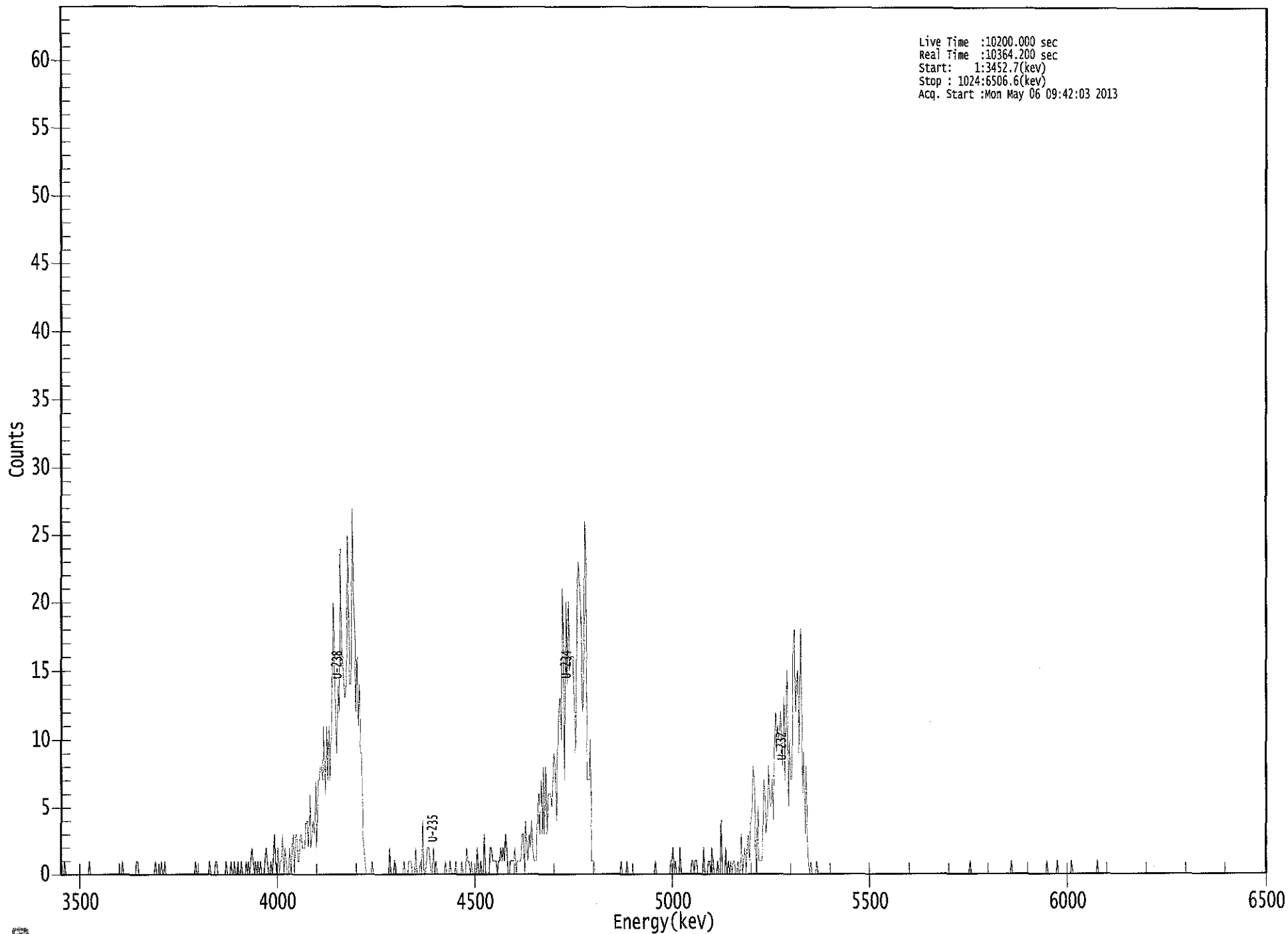
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.23E+000 +/- 5.60E-001	6.12E-002 +/- 6.55E-003
U-234	0.994	4761.50*	7.21E+000 +/- 9.74E-001	8.43E-002 +/- 9.02E-003
U-235	0.999	4385.50*	4.68E-001 +/- 1.77E-001	7.55E-002 +/- 8.08E-003
U-238	0.993	4184.40*	7.39E+000 +/- 9.95E-001	1.14E-001 +/- 1.22E-002

AG
5/16/13

US EPA ARCHIVE DOCUMENT

0000057211.CNF



0227

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: 10364

Channel	1	2	3	4	5	6	7	8	9
1:	0	0	0	1	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:	1	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	1	0	0	0	0
57:	0	0	0	0	0	0	0	0	0
65:	1	1	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0	0
81:	1	0	0	0	0	1	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	1	0	0	0	0	0	0
121:	0	0	0	0	0	0	1	0	0
129:	0	0	0	1	1	0	0	0	0
137:	0	0	0	0	1	0	0	0	0
145:	1	0	0	1	0	0	1	0	0
153:	0	1	0	0	0	1	0	1	0
161:	0	1	2	1	0	1	0	1	0
169:	0	1	0	0	0	1	2	1	0
177:	0	0	1	0	1	3	1	0	0
185:	2	0	1	1	3	0	2	1	0
193:	0	0	2	0	2	3	0	3	0
201:	3	1	1	3	3	2	2	2	0
209:	4	4	2	6	2	3	4	3	0
217:	7	2	7	7	8	8	7	11	0
225:	6	11	7	11	7	10	15	20	0
233:	15	11	9	14	12	24	16	16	0
241:	14	13	14	25	19	14	14	27	0
249:	21	18	12	16	11	14	9	9	0
257:	3	2	1	0	0	0	0	0	0
265:	1	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	2	0
281:	0	0	0	1	0	0	0	0	0
289:	0	0	0	1	0	0	0	1	0
297:	1	1	0	0	0	2	0	0	0
305:	0	1	0	4	0	0	1	2	0
313:	2	1	0	0	2	0	1	0	0
321:	0	0	0	0	0	0	1	0	0
329:	0	0	1	0	0	0	0	1	0
337:	0	0	0	0	1	0	0	0	0
345:	2	1	1	0	1	0	0	0	0
353:	0	2	0	0	1	0	0	3	0
361:	0	0	0	0	2	2	1	1	0

369: 1 1 0 1 1 2 1 2

Sample Title: 01

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

801: 0 0 0 0 0 0 1 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	1	0	0	0
841:	0	0	0	0	0	1	0	0
849:	0	0	0	0	0	0	0	0
857:	0	1	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	1
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	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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5/6/13

Apex-Alpha™

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000572
 Batch Identification: 1304106B-UU
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 5/6/2013 7:38:46 AM
 Acquisition Date/Time: 5/6/2013 9:42:05 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 172.7 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.607 mL
 Effective Efficiency: 0.1948 +/- 0.0109
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 1.0553 +/- 0.0620

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.278	381.83	10.03	0.17	0.00E+000	4.4
U-234	4.697	2.49	138.29	0.51	0.00E+000	3.0
U-235	4.457	0.83	239.53	0.17	0.00E+000	3.0
U-238	4.086	2.66	128.85	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

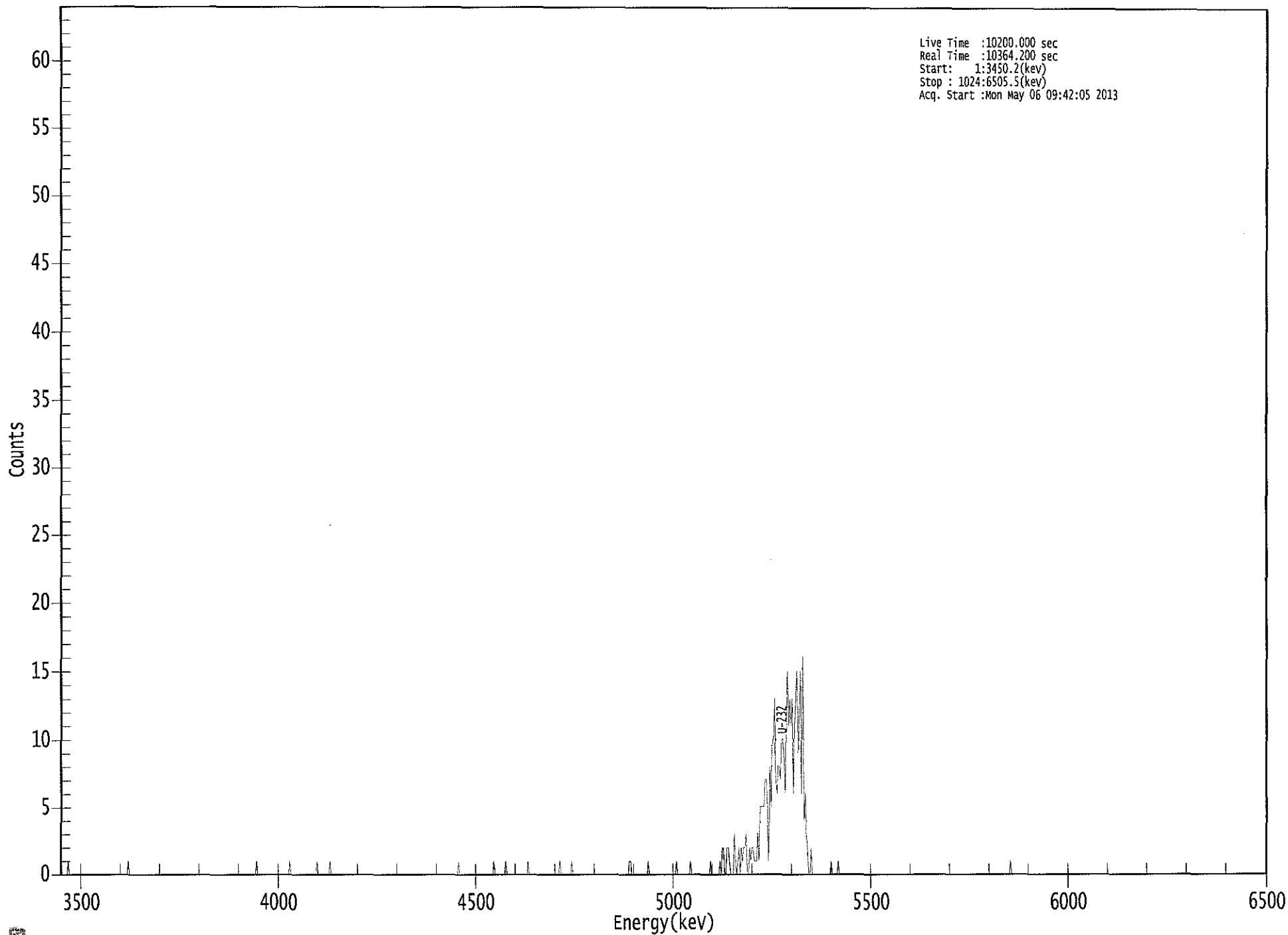
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.20E+000 +/- 5.72E-001	5.69E-002 +/- 6.26E-003
U-234	0.970	4761.50*	3.39E-002 +/- 4.71E-002	7.15E-002 +/- 7.87E-003
U-235	0.965	4385.50*	1.40E-002 +/- 3.35E-002	7.02E-002 +/- 7.72E-003
U-238	0.934	4184.40*	3.61E-002 +/- 4.67E-002	6.49E-002 +/- 7.14E-003

AG
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US EPA ARCHIVE DOCUMENT

0000057212.CNF



0232

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: 10364

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 02

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	1	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	1	0	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	1
425:	0	0	0	0	0	0	0	0
433:	0	1	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	1	1	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	1	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	1	0	0	0	0	0
529:	0	0	0	0	0	0	1	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	1
553:	0	0	0	0	0	0	0	1
561:	0	2	2	0	0	2	2	1
569:	0	0	0	3	1	0	1	2
577:	0	2	1	2	2	3	0	0
585:	2	1	2	2	1	1	1	3
593:	1	5	5	5	5	7	7	5
601:	1	8	5	10	10	13	7	6
609:	8	8	7	10	10	9	6	11
617:	15	11	13	11	13	6	11	13
625:	15	9	12	15	6	16	4	6
633:	3	2	0	0	2	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	1	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	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 1 0 0

Sample Title: 02

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

KB
5/6/13

Apex-Alpha™

Sample Description: PZ-104-SD TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000572
 Batch Identification: 1304106B-UU
 Sample Identification: 03
 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: 2.500E-001 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:38:46 AM
 Acquisition Date/Time: 5/6/2013 9:42:00 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.602 mL
 Effective Efficiency: 0.0771 +/- 0.0065
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Chem. Recovery Factor: 0.4233 +/- 0.0367

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	149.83	16.02	0.17	0.00E+000	11.3
U-234	4.704	4.00	109.57	0.00	0.00E+000	2.9
U-235	4.377	1.49	190.02	0.51	0.00E+000	2.9
U-238	4.089	1.83	152.56	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

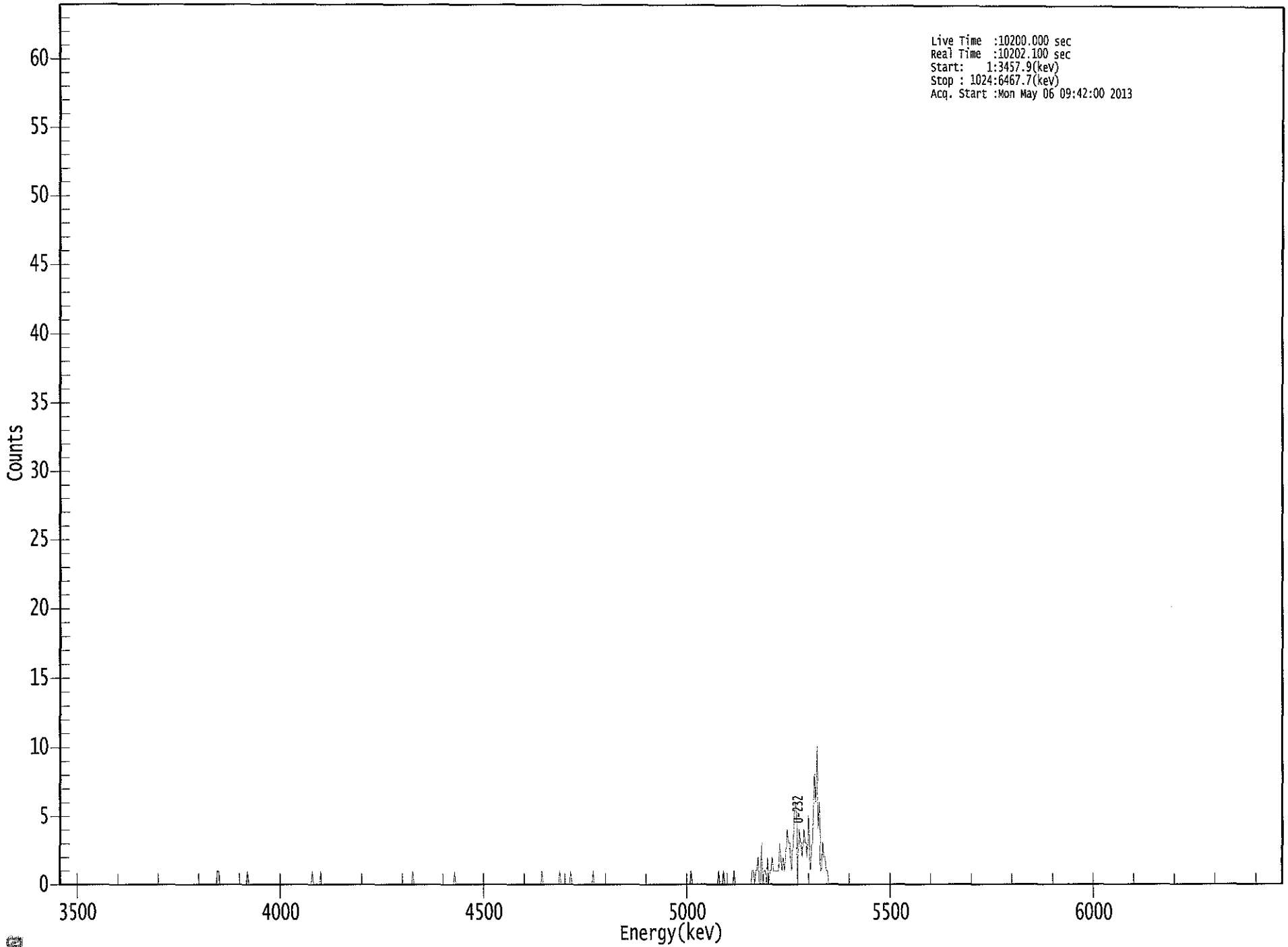
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	2.07E+001 +/- 3.44E+000	5.75E-001 +/- 9.57E-002
U-234	0.977	4761.50*	5.51E-001 +/- 6.11E-001	8.26E-001 +/- 1.37E-001
U-235	1.000	4385.50*	2.53E-001 +/- 4.83E-001	8.92E-001 +/- 1.48E-001
U-238	0.937	4184.40*	2.51E-001 +/- 3.85E-001	5.72E-001 +/- 9.53E-002

AG
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US EPA ARCHIVE DOCUMENT

0000057209.CNF



Live Time :10200.000 sec
Real Time :10202.100 sec
Start: 1:3457.9(keV)
Stop : 1024:6467.7(keV)
Acq. Start :Mon May 06 09:42:00 2013

US EPA ARCHIVE DOCUMENT

0237

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: 10202

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	1	1	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	1	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	1	0	0	0	0
217:	0	0	1	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	1
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	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 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	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	1	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	1	0	0	0	0	0
425:	0	0	0	1	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	1	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	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	1
553:	0	0	0	1	0	0	0	0
561:	0	0	0	0	1	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	1	1	0	1	1
585:	2	0	0	3	0	1	1	0
593:	2	0	1	1	2	1	1	1
601:	1	1	3	2	1	2	1	2
609:	4	3	3	2	1	3	5	6
617:	5	0	4	3	3	2	4	3
625:	3	2	5	2	1	3	5	8
633:	6	10	4	6	1	1	3	2
641:	2	1	1	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 03

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

KD
5/6/13

Apex-Alpha™

Sample Description: PZ-104-SD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000572
 Batch Identification: 1304106B-UU
 Sample Identification: 16
 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: 2.500E-001 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:38:46 AM
 Acquisition Date/Time: 5/6/2013 9:42:02 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.0860 +/- 0.0069
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Chem. Recovery Factor: 0.5119 +/- 0.0423

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.283	167.49	15.17	0.51	0.00E+000	24.8
U-234	4.778	1.49	190.02	0.51	0.00E+000	3.0
U-235	4.407	3.00	130.67	0.00	0.00E+000	3.0
U-238	4.152	1.66	169.38	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

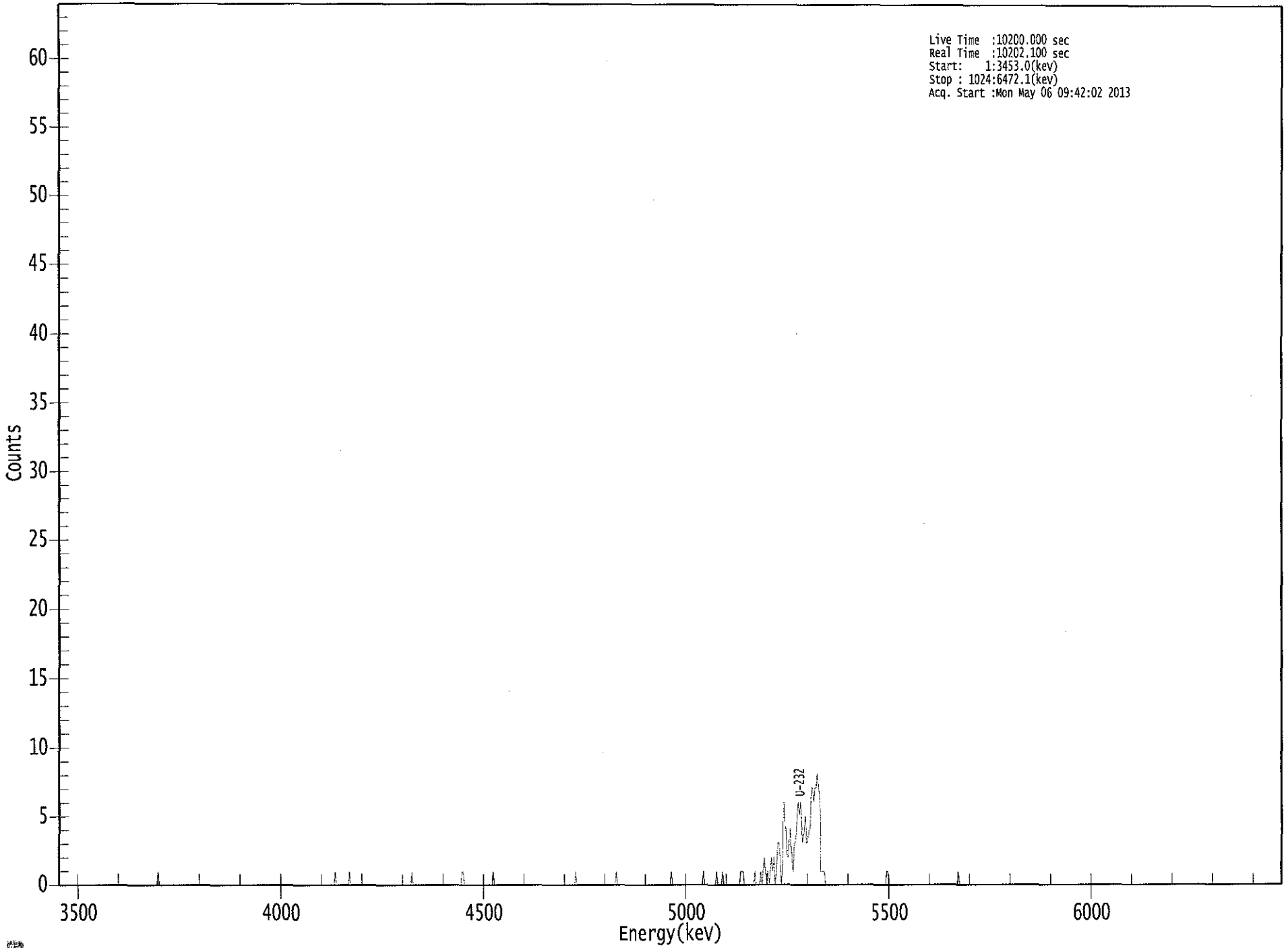
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	2.07E+001 +/- 3.28E+000	6.49E-001 +/- 1.03E-001
U-234	0.998	4761.50*	1.84E-001 +/- 3.51E-001	6.48E-001 +/- 1.03E-001
U-235	0.997	4385.50*	4.57E-001 +/- 6.02E-001	9.14E-001 +/- 1.45E-001
U-238	0.993	4184.40*	2.04E-001 +/- 3.47E-001	5.88E-001 +/- 9.31E-002

AG
5/6/13

US EPA ARCHIVE DOCUMENT

0000057210.CNF

Live Time :10200.000 sec
Real Time :10202.100 sec
Start: 1:3453.0(kev)
Stop : 1024:6472.1(kev)
Acq. Start :Mon May 06 09:42:02 2013



US EPA ARCHIVE DOCUMENT

0242

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: 10202

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	1	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	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:	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	1
233:	0	0	0	0	0	0	0	0	0
241:	0	0	0	1	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	1
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	1	1	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	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 16

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

801: 0 0 0 0 0 0 0 0

Sample Title: 16

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	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 : 5/6/2013
Time : 5:36:52 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	5/6/2013 5:21:40 AM
Alpha 004	21f	ALL	Passed	5/6/2013 5:21:40 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	5/6/2013 5:21:41 AM
Alpha 011	21f	ALL	Passed	5/6/2013 5:21:42 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	5/6/2013 5:21:43 AM
Alpha 014	21f	ALL	Passed	5/6/2013 5:21:44 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	5/6/2013 5:21:45 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	5/6/2013 5:21:45 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	5/6/2013 5:21:46 AM
Alpha 025	AIM730	ALL	Passed	5/6/2013 5:21:47 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	5/6/2013 5:21:48 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	5/6/2013 5:21:49 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Not Done	
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	5/6/2013 5:21:50 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	5/6/2013 5:21:51 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	5/6/2013 5:21:53 AM
Alpha 036	Alpha Analyst100DC	ALL	Not Done	
Alpha 037	Alpha Analyst100DC	ALL	Passed	5/6/2013 5:21:54 AM
Alpha 038	Alpha Analyst100DC	ALL	Not Done	
Alpha 039	Alpha Analyst100DC	ALL	Not Done	
Alpha 040	Alpha Analyst100DC	ALL	Passed	5/6/2013 5:21:56 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	5/6/2013 5:21:58 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	5/6/2013 5:21:59 AM

***** 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	13-04106	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	ThISO	01	LCS	LCS		04/16/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		04/16/13 00:00	1.0000E+00
Date Received	4/16/2013	03	DUP	PZ-111-KS TOT	43	04/09/13 15:35	1.0000E+00
Lab Deadline	5/7/2013	04	DO	PZ-111-KS TOT	43	04/09/13 15:35	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-111-KS DIS	43	04/09/13 15:35	1.0000E+00
Project	West Lake OU-1	06	TRG	D-6 TOT	45	04/09/13 15:45	1.0000E+00
Report Level	4	07	TRG	D-6 DIS	45	04/09/13 15:45	1.0000E+00
Activity Units	pCi	08	TRG	D-83 TOT	40	04/09/13 16:16	1.0000E+00
Aliquot Units	I	09	TRG	D-83 DIS	40	04/09/13 16:16	1.0000E+00
Matrix	WA	10	TRG	DUP 05 TOT	47	04/09/13 00:00	1.0000E+00
Method	NAS NS-3004 Modified	11	TRG	DUP 05 DIS	47	04/09/13 00:00	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	PZ-102-SS TOT	39	04/11/13 09:10	1.0000E+00
Radiometric Tracer	Th-229	13	TRG	PZ-102-SS DIS	39	04/11/13 09:10	1.0000E+00
Radiometric Sol#	Th-18a	14	TRG	PZ-102R-SS TOT	45	04/11/13 11:30	1.0000E+00
Tracer Act (dpm/g)	22.467	15	TRG	PZ-102R-SS DIS	45	04/11/13 11:30	1.0000E+00
Carrier		16	TRG	PZ-104-SD TOT	44	04/11/13 11:38	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-104-SD DIS	44	04/11/13 11:38	1.0000E+00
		18	TRG	PZ-104-SS TOT	42	04/11/13 12:59	1.0000E+00
		19	TRG	PZ-104-SS DIS	42	04/11/13 12:59	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.

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	0.4745	10.7		0.00								
02	MBL	0.2367	5.3		0.00								
03	DUP	0.2361	5.3		0.00								
04	DO	0.2344	5.3		0.00								
05	TRG	0.2321	5.2		0.00								
06	TRG	0.2341	5.3		0.00								
07	TRG	0.2327	5.2		0.00								
08	TRG	0.2336	5.2		0.00								
09	TRG	0.2321	5.2		0.00								
10	TRG	0.2324	5.2		0.00								
11	TRG	0.2319	5.2		0.00								
12	TRG	0.2329	5.2		0.00								
13	TRG	0.2338	5.3		0.00								
14	TRG	0.2322	5.2		0.00								
15	TRG	0.2317	5.2		0.00								
16	TRG	0.2325	5.2		0.00								
17	TRG	0.2316	5.2		0.00								
18	TRG	0.2326	5.2		0.00								
19	TRG	0.2307	5.2		0.00								

US EPA ARCHIVE DOCUMENT

0251

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

US EPA ARCHIVE DOCUMENT

Internal Fraction	Sample Desc	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			04/25/13 08:59	JBARNARD				
02	MBL			04/25/13 08:59	JBARNARD				
03	DUP			04/25/13 08:59	JBARNARD				
04	DO			04/25/13 08:59	JBARNARD				
05	TRG			04/25/13 08:59	JBARNARD				
06	TRG			04/25/13 08:59	JBARNARD				
07	TRG			04/25/13 08:59	JBARNARD				
08	TRG			04/25/13 08:59	JBARNARD				
09	TRG			04/25/13 08:59	JBARNARD				
10	TRG			04/25/13 08:59	JBARNARD				
11	TRG			04/25/13 08:59	JBARNARD				
12	TRG			04/25/13 08:59	JBARNARD				
13	TRG			04/25/13 08:59	JBARNARD				
14	TRG			04/25/13 08:59	JBARNARD				
15	TRG			04/25/13 08:59	JBARNARD				
16	TRG			04/25/13 08:59	JBARNARD				
17	TRG			04/25/13 08:59	JBARNARD				
18	TRG			04/25/13 08:59	JBARNARD				
19	TRG			04/25/13 08:59	JBARNARD				

0252

* 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.

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-228	LCS	LCS	pCi/l	5.84E+00	8.85E-01	1.17E-01	4.81E+00	121.36	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	1.02E-02	5.54E-02	1.21E-01					OK	OK
03	TH-228	DUP	PZ-111-KS TOT	pCi/l	1.57E-01	9.80E-02	1.11E-01				NA	OK	
04	TH-228	DO	PZ-111-KS TOT	pCi/l	1.11E-01	7.86E-02	8.69E-02					OK	
05	TH-228	TRG	PZ-111-KS DIS	pCi/l	-8.59E-03	5.61E-02	1.42E-01					OK	
06	TH-228	TRG	D-6 TOT	pCi/l	1.38E-01	1.00E-01	1.25E-01					OK	
07	TH-228	TRG	D-6 DIS	pCi/l	2.14E-02	4.92E-02	9.58E-02					OK	
08	TH-228	TRG	D-83 TOT	pCi/l	1.98E-01	1.26E-01	1.37E-01					OK	
09	TH-228	TRG	D-83 DIS	pCi/l	3.35E-02	7.00E-02	1.33E-01					OK	
10	TH-228	TRG	DUP 05 TOT	pCi/l	4.50E-02	5.59E-02	8.48E-02					OK	
11	TH-228	TRG	DUP 05 DIS	pCi/l	6.08E-02	8.01E-02	1.28E-01					OK	
12	TH-228	TRG	PZ-102-SS TOT	pCi/l	3.24E+00	7.14E-01	1.31E-01					OK	
13	TH-228	TRG	PZ-102-SS DIS	pCi/l	9.66E-02	7.02E-02	6.55E-02					OK	
14	TH-228	TRG	PZ-102R-SS TOT	pCi/l	2.49E-01	1.23E-01	5.84E-02					OK	
15	TH-228	TRG	PZ-102R-SS DIS	pCi/l	8.15E-03	2.49E-02	5.90E-02					OK	
16	TH-228	TRG	PZ-104-SD TOT	pCi/l	4.66E-02	5.67E-02	6.87E-02					OK	
17	TH-228	TRG	PZ-104-SD DIS	pCi/l	2.33E-02	3.96E-02	6.71E-02					OK	
18	TH-228	TRG	PZ-104-SS TOT	pCi/l	4.81E-02	5.24E-02	6.28E-02					OK	
19	TH-228	TRG	PZ-104-SS DIS	pCi/l	2.51E-02	5.98E-02	1.16E-01					OK	



Run	1
Analysis Code	THISO
Eberline Services Work Order	13-04106
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-228	LCS	04/16/13 00:00	1.00E+00	115.65	0.00	0.00			
02	TH-228	MBL	04/16/13 00:00	1.00E+00	103.18	0.00	0.00			
03	TH-228	DUP	04/09/13 15:35	1.00E+00	122.51	0.00	0.00			
04	TH-228	DO	04/09/13 15:35	1.00E+00	123.12	0.00	0.00			
05	TH-228	TRG	04/09/13 15:35	1.00E+00	96.26	0.00	0.00			
06	TH-228	TRG	04/09/13 15:45	1.00E+00	116.23	0.00	0.00			
07	TH-228	TRG	04/09/13 15:45	1.00E+00	127.42	0.00	0.00			
08	TH-228	TRG	04/09/13 16:16	1.00E+00	115.73	0.00	0.00			
09	TH-228	TRG	04/09/13 16:16	1.00E+00	92.78	0.00	0.00			
10	TH-228	TRG	04/09/13 00:00	1.00E+00	126.25	0.00	0.00			
11	TH-228	TRG	04/09/13 00:00	1.00E+00	97.80	0.00	0.00			
12	TH-228	TRG	04/11/13 09:10	1.00E+00	87.06	0.00	0.00			
13	TH-228	TRG	04/11/13 09:10	1.00E+00	127.66	0.00	0.00			
14	TH-228	TRG	04/11/13 11:30	1.00E+00	104.21	0.00	0.00			
15	TH-228	TRG	04/11/13 11:30	1.00E+00	119.97	0.00	0.00			
16	TH-228	TRG	04/11/13 11:38	1.00E+00	92.22	0.00	0.00			
17	TH-228	TRG	04/11/13 11:38	1.00E+00	101.44	0.00	0.00			
18	TH-228	TRG	04/11/13 12:59	1.00E+00	104.03	0.00	0.00			
19	TH-228	TRG	04/11/13 12:59	1.00E+00	119.57	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04106	Analysis Code	THISO	Run	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	05/01/13 12:48		A_Spec	Alpha_003	170	4.45 E+02	1.80 E-02	17.5
02	TH-228	MBL	05/01/13 12:48		A_Spec	Alpha_004	170	7.70 E-01	1.90 E-02	19.4
03	TH-228	DUP	05/01/13 12:48		A_Spec	Alpha_010	170	1.39 E+01	2.40 E-02	19.7
04	TH-228	DO	05/01/13 12:48		A_Spec	Alpha_011	170	9.96 E+00	1.20 E-02	19.7
05	TH-228	TRG	05/01/13 12:48		A_Spec	Alpha_013	170.02	-5.70 E-01	2.10 E-02	18.7
06	TH-228	TRG	05/01/13 12:48		A_Spec	Alpha_014	170.02	1.09 E+01	2.40 E-02	18.5
07	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_018	170	1.79 E+00	1.30 E-02	17.8
08	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_022	170	1.29 E+01	1.80 E-02	15.3
09	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_024	170	1.96 E+00	1.20 E-02	17.1
10	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_025	170	3.64 E+00	8.00 E-03	17.4
11	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_027	170	3.79 E+00	1.30 E-02	17.3
12	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_029	170	2.03 E+02	1.40 E-02	19.5
13	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_033	170	8.32 E+00	4.00 E-03	18.2
14	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_034	170	1.78 E+01	1.00 E-03	18.6
15	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_035	170	6.60 E-01	2.00 E-03	18.3
16	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_037	170	2.83 E+00	1.00 E-03	17.8
17	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_040	170	1.66 E+00	2.00 E-03	19
18	TH-228	TRG	05/01/13 12:49		A_Spec	Alpha_041	170	3.66 E+00	2.00 E-03	19.8
19	TH-228	TRG	05/01/13 16:16		A_Spec	Alpha_003	170	1.94 E+00	1.80 E-02	17.5

	Run	1
	Analysis Code	THISO
Eberline Services Work Order	13-04106	
Client	Engineering Management Support, Inc.	

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-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-230	LCS	LCS	pCi/l	5.38E+00	8.28E-01	9.01E-02	5.44E+00	98.93	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	2.54E-01	1.23E-01	7.94E-02					OK	OK
03	TH-230	DUP	PZ-111-KS TOT	pCi/l	1.83E-01	9.60E-02	7.55E-02				NA	OK	
04	TH-230	DO	PZ-111-KS TOT	pCi/l	2.04E-01	9.82E-02	5.22E-02					OK	
05	TH-230	TRG	PZ-111-KS DIS	pCi/l	1.40E-01	9.48E-02	7.74E-02					OK	
06	TH-230	TRG	D-6 TOT	pCi/l	1.28E-01	8.32E-02	6.98E-02					OK	
07	TH-230	TRG	D-6 DIS	pCi/l	6.81E-02	6.25E-02	7.73E-02					OK	
08	TH-230	TRG	D-83 TOT	pCi/l	4.74E-01	1.87E-01	1.03E-01					OK	
09	TH-230	TRG	D-83 DIS	pCi/l	2.12E-01	1.24E-01	8.00E-02					OK	
10	TH-230	TRG	DUP 05 TOT	pCi/l	1.25E-01	8.14E-02	6.83E-02					OK	
11	TH-230	TRG	DUP 05 DIS	pCi/l	9.40E-02	8.40E-02	9.90E-02					OK	
12	TH-230	TRG	PZ-102-SS TOT	pCi/l	3.03E+00	6.73E-01	9.38E-02					OK	
13	TH-230	TRG	PZ-102-SS DIS	pCi/l	1.18E-01	7.65E-02	6.43E-02					OK	
14	TH-230	TRG	PZ-102R-SS TOT	pCi/l	2.65E-01	1.28E-01	7.74E-02					OK	
15	TH-230	TRG	PZ-102R-SS DIS	pCi/l	5.65E-02	5.41E-02	5.79E-02					OK	
16	TH-230	TRG	PZ-104-SD TOT	pCi/l	1.72E-01	1.09E-01	7.72E-02					OK	
17	TH-230	TRG	PZ-104-SD DIS	pCi/l	1.61E-01	9.73E-02	6.58E-02					OK	
18	TH-230	TRG	PZ-104-SS TOT	pCi/l	1.57E-01	9.49E-02	7.72E-02					OK	
19	TH-230	TRG	PZ-104-SS DIS	pCi/l	8.44E-02	7.27E-02	8.72E-02					OK	

Client	Eberline Services Work Order	Run
	13-04106	1
Analysis Code	THISO	

Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-THISO-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	04/16/13 00:00	1.00E+00	115.65	0.00	0.00			
02	TH-230	MBL	04/16/13 00:00	1.00E+00	103.18	0.00	0.00			
03	TH-230	DUP	04/09/13 15:35	1.00E+00	122.51	0.00	0.00			
04	TH-230	DO	04/09/13 15:35	1.00E+00	123.12	0.00	0.00			
05	TH-230	TRG	04/09/13 15:35	1.00E+00	96.26	0.00	0.00			
06	TH-230	TRG	04/09/13 15:45	1.00E+00	116.23	0.00	0.00			
07	TH-230	TRG	04/09/13 15:45	1.00E+00	127.42	0.00	0.00			
08	TH-230	TRG	04/09/13 16:16	1.00E+00	115.73	0.00	0.00			
09	TH-230	TRG	04/09/13 16:16	1.00E+00	92.78	0.00	0.00			
10	TH-230	TRG	04/09/13 00:00	1.00E+00	126.25	0.00	0.00			
11	TH-230	TRG	04/09/13 00:00	1.00E+00	97.80	0.00	0.00			
12	TH-230	TRG	04/11/13 09:10	1.00E+00	87.06	0.00	0.00			
13	TH-230	TRG	04/11/13 09:10	1.00E+00	127.66	0.00	0.00			
14	TH-230	TRG	04/11/13 11:30	1.00E+00	104.21	0.00	0.00			
15	TH-230	TRG	04/11/13 11:30	1.00E+00	119.97	0.00	0.00			
16	TH-230	TRG	04/11/13 11:38	1.00E+00	92.22	0.00	0.00			
17	TH-230	TRG	04/11/13 11:38	1.00E+00	101.44	0.00	0.00			
18	TH-230	TRG	04/11/13 12:59	1.00E+00	104.03	0.00	0.00			
19	TH-230	TRG	04/11/13 12:59	1.00E+00	119.57	0.00	0.00			

	Run	1
	Analysis Code	THISO
Eberline Services Work Order	13-04106	
Client	Engineering Management Support, Inc.	

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-230	LCS	05/01/13 12:48		A_Spec	Alpha_003	170	4.10 E+02	8.00 E-03	17.5
02	TH-230	MBL	05/01/13 12:48		A_Spec	Alpha_004	170	1.92 E+01	5.00 E-03	19.4
03	TH-230	DUP	05/01/13 12:48		A_Spec	Alpha_010	170	1.66 E+01	8.00 E-03	19.7
04	TH-230	DO	05/01/13 12:48		A_Spec	Alpha_011	170	1.87 E+01	2.00 E-03	19.7
05	TH-230	TRG	05/01/13 12:48		A_Spec	Alpha_013	170.02	9.49 E+00	3.00 E-03	18.7
06	TH-230	TRG	05/01/13 12:48		A_Spec	Alpha_014	170.02	1.03 E+01	4.00 E-03	18.5
07	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_018	170	5.81 E+00	7.00 E-03	17.8
08	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_022	170	3.16 E+01	8.00 E-03	15.3
09	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_024	170	1.27 E+01	2.00 E-03	17.1
10	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_025	170	1.03 E+01	4.00 E-03	17.4
11	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_027	170	5.98 E+00	6.00 E-03	17.3
12	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_029	170	1.93 E+02	5.00 E-03	19.5
13	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_033	170	1.03 E+01	4.00 E-03	18.2
14	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_034	170	1.93 E+01	4.00 E-03	18.6
15	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_035	170	4.66 E+00	2.00 E-03	18.3
16	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_037	170	1.07 E+01	2.00 E-03	17.8
17	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_040	170	1.17 E+01	2.00 E-03	19
18	TH-230	TRG	05/01/13 12:49		A_Spec	Alpha_041	170	1.21 E+01	5.00 E-03	19.8
19	TH-230	TRG	05/01/13 16:16		A_Spec	Alpha_003	170	6.64 E+00	8.00 E-03	17.5

	Run	1
	Analysis Code	THISO
Eberline Services Work Order	13-04106	
Client	Engineering Management Support, Inc.	

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-232	LCS	LCS	pCi/l	5.42E+00	8.31E-01	8.64E-02	4.81E+00	112.51	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	4.62E-02	5.29E-02	6.95E-02					OK	OK
03	TH-232	DUP	PZ-111-KS TOT	pCi/l	8.59E-02	6.66E-02	7.24E-02				NA	OK	
04	TH-232	DO	PZ-111-KS TOT	pCi/l	1.25E-01	7.66E-02	5.72E-02					OK	
05	TH-232	TRG	PZ-111-KS DIS	pCi/l	7.22E-03	3.01E-02	7.73E-02					OK	
06	TH-232	TRG	D-6 TOT	pCi/l	3.89E-02	4.96E-02	7.39E-02					OK	
07	TH-232	TRG	D-6 DIS	pCi/l	1.72E-02	4.15E-02	8.32E-02					OK	
08	TH-232	TRG	D-83 TOT	pCi/l	-5.38E-03	3.25E-02	1.02E-01					OK	
09	TH-232	TRG	D-83 DIS	pCi/l	-1.70E-02	3.56E-02	1.05E-01					OK	
10	TH-232	TRG	DUP 05 TOT	pCi/l	2.81E-02	4.21E-02	6.82E-02					OK	
11	TH-232	TRG	DUP 05 DIS	pCi/l	5.02E-03	3.25E-02	8.85E-02					OK	
12	TH-232	TRG	PZ-102-SS TOT	pCi/l	4.35E+00	9.05E-01	9.38E-02					OK	
13	TH-232	TRG	PZ-102-SS DIS	pCi/l	3.41E-02	4.49E-02	6.82E-02					OK	
14	TH-232	TRG	PZ-102R-SS TOT	pCi/l	3.63E-01	1.52E-01	7.19E-02					OK	
15	TH-232	TRG	PZ-102R-SS DIS	pCi/l	1.00E-02	2.41E-02	5.05E-02					OK	
16	TH-232	TRG	PZ-104-SD TOT	pCi/l	1.61E-02	4.48E-02	9.66E-02					OK	
17	TH-232	TRG	PZ-104-SD DIS	pCi/l	-4.67E-03	2.77E-02	6.57E-02					OK	
18	TH-232	TRG	PZ-104-SS TOT	pCi/l	-2.85E-02	2.99E-02	1.03E-01					OK	
19	TH-232	TRG	PZ-104-SS DIS	pCi/l	-1.51E-02	2.74E-02	8.36E-02					OK	



Client	Engineering Management Support, Inc.
Eberline Services Work Order	13-04106
Analysis Code	THISO
Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-THISO-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-232	LCS	04/16/13 00:00	1.00E+00	115.65	0.00	0.00			
02	TH-232	MBL	04/16/13 00:00	1.00E+00	103.18	0.00	0.00			
03	TH-232	DUP	04/09/13 15:35	1.00E+00	122.51	0.00	0.00			
04	TH-232	DO	04/09/13 15:35	1.00E+00	123.12	0.00	0.00			
05	TH-232	TRG	04/09/13 15:35	1.00E+00	96.26	0.00	0.00			
06	TH-232	TRG	04/09/13 15:45	1.00E+00	116.23	0.00	0.00			
07	TH-232	TRG	04/09/13 15:45	1.00E+00	127.42	0.00	0.00			
08	TH-232	TRG	04/09/13 16:16	1.00E+00	115.73	0.00	0.00			
09	TH-232	TRG	04/09/13 16:16	1.00E+00	92.78	0.00	0.00			
10	TH-232	TRG	04/09/13 00:00	1.00E+00	126.25	0.00	0.00			
11	TH-232	TRG	04/09/13 00:00	1.00E+00	97.80	0.00	0.00			
12	TH-232	TRG	04/11/13 09:10	1.00E+00	87.06	0.00	0.00			
13	TH-232	TRG	04/11/13 09:10	1.00E+00	127.66	0.00	0.00			
14	TH-232	TRG	04/11/13 11:30	1.00E+00	104.21	0.00	0.00			
15	TH-232	TRG	04/11/13 11:30	1.00E+00	119.97	0.00	0.00			
16	TH-232	TRG	04/11/13 11:38	1.00E+00	92.22	0.00	0.00			
17	TH-232	TRG	04/11/13 11:38	1.00E+00	101.44	0.00	0.00			
18	TH-232	TRG	04/11/13 12:59	1.00E+00	104.03	0.00	0.00			
19	TH-232	TRG	04/11/13 12:59	1.00E+00	119.57	0.00	0.00			

Run	1
	Analysis Code
Eberline Services Work Order	THISO
Client	13-04106
Engineering Management Support, Inc.	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04106	Analysis Code	THISO	Run	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	05/01/13 12:48		A_Spec	Alpha_003	170	4.13 E+02	7.00 E-03	17.5
02	TH-232	MBL	05/01/13 12:48		A_Spec	Alpha_004	170	3.49 E+00	3.00 E-03	19.4
03	TH-232	DUP	05/01/13 12:48		A_Spec	Alpha_010	170	7.81 E+00	7.00 E-03	19.7
04	TH-232	DO	05/01/13 12:48		A_Spec	Alpha_011	170	1.15 E+01	3.00 E-03	19.7
05	TH-232	TRG	05/01/13 12:48		A_Spec	Alpha_013	170.02	4.90 E-01	3.00 E-03	18.7
06	TH-232	TRG	05/01/13 12:48		A_Spec	Alpha_014	170.02	3.15 E+00	5.00 E-03	18.5
07	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_018	170	1.47 E+00	9.00 E-03	17.8
08	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_022	170	-3.60 E-01	8.00 E-03	15.3
09	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_024	170	-1.02 E+00	6.00 E-03	17.1
10	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_025	170	2.32 E+00	4.00 E-03	17.4
11	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_027	170	3.20 E-01	4.00 E-03	17.3
12	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_029	170	2.78 E+02	0.00 E+00	19.5
13	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_033	170	3.00 E+00	0.00 E+00	18.2
14	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_034	170	2.65 E+01	3.00 E-03	18.6
15	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_035	170	8.30 E-01	1.00 E-03	18.3
16	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_037	170	1.00 E+00	0.00 E+00	17.8
17	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_040	170	-3.40 E-01	2.00 E-03	19
18	TH-232	TRG	05/01/13 12:49		A_Spec	Alpha_041	170	-2.21 E+00	1.30 E-02	19.8
19	TH-232	TRG	05/01/13 16:16		A_Spec	Alpha_003	170	-1.19 E+00	7.00 E-03	17.5

3-14

18-29

22-41

#3

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	04/16/13 00:00	1.0000	0.4745	10.6606		0.00		
02	MBL	BLANK	04/16/13 00:00	1.0000	0.2367	5.3179		0.00		
03	DUP	PZ-111-KS TOT	04/09/13 15:35	1.0000	0.2361	5.3045		0.00		
04	DO	PZ-111-KS TOT	04/09/13 15:35	1.0000	0.2344	5.2663		0.00		
05	TRG	PZ-111-KS DIS	04/09/13 15:35	1.0000	0.2321	5.2146		0.00		
06	TRG	D-6 TOT	04/09/13 15:45	1.0000	0.2341	5.2595		0.00		
07	TRG	D-6 DIS	04/09/13 15:45	1.0000	0.2327	5.2281		0.00		
08	TRG	D-83 TOT	04/09/13 16:16	1.0000	0.2336	5.2483		0.00		
09	TRG	D-83 DIS	04/09/13 16:16	1.0000	0.2321	5.2146		0.00		
10	TRG	DUP 05 TOT	04/09/13 00:00	1.0000	0.2324	5.2213		0.00		
11	TRG	DUP 05 DIS	04/09/13 00:00	1.0000	0.2319	5.2101		0.00		
12	TRG	PZ-102-SS TOT	04/11/13 09:10	1.0000	0.2329	5.2326		0.00		
13	TRG	PZ-102-SS DIS	04/11/13 09:10	1.0000	0.2338	5.2528		0.00		
14	TRG	PZ-102R-SS TOT	04/11/13 11:30	1.0000	0.2322	5.2168		0.00		
15	TRG	PZ-102R-SS DIS	04/11/13 11:30	1.0000	0.2317	5.2056		0.00		
16	TRG	PZ-104-SD TOT	04/11/13 11:38	1.0000	0.2325	5.2236		0.00		
17	TRG	PZ-104-SD DIS	04/11/13 11:38	1.0000	0.2316	5.2034		0.00		
18	TRG	PZ-104-SS TOT	04/11/13 12:59	1.0000	0.2326	5.2258		0.00		
19	TRG	PZ-104-SS DIS	04/11/13 12:59	1.0000	0.2307	5.1831		0.00		

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04106	1	ThISO	liters	5/7/2013	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				1.00E+00	1.0000E+00	1.0000E+00				
02	BLANK	MBL				1.00E+00	1.0000E+00	1.0000E+00				
03	PZ-111-KS TOT	DUP				1.00E+00	1.0000E+00	1.0000E+00				
04	PZ-111-KS TOT	DO				1.00E+00	1.0000E+00	1.0000E+00				
05	PZ-111-KS DIS	TRG				1.00E+00	1.0000E+00	1.0000E+00				
06	D-6 TOT	TRG				1.00E+00	1.0000E+00	1.0000E+00				
07	D-6 DIS	TRG				1.00E+00	1.0000E+00	1.0000E+00				
08	D-83 TOT	TRG				1.00E+00	1.0000E+00	1.0000E+00				
09	D-83 DIS	TRG				1.00E+00	1.0000E+00	1.0000E+00				
10	DUP 05 TOT	TRG				1.00E+00	1.0000E+00	1.0000E+00				
11	DUP 05 DIS	TRG				1.00E+00	1.0000E+00	1.0000E+00				
12	PZ-102-SS TOT	TRG				1.00E+00	1.0000E+00	1.0000E+00				
13	PZ-102-SS DIS	TRG				1.00E+00	1.0000E+00	1.0000E+00				
14	PZ-102R-SS TOT	TRG				1.00E+00	1.0000E+00	1.0000E+00				
15	PZ-102R-SS DIS	TRG				1.00E+00	1.0000E+00	1.0000E+00				
16	PZ-104-SD TOT	TRG				1.00E+00	1.0000E+00	1.0000E+00				
17	PZ-104-SD DIS	TRG				1.00E+00	1.0000E+00	1.0000E+00				
18	PZ-104-SS TOT	TRG				1.00E+00	1.0000E+00	1.0000E+00				
19	PZ-104-SS DIS	TRG				1.00E+00	1.0000E+00	1.0000E+00				

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

Technician: _____

JB

Date: _____

4/25/13

US EPA ARCHIVE DOCUMENT



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5/2/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_003
 Chamber Serial Number:
 Detector Serial Number: 3
 Env. Background: System Bkgd 55734
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 5/1/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:48:31 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.475 mL
 Effective Efficiency: 0.2020 +/- 0.0123
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 1.1565 +/- 0.0736

Control Certificate Name: NatTh_Th-8
 Chem. Recov. of Control: TH-232 1.125063 +/- 0.094350
 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	5.779	11.79	63.03	2.21	0.00E+000	4.5
TH-228	5.377	444.94	9.33	3.06	0.00E+000	19.6
TH-229 T	4.883	365.98	10.26	1.02	0.00E+000	4.4
TH-230	4.641	409.64	9.70	1.36	0.00E+000	26.8
TH-232	3.959	412.81	9.66	1.19	0.00E+000	62.3

T = Tracer Peak used for Effective Efficiency

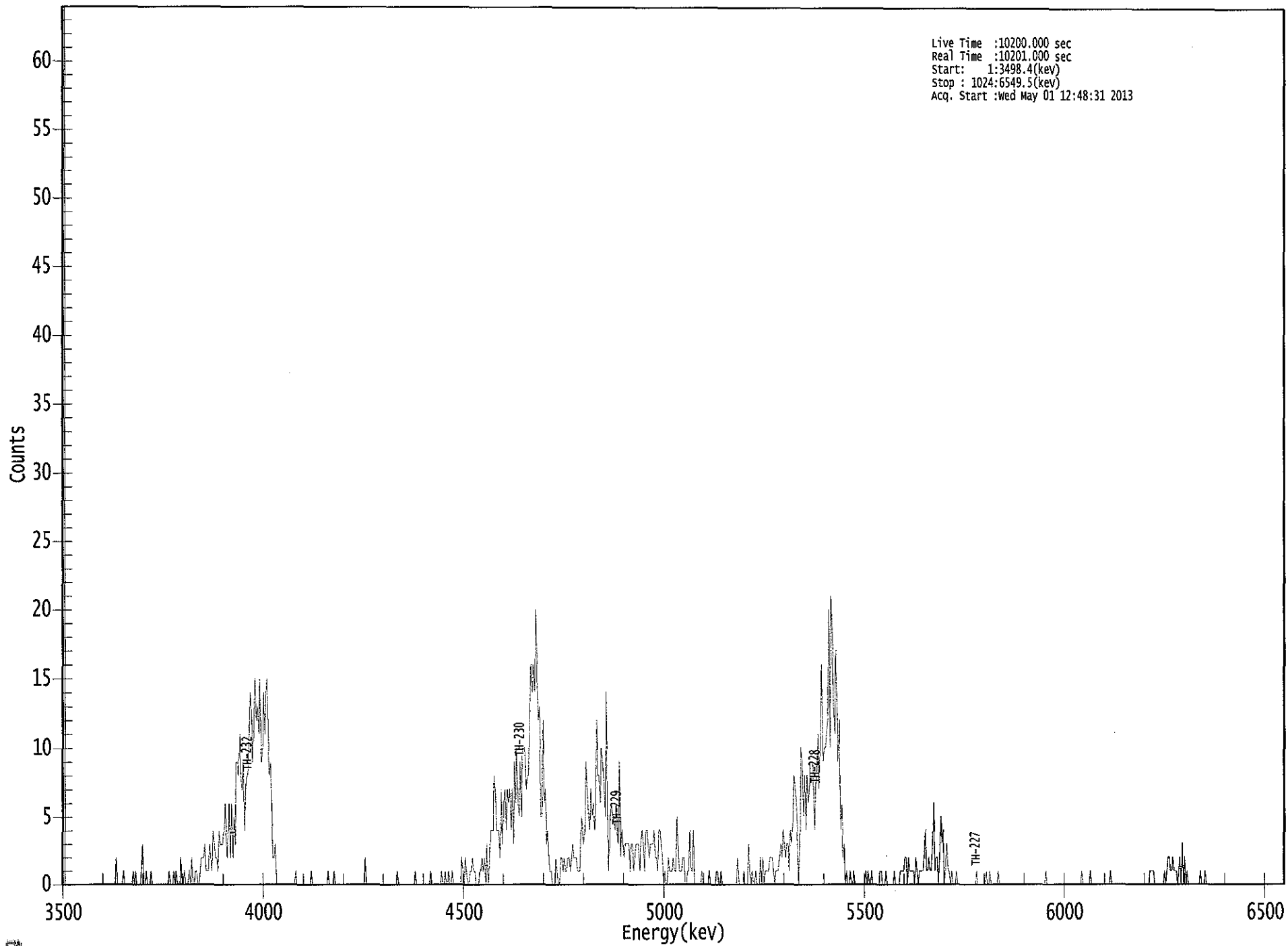
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.974	5850.00*	1.59E-001 +/- 1.02E-001	1.08E-001 +/- 1.28E-002
TH-228	0.997	5400.00*	5.84E+000 +/- 8.85E-001	1.17E-001 +/- 1.40E-002
TH-229	0.999	4872.00*	4.82E+000 +/- 5.75E-001	8.31E-002 +/- 9.91E-003
TH-230	0.995	4672.00*	5.38E+000 +/- 8.28E-001	9.01E-002 +/- 1.07E-002
TH-232	0.993	3997.00*	5.42E+000 +/- 8.31E-001	8.64E-002 +/- 1.03E-002

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US EPA ARCHIVE DOCUMENT

000056825.CNF



Live Time :10200.000 sec
Real Time :10201.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :wed May 01 12:48:31 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: 01

Elapsed Live time: 10200

Elapsed Real Time: 10201

Channel	10201	10200	0	0	0	0	0	0	0
1:	10201	10200	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	2	0	0	0
49:	0	0	0	1	0	0	0	0	0
57:	0	0	0	1	0	1	0	0	0
65:	0	0	1	3	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	1	0	0	0	1	0	0	1
97:	0	0	0	2	0	0	1	0	0
105:	0	0	1	0	2	0	0	0	1
113:	1	0	0	1	2	2	2	2	3
121:	1	1	1	3	2	1	4	3	3
129:	2	2	1	4	3	3	3	3	4
137:	6	3	2	6	2	6	2	2	5
145:	3	9	9	8	11	8	7	9	9
153:	4	7	8	8	12	14	12	9	9
161:	12	15	12	13	11	15	9	9	9
169:	14	11	14	15	10	8	9	5	5
177:	2	2	3	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0	0
193:	0	0	0	1	0	0	0	0	0
201:	0	0	0	0	0	0	0	0	0
209:	1	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	1	0	0
225:	0	0	0	1	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	2	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:	1	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0	1
297:	0	0	0	0	0	0	0	0	0
305:	0	0	0	0	1	0	0	0	0
313:	0	0	0	0	0	1	0	0	0
321:	1	0	0	1	0	0	1	0	0
329:	0	0	0	0	0	0	2	1	1
337:	0	2	1	0	0	1	1	2	2
345:	1	1	0	0	0	1	1	2	2
353:	1	2	0	3	0	1	4	4	4
361:	4	8	7	4	4	4	2	7	7

369: 3 6 7 4 7 6 7 4

Sample Title: 01

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

Sample Title: 01

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



C
51246

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_004
 Chamber Serial Number:
 Detector Serial Number: 4
 Env. Background: System Bkgd 55735
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 5/1/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:48:32 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: 0.2002 +/- 0.0162
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 1.0318 +/- 0.0855

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.826	1.62	253.91	2.38	0.00E+000	2.9
TH-228	5.392	0.77	542.87	3.23	0.00E+000	2.9
TH-229 T	4.858	180.98	14.62	1.02	0.00E+000	4.9
TH-230	4.660	19.15	45.94	0.85	0.00E+000	2.9
TH-232	3.906	3.49	113.53	0.51	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

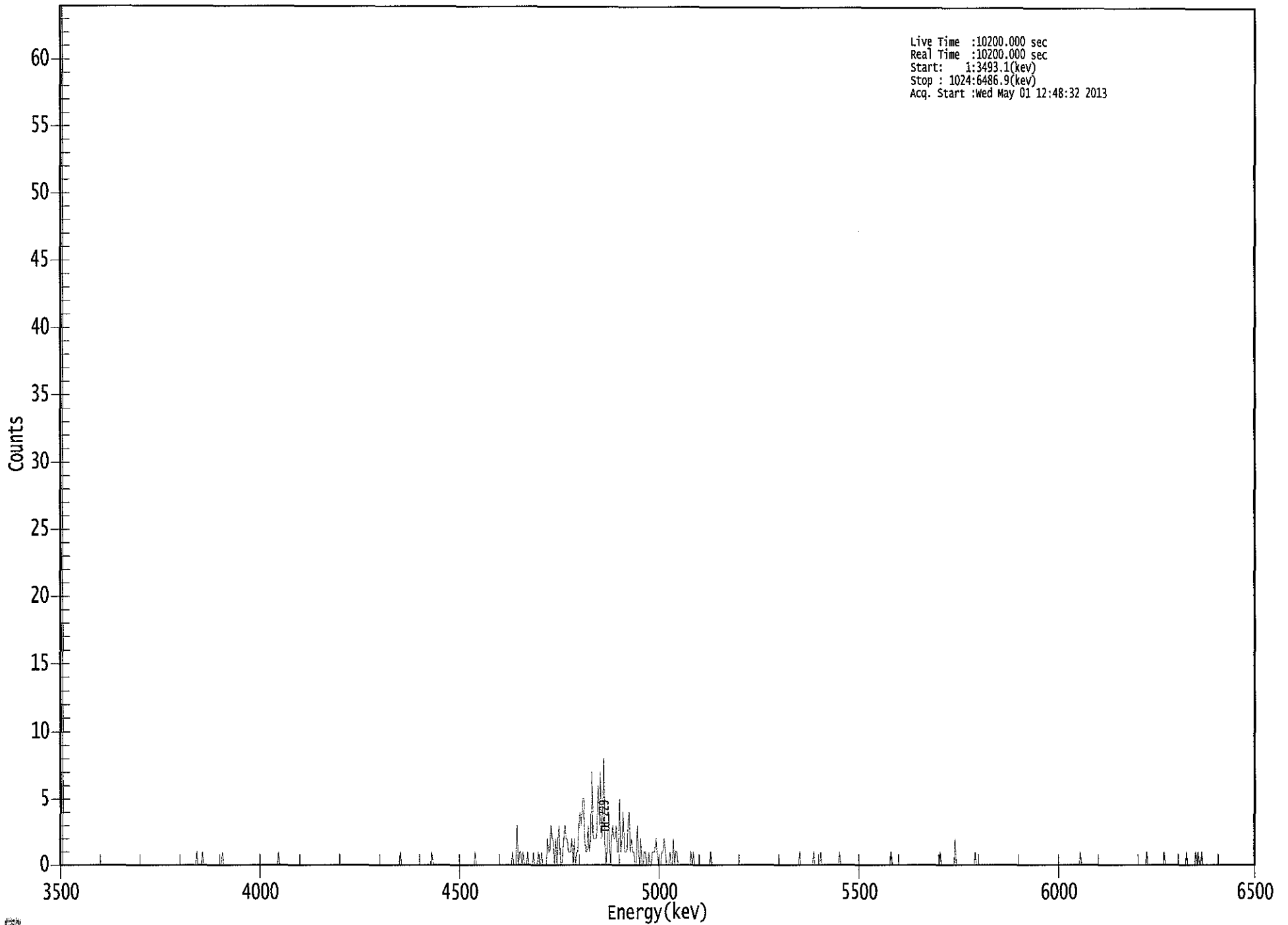
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	2.20E-002 +/- 5.59E-002	1.11E-001 +/- 1.76E-002
TH-228	1.000	5400.00*	1.02E-002 +/- 5.54E-002	1.21E-001 +/- 1.91E-002
TH-229	0.999	4872.00*	2.41E+000 +/- 3.81E-001	8.38E-002 +/- 1.33E-002
TH-230	0.999	4672.00*	2.54E-001 +/- 1.23E-001	7.94E-002 +/- 1.26E-002
TH-232	0.958	3997.00*	4.62E-002 +/- 5.29E-002	6.95E-002 +/- 1.10E-002

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US EPA ARCHIVE DOCUMENT

0000056826.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 01 12:48:32 2013



US EPA ARCHIVE DOCUMENT

0271

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	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	1	0	0
121:	0	0	1	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	1	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	1	0	0	0	0
193:	0	0	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	1	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	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	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: 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	1	0	0	0	0	3
393:	0	1	1	0	1	0	0	0	0
401:	1	0	0	0	0	1	0	0	0
409:	0	1	0	0	1	0	0	0	0
417:	0	2	1	1	3	2	2	0	0
425:	2	0	2	3	0	0	1	2	2
433:	3	2	2	1	1	1	2	0	0
441:	2	0	1	1	3	4	3	5	5
449:	5	2	1	1	3	1	2	7	7
457:	2	2	2	2	6	3	7	2	2
465:	4	8	2	0	1	4	2	0	0
473:	2	3	2	2	3	1	1	5	5
481:	1	2	4	1	1	1	3	4	4
489:	1	2	1	1	0	0	3	1	1
497:	0	2	0	0	1	1	0	0	0
505:	1	0	0	1	1	1	2	1	1
513:	0	0	0	1	1	2	1	0	0
521:	0	0	1	0	0	2	0	1	1
529:	1	0	0	0	0	0	0	0	0
537:	0	0	0	0	1	0	1	0	0
545:	0	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	1	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	1	0	0	0	0	0	0	0
641:	0	0	0	0	0	1	0	0	0
649:	0	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	0	0	0	0
665:	0	0	0	1	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	1	1
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	1	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	2	0	0
769:	0	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	1	1
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: 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	1	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	1	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	1	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	1	0	0	0
969:	0	0	0	0	1	0	1	0
977:	0	1	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C
R 2/11/13

Sample Description: PZ-111-KS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_010
 Chamber Serial Number:
 Detector Serial Number: 10
 Env. Background: System Bkgd 55736
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:48:27 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: 0.2410 +/- 0.0180
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 1.2251 +/- 0.0944

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	5.896	0.11	3327.8	2.89	0.00E+000	2.9
TH-228	5.360	13.92	60.88	4.08	0.00E+000	2.9
TH-229 T	4.877	217.30	13.36	1.70	0.00E+000	6.2
TH-230	4.636	16.64	50.29	1.36	0.00E+000	2.9
TH-232	3.959	7.81	76.13	1.19	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

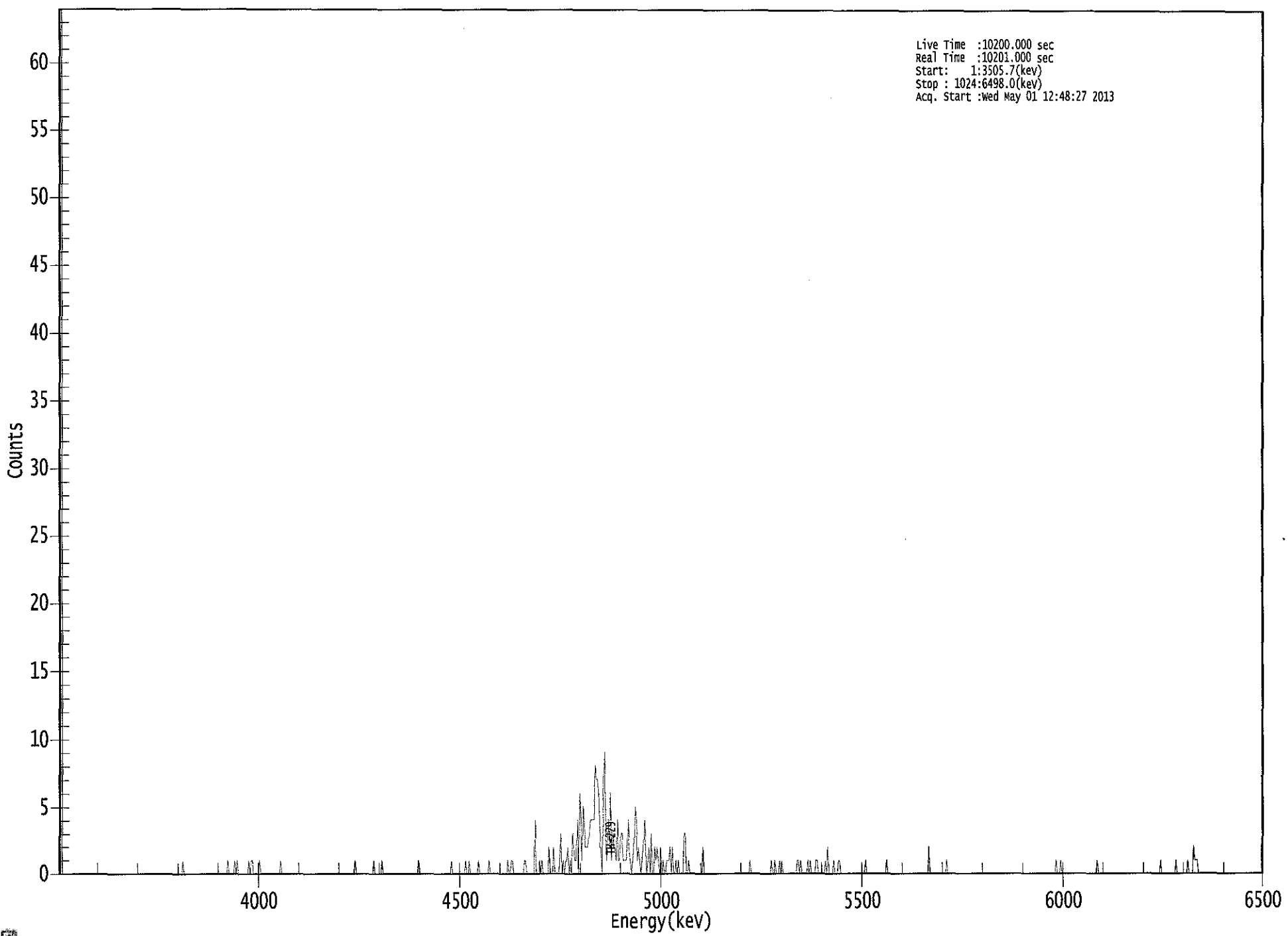
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.989	5850.00*	1.24E-003 +/- 4.14E-002	9.89E-002 +/- 1.45E-002
TH-228	0.992	5400.00*	1.57E-001 +/- 9.80E-002	1.11E-001 +/- 1.63E-002
TH-229	1.000	4872.00*	2.40E+000 +/- 3.52E-001	8.12E-002 +/- 1.19E-002
TH-230	0.993	4672.00*	1.83E-001 +/- 9.60E-002	7.55E-002 +/- 1.11E-002
TH-232	0.992	3997.00*	8.59E-002 +/- 6.66E-002	7.24E-002 +/- 1.06E-002

AG
5/2/13

US EPA ARCHIVE DOCUMENT

0000056821.CNF

Live Time :10200.000 sec
Real Time :10201.000 sec
Start : 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :wed May 01 12:48:27 2013



US EPA ARCHIVE DOCUMENT

0276

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 03

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

801: 0 0 0 0 0 0 0 0 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	1
849:	0	0	0	1	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	1	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	1	0	0	0	0	0	0	0
945:	0	0	0	0	0	1	0	0
953:	0	0	0	0	0	0	0	1
961:	0	0	0	0	2	1	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	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
5/2/13

Sample Description: PZ-111-KS TOT
 Spectrum File: \\OR-ALPHA\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_011
 Chamber Serial Number:
 Detector Serial Number: 11
 Env. Background: System Bkgd 55737
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:48:28 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: 0.2429 +/- 0.0182
 Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
 Chem. Recovery Factor: 1.2312 +/- 0.0957

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.742	0.13	2294.8	1.87	0.00E+000	2.7
TH-228	5.347	9.96	69.15	2.04	0.00E+000	2.7
TH-229 T	4.873	217.47	13.35	1.53	0.00E+000	2.9
TH-230	4.629	18.66	45.85	0.34	0.00E+000	2.7
TH-232	3.969	11.49	59.30	0.51	0.00E+000	2.7

T = Tracer Peak used for Effective Efficiency

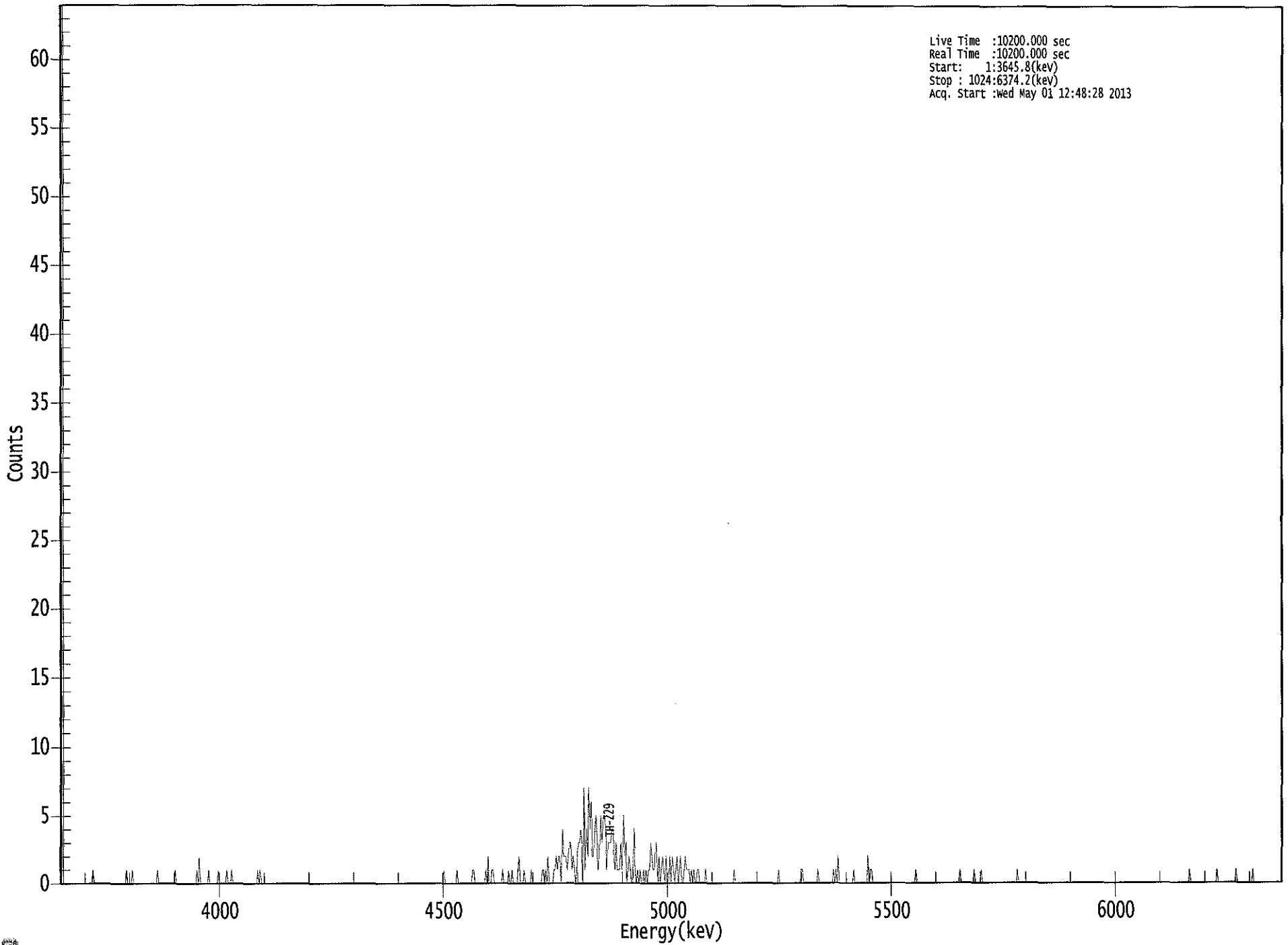
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.941	5850.00*	1.46E-003 +/- 3.34E-002	8.49E-002 +/- 1.24E-002
TH-228	0.985	5400.00*	1.11E-001 +/- 7.86E-002	8.69E-002 +/- 1.27E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 3.50E-001	7.79E-002 +/- 1.14E-002
TH-230	0.990	4672.00*	2.04E-001 +/- 9.82E-002	5.22E-002 +/- 7.66E-003
TH-232	0.996	3997.00*	1.25E-001 +/- 7.66E-002	5.72E-002 +/- 8.39E-003

AG
5/2/13

0000056822.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3645.8(kev)
Stop : 1024:6374.2(kev)
Acq. Start :Wed May 01 12:48:28 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0281

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

369: 0 0 1 0 0 0 0 0 1

Sample Title: 04

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	1	0	0	0	0	1
385:	2	0	0	0	1	0	0	0
393:	0	0	1	0	0	0	0	0
401:	0	0	0	1	1	0	1	0
409:	2	0	0	0	0	1	1	2
417:	1	2	2	0	4	2	2	2
425:	1	2	3	3	1	2	1	0
433:	1	3	3	4	3	0	7	1
441:	4	2	7	4	6	2	2	4
449:	5	3	1	2	5	3	5	5
457:	4	1	3	3	3	4	4	2
465:	1	3	1	1	1	3	1	5
473:	2	3	0	1	2	1	0	0
481:	4	1	0	1	0	1	0	0
489:	1	0	1	0	1	1	3	2
497:	1	1	3	2	0	2	0	1
505:	2	1	0	2	0	0	2	0
513:	2	1	0	1	2	0	1	2
521:	0	0	1	2	1	1	1	0
529:	1	0	1	0	0	1	1	0
537:	0	0	0	0	1	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	1	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	1	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	1	1	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	1
649:	0	1	0	2	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	1	0	0	0	0	0	0	0
673:	0	0	0	0	2	0	1	1
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	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	1	0	0	0	0	0	0
761:	0	0	0	0	0	1	0	0
769:	0	0	0	1	0	0	0	0
777:	0	0	0	0	0	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: 04

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



Apex-Alpha™

C
5/2/13

Sample Description: PZ-111-KS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_013
 Chamber Serial Number:
 Detector Serial Number: 13
 Env. Background: System Bkgd 55738
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:48:29 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: 0.1799 +/- 0.0153
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 0.9626 +/- 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	5.821	2.94	170.25	3.06	0.00E+000	0.0
TH-228	5.343	-0.57	652.66	3.57	0.00E+000	2.8
TH-229 T	4.855	159.49	15.55	0.51	0.00E+000	6.4
TH-230	4.614	9.49	65.59	0.51	0.00E+000	2.8
TH-232	4.070	0.49	417.03	0.51	0.00E+000	2.8

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

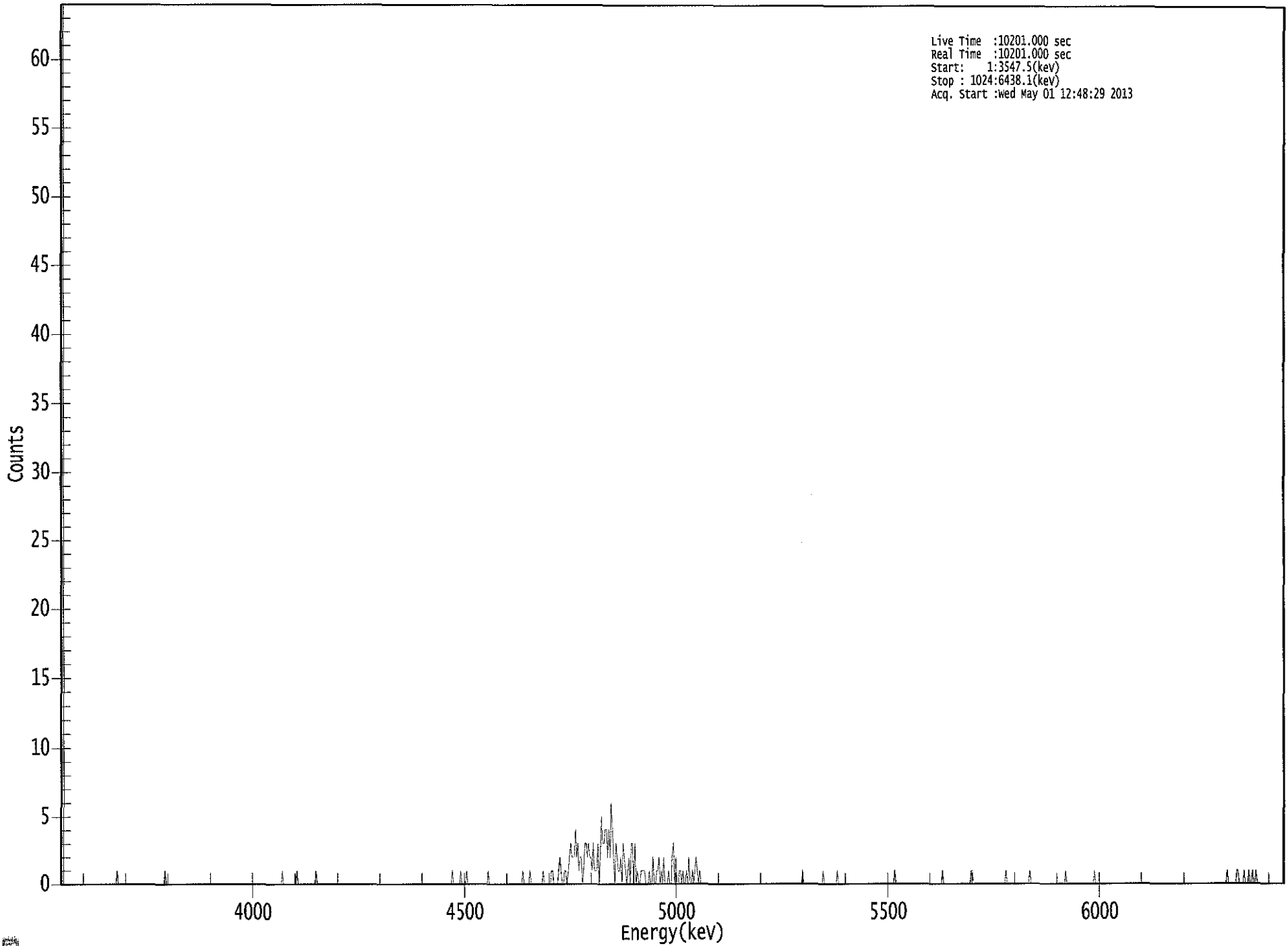
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.996	5850.00*	4.45E-002 +/- 7.61E-002	1.35E-001 +/- 2.26E-002
TH-228	0.983	5400.00*	-8.59E-003 +/- 5.61E-002	1.42E-001 +/- 2.37E-002
TH-229	0.999	4872.00*	2.36E+000 +/- 3.94E-001	7.77E-002 +/- 1.30E-002
TH-230	0.983	4672.00*	1.40E-001 +/- 9.48E-002	7.74E-002 +/- 1.29E-002
TH-232	0.972	3997.00*	7.22E-003 +/- 3.01E-002	7.73E-002 +/- 1.29E-002

AG
5/2/13

US EPA ARCHIVE DOCUMENT

0000056823.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3547.5(keV)
Stop : 1024:6438.1(keV)
Acq. Start :wed May 01 12:48:29 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0286

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

Sample Title: 05

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	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	0	0	0	0
81:	0	0	0	0	0	0	0	1
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	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	1	0	0	0	0	0	0
193:	0	0	0	0	0	1	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	1	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	1
329:	0	0	0	0	0	0	1	0
337:	0	0	0	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	1	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 05

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

801: 0 0 0 0 0 0 0 0

Sample Title: 05

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



C
JLW

Sample Description: D-6 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_014
 Chamber Serial Number:
 Detector Serial Number: 14
 Env. Background: System Bkgd 55739
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:48:30 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: 0.2145 +/- 0.0169
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 1.1623 +/- 0.0941

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	5.800	0.09	4723.7	3.91	0.00E+000	5.9
TH-228	5.367	10.92	71.11	4.08	0.00E+000	2.9
TH-229 T	4.864	191.81	14.20	1.19	0.00E+000	9.8
TH-230	4.641	10.32	63.32	0.68	0.00E+000	2.9
TH-232	3.956	3.15	126.68	0.85	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

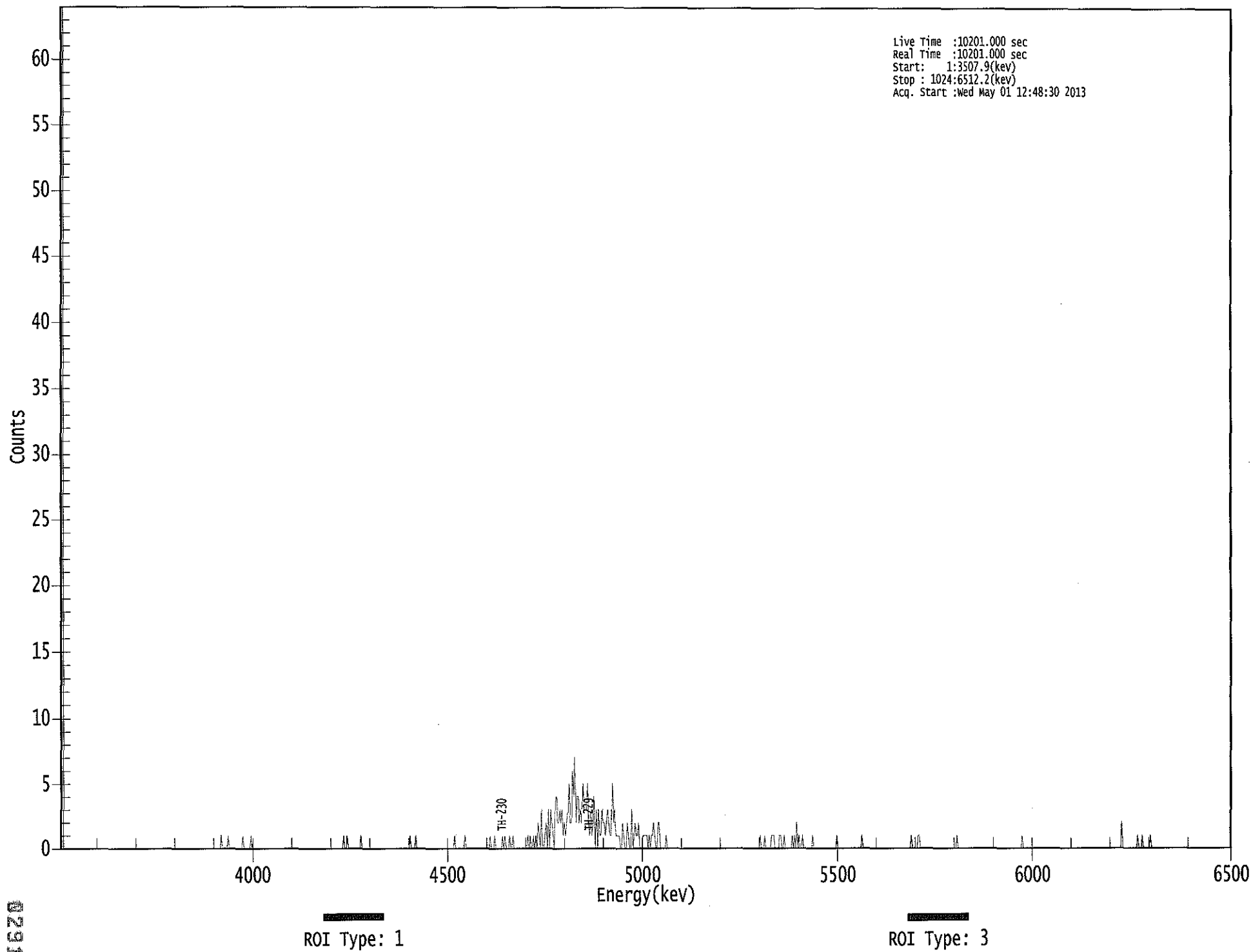
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.987	5850.00*	1.14E-003 +/- 5.37E-002	1.24E-001 +/- 1.91E-002
TH-228	0.994	5400.00*	1.38E-001 +/- 1.00E-001	1.25E-001 +/- 1.93E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 3.68E-001	8.18E-002 +/- 1.26E-002
TH-230	0.995	4672.00*	1.28E-001 +/- 8.32E-002	6.98E-002 +/- 1.08E-002
TH-232	0.991	3997.00*	3.89E-002 +/- 4.96E-002	7.39E-002 +/- 1.14E-002

AG
5/2/13

US EPA ARCHIVE DOCUMENT

0000056824.CNF



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

Sample Title: 06

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	1	0	0	0
145:	0	0	1	0	0	0	0	0
153:	0	0	0	0	0	0	0	1
161:	0	0	0	0	0	0	1	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	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	1
249:	0	0	1	0	0	0	0	0
257:	0	0	0	0	0	0	1	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	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	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	0	0	0
345:	1	0	0	0	0	0	0	0
353:	0	1	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 1

Sample Title: 06

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	1	0	0	0	0
385:	0	0	1	0	1	0	0	0
393:	1	0	0	1	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	1	0	1	0	0	1	0	1
417:	0	2	1	0	3	0	0	1
425:	2	0	3	0	3	2	1	0
433:	4	4	2	2	3	2	3	1
441:	2	1	2	3	5	2	2	6
449:	4	7	2	4	4	2	3	2
457:	5	3	3	3	5	2	1	3
465:	1	2	4	0	3	0	3	1
473:	1	3	2	2	1	2	3	2
481:	1	1	5	2	3	1	1	1
489:	1	0	0	2	1	0	0	2
497:	1	0	0	3	0	1	2	1
505:	1	2	0	0	0	1	1	1
513:	1	0	1	0	1	1	2	1
521:	0	0	2	2	0	0	0	0
529:	0	1	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	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	1	0	0	0	1
617:	0	0	0	0	0	1	1	1
625:	0	0	0	0	1	1	0	0
633:	1	0	0	0	0	0	0	1
641:	0	1	0	2	0	1	0	0
649:	1	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	1	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	1	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	1
745:	0	0	0	0	0	1	1	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	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: 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:	1	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	2
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	1	0	0
945:	0	1	0	0	0	0	0	0
953:	1	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

S/2/13

Sample Description: D-6 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_018
 Chamber Serial Number:
 Detector Serial Number: 18
 Env. Background: System Bkgd 55740
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:00 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: 0.2263 +/- 0.0175
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 1.2742 +/- 0.1012

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	5.786	0.94	443.31	3.06	0.00E+000	3.1
TH-228	5.345	1.79	229.05	2.21	0.00E+000	3.1
TH-229 T	4.885	201.15	13.85	0.85	0.00E+000	7.9
TH-230	4.616	5.81	90.53	1.19	0.00E+000	3.1
TH-232	3.888	1.47	240.74	1.53	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

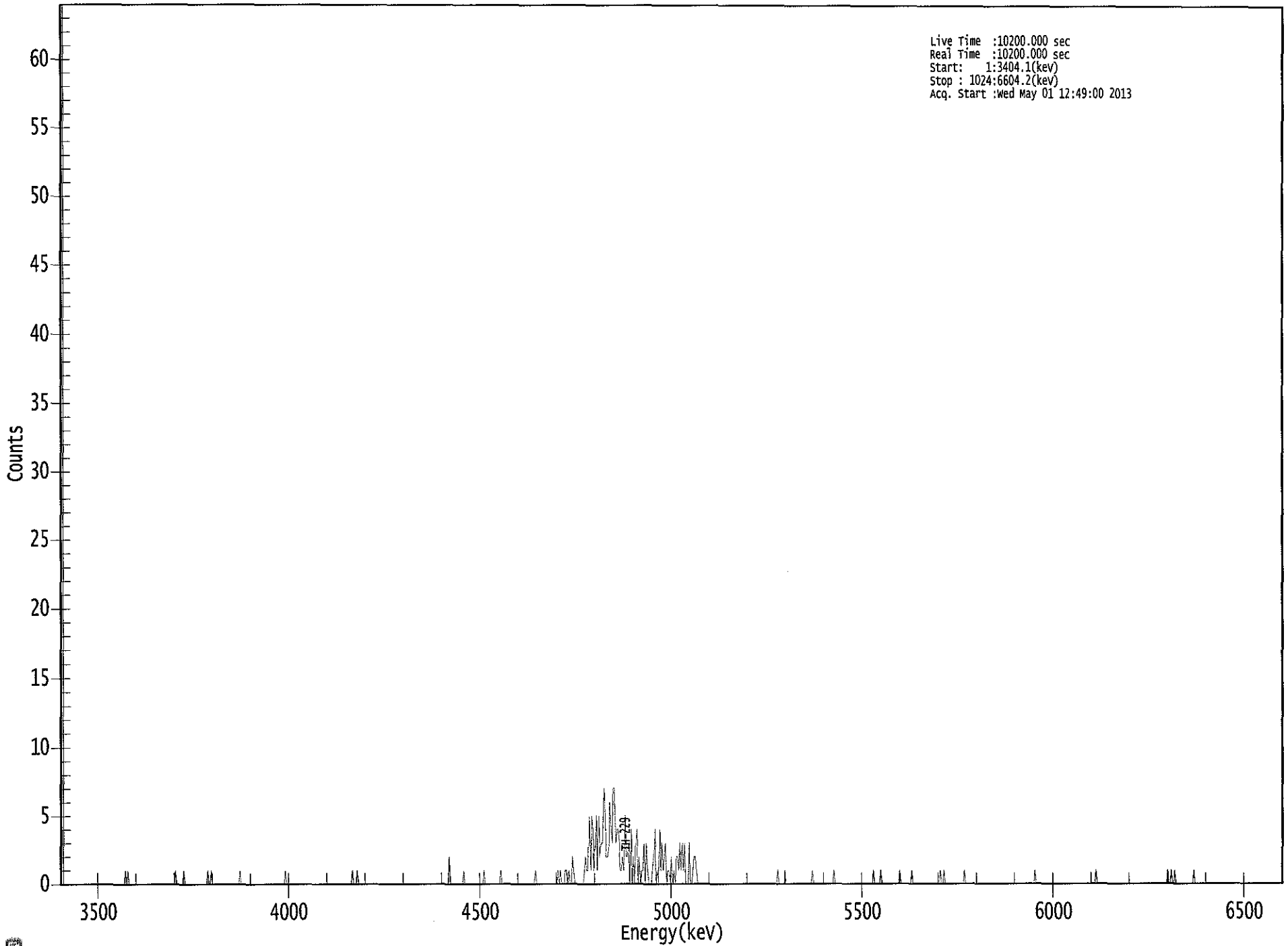
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.979	5850.00*	1.13E-002 +/- 5.02E-002	1.07E-001 +/- 1.63E-002
TH-228	0.984	5400.00*	2.14E-002 +/- 4.92E-002	9.58E-002 +/- 1.45E-002
TH-229	0.999	4872.00*	2.37E+000 +/- 3.58E-001	7.04E-002 +/- 1.07E-002
TH-230	0.984	4672.00*	6.81E-002 +/- 6.25E-002	7.73E-002 +/- 1.17E-002
TH-232	0.940	3997.00*	1.72E-002 +/- 4.15E-002	8.32E-002 +/- 1.26E-002

AG
 5/2/13

0000056828.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start :wed May 01 12:49:00 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: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 0 0 0 0 0 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0

Sample Title: 07

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

e
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Sample Description: D-83 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_022
 Chamber Serial Number:
 Detector Serial Number: 22
 Env. Background: System Bkgd 55741
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:01 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: 0.1772 +/- 0.0152
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 1.1573 +/- 0.1018

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	5.818	4.98	97.79	1.02	0.00E+000	3.1
TH-228	5.334	12.94	61.56	3.06	0.00E+000	3.1
TH-229 T	4.862	158.13	15.69	1.87	0.00E+000	4.2
TH-230	4.636	31.64	35.71	1.36	0.00E+000	4.7
TH-232	4.023	-0.36	604.11	1.36	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

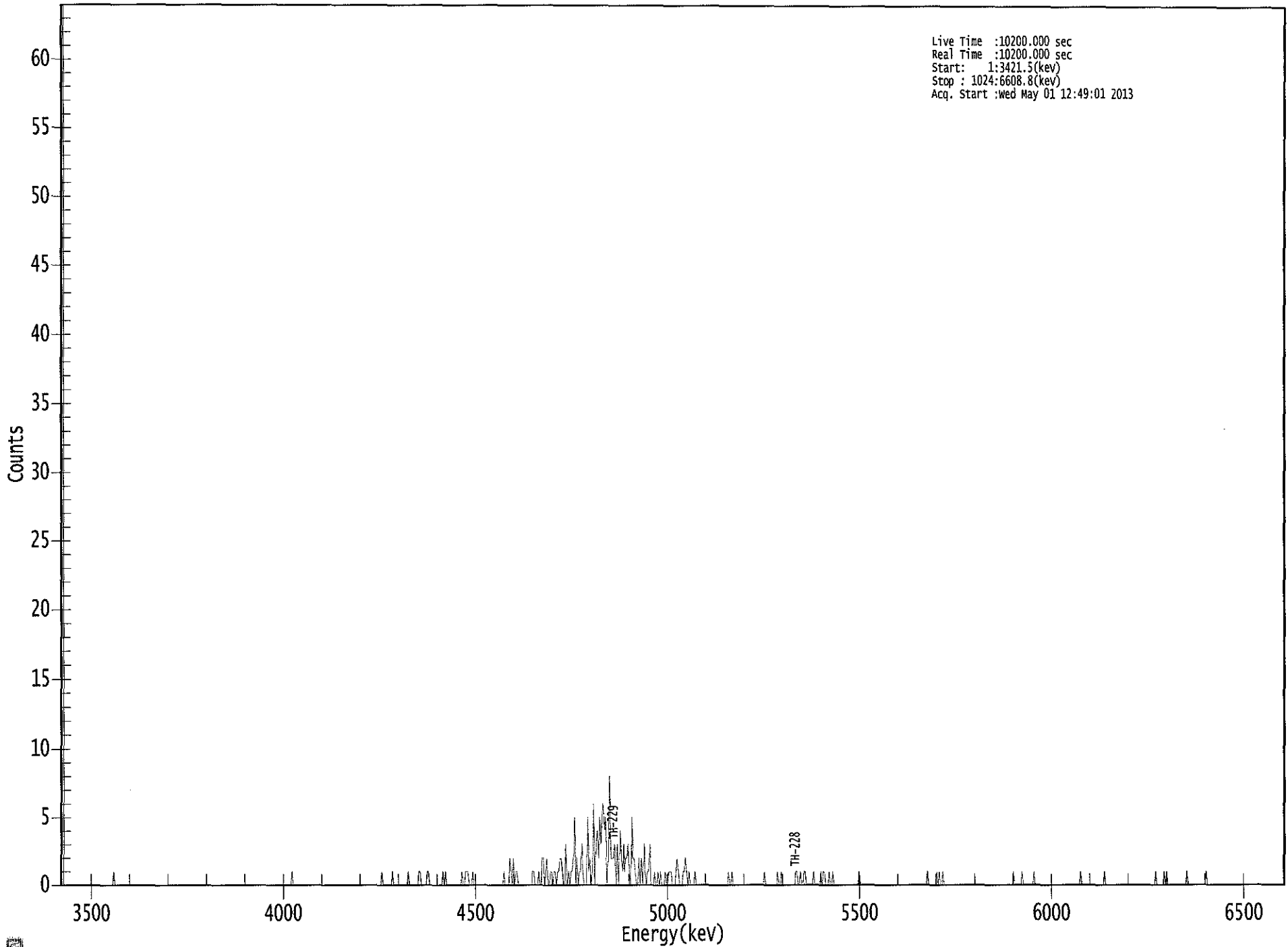
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.995	5850.00*	7.65E-002 +/- 7.59E-002	9.68E-002 +/- 1.63E-002
TH-228	0.978	5400.00*	1.98E-001 +/- 1.26E-001	1.37E-001 +/- 2.30E-002
TH-229	0.999	4872.00*	2.38E+000 +/- 4.00E-001	1.14E-001 +/- 1.91E-002
TH-230	0.993	4672.00*	4.74E-001 +/- 1.87E-001	1.03E-001 +/- 1.73E-002
TH-232	0.997	3997.00*	-5.38E-003 +/- 3.25E-002	1.02E-001 +/- 1.72E-002

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US EPA ARCHIVE DOCUMENT

0000056829.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3421.5(kev)
Stop : 1024:6608.8(kev)
Acq. Start :wed May 01 12:49:01 2013



US EPA ARCHIVE DOCUMENT

0301

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	1	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	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	0
193:	0	1	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	0	0	0	0
265:	0	0	0	0	1	0	0
273:	0	0	0	0	0	1	0
281:	0	0	0	0	0	0	0
289:	0	0	1	0	0	0	0
297:	0	0	0	1	1	0	0
305:	0	0	1	1	0	0	0
313:	0	0	0	0	0	0	1
321:	0	1	0	0	0	0	0
329:	0	0	0	0	0	0	1
337:	0	0	1	1	1	0	0
345:	1	0	0	0	0	0	0
353:	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0

369: 0 0 1 0 0 0 0 0 2

Sample Title: 08

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	1	0	2	0	1	1	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	1	1	0	0	0	1
401:	0	0	2	2	0	1	2	0
409:	0	1	1	0	1	1	0	1
417:	1	2	2	1	0	0	3	0
425:	1	0	1	1	2	5	0	2
433:	0	1	1	3	1	0	0	0
441:	5	1	2	0	1	6	0	3
449:	4	2	5	3	5	6	4	5
457:	0	2	8	2	2	2	3	2
465:	0	3	0	4	2	1	3	1
473:	2	2	3	1	0	5	2	2
481:	1	0	0	2	0	2	0	3
489:	1	0	1	1	3	0	0	0
497:	1	0	0	1	0	1	0	0
505:	0	1	0	0	1	1	1	0
513:	0	0	1	2	1	0	0	0
521:	1	1	2	1	0	1	0	0
529:	0	0	1	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	1	0
561:	0	1	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	1	0	0	0
593:	0	0	0	0	0	0	0	1
601:	0	0	1	0	0	0	0	0
609:	0	0	0	0	0	0	1	1
617:	0	0	1	0	0	1	1	0
625:	0	0	0	0	0	1	0	0
633:	0	0	0	1	0	1	1	0
641:	0	0	1	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	1	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	1	0	0	0
729:	0	0	0	0	1	0	1	0
737:	0	1	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	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	0

801: 0 0 0 1 0 0 0 0

Sample Title: 08

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	1	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	1	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	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	1	0	0	0	0
921:	0	0	1	0	1	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	1	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	1	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	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
5/1/13

Sample Description: D-83 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_024
 Chamber Serial Number:
 Detector Serial Number: 24
 Env. Background: System Bkgd 55742
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:03 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: 0.1587 +/- 0.0143
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Chem. Recovery Factor: 0.9278 +/- 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	5.875	2.11	217.68	2.89	0.00E+000	3.1
TH-228	5.302	1.96	208.49	2.04	0.00E+000	3.1
TH-229 T	4.846	140.66	16.55	0.34	0.00E+000	4.3
TH-230	4.662	12.66	55.94	0.34	0.00E+000	3.1
TH-232	3.947	-1.02	208.15	1.02	0.00E+000	0.0

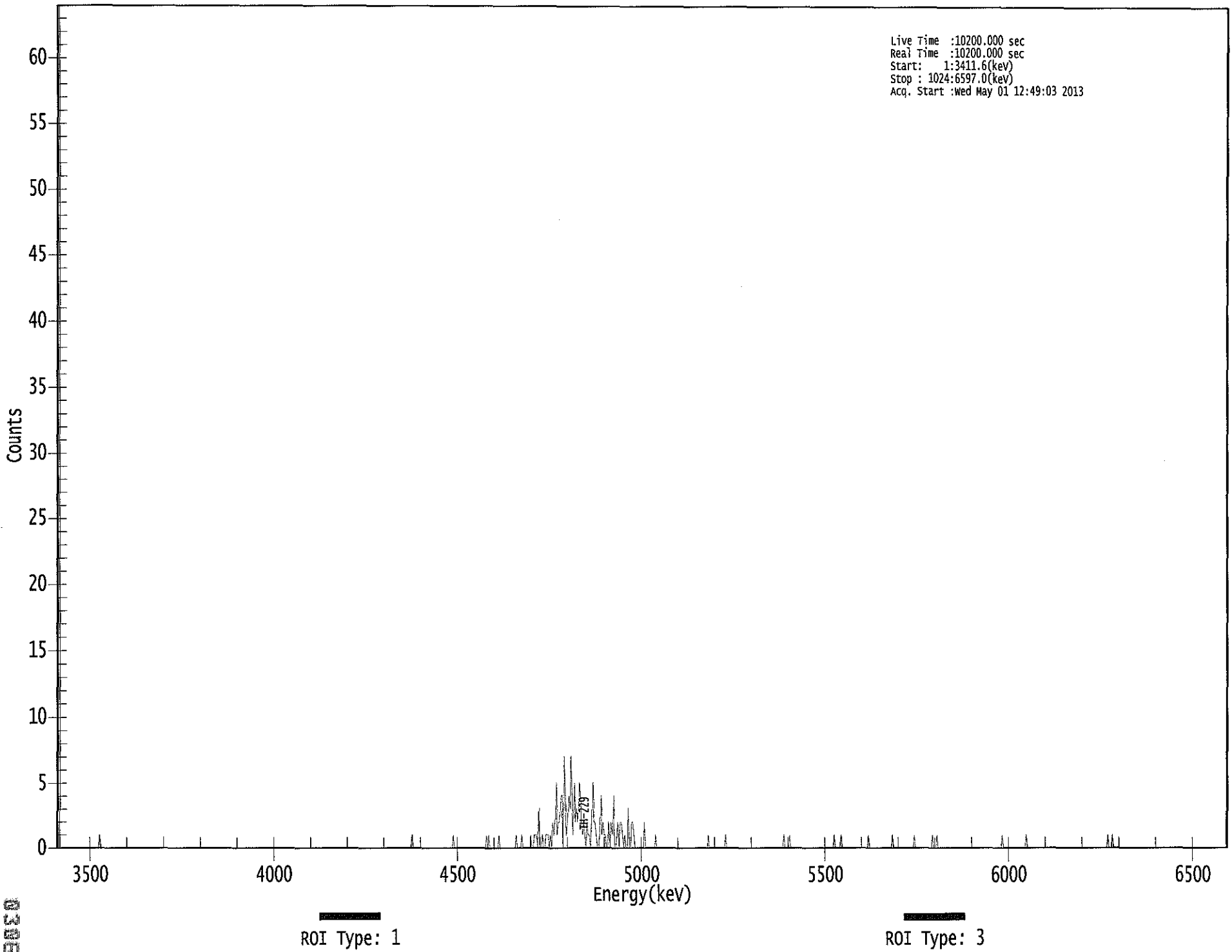
T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	3.62E-002 +/- 7.91E-002	1.50E-001 +/- 2.65E-002
TH-228	0.951	5400.00*	3.35E-002 +/- 7.00E-002	1.33E-001 +/- 2.35E-002
TH-229	0.996	4872.00*	2.36E+000 +/- 4.16E-001	8.02E-002 +/- 1.41E-002
TH-230	1.000	4672.00*	2.12E-001 +/- 1.24E-001	8.00E-002 +/- 1.41E-002
TH-232	0.987	3997.00*	-1.70E-002 +/- 3.56E-002	1.05E-001 +/- 1.85E-002

AG
5/1/13

0000056830.CNF



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

Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0 1

Sample Title: 09

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

801: 0 0 0 0 0 0 0 0 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	1	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	1	0
921:	0	0	1	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

C
5/2/13

Sample Description: DUP 05 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_025
 Chamber Serial Number:
 Detector Serial Number: 25
 Env. Background: System Bkgd 55743
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:04 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: 0.2191 +/- 0.0171
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Chem. Recovery Factor: 1.2625 +/- 0.1015

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.743	2.98	134.36	1.02	0.00E+000	3.1
TH-228	5.356	3.64	123.16	1.36	0.00E+000	3.1
TH-229 T	4.869	194.49	14.08	0.51	0.00E+000	13.6
TH-230	4.632	10.32	63.32	0.68	0.00E+000	6.3
TH-232	3.947	2.32	149.12	0.68	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

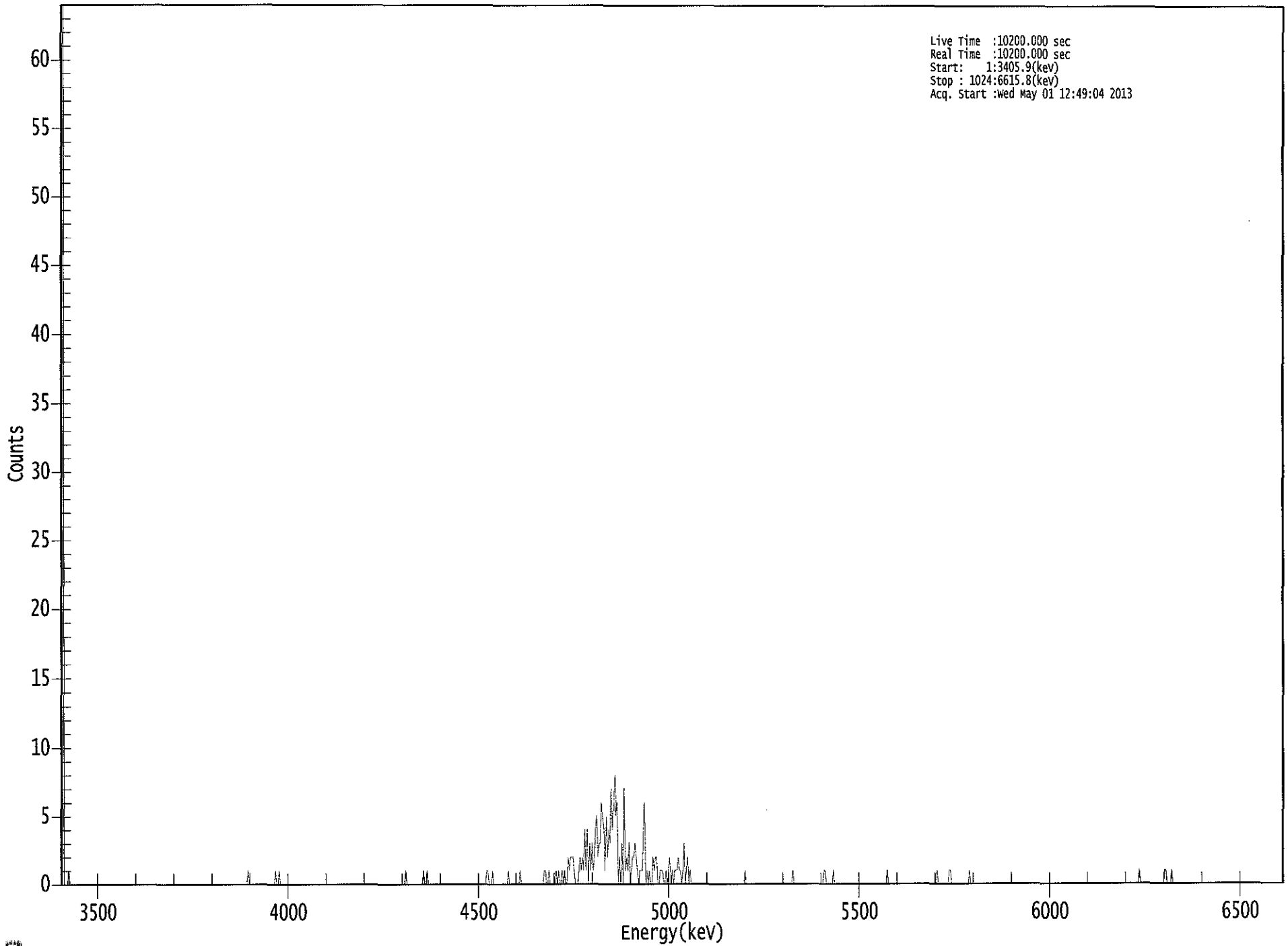
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.942	5850.00*	3.70E-002 +/- 5.01E-002	7.83E-002 +/- 1.20E-002
TH-228	0.990	5400.00*	4.50E-002 +/- 5.59E-002	8.48E-002 +/- 1.30E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 3.62E-001	6.38E-002 +/- 9.78E-003
TH-230	0.992	4672.00*	1.25E-001 +/- 8.14E-002	6.83E-002 +/- 1.05E-002
TH-232	0.987	3997.00*	2.81E-002 +/- 4.21E-002	6.82E-002 +/- 1.05E-002

AG
5/2/13

US EPA ARCHIVE DOCUMENT

0000056831.CNF



US EPA ARCHIVE DOCUMENT

0311

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	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	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	1	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	1	0	0	1	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	1	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	1
305:	0	0	1	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	1	1	0	0
361:	0	1	0	0	0	0	0	0

369: 0 0 0 0 0 0 1 0

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0

Sample Title: 10

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



C
JTW

Sample Description: DUP 05 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_027
 Chamber Serial Number:
 Detector Serial Number: 27
 Env. Background: System Bkgd 55744
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/9/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:05 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: 0.1690 +/- 0.0148
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Chem. Recovery Factor: 0.9780 +/- 0.0878

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	5.763	5.15	94.34	0.85	0.00E+000	3.2
TH-228	5.372	3.79	130.58	2.21	0.00E+000	3.2
TH-229 T	4.866	149.64	16.11	1.36	0.00E+000	5.7
TH-230	4.628	5.98	87.78	1.02	0.00E+000	3.2
TH-232	3.896	0.32	646.93	0.68	0.00E+000	3.2

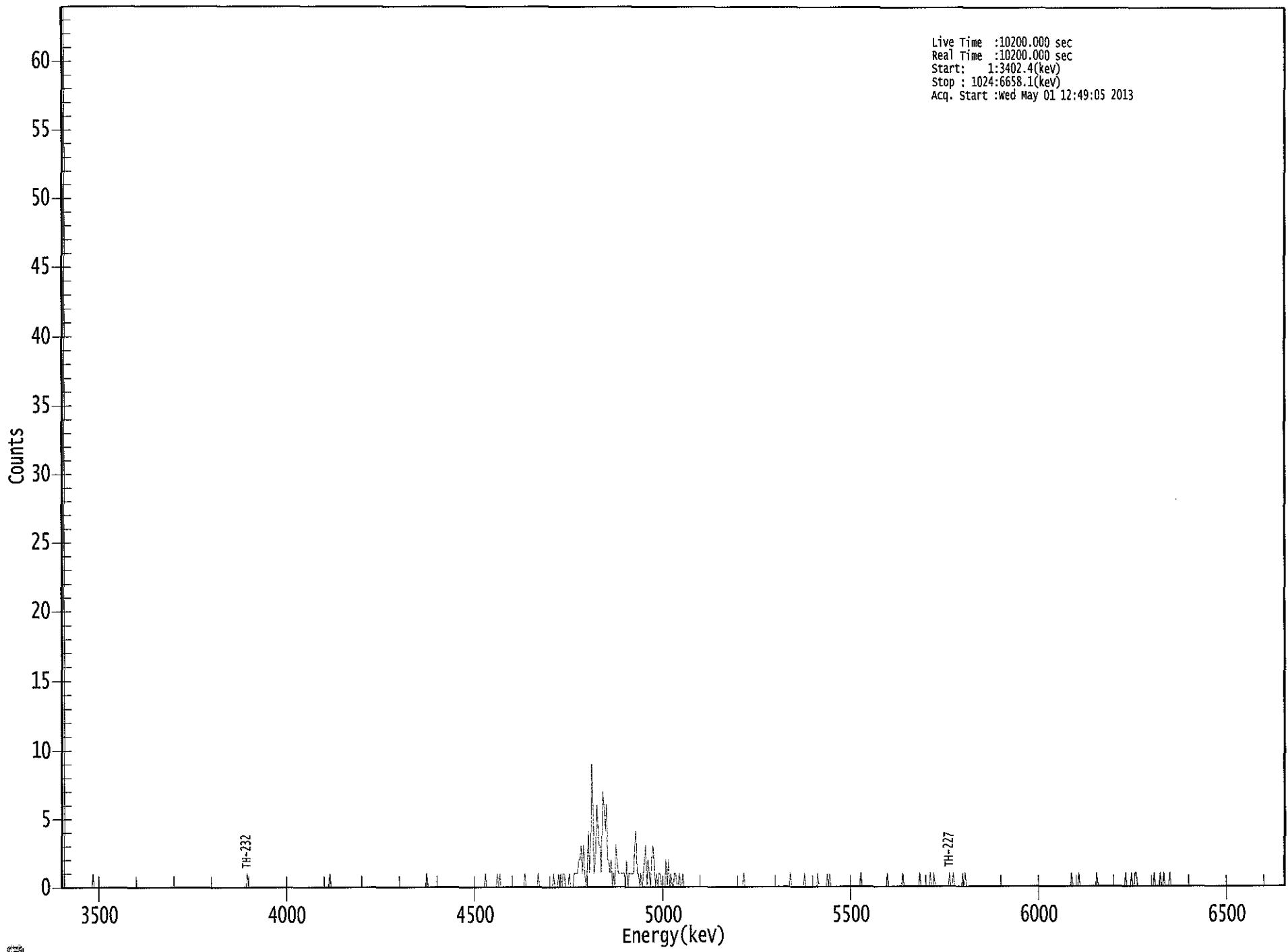
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.961	5850.00*	8.30E-002 +/- 7.96E-002	9.65E-002 +/- 1.66E-002
TH-228	0.996	5400.00*	6.08E-002 +/- 8.01E-002	1.28E-001 +/- 2.21E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 4.06E-001	1.08E-001 +/- 1.86E-002
TH-230	0.990	4672.00*	9.40E-002 +/- 8.40E-002	9.90E-002 +/- 1.70E-002
TH-232	0.948	3997.00*	5.02E-003 +/- 3.25E-002	8.85E-002 +/- 1.52E-002

AG
5/2/13

US EPA ARCHIVE DOCUMENT



9150

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:	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	1	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	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	1	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:	1	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	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	1	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	1	0	0	0	0
361:	0	0	0	0	1	0	1

369: 0 0 0 0 0 0 0 0 0

Sample Title: 11

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	1	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	1	0	0	0	1
417:	0	1	0	1	1	0	0	0
425:	1	0	0	0	1	1	1	1
433:	2	2	3	1	3	1	0	1
441:	4	1	4	9	4	1	2	6
449:	4	3	3	1	7	6	4	6
457:	2	2	1	2	0	1	0	3
465:	2	1	1	1	1	1	1	0
473:	2	0	1	1	1	1	1	3
481:	4	1	1	0	1	0	1	2
489:	3	0	2	1	0	2	3	2
497:	0	1	0	1	1	0	0	0
505:	0	2	0	2	0	1	0	0
513:	1	1	0	0	1	0	0	1
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	1	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	1	0	0	0	0	0	0
617:	0	0	0	0	0	1	0	0
625:	0	0	0	0	0	0	0	0
633:	1	0	0	0	0	0	0	0
641:	1	0	1	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	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	1	0	0	0	0	0
697:	0	0	0	0	0	0	0	1
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	1	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	0	1	0
745:	0	1	0	0	0	0	0	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 0

Sample Title: 11

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	1	0	0	0
849:	0	0	1	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	1	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	1	0	0	0	0	1	0
897:	0	1	1	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	1	0	0	0	0	1	0
921:	0	1	0	0	0	0	1	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	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
Jr 1/17

Sample Description: PZ-102-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_029
 Chamber Serial Number:
 Detector Serial Number: 29
 Env. Background: System Bkgd 55745
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:06 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: 0.1694 +/- 0.0148
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Chem. Recovery Factor: 0.8706 +/- 0.0779

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.842	10.64	64.42	1.36	0.00E+000	3.1
TH-228	5.384	202.62	13.86	2.38	0.00E+000	10.5
TH-229 T	4.878	150.64	16.05	1.36	0.00E+000	7.8
TH-230	4.631	193.15	14.14	0.85	0.00E+000	15.8
TH-232	3.958	278.00	11.78	0.00	0.00E+000	20.9

T = Tracer Peak used for Effective Efficiency

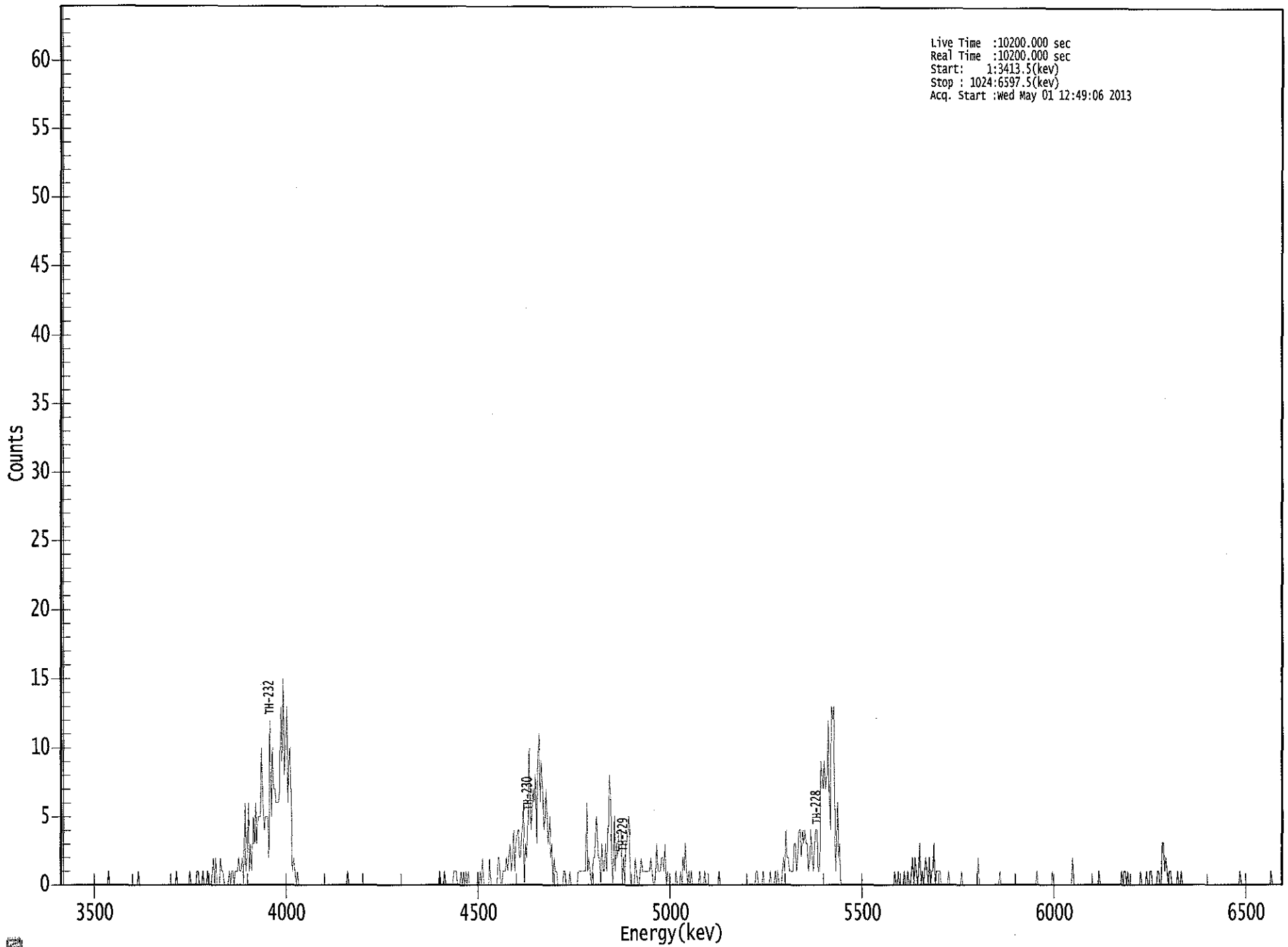
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	1.71E-001 +/- 1.14E-001	1.10E-001 +/- 1.89E-002
TH-228	0.999	5400.00*	3.24E+000 +/- 7.14E-001	1.31E-001 +/- 2.25E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 4.07E-001	1.08E-001 +/- 1.85E-002
TH-230	0.991	4672.00*	3.03E+000 +/- 6.73E-001	9.38E-002 +/- 1.61E-002
TH-232	0.992	3997.00*	4.35E+000 +/- 9.05E-001	9.38E-002 +/- 1.61E-002

AG
 5/2/13

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 :wed May 01 12:49:06 2013



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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	1	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	1	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	1	0	0	0	0	0	0
105:	0	0	0	0	1	0	0	0
113:	0	0	1	1	0	0	0	1
121:	0	0	0	1	0	0	0	1
129:	2	0	2	0	0	0	2	1
137:	1	0	0	0	0	1	0	1
145:	1	0	1	1	1	2	1	1
153:	2	0	6	1	2	6	1	3
161:	1	5	3	6	3	5	5	5
169:	10	6	4	5	5	5	2	12
177:	5	10	7	7	6	6	6	7
185:	13	9	15	8	10	13	6	9
193:	10	4	1	2	1	0	1	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	1	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	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	1	0	0	0	0	0	0
329:	0	1	1	1	0	0	0	1
337:	0	1	0	1	0	1	0	0
345:	0	0	0	0	0	1	0	1
353:	0	2	0	0	0	0	0	2
361:	0	0	0	0	0	0	2	2

369: 0 0 1 1 1 2 1 2

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 12

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	1	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	2
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	1	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	1	0	1	1	0	1	0	0
897:	0	0	0	0	0	0	0	0
905:	1	0	0	0	0	1	0	0
913:	1	1	0	0	0	0	1	1
921:	0	0	3	3	1	2	1	0
929:	1	1	0	0	0	0	0	1
937:	0	0	1	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	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	1	0	0
1017:	0	0	0	0	0	0	0	0



C
5/1/13

Sample Description: PZ-102-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_033
 Chamber Serial Number: 04026479A
 Detector Serial Number: 91132
 Env. Background: System Bkgd 55746
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:46 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.2329 +/- 0.0177
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
 Chem. Recovery Factor: 1.2766 +/- 0.0997

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	5.970	1.66	169.38	0.34	0.00E+000	3.0
TH-228	5.334	8.32	71.13	0.68	0.00E+000	3.0
TH-229 T	4.883	208.00	13.62	0.00	0.00E+000	6.5
TH-230	4.630	10.32	63.32	0.68	0.00E+000	4.5
TH-232	3.890	3.00	130.67	0.00	0.00E+000	5.9

T = Tracer Peak used for Effective Efficiency

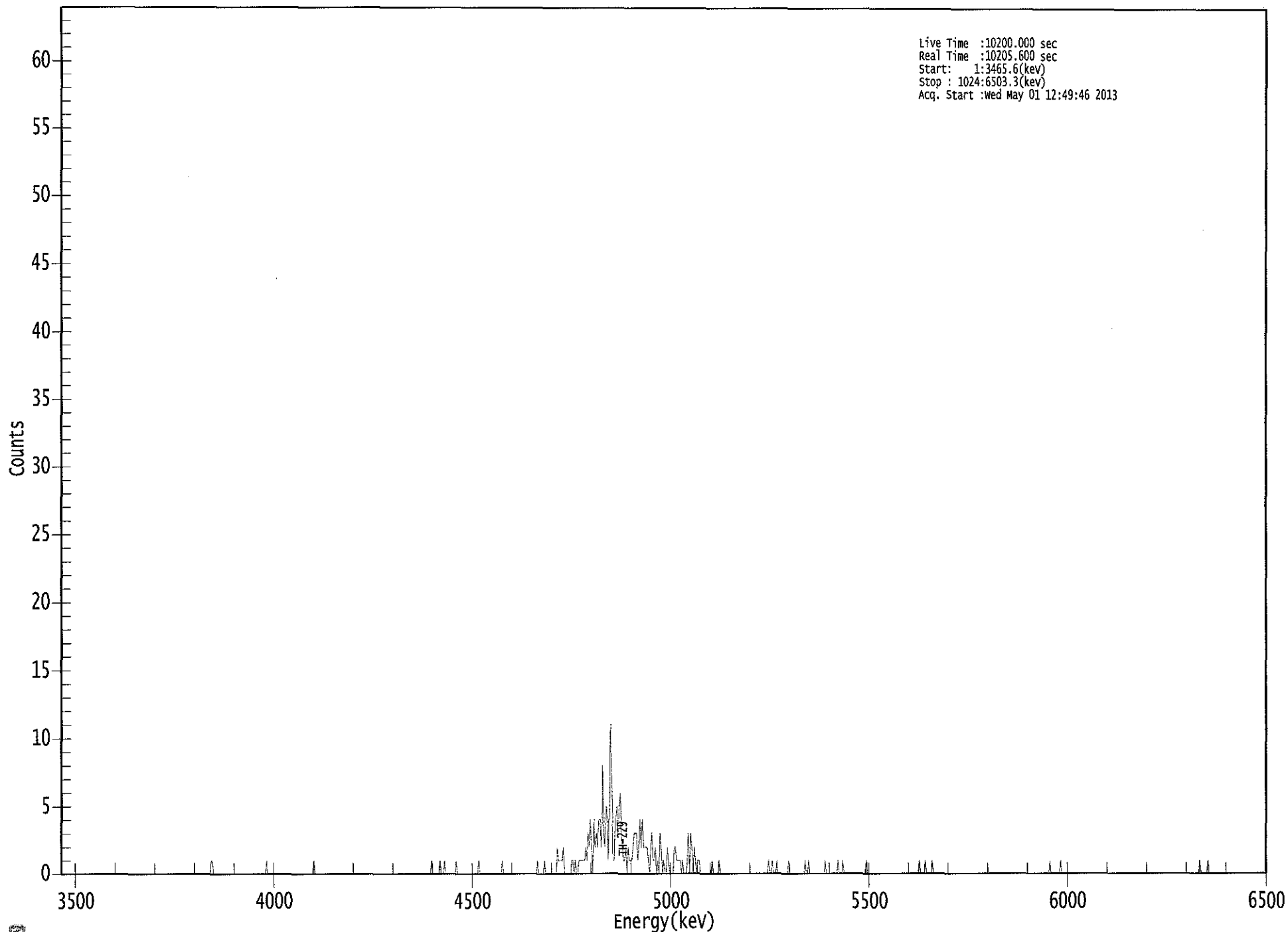
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.927	5850.00*	1.94E-002 +/- 3.30E-002	5.59E-002 +/- 8.33E-003
TH-228	0.977	5400.00*	9.66E-002 +/- 7.02E-002	6.55E-002 +/- 9.77E-003
TH-229	0.999	4872.00*	2.38E+000 +/- 3.55E-001	6.85E-002 +/- 1.02E-002
TH-230	0.991	4672.00*	1.18E-001 +/- 7.65E-002	6.43E-002 +/- 9.59E-003
TH-232	0.942	3997.00*	3.41E-002 +/- 4.49E-002	6.82E-002 +/- 1.02E-002

AG
5/2/13

US EPA ARCHIVE DOCUMENT

0000056835.CNF



Live Time :10200.000 sec
Real Time :10205.600 sec
Start: 1:3465.6(kev)
Stop : 1024:6503.3(kev)
Acq. Start :wed May 01 12:49:46 2013

0326

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: 10206

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	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	1
129:	1	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	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	0
201:	0	0	0	0	0	0	0	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	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	1	0	0	0	0	0	0
321:	0	1	0	0	0	1	0	0	0
329:	0	0	0	0	0	0	0	1	0
337:	0	0	0	0	0	0	0	0	0
345:	0	0	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 0 0 0 0 0 1 0

Sample Title: 13

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

801: 0 0 0 0 0 0 0 0

Sample Title: 13

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

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Sample Description: PZ-102R-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_034
 Chamber Serial Number: 04026479B
 Detector Serial Number: 91136
 Env. Background: System Bkgd 55747
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:49 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.232 mL
 Effective Efficiency: 0.1934 +/- 0.0160
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 1.0421 +/- 0.0879

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.752	0.66	305.43	0.34	0.00E+000	3.0
TH-228	5.373	17.83	46.68	0.17	0.00E+000	3.0
TH-229 T	4.893	171.49	14.99	0.51	0.00E+000	8.1
TH-230	4.633	19.32	45.50	0.68	0.00E+000	3.0
TH-232	3.972	26.49	38.51	0.51	0.00E+000	8.9

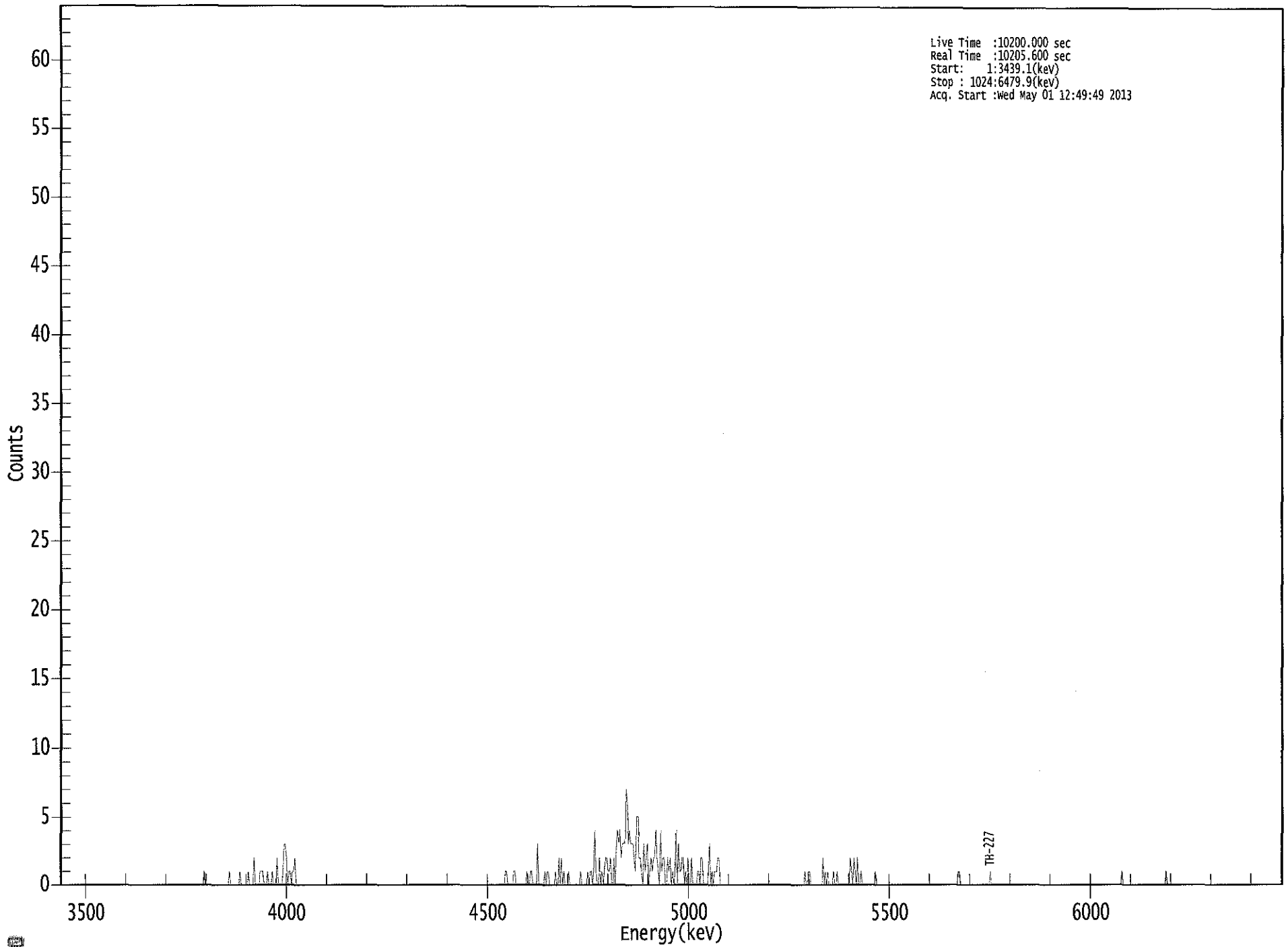
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.951	5850.00*	9.29E-003 +/- 2.84E-002	6.73E-002 +/- 1.09E-002
TH-228	0.996	5400.00*	2.49E-001 +/- 1.23E-001	5.84E-002 +/- 9.44E-003
TH-229	0.998	4872.00*	2.36E+000 +/- 3.82E-001	7.22E-002 +/- 1.17E-002
TH-230	0.992	4672.00*	2.65E-001 +/- 1.28E-001	7.74E-002 +/- 1.25E-002
TH-232	0.997	3997.00*	3.63E-001 +/- 1.52E-001	7.19E-002 +/- 1.16E-002

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Live Time :10200.000 sec
Real Time :10205.600 sec
Start: 1:3439.1(keV)
Stop : 1024:6479.9(keV)
Acq. Start :wed May 01 12:49:49 2013



 ***** 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: 10206

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	0	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:	0	0	0	0	0	1	0	0	0
145:	0	0	0	0	0	0	1	0	0
153:	0	0	0	0	0	1	0	0	0
161:	0	0	2	0	0	0	0	1	0
169:	1	1	0	0	0	1	0	0	0
177:	0	1	0	0	0	2	0	0	0
185:	0	0	1	3	3	2	0	1	0
193:	1	0	1	1	2	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	0	0	0	0	0	0

369: 0 0 0 0 1 1 0 0

Sample Title: 14

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

801: 0 0 0 0 0 0 0 0

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



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Sample Description: PZ-102R-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_035
 Chamber Serial Number: 04026477A
 Detector Serial Number: 58771
 Env. Background: System Bkgd 55748
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:43 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.232 mL
 Effective Efficiency: 0.2190 +/- 0.0171
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 1.1997 +/- 0.0962

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.792	3.32	119.77	0.68	0.00E+000	2.9
TH-228	5.347	0.66	305.43	0.34	0.00E+000	2.9
TH-229 T	4.908	193.83	14.09	0.17	0.00E+000	7.3
TH-230	4.630	4.66	94.59	0.34	0.00E+000	2.9
TH-232	3.866	0.83	239.53	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

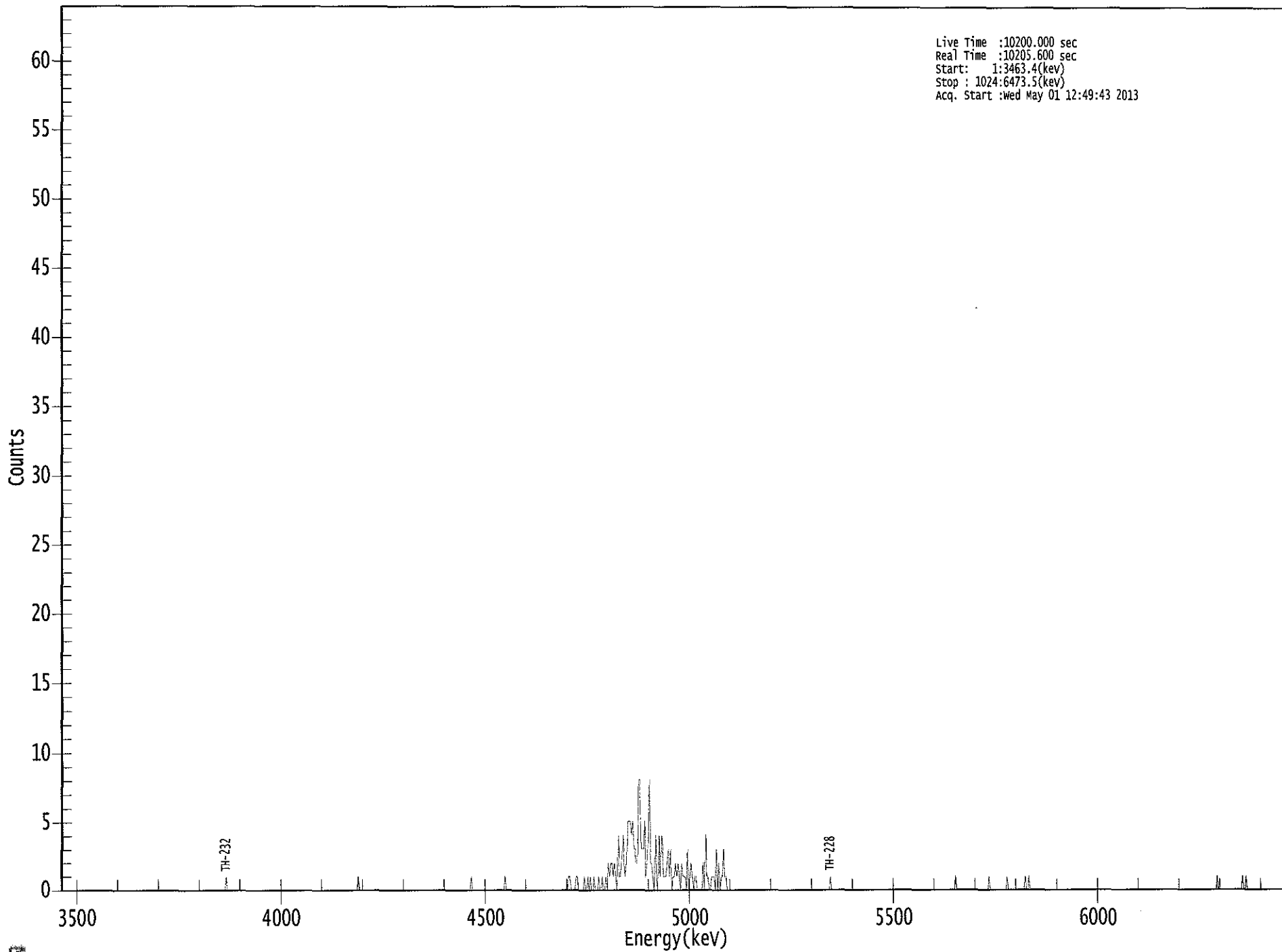
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.983	5850.00*	4.13E-002 +/- 4.98E-002	7.01E-002 +/- 1.08E-002
TH-228	0.985	5400.00*	8.15E-003 +/- 2.49E-002	5.90E-002 +/- 9.06E-003
TH-229	0.993	4872.00*	2.36E+000 +/- 3.61E-001	5.07E-002 +/- 7.78E-003
TH-230	0.991	4672.00*	5.65E-002 +/- 5.41E-002	5.79E-002 +/- 8.89E-003
TH-232	0.915	3997.00*	1.00E-002 +/- 2.41E-002	5.05E-002 +/- 7.74E-003

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US EPA ARCHIVE DOCUMENT

0000056837.CNF



9550

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: 10206

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	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	1	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	0	1
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	1	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 1 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	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	1	1
425:	0	0	0	0	1	1	0	0	0
433:	0	0	0	1	0	0	1	0	0
441:	1	0	0	1	0	0	0	0	1
449:	0	0	1	0	0	1	0	0	2
457:	1	2	2	1	2	1	0	0	4
465:	1	1	2	4	2	1	2	2	5
473:	5	5	4	5	3	3	2	2	2
481:	8	8	3	3	3	5	1	1	2
489:	4	8	2	2	1	0	4	1	1
497:	0	4	1	4	3	1	1	1	1
505:	2	3	1	3	0	1	1	1	2
513:	1	2	1	0	2	1	1	1	1
521:	0	3	0	1	2	1	0	0	1
529:	1	0	0	0	0	0	2	0	0
537:	4	1	1	0	0	1	1	1	1
545:	0	3	0	2	0	1	1	1	3
553:	1	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	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:	1	0	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:	1	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	1	0	0	0	0
777:	0	0	0	0	0	0	0	0	0
785:	0	0	0	1	0	0	0	0	0
793:	0	0	0	0	0	0	0	0	0

801: 0 0 1 0 0 1 0 0

Sample Title: 15

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

c
Thm

Sample Description: PZ-104-SD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_037
 Chamber Serial Number: 04026478A
 Detector Serial Number: 91133
 Env. Background: System Bkgd 55750
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:45 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.1644 +/- 0.0146
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Chem. Recovery Factor: 0.9222 +/- 0.0835

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	5.790	0.32	646.93	0.68	0.00E+000	2.9
TH-228	5.312	2.83	120.53	0.17	0.00E+000	2.9
TH-229 T	4.875	146.00	16.28	0.00	0.00E+000	4.6
TH-230	4.618	10.66	61.14	0.34	0.00E+000	2.9
TH-232	3.834	1.00	277.19	0.00	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

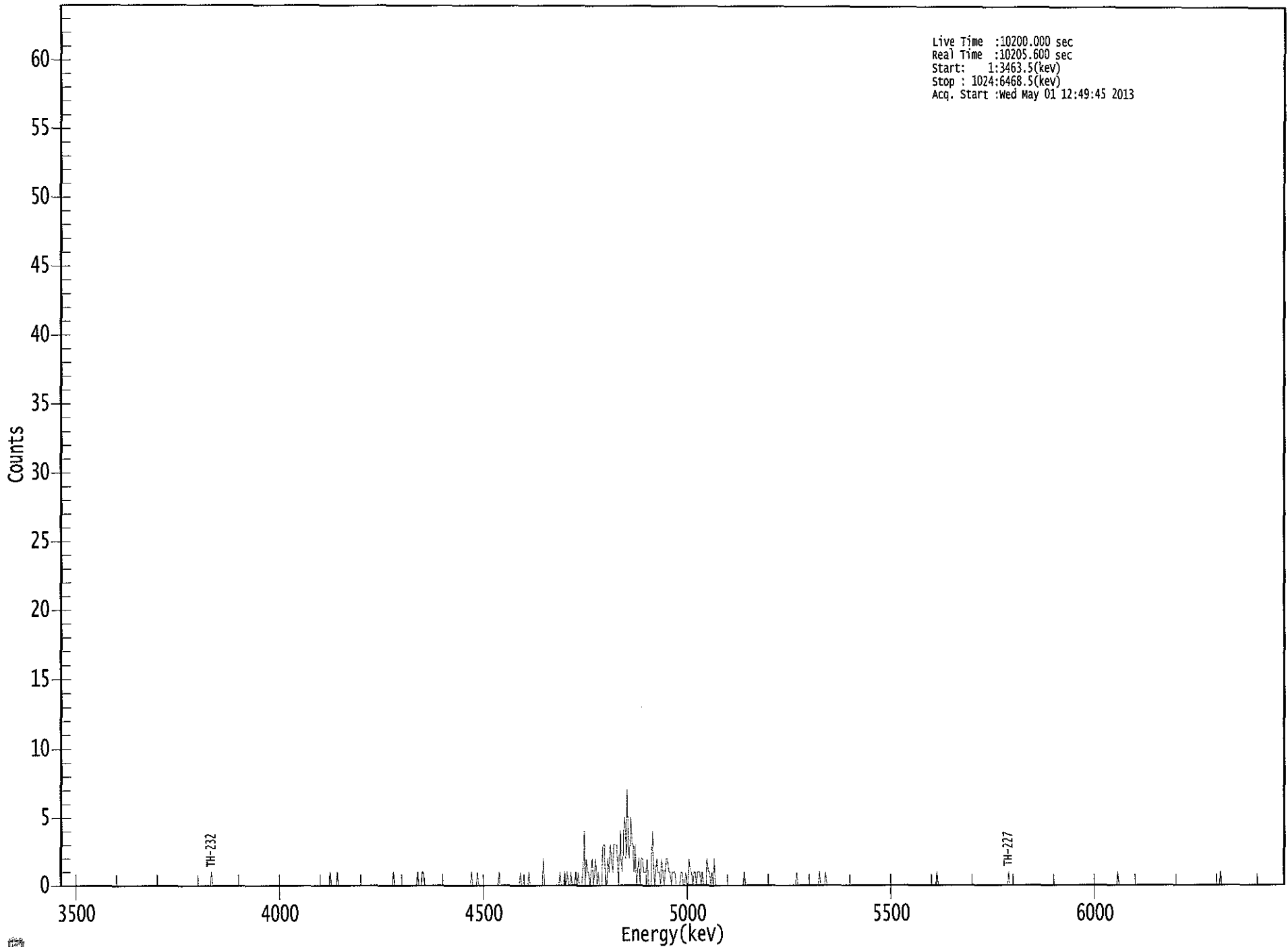
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.981	5850.00*	5.30E-003 +/- 3.43E-002	9.34E-002 +/- 1.62E-002
TH-228	0.960	5400.00*	4.66E-002 +/- 5.67E-002	6.87E-002 +/- 1.19E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 4.11E-001	9.71E-002 +/- 1.69E-002
TH-230	0.985	4672.00*	1.72E-001 +/- 1.09E-001	7.72E-002 +/- 1.34E-002
TH-232	0.870	3997.00*	1.61E-002 +/- 4.48E-002	9.66E-002 +/- 1.68E-002

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5/2/13

US EPA ARCHIVE DOCUMENT

0000056838.CNF

Live Time :10200.000 sec
Real Time :10205.600 sec
Start : 1:3463.5(kev)
Stop : 1024:6468.5(kev)
Acq. Start :wed May 01 12:49:45 2013



US EPA ARCHIVE DOCUMENT

0341

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: 10206

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	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	1	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:	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	1	0	0	0	0	0	0	1
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	1	0
281:	0	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0	0
297:	0	0	1	0	0	0	0	1	1
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	1
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	1	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 16

Channel								
377:	0	0	0	0	0	0	0	0
385:	1	0	0	0	0	0	0	1
393:	0	0	0	0	0	0	0	0
401:	0	0	0	2	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	1	0	0	0	1	0	1
425:	0	0	1	0	0	0	1	0
433:	1	0	0	0	1	4	0	2
441:	1	1	0	1	2	0	1	2
449:	0	1	0	0	0	3	3	1
457:	0	2	1	3	2	1	3	3
465:	3	2	0	4	2	1	4	5
473:	2	7	3	2	5	3	3	1
481:	3	0	1	2	0	2	2	1
489:	1	1	2	0	0	0	4	2
497:	0	1	2	1	1	0	2	1
505:	0	1	2	2	1	1	0	1
513:	1	1	0	0	0	0	1	1
521:	0	0	1	0	0	2	1	1
529:	0	1	1	0	1	1	1	0
537:	1	0	0	0	2	1	1	0
545:	1	0	2	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	1	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	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	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	1	0	0	0	0	1
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	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	1	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	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

*c
5/2/13*

Sample Description: PZ-104-SD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 55752
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:54 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.232 mL
 Effective Efficiency: 0.1927 +/- 0.0159
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 1.0144 +/- 0.0858

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	-0.34	592.90	0.34	0.00E+000	0.0
TH-228	5.409	1.66	169.38	0.34	0.00E+000	3.0
TH-229 T	4.857	170.49	15.04	0.51	0.00E+000	8.9
TH-230	4.675	11.66	58.37	0.34	0.00E+000	3.0
TH-232	3.946	-0.34	592.90	0.34	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

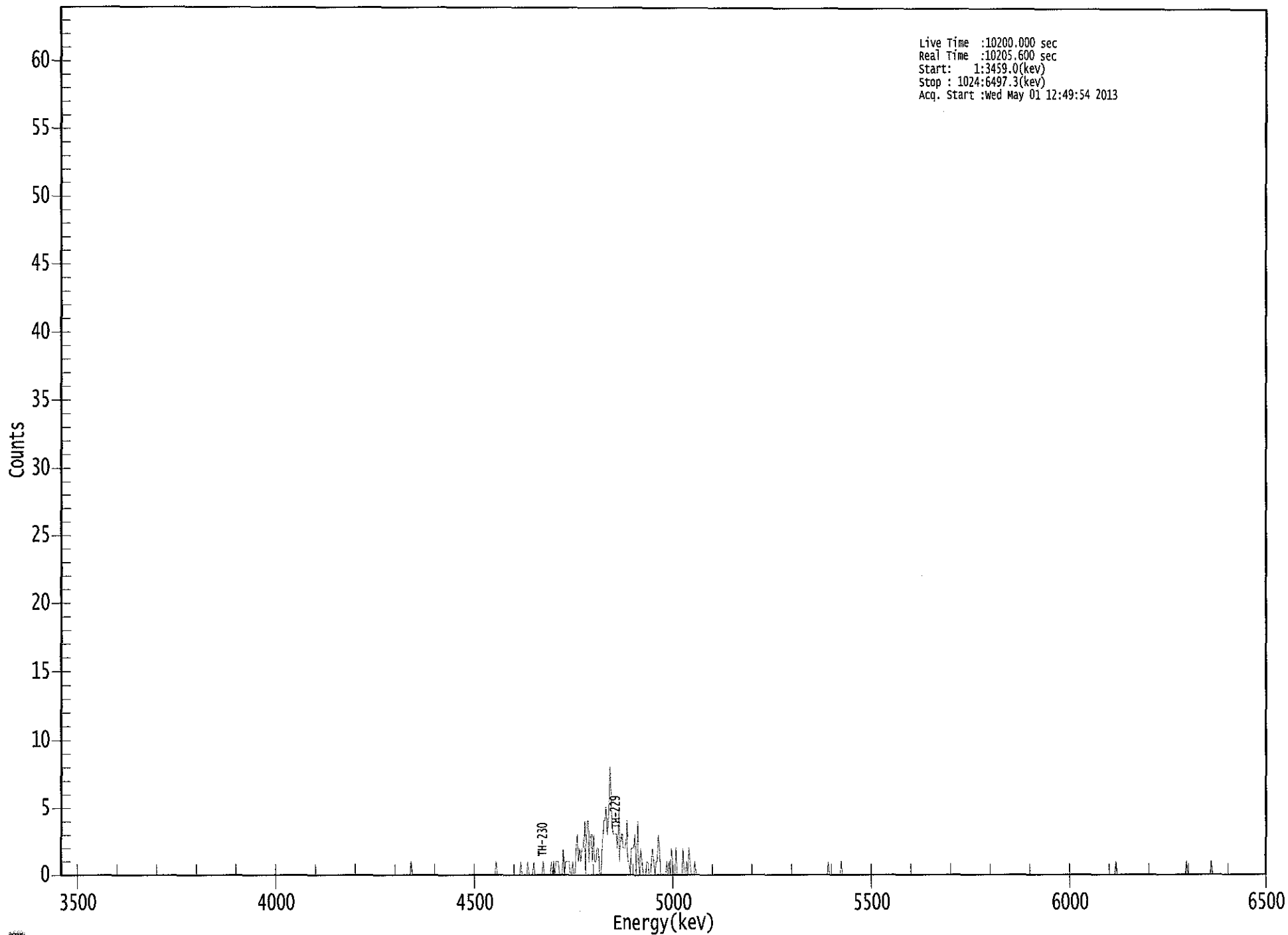
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	-4.80E-003 +/- 2.85E-002	6.75E-002 +/- 1.10E-002
TH-228	1.000	5400.00*	2.33E-002 +/- 3.96E-002	6.71E-002 +/- 1.09E-002
TH-229	0.999	4872.00*	2.36E+000 +/- 3.82E-001	7.25E-002 +/- 1.18E-002
TH-230	1.000	4672.00*	1.61E-001 +/- 9.73E-002	6.58E-002 +/- 1.07E-002
TH-232	0.987	3997.00*	-4.67E-003 +/- 2.77E-002	6.57E-002 +/- 1.07E-002

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US EPA ARCHIVE DOCUMENT

0000056839.CNF



Live Time :10200.000 sec
Real Time :10205.600 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Wed May 01 12:49:54 2013

0345

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: 10206

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	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	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	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	1	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 1 0 0 0 0 0 0

Sample Title: 17

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:	0	0	0	0	1	0	0	0
401:	0	1	0	0	0	0	0	0
409:	0	1	0	0	0	0	0	0
417:	1	0	1	0	1	1	1	0
425:	0	0	2	0	1	1	1	1
433:	0	0	1	0	0	2	3	1
441:	2	1	2	2	4	0	4	4
449:	1	3	3	1	3	1	1	2
457:	2	0	0	2	4	4	5	3
465:	4	6	8	4	3	3	3	3
473:	2	5	1	3	3	2	2	2
481:	4	1	1	0	2	2	2	3
489:	0	4	1	0	2	1	0	0
497:	0	1	1	0	0	1	2	1
505:	0	1	1	3	2	0	0	0
513:	0	0	1	0	1	0	2	1
521:	0	0	2	0	0	0	0	0
529:	2	0	0	1	0	2	1	0
537:	0	0	1	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	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	1	0	0	0	0
657:	0	0	0	0	0	0	1	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	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:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	1
897:	0	0	0	0	0	0	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	1	0	0	0	0
961:	0	0	0	0	0	0	0	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
JRM*

Sample Description: PZ-104-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_041
 Chamber Serial Number: 05026930A
 Detector Serial Number: 91087
 Env. Background: System Bkgd 55753
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 12:49:51 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.2058 +/- 0.0165
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 1.0403 +/- 0.0854

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	5.784	3.15	126.67	0.85	0.00E+000	3.0
TH-228	5.375	3.66	107.87	0.34	0.00E+000	6.0
TH-229 T	4.879	182.83	14.50	0.17	0.00E+000	6.7
TH-230	4.671	12.15	58.49	0.85	0.00E+000	3.7
TH-232	3.948	-2.21	104.02	2.21	0.00E+000	0.0

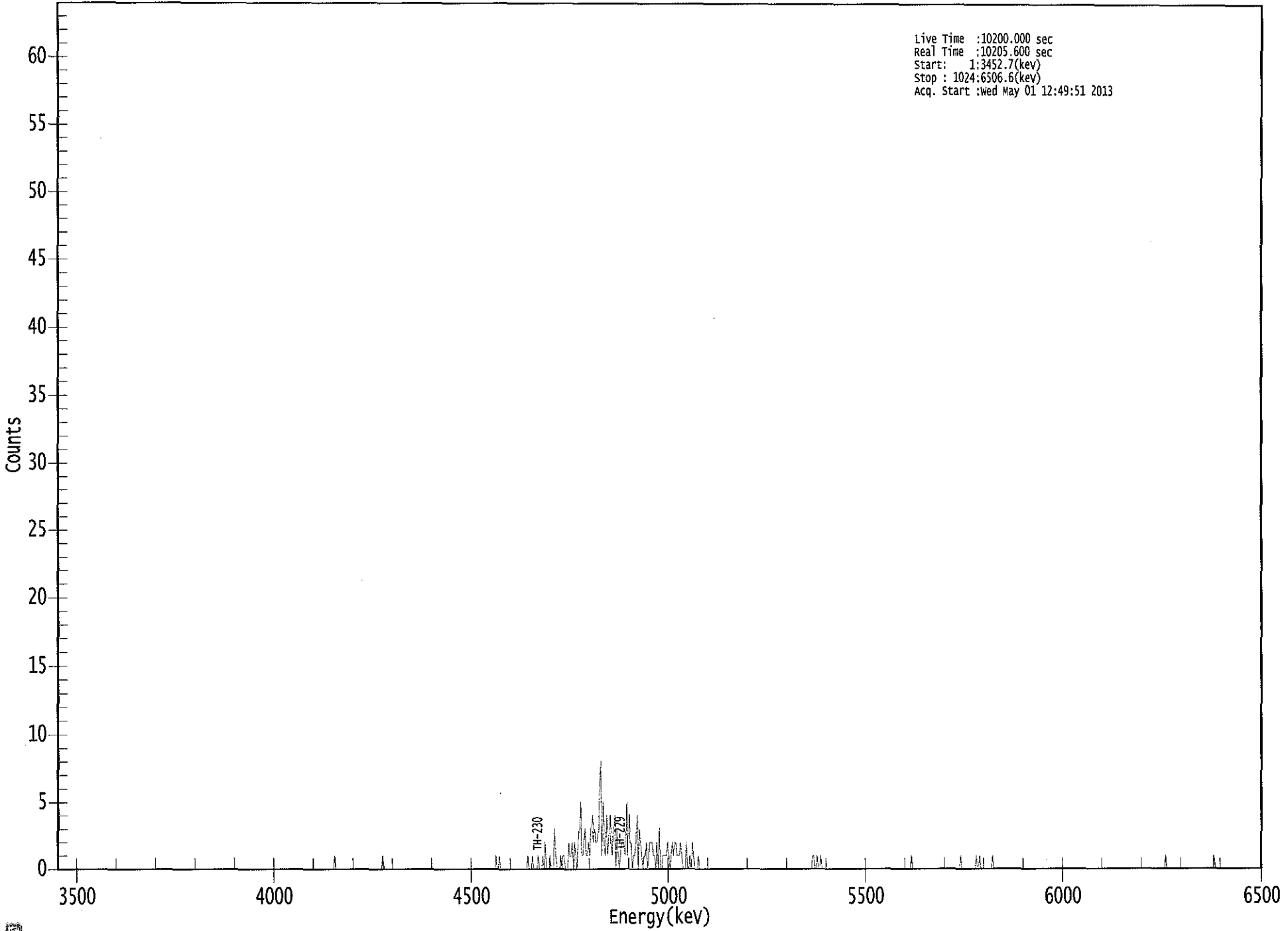
T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.978	5850.00*	4.17E-002 +/- 5.32E-002	7.92E-002 +/- 1.25E-002
TH-228	0.997	5400.00*	4.81E-002 +/- 5.24E-002	6.28E-002 +/- 9.88E-003
TH-229	1.000	4872.00*	2.37E+000 +/- 3.72E-001	5.40E-002 +/- 8.49E-003
TH-230	1.000	4672.00*	1.57E-001 +/- 9.49E-002	7.72E-002 +/- 1.21E-002
TH-232	0.988	3997.00*	-2.85E-002 +/- 2.99E-002	1.03E-001 +/- 1.62E-002

*AG
5/2/13*

US EPA ARCHIVE DOCUMENT



Live Time :10200.000 sec
Real Time :10205.600 sec
Start: 1:3452.7(kev)
Stop : 1024:6506.6(kev)
Acq. Start :wed May 01 12:49:51 2013

0351

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: 10206

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	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	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	1	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	1	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 1

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

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



c
Form

Sample Description: PZ-104-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000568
 Batch Identification: 1304106A-TH
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_003
 Chamber Serial Number:
 Detector Serial Number: 3
 Env. Background: System Bkgd 55734
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/11/2013 7:33:34 AM
 Acquisition Date/Time: 5/1/2013 4:16:51 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: 0.2088 +/- 0.0167
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 1.1957 +/- 0.0985

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	5.779	4.79	111.13	2.21	0.00E+000	3.0
TH-228	5.308	1.94	237.37	3.06	0.00E+000	3.0
TH-229 T	4.875	183.98	14.50	1.02	0.00E+000	10.9
TH-230	4.680	6.64	84.69	1.36	0.00E+000	3.0
TH-232	3.949	-1.19	180.60	1.19	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

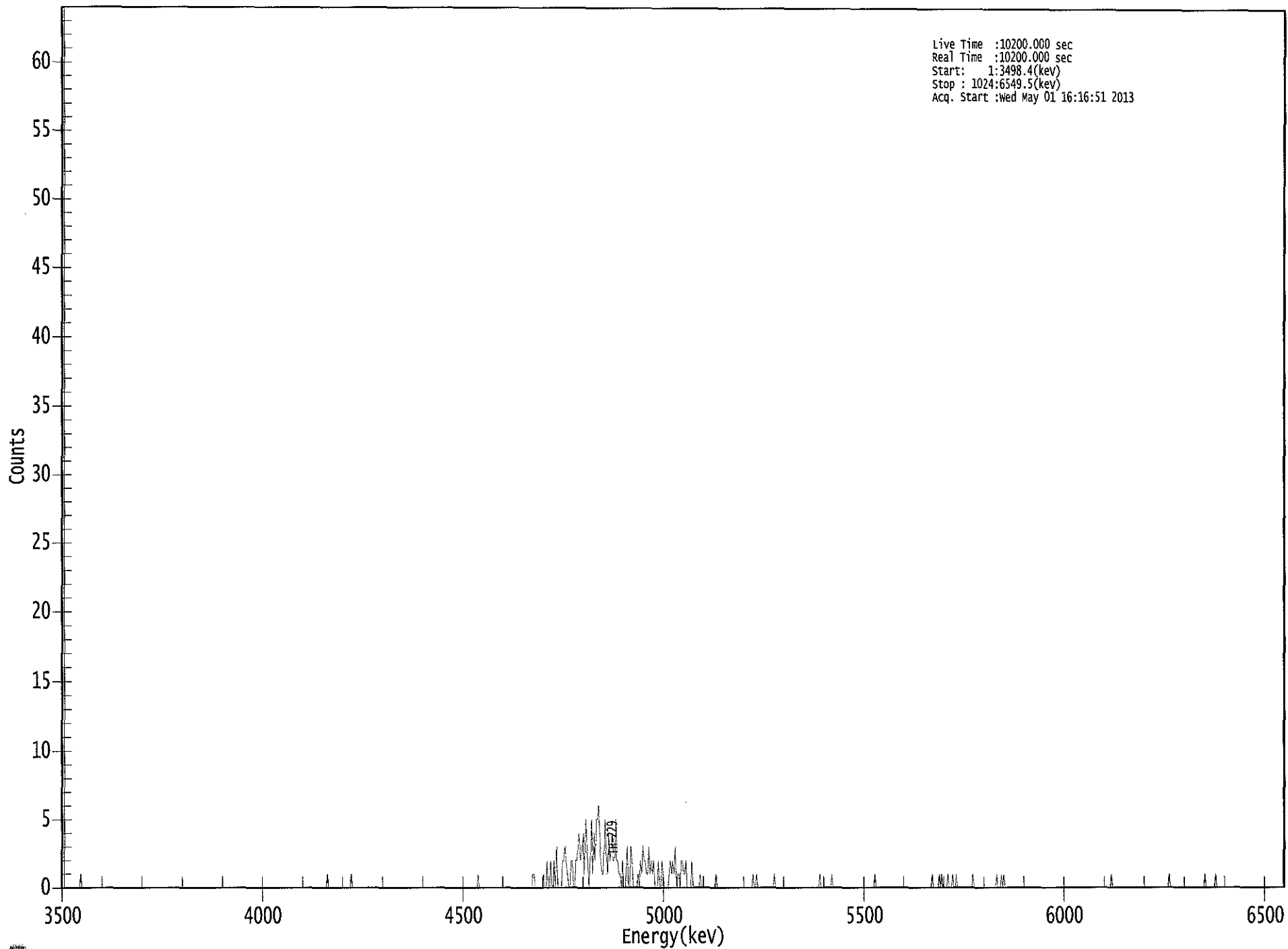
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.974	5850.00*	6.25E-002 +/- 7.01E-002	1.04E-001 +/- 1.64E-002
TH-228	0.956	5400.00*	2.51E-002 +/- 5.98E-002	1.16E-001 +/- 1.82E-002
TH-229	1.000	4872.00*	2.35E+000 +/- 3.69E-001	8.03E-002 +/- 1.26E-002
TH-230	1.000	4672.00*	8.44E-002 +/- 7.27E-002	8.72E-002 +/- 1.37E-002
TH-232	0.988	3997.00*	-1.51E-002 +/- 2.74E-002	8.36E-002 +/- 1.31E-002

AG
5/2/13

US EPA ARCHIVE DOCUMENT

0000056840.CNF



Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :wed May 01 16:16:51 2013

0356

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 19

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	1	1	0	0	0	0	0
401:	0	0	0	1	0	0	2	0	0
409:	0	2	0	0	2	0	3	0	0
417:	0	0	0	2	2	3	2	1	1
425:	0	0	2	2	0	0	2	2	2
433:	4	3	2	3	4	1	5	3	3
441:	2	0	2	5	1	4	2	5	5
449:	5	6	3	2	1	1	5	3	3
457:	1	4	2	3	4	2	2	5	5
465:	2	2	1	1	0	2	0	0	0
473:	1	3	0	0	3	2	0	0	0
481:	0	0	1	0	2	1	3	2	2
489:	2	1	1	3	1	2	1	2	2
497:	0	0	0	2	0	0	2	1	1
505:	0	0	0	0	1	2	1	2	2
513:	1	3	0	1	1	0	2	2	2
521:	1	1	2	0	0	0	0	2	2
529:	0	0	0	0	0	0	1	0	0
537:	0	0	0	0	0	0	0	0	0
545:	0	0	0	1	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	1	0	0	1	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	1	0	0	0	0	0	0
641:	0	0	0	0	1	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:	1	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:	1	0	0	0	0	0	1	0	0
737:	1	0	0	0	0	1	0	0	0
745:	0	1	0	0	1	0	0	0	0
753:	0	0	0	0	0	0	0	0	0
761:	0	0	1	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	1	0	1	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: 19

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	1	0
881:	0	0	0	0	0	0	0	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	0	0	0	0
913:	0	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	1	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	1	0	0	0
961:	0	0	0	0	0	0	1	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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check


Date : 5/1/2013

Time : 5:42:12 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	5/1/2013 5:26:43 AM
Alpha 004	21f	ALL	Passed	5/1/2013 5:26:44 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	5/1/2013 5:26:45 AM
Alpha 011	21f	ALL	Passed	5/1/2013 5:26:45 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	5/1/2013 5:26:46 AM
Alpha 014	21f	ALL	Passed	5/1/2013 5:26:47 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	5/1/2013 5:26:48 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	5/1/2013 5:26:49 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	5/1/2013 5:26:50 AM
Alpha 025	AIM730	ALL	Passed	5/1/2013 5:26:51 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	5/1/2013 5:26:51 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	5/1/2013 5:26:52 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Not Done	
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:26:53 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:26:55 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:26:56 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:29:59 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:26:58 AM
Alpha 038	Alpha Analyst100DC	ALL	Not Done	
Alpha 039	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:03 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:26:59 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:27:01 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:27:02 AM

US EPA ARCHIVE DOCUMENT

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:09 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:27:04 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:27:06 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:27:08 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	5/1/2013 5:27:09 AM

APPROVED BY: _____ 

APPROVAL DATE: _____ 5/1/13

US EPA ARCHIVE DOCUMENT I

***** 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)

Work Order	13-04106	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra226	01	LCS	LCS		04/16/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		04/16/13 00:00	1.5000E+00
Date Received	4/16/2013	03	DUP	PZ-111-KS TOT	43	04/09/13 15:35	1.5000E+00
Lab Deadline	5/7/2013	04	DO	PZ-111-KS TOT	43	04/09/13 15:35	1.5000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-111-KS DIS	43	04/09/13 15:35	1.5000E+00
Project	West Lake OU-1	06	TRG	D-6 TOT	45	04/09/13 15:45	1.5000E+00
Report Level	4	07	TRG	D-6 DIS	45	04/09/13 15:45	1.5000E+00
Activity Units	pCi	08	TRG	D-83 TOT	40	04/09/13 16:16	1.5000E+00
Aliquot Units	I	09	TRG	D-83 DIS	40	04/09/13 16:16	1.5000E+00
Matrix	WA	10	TRG	DUP 05 TOT	47	04/09/13 00:00	1.5000E+00
Method	EPA 903.0 Modified	11	TRG	DUP 05 DIS	47	04/09/13 00:00	1.5000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	PZ-102-SS TOT	39	04/11/13 09:10	1.5000E+00
Radiometric Tracer	Ba-133	13	TRG	PZ-102-SS DIS	39	04/11/13 09:10	1.5000E+00
Radiometric Sol#	Ba-6a	14	TRG	PZ-102R-SS TOT	45	04/11/13 11:30	1.5000E+00
Tracer Act (dpm/g)	1009.047	15	TRG	PZ-102R-SS DIS	45	04/11/13 11:30	1.5000E+00
Carrier		16	TRG	PZ-104-SD TOT	44	04/11/13 11:38	1.5000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-104-SD DIS	44	04/11/13 11:38	1.5000E+00
		18	TRG	PZ-104-SS TOT	42	04/11/13 12:59	1.5000E+00
		19	TRG	PZ-104-SS DIS	42	04/11/13 12:59	1.5000E+00

Ra226

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	0.9115	919.7	404.3	97.59		0.0224	0.0278	0.0054		97.59	1.91	1.00
02	MBL	0.9097	917.9	399.5	96.62		0.0225	0.0281	0.0056		96.62	2.00	1.00
03	DUP	0.9069	915.1	370.1	89.78		0.0224	0.0281	0.0057		89.78	2.04	1.00
04	DO	0.9027	910.9	376.3	91.71		0.0223	0.0283	0.0060		91.71	2.16	1.00
05	TRG	0.8995	907.6	362.5	88.66		0.0223	0.0281	0.0058		88.66	2.08	1.00
06	TRG	0.9010	909.2	337.4	82.39		0.0222	0.0305	0.0083		82.39	2.84	1.00
07	TRG	0.8735	881.4	339.2	85.43		0.0224	0.0302	0.0078		85.43	2.72	1.00
08	TRG	0.9031	911.3	359.6	87.60		0.0226	0.0319	0.0093		87.60	3.09	1.00
09	TRG	0.8786	886.5	365.2	91.45		0.0225	0.0313	0.0088		91.45	2.96	1.00
10	TRG	0.9011	909.3	315.6	77.06		0.0227	0.0310	0.0083		77.06	2.84	1.00
11	TRG	0.8694	877.3	344.1	87.08		0.0223	0.0302	0.0079		87.08	2.74	1.00
12	TRG	0.9020	910.2	217.8	53.12		0.0225	0.0272	0.0047		53.12	1.55	1.00
13	TRG	0.9038	912.0	343.9	83.71		0.0229	0.0286	0.0057		83.71	2.04	1.00
14	TRG	0.9034	911.6	162.8	39.65		0.0231	0.0390	0.0159		39.65	7.64	1.00
15	TRG	0.9002	908.3	326.1	79.70		0.0224	0.0280	0.0056		79.70	2.00	1.00
16	TRG	0.8050	812.3	256.5	70.10		0.0226	0.0292	0.0066		70.10	2.37	1.00
17	TRG	0.9010	909.2	365.4	89.22		0.0226	0.0296	0.0070		89.22	2.50	1.00
18	TRG	0.9107	918.9	386.7	93.42		0.0225	0.0287	0.0062		93.42	2.23	1.00
19	TRG	0.9016	909.8	424.9	103.68		0.0225	0.0290	0.0065		103.68	2.34	1.00

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* 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.

000001

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			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
02	MBL			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
03	DUP			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
04	DO			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
05	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
06	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
07	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
08	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
09	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
10	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
11	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
12	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
13	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
14	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
15	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
16	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
17	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
18	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		
19	TRG			04/25/13 09:06	JBARNARD	05/02/13 13:37	LWALKER		

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

0305

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-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	1.04E+01	1.16E+00	2.04E-01	1.02E+01	102.12	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	8.86E-03	5.55E-02	1.34E-01					OK	OK
03	RA-226	DUP	PZ-111-KS TOT	pCi/l	2.95E-01	1.67E-01	1.71E-01				OK	OK	
04	RA-226	DO	PZ-111-KS TOT	pCi/l	3.48E-01	1.71E-01	1.11E-01					OK	
05	RA-226	TRG	PZ-111-KS DIS	pCi/l	3.14E-01	1.70E-01	1.33E-01					OK	
06	RA-226	TRG	D-6 TOT	pCi/l	1.91E+00	5.02E-01	2.08E-01					OK	
07	RA-226	TRG	D-6 DIS	pCi/l	1.75E+00	4.74E-01	2.40E-01					OK	
08	RA-226	TRG	D-83 TOT	pCi/l	3.17E+00	7.25E-01	3.17E-01					OK	
09	RA-226	TRG	D-83 DIS	pCi/l	1.79E+00	4.86E-01	1.60E-01					OK	
10	RA-226	TRG	DUP 05 TOT	pCi/l	1.27E+00	4.39E-01	2.36E-01					OK	
11	RA-226	TRG	DUP 05 DIS	pCi/l	8.52E-01	3.37E-01	2.29E-01					OK	
12	RA-226	TRG	PZ-102-SS TOT	pCi/l	8.05E+00	9.52E-01	1.82E-01					OK	
13	RA-226	TRG	PZ-102-SS DIS	pCi/l	4.58E+00	6.65E-01	1.33E-01					OK	
14	RA-226	TRG	PZ-102R-SS TOT	pCi/l	3.18E+00	1.11E+00	5.75E-01					OK	
15	RA-226	TRG	PZ-102R-SS DIS	pCi/l	1.88E+00	4.25E-01	1.27E-01					OK	
16	RA-226	TRG	PZ-104-SD TOT	pCi/l	5.72E+00	8.84E-01	1.60E-01					OK	
17	RA-226	TRG	PZ-104-SD DIS	pCi/l	3.76E+00	6.28E-01	1.37E-01					OK	
18	RA-226	TRG	PZ-104-SS TOT	pCi/l	1.19E+00	3.18E-01	1.40E-01					OK	
19	RA-226	TRG	PZ-104-SS DIS	pCi/l	8.06E-01	2.69E-01	1.41E-01					OK	



Run **1**

Analysis Code **Ra226**

Eberline Services Work Order **13-04106**

Client **Engineering Management Support, Inc.**

Preliminary Data Report & Analytical Calculations
Work Order: 13-04106-Ra226-1

US EPA ARCHIVE DOCUMENT



Client: Engineering Management Support, Inc.
Eberline Services Work Order: **13-04106**
Analysis Code: **Ra226**
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-226	LCS	04/16/13 00:00	1.00E+00	97.59	0.00	97.59		5/2/2013 13:37	
02	RA-226	MBL	04/16/13 00:00	1.50E+00	96.62	0.00	96.62		5/2/2013 13:37	
03	RA-226	DUP	04/09/13 15:35	1.50E+00	89.78	0.00	89.78		5/2/2013 13:37	
04	RA-226	DO	04/09/13 15:35	1.50E+00	91.71	0.00	91.71		5/2/2013 13:37	
05	RA-226	TRG	04/09/13 15:35	1.50E+00	88.66	0.00	88.66		5/2/2013 13:37	
06	RA-226	TRG	04/09/13 15:45	1.50E+00	82.39	0.00	82.39		5/2/2013 13:37	
07	RA-226	TRG	04/09/13 15:45	1.50E+00	85.43	0.00	85.43		5/2/2013 13:37	
08	RA-226	TRG	04/09/13 16:16	1.50E+00	87.60	0.00	87.60		5/2/2013 13:37	
09	RA-226	TRG	04/09/13 16:16	1.50E+00	91.45	0.00	91.45		5/2/2013 13:37	
10	RA-226	TRG	04/09/13 00:00	1.50E+00	77.06	0.00	77.06		5/2/2013 13:37	
11	RA-226	TRG	04/09/13 00:00	1.50E+00	87.08	0.00	87.08		5/2/2013 13:37	
12	RA-226	TRG	04/11/13 09:10	1.50E+00	53.12	0.00	53.12		5/2/2013 13:37	
13	RA-226	TRG	04/11/13 09:10	1.50E+00	83.71	0.00	83.71		5/2/2013 13:37	
14	RA-226	TRG	04/11/13 11:30	1.50E+00	39.65	0.00	39.65		5/2/2013 13:37	
15	RA-226	TRG	04/11/13 11:30	1.50E+00	79.70	0.00	79.70		5/2/2013 13:37	
16	RA-226	TRG	04/11/13 11:38	1.50E+00	70.10	0.00	70.10		5/2/2013 13:37	
17	RA-226	TRG	04/11/13 11:38	1.50E+00	89.22	0.00	89.22		5/2/2013 13:37	
18	RA-226	TRG	04/11/13 12:59	1.50E+00	93.42	0.00	93.42		5/2/2013 13:37	
19	RA-226	TRG	04/11/13 12:59	1.50E+00	100.00	0.00	103.68		5/2/2013 13:37	


Client: Engineering Management Support, Inc. Eberline Services Work Order: 13-04106 Analysis Code: Ra226 Run: 1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-226	LCS	05/03/13 05:44		A_Spec	Alpha_003	170	3.52 E+02	8.00 E-03	17.5
02	RA-226	MBL	05/03/13 05:44		A_Spec	Alpha_004	170	4.70 E-01	9.00 E-03	19.4
03	RA-226	DUP	05/03/13 05:44		A_Spec	Alpha_010	170.02	1.44 E+01	1.50 E-02	19.7
04	RA-226	DO	05/03/13 05:44		A_Spec	Alpha_011	170.02	1.65 E+01	3.00 E-03	19.7
05	RA-226	TRG	05/03/13 05:44		A_Spec	Alpha_013	170	1.41 E+01	5.00 E-03	18.7
06	RA-226	TRG	05/03/13 05:44		A_Spec	Alpha_014	170.02	5.80 E+01	6.00 E-03	18.5
07	RA-226	TRG	05/03/13 05:44		A_Spec	Alpha_018	170	5.51 E+01	1.10 E-02	17.8
08	RA-226	TRG	05/03/13 05:44		A_Spec	Alpha_022	170	7.80 E+01	1.20 E-02	15.3
09	RA-226	TRG	05/03/13 05:44		A_Spec	Alpha_024	170	5.37 E+01	2.00 E-03	17.1
10	RA-226	TRG	05/03/13 05:44		A_Spec	Alpha_025	170	3.40 E+01	6.00 E-03	17.4
11	RA-226	TRG	05/03/13 06:44		A_Spec	Alpha_027	170	2.65 E+01	9.00 E-03	17.3
12	RA-226	TRG	05/03/13 05:44		A_Spec	Alpha_029	170	3.04 E+02	8.00 E-03	19.5
13	RA-226	TRG	05/03/13 08:20		A_Spec	Alpha_033	170	1.94 E+02	4.00 E-03	18.2
14	RA-226	TRG	05/03/13 08:20		A_Spec	Alpha_034	170	3.32 E+01	5.00 E-03	18.6
15	RA-226	TRG	05/03/13 08:20		A_Spec	Alpha_035	170	7.75 E+01	3.00 E-03	18.3
16	RA-226	TRG	05/03/13 08:20		A_Spec	Alpha_037	170	1.71 E+02	2.00 E-03	17.8
17	RA-226	TRG	05/03/13 08:20		A_Spec	Alpha_040	170	1.44 E+02	3.00 E-03	19
18	RA-226	TRG	05/03/13 08:20		A_Spec	Alpha_041	170	5.58 E+01	7.00 E-03	19.8
19	RA-226	TRG	05/03/13 08:20		A_Spec	Alpha_042	170	3.60 E+01	6.00 E-03	18.5

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Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/16/13 00:00	1.0000	0.9115	919.7463	404.3000	97.59	1.91	1.00
02	MBL	BLANK	04/16/13 00:00	1.5000	0.9097	917.9301	399.5000	96.62	2.00	1.00
03	DUP	PZ-111-KS TOT	04/09/13 15:35	1.5000	0.9069	915.1047	370.1000	89.78	2.04	1.00
04	DO	PZ-111-KS TOT	04/09/13 15:35	1.5000	0.9027	910.8667	376.3000	91.71	2.16	1.00
05	TRG	PZ-111-KS DIS	04/09/13 15:35	1.5000	0.8995	907.6378	362.5000	88.66	2.08	1.00
06	TRG	D-6 TOT	04/09/13 15:45	1.5000	0.9010	909.1513	337.4000	82.39	2.84	1.00
07	TRG	D-6 DIS	04/09/13 15:45	1.5000	0.8735	881.4026	339.2000	85.43	2.72	1.00
08	TRG	D-83 TOT	04/09/13 16:16	1.5000	0.9031	911.2703	359.6000	87.60	3.09	1.00
09	TRG	D-83 DIS	04/09/13 16:16	1.5000	0.8786	886.5487	365.2000	91.45	2.96	1.00
10	TRG	DUP 05 TOT	04/09/13 00:00	1.5000	0.9011	909.2523	315.6000	77.06	2.84	1.00
11	TRG	DUP 05 DIS	04/09/13 00:00	1.5000	0.8694	877.2655	344.1000	87.08	2.74	1.00
12	TRG	PZ-102-SS TOT	04/11/13 09:10	1.5000	0.9020	910.1604	217.8000	53.12	1.55	1.00
13	TRG	PZ-102-SS DIS	04/11/13 09:10	1.5000	0.9038	911.9767	343.9000	83.71	2.04	1.00
14	TRG	PZ-102R-SS TOT	04/11/13 11:30	1.5000	0.9034	911.5731	162.8000	39.65	7.64	1.00
15	TRG	PZ-102R-SS DIS	04/11/13 11:30	1.5000	0.9002	908.3441	326.1000	79.70	2.00	1.00
16	TRG	PZ-104-SD TOT	04/11/13 11:38	1.5000	0.8050	812.2828	256.5000	70.10	2.37	1.00
17	TRG	PZ-104-SD DIS	04/11/13 11:38	1.5000	0.9010	909.1513	365.4000	89.22	2.50	1.00
18	TRG	PZ-104-SS TOT	04/11/13 12:59	1.5000	0.9107	918.9391	386.7000	93.42	2.23	1.00
19	TRG	PZ-104-SS DIS	04/11/13 12:59	1.5000	0.9016	909.7568	424.9000	103.68	2.34	1.00

Internal Work Order				Run	Analysis Code				Date				Technician				Technician Initials		Witness Initials	
13-04106				1	Ra226				4/25/2013 9:05				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	4/25/2013	0.500	0.5151				10.23	0.470	0.00	0.000	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	1009.047	4/25/2013	0.9115	1.0000										
02	Ba-133	Ba-6a	1009.047	4/25/2013	0.9097	1.0000	0.9115 g									
03	Ba-133	Ba-6a	1009.047	4/25/2013	0.9069	1.0000	0.9097 g									
04	Ba-133	Ba-6a	1009.047	4/25/2013	0.9027	1.0000	-0.9069 g					0.5151 g				
05	Ba-133	Ba-6a	1009.047	4/25/2013	0.8995	1.0000	-0.9027 g					0.5188 g				
06	Ba-133	Ba-6a	1009.047	4/25/2013	0.9010	1.0000	-0.8995 g									
07	Ba-133	Ba-6a	1009.047	4/25/2013	0.8735	1.0000	-0.9010 g									
08	Ba-133	Ba-6a	1009.047	4/25/2013	0.9031	1.0000	-0.8735 g									
09	Ba-133	Ba-6a	1009.047	4/25/2013	0.8786	1.0000	-0.9031 g									
10	Ba-133	Ba-6a	1009.047	4/25/2013	0.9011	1.0000	-0.8786 g									
11	Ba-133	Ba-6a	1009.047	4/25/2013	0.8694	1.0000	-0.9011 g									
12	Ba-133	Ba-6a	1009.047	4/25/2013	0.9020	1.0000	-0.8694 g									
13	Ba-133	Ba-6a	1009.047	4/25/2013	0.9038	1.0000	-0.9020 g									
14	Ba-133	Ba-6a	1009.047	4/25/2013	0.9034	1.0000	-0.9038 g									
15	Ba-133	Ba-6a	1009.047	4/25/2013	0.9002	1.0000	-0.9034 g									
16	Ba-133	Ba-6a	1009.047	4/25/2013	0.8050	1.0000	-0.9002 g									
17	Ba-133	Ba-6a	1009.047	4/25/2013	0.9010	1.0000	-0.8050 g									
18	Ba-133	Ba-6a	1009.047	4/25/2013	0.9107	1.0000	-0.9010 g									
19	Ba-133	Ba-6a	1009.047	4/25/2013	0.9016	1.0000	-0.9107 g									
							-0.9016 g									
							Matrix Spike									

US EPA ARCHIVE DOCUMENT

1271

Aliquot Worksheet

US EPA ARCHIVE DOCUMENT

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04106	1	Ra226	liters	5/7/2013	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-111-KS TOT	DUP					1.5000E+00	1.5000E+00				
04	PZ-111-KS TOT	DO					1.5000E+00	1.5000E+00				
05	PZ-111-KS DIS	TRG					1.5000E+00	1.5000E+00				
06	D-6 TOT	TRG					1.5000E+00	1.5000E+00				
07	D-6 DIS	TRG					1.5000E+00	1.5000E+00				
08	D-83 TOT	TRG					1.5000E+00	1.5000E+00				
09	D-83 DIS	TRG					1.5000E+00	1.5000E+00				
10	DUP 05 TOT	TRG					1.5000E+00	1.5000E+00				
11	DUP 05 DIS	TRG					1.5000E+00	1.5000E+00				
12	PZ-102-SS TOT	TRG					1.5000E+00	1.5000E+00				
13	PZ-102-SS DIS	TRG					1.5000E+00	1.5000E+00				
14	PZ-102R-SS TOT	TRG					1.5000E+00	1.5000E+00				
15	PZ-102R-SS DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-104-SD TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-104-SD DIS	TRG					1.5000E+00	1.5000E+00				
18	PZ-104-SS TOT	TRG					1.5000E+00	1.5000E+00				
19	PZ-104-SS DIS	TRG					1.5000E+00	1.5000E+00				

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

Technician: _____

[Signature] Date: 4/25/13

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-04106	1	Ra226			LWALKER

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		0.0224	0.0278	0.0054	
02	BLANK	MBL		0.0225	0.0281	0.0056	
03	DUP	DUP		0.0224	0.0281	0.0057	
04	PZ-111-KS TOT	DO		0.0223	0.0283	0.0060	
05	PZ-111-KS DIS	TRG		0.0223	0.0281	0.0058	
06	D-6 TOT	TRG		0.0222	0.0305	0.0083	
07	D-6 DIS	TRG		0.0224	0.0302	0.0078	
08	D-83 TOT	TRG		0.0226	0.0319	0.0093	
09	D-83 DIS	TRG		0.0225	0.0313	0.0088	
10	DUP 05 TOT	TRG		0.0227	0.0310	0.0083	
11	DUP 05 DIS	TRG		0.0223	0.0302	0.0079	
12	PZ-102-SS TOT	TRG		0.0225	0.0272	0.0047	
13	PZ-102-SS DIS	TRG		0.0229	0.0286	0.0057	
14	PZ-102R-SS TOT	TRG		0.0231	0.0390	0.0159	
15	PZ-102R-SS DIS	TRG		0.0224	0.0280	0.0056	
16	PZ-104-SD TOT	TRG		0.0226	0.0292	0.0066	
17	PZ-104-SD DIS	TRG		0.0226	0.0296	0.0070	
18	PZ-104-SS TOT	TRG		0.0225	0.0287	0.0062	
19	PZ-104-SS DIS	TRG		0.0225	0.0290	0.0065	

US EPA ARCHIVE DOCUMENT

0373

Technician: J. Walker

Date: 5, 2, 13

KB
5/3/13

Apex-Alpha™

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-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 55734
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 1.910E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/3/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:14 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9759 +/- 0.0000
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Effective Efficiency: 0.1704 +/- 0.0032

Control Certificate Name: Ra226 Ra-5b
 Chem. Recov. of Control: RA-226 0.534636 +/- 0.034258
 Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

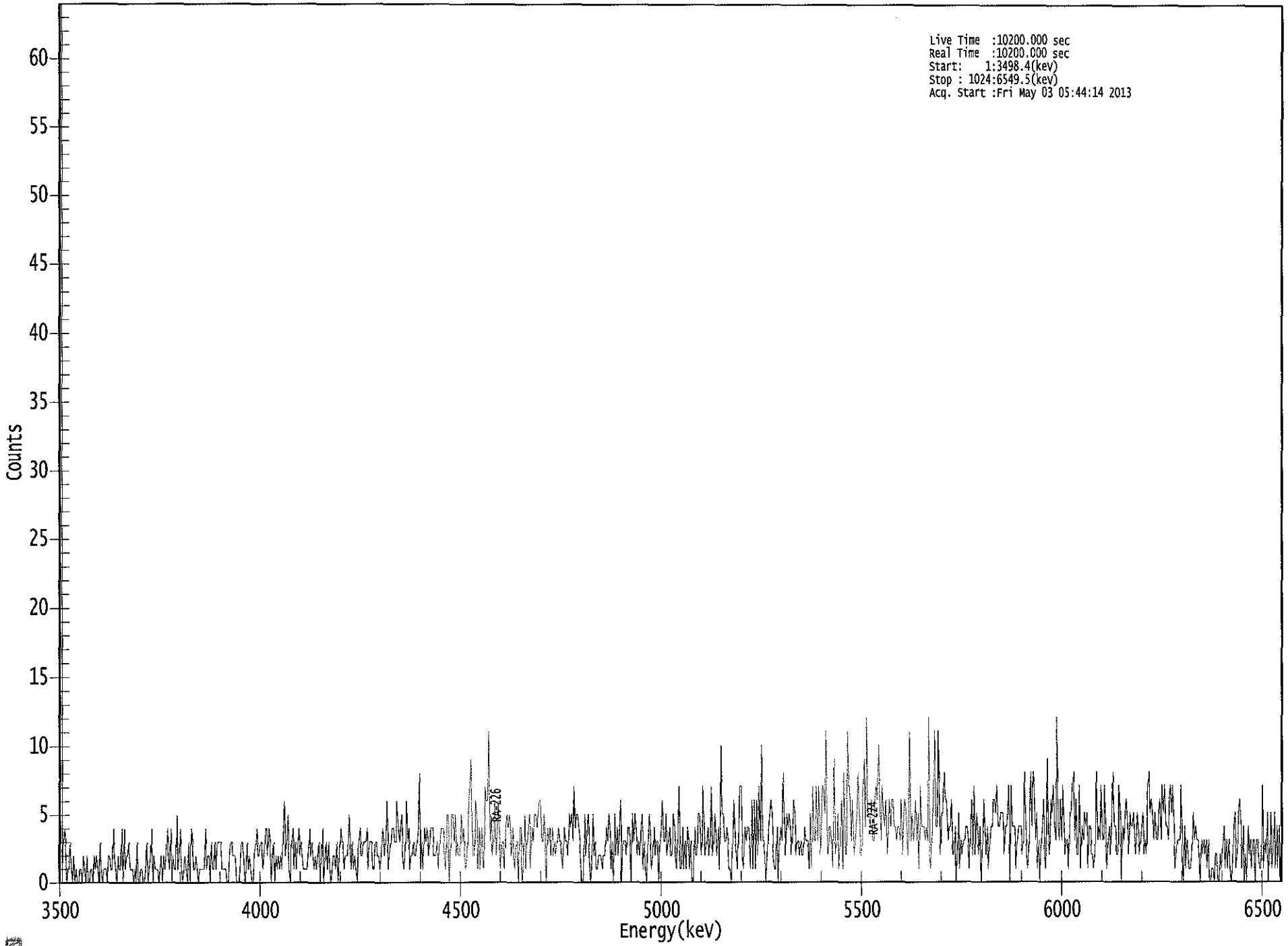
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.530	505.62	8.74	2.38	0.00E+000	4.8
RA-226	4.590	351.64	10.48	1.36	0.00E+000	11.7

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	1.48E+001 +/- 1.26E+003	2.40E-001 +/- 2.05E+001
RA-226	0.951	4785.00*	1.04E+001 +/- 1.16E+000	2.04E-001 +/- 7.46E-003

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :Fri May 03 05:44:14 2013



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: 01

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 3 1 3 3 1 4 5 4

Sample Title: 01

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

801: 1 3 4 4 4 2 3 8

Sample Title: 01

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	4	2	1	3	8	4	8	7
817:	3	5	1	3	0	3	4	6
825:	2	1	9	3	2	6	5	7
833:	4	3	12	4	3	6	3	7
841:	4	2	3	3	1	5	5	7
849:	8	3	6	2	2	7	1	4
857:	3	5	4	5	1	4	4	2
865:	2	1	2	8	3	4	3	7
873:	3	3	7	3	1	3	4	2
881:	5	8	4	4	2	2	7	5
889:	0	4	3	5	6	4	2	5
897:	4	4	5	3	2	5	4	2
905:	3	4	5	2	3	2	7	8
913:	5	6	5	3	5	3	3	5
921:	6	3	7	5	7	4	4	3
929:	6	7	5	7	4	1	2	3
937:	3	3	7	2	0	4	1	3
945:	2	1	1	2	5	3	4	3
953:	3	2	0	3	2	3	2	3
961:	1	3	0	0	1	1	0	2
969:	2	0	0	2	1	3	4	1
977:	3	1	3	1	0	1	4	5
985:	1	2	5	6	4	1	4	0
993:	2	0	4	2	3	1	3	3
1001:	0	3	3	2	1	1	7	1
1009:	3	2	5	0	2	5	1	2
1017:	5	1	4	1	4	0	4	2

103
5/3/13

Apex-Alpha™

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-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 55735
 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: 5/3/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:15 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9662 +/- 0.0000
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Effective Efficiency: 0.1875 +/- 0.0034

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

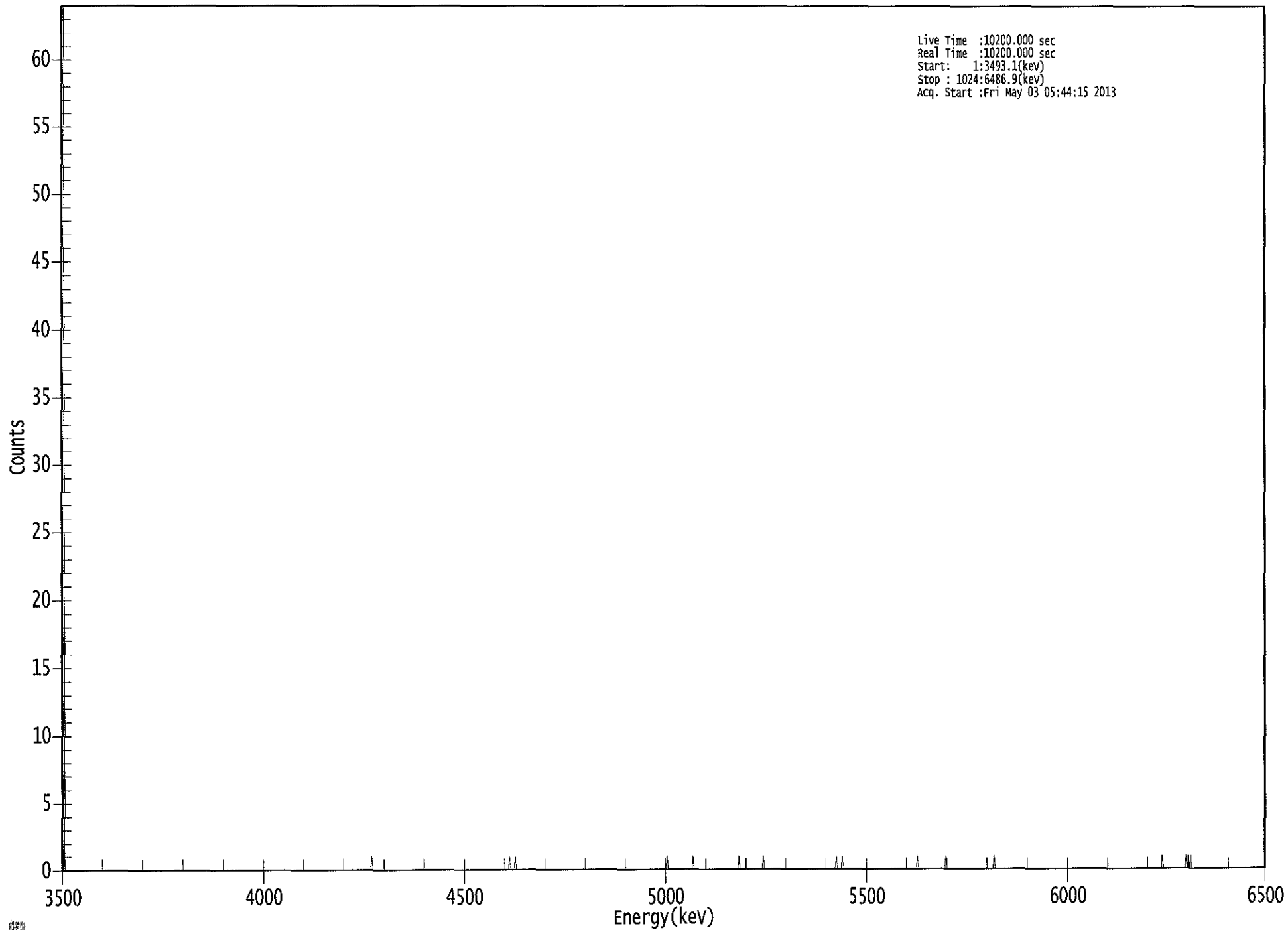
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.491	0.11	3327.8	2.89	0.00E+000	2.9
RA-226	4.613	0.47	626.90	1.53	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.952	5685.50*	2.05E-003 +/- 1.87E-001	1.63E-001 +/- 1.39E+001
RA-226	0.962	4785.00*	8.86E-003 +/- 5.55E-002	1.34E-001 +/- 4.82E-003

US EPA ARCHIVE DOCUMENT

0000057009.CNF



0850

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: 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	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	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	0	0	0	1
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: 0 0 0 0 0 0 0 0 0

Sample Title: 02

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	1	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	1	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	1	0	0	0	0	0	0	0
545:	0	0	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	1
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	1	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	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	1	0	0	0	0	1
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	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	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:	1	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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

KS
5/3/13

Apex-Alpha™

Sample Description: PZ-111-KS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-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 55736
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.040E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:09 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8978 +/- 0.0000
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Effective Efficiency: 0.1766 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

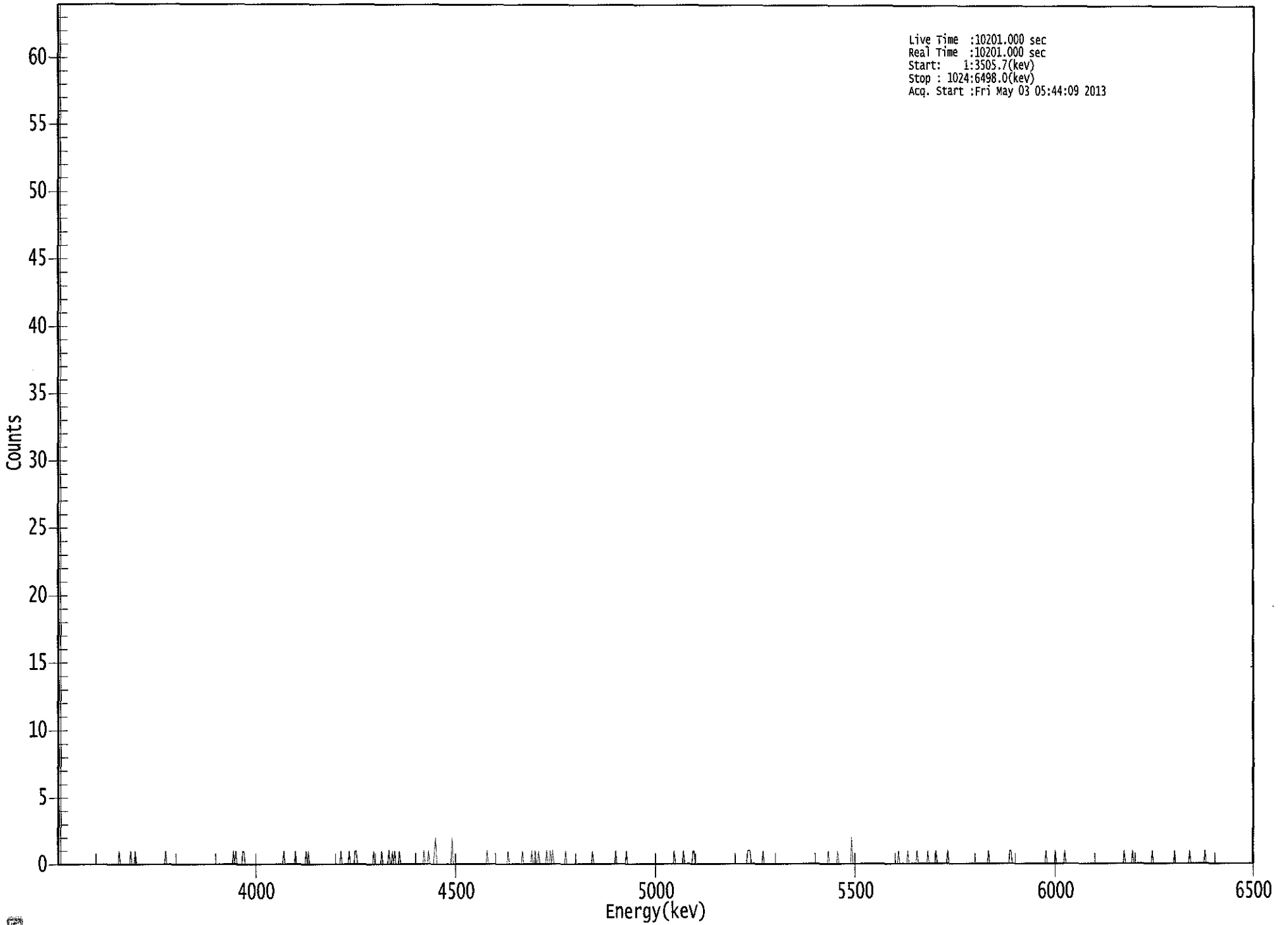
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.557	4.26	135.22	3.74	0.00E+000	2.9
RA-226	4.597	14.45	56.64	2.55	0.00E+000	4.4

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.978	5685.50*	1.04E-001 +/- 1.81E+001	2.34E-001 +/- 4.07E+001
RA-226	0.955	4785.00*	2.95E-001 +/- 1.67E-001	1.71E-001 +/- 6.12E-003

US EPA ARCHIVE DOCUMENT

0000057004.CNF



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: 03

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	1	0	0	0
57:	0	0	0	0	0	0	1	0
65:	0	0	1	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	1	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	1	0
153:	1	0	0	0	0	0	1	1
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	1	0	0	0	0	0	0
201:	0	0	0	1	0	0	0	0
209:	0	0	0	0	1	0	1	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	1	0	0	0	0	0
249:	0	1	0	0	0	0	1	1
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	1	0
273:	0	0	0	0	0	1	0	0
281:	0	0	0	1	0	0	1	0
289:	1	0	0	0	1	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	1	0	0	0	1	0	0
321:	0	0	1	2	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	2	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: 03

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	1	0	0
401:	0	0	0	0	0	1	0	0
409:	1	0	0	1	0	0	0	0
417:	0	0	1	0	0	1	0	1
425:	0	0	0	0	0	0	0	0
433:	0	0	1	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	1	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	1	0	0
481:	0	0	0	0	0	0	1	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	1
529:	0	0	0	0	0	0	0	1
537:	0	0	0	0	0	0	0	1
545:	1	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	1	1
593:	1	0	0	0	0	0	0	0
601:	0	0	0	1	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	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	1	0	0	0	0
673:	0	0	0	0	0	0	0	2
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	1
721:	0	0	0	0	0	0	0	1
729:	0	0	0	0	0	0	0	1
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	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	1	0	0	0

801: 0 0 0 0 0 0 0 0 0

Sample Title: 03

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

KB
5/3/13

Apex-Alpha™

Sample Description: PZ-111-KS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-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 55737
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.160E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:10 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9171 +/- 0.0000
 Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
 Effective Efficiency: 0.1810 +/- 0.0038

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	5.483	5.60	108.33	3.40	0.00E+000	2.7
RA-226	4.559	16.49	49.13	0.51	0.00E+000	2.7

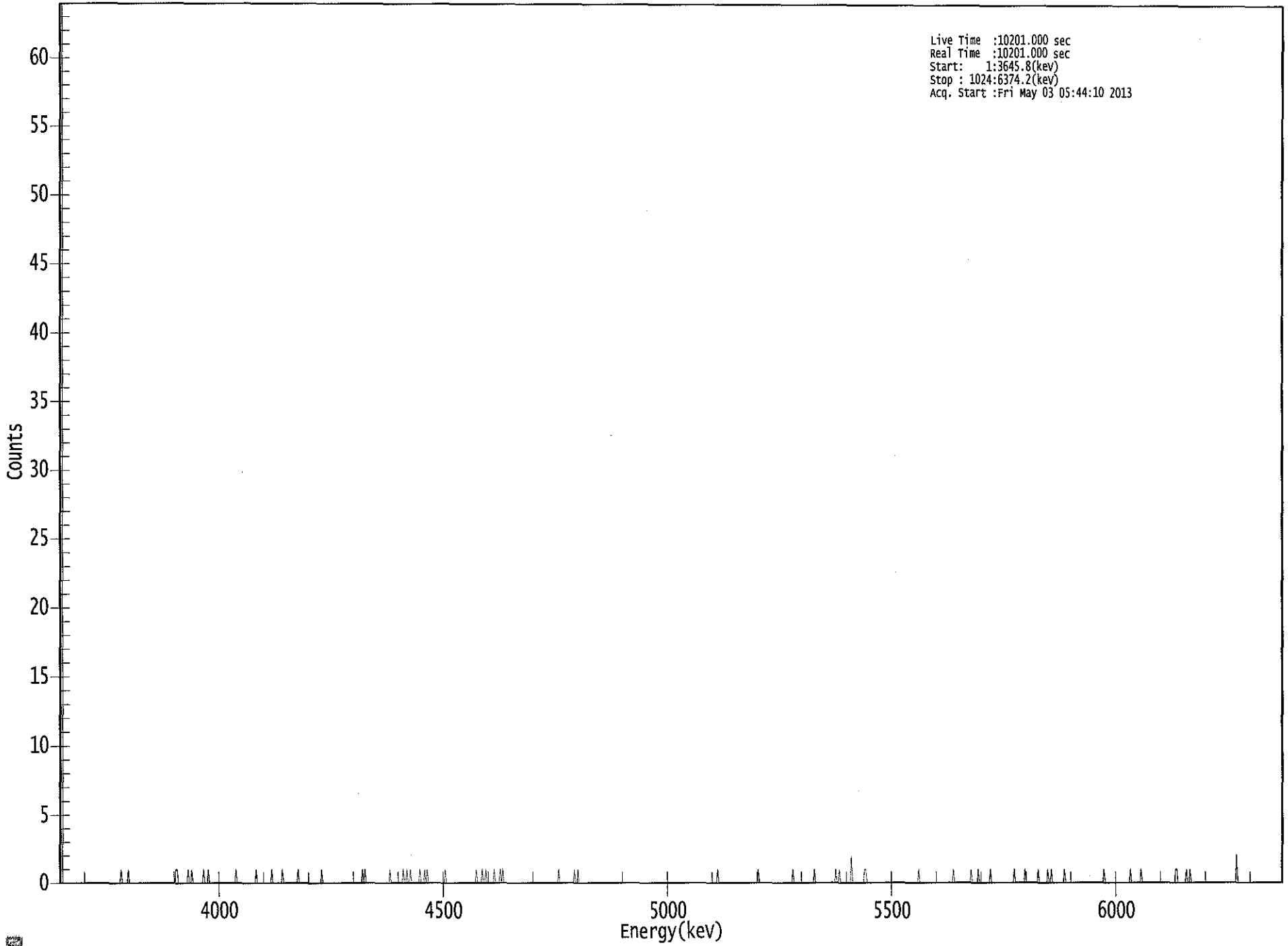
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.948	5685.50*	1.41E-001 +/- 2.45E+001	2.33E-001 +/- 4.06E+001
RA-226	0.935	4785.00*	3.48E-001 +/- 1.71E-001	1.11E-001 +/- 4.57E-003

US EPA ARCHIVE DOCUMENT

0000057005.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3645.8(kev)
Stop : 1024:6374.2(kev)
Acq. Start :Fri May 03 05:44:10 2013



US EPA ARCHIVE DOCUMENT

0520

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: 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	1	0	0	0
57:	0	1	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	0
89:	0	0	0	0	0	0	0
97:	0	1	1	0	0	0	0
105:	0	0	0	1	0	0	1
113:	0	0	0	0	0	0	0
121:	1	0	0	0	1	0	0
129:	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	1	0	0	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	1	0	0
169:	0	0	0	0	0	0	0
177:	0	1	0	0	0	0	0
185:	0	0	1	0	0	0	0
193:	0	0	0	0	0	0	1
201:	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0
217:	0	0	0	1	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	1	1
257:	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0
273:	0	0	0	0	1	0	0
281:	0	0	0	0	0	0	1
289:	0	0	1	0	0	1	0
297:	0	0	0	0	0	1	0
305:	0	1	0	1	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	1	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	1	0	0	1	0	0
361:	0	0	0	1	0	0	0

369: 1 0 1 0 0 0 0 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	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	1	0	0	0	0	0	0
425:	0	0	0	0	0	0	1	0
433:	0	1	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	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	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:	1	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	1	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	1
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	1	0	0	1	0	0	0
657:	0	0	0	0	0	0	2	0
665:	0	0	0	0	0	0	0	0
673:	0	1	1	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	1	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	1	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	1	0	0	0	0	0
769:	1	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	1	0

801: 0 0 0 0 0 0 0 0 1

Sample Title: 04

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

143
5/3/13

Apex-Alpha™

Sample Description: PZ-111-KS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-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 55738
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.080E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:11 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8866 +/- 0.0000
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Effective Efficiency: 0.1657 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

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

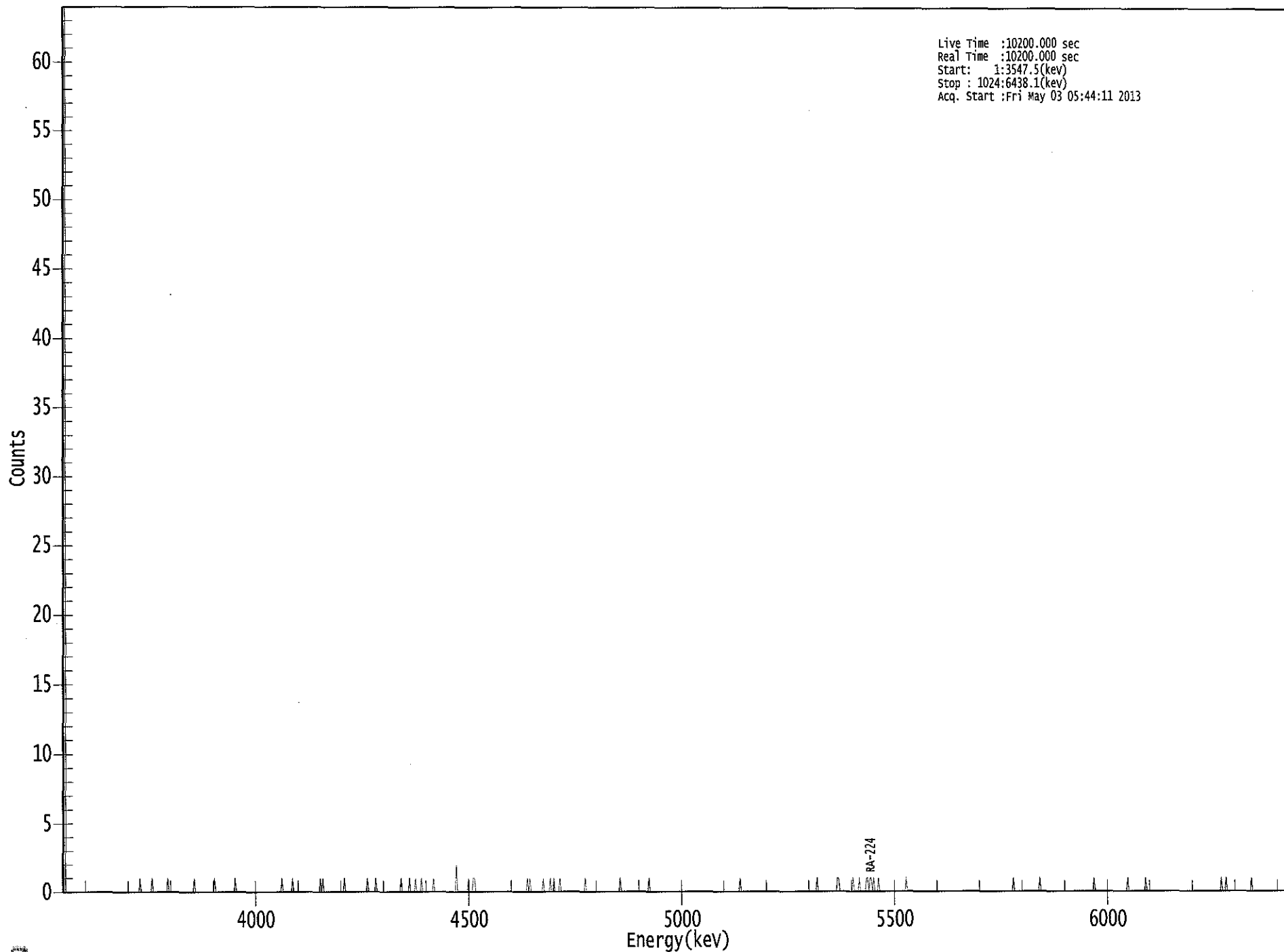
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.448	5.43	111.88	3.57	0.00E+000	2.8
RA-226	4.566	14.15	53.90	0.85	0.00E+000	2.8

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.929	5685.50*	1.44E-001 +/- 2.50E+001	2.50E-001 +/- 4.35E+001
RA-226	0.939	4785.00*	3.14E-001 +/- 1.70E-001	1.33E-001 +/- 4.81E-003

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.000 sec
Start : 1:3547.5(kev)
Stop : 1024:6438.1(kev)
Acq. Start :Fri May 03 05:44:11 2013



US EPA ARCHIVE DOCUMENT

0395
6660

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 05

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	1	0	1	0	0	0
393:	0	0	0	0	0	0	0	1
401:	0	0	0	0	0	1	0	0
409:	1	0	0	0	0	1	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	1	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	1
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	1
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	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	1	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	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	1	0
665:	0	0	0	0	1	1	0	1
673:	1	0	1	0	0	0	1	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	1	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	1	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 05

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



VCS
5/3/13

Sample Description: D-6 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-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 55739
 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: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:13 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8239 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Effective Efficiency: 0.1521 +/- 0.0028

Peak Match Tolerance: 0.350 MeV

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

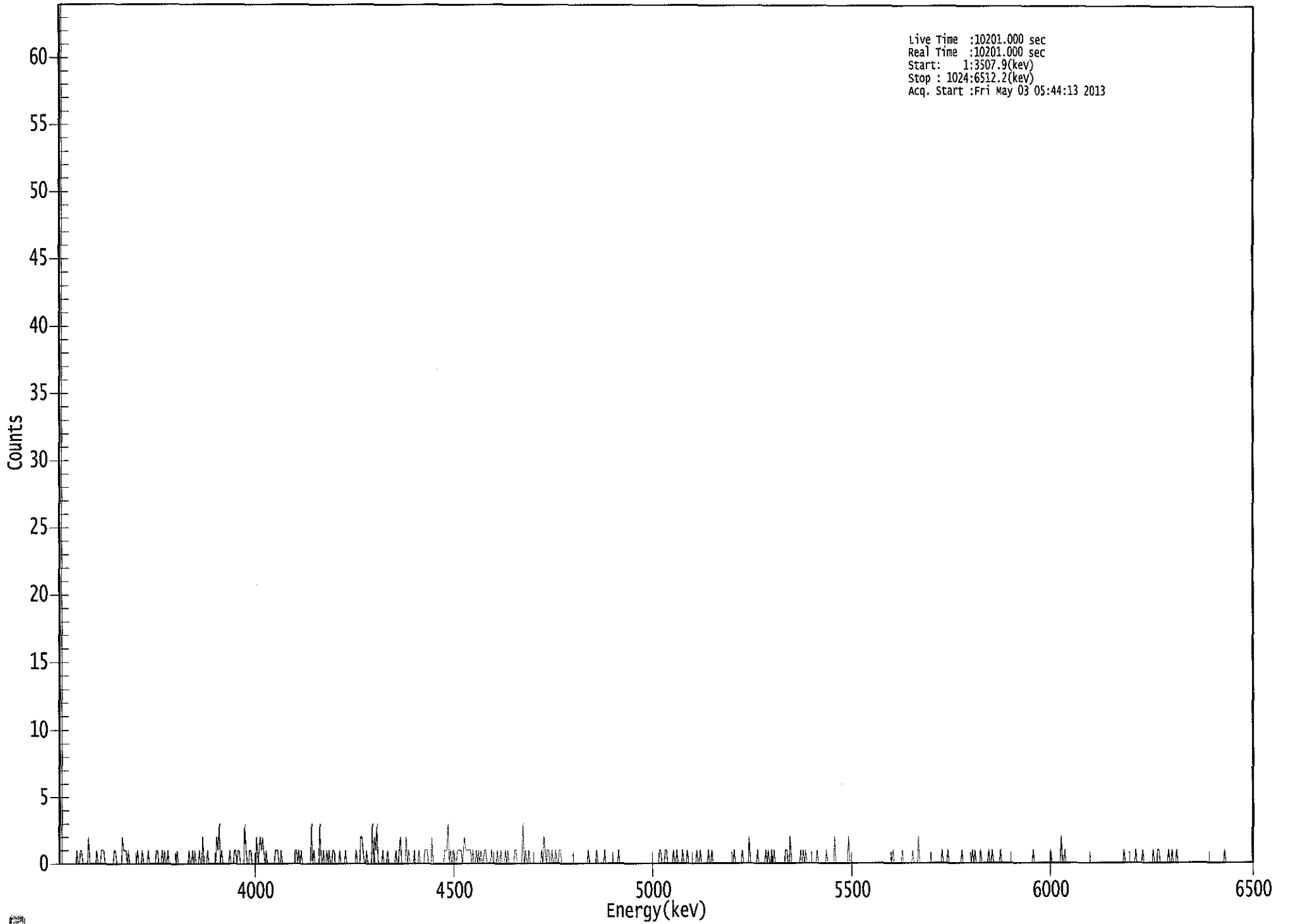
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.508	10.43	71.82	3.57	0.00E+000	2.9
RA-226	4.567	57.98	26.00	1.02	0.00E+000	3.7

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.960	5685.50*	4.11E-001 +/- 7.15E+001	3.71E-001 +/- 6.47E+001
RA-226	0.940	4785.00*	1.91E+000 +/- 5.02E-001	2.08E-001 +/- 7.55E-003

US EPA ARCHIVE DOCUMENT

0000057007.CNF



US EPA ARCHIVE DOCUMENT

0070

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: 10201

Elapsed Real Time: 10201

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

369: 0 0 1 0 0 0 0 0 1

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	1	0	0	0	1	0
385:	1	0	0	0	0	0	1	1
393:	0	0	0	0	0	3	0	1
401:	0	0	1	0	0	0	0	0
409:	0	0	0	0	0	1	0	2
417:	1	0	1	1	0	0	1	0
425:	0	1	0	0	1	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	1	0	0
457:	0	0	0	0	1	0	0	0
465:	0	0	0	1	0	0	0	0
473:	0	0	0	0	0	0	0	1
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	1	1	0	0	0	1
521:	1	0	0	0	0	0	1	0
529:	0	1	0	0	0	0	1	0
537:	0	0	1	0	0	0	0	0
545:	0	0	1	0	0	1	0	0
553:	0	0	0	0	1	0	0	1
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	1	0	0	0	0	0	2
593:	0	0	0	0	0	0	1	0
601:	0	0	0	0	0	1	0	1
609:	0	0	1	0	1	0	0	0
617:	0	0	0	0	0	0	1	1
625:	0	0	2	0	0	0	0	0
633:	0	0	0	1	0	1	0	1
641:	0	0	0	0	0	0	0	0
649:	0	1	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	2	0	0	0	0	0	0	0
673:	0	0	0	0	2	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	1	0	0	0	0	0
721:	0	0	1	0	0	0	0	0
729:	0	0	0	1	0	0	0	0
737:	2	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	1	0	0	0
761:	0	1	0	0	0	0	0	0
769:	0	0	0	0	0	1	0	0
777:	0	0	0	0	0	0	1	0
785:	1	0	0	0	0	1	0	0
793:	0	0	0	0	1	0	0	1

801: 0 0 0 0 0 0 1 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	1	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	2	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:	1	0	0	0	0	0	0	0
921:	0	0	1	0	0	0	0	0
929:	1	0	0	0	0	0	0	0
937:	0	1	0	0	0	1	1	0
945:	0	0	0	0	0	0	1	0
953:	0	1	0	0	0	1	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	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

10/5
5/3/13

Apex-Alpha™

Sample Description: D-6 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_018
 Chamber Serial Number:
 Detector Serial Number: 18
 Env. Background: System Bkgd 55740
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.720E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:51 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8543 +/- 0.0000
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
 Effective Efficiency: 0.1518 +/- 0.0028

Peak Match Tolerance: 0.350 MeV

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

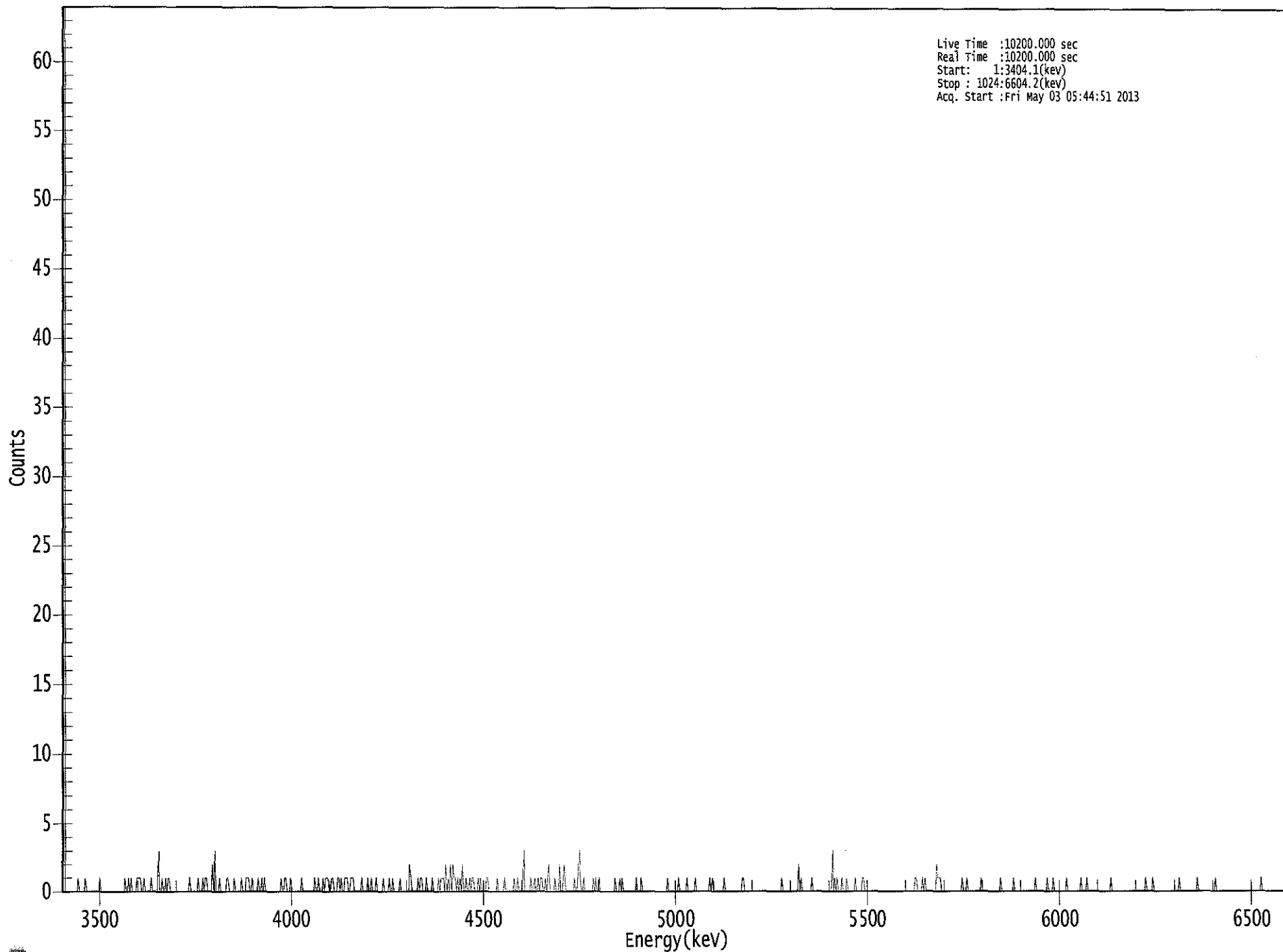
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.537	16.30	51.42	1.70	0.00E+000	3.1
RA-226	4.574	55.13	26.92	1.87	0.00E+000	3.1

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.972	5685.50*	6.16E-001 +/- 1.07E+002	2.78E-001 +/- 4.84E+001
RA-226	0.943	4785.00*	1.75E+000 +/- 4.74E-001	2.40E-001 +/- 8.74E-003

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start :Fri May 03 05:44:51 2013



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

Sample Title: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 0 0 0 0 0 0 0

Sample Title: 07

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

Sample Title: 07

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

100
5/13/13

Apex-Alpha™

Sample Description: D-83 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_022
 Chamber Serial Number:
 Detector Serial Number: 22
 Env. Background: System Bkgd 55741
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.090E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:52 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8760 +/- 0.0000
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Effective Efficiency: 0.1342 +/- 0.0026

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

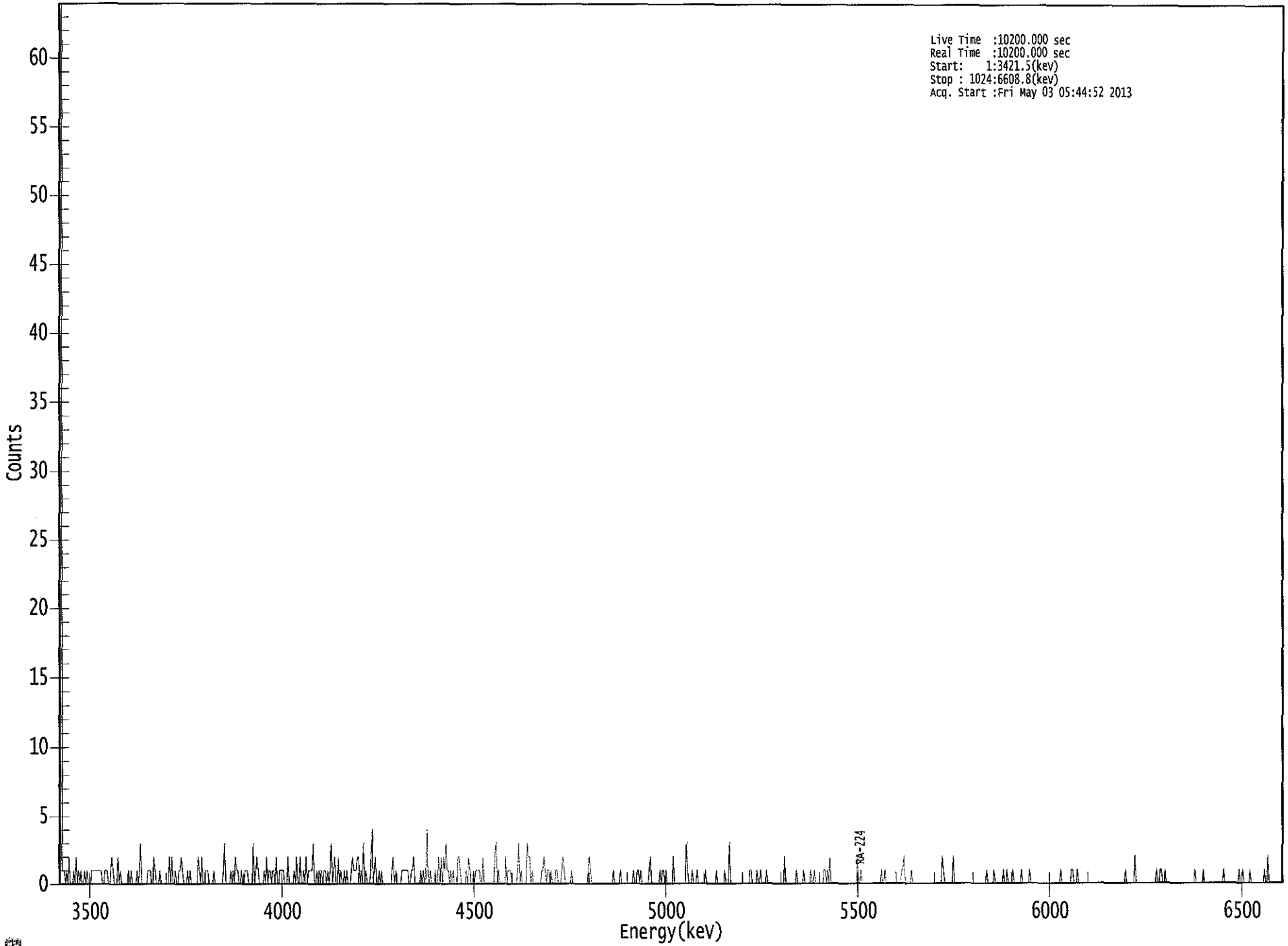
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.507	14.45	56.63	2.55	0.00E+000	3.1
RA-226	4.561	77.96	22.54	2.04	0.00E+000	3.6

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.959	5685.50*	7.02E-001 +/- 1.22E+002	4.08E-001 +/- 7.10E+001
RA-226	0.936	4785.00*	3.17E+000 +/- 7.25E-001	3.17E-001 +/- 1.18E-002

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3421.5(kev)
Stop : 1024:6608.8(kev)
Acq. Start :Fri May 03 05:44:52 2013



US EPA ARCHIVE DOCUMENT

0410

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: 10200

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

369: 0 0 0 0 0 2 0 1

Sample Title: 08

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

801: 0 0 0 0 1 0 0 0

Sample Title: 08

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

KC
5/3/13

Apex-Alpha™

Sample Description: D-83 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_024
 Chamber Serial Number:
 Detector Serial Number: 24
 Env. Background: System Bkgd 55742
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.960E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:54 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9145 +/- 0.0000
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Effective Efficiency: 0.1564 +/- 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	5.534	9.43	76.67	3.57	0.00E+000	3.1
RA-226	4.565	53.66	26.86	0.34	0.00E+000	3.9

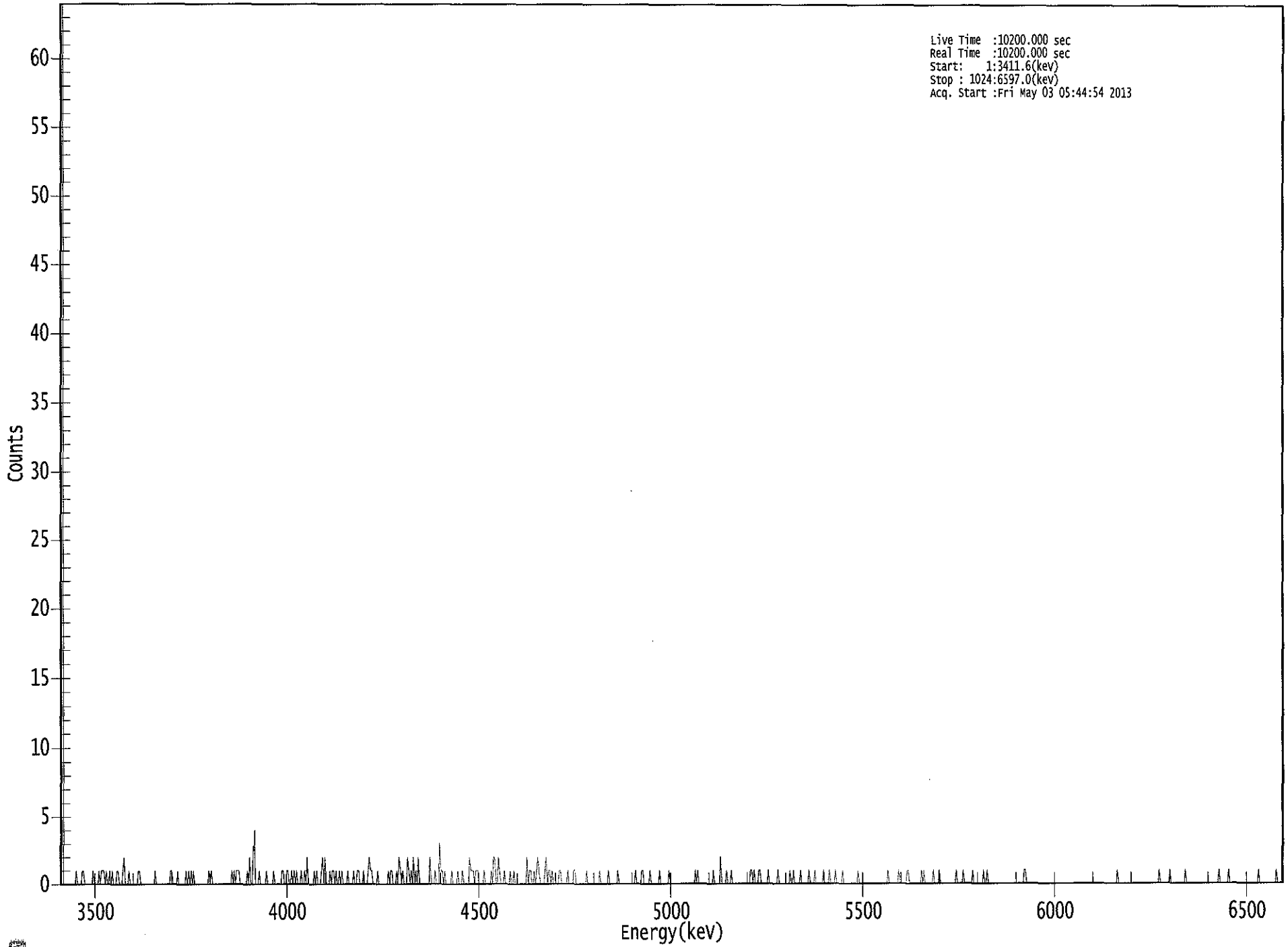
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.970	5685.50*	3.76E-001 +/- 6.56E+001	3.76E-001 +/- 6.56E+001
RA-226	0.938	4785.00*	1.79E+000 +/- 4.86E-001	1.60E-001 +/- 5.85E-003

US EPA ARCHIVE DOCUMENT

0000057012.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3411.6(kev)
Stop : 1024:6597.0(kev)
Acq. Start :Fri May 03 05:44:54 2013



US EPA ARCHIVE DOCUMENT

0415
5170

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: 10200

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

369: 0 0 0 1 0 0 0 0

Sample Title: 09

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

Sample Title: 09

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	1	0	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	0	0	0	0
913:	0	0	0	0	0	0	0	0	1
921:	0	0	0	0	0	0	0	0	0
929:	1	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	1	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	1	0	0	0	0	0	0	0
977:	0	1	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	1	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0
1017:	0	1	0	0	0	0	0	0	0

106
5/3/13

Apex-Alpha™

Sample Description: DUP 05 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_025
 Chamber Serial Number:
 Detector Serial Number: 25
 Env. Background: System Bkgd 55743
 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: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:55 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.7706 +/- 0.0000
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Effective Efficiency: 0.1337 +/- 0.0025

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	5.543	13.13	58.42	1.87	0.00E+000	3.1
RA-226	4.606	33.98	34.21	1.02	0.00E+000	4.7

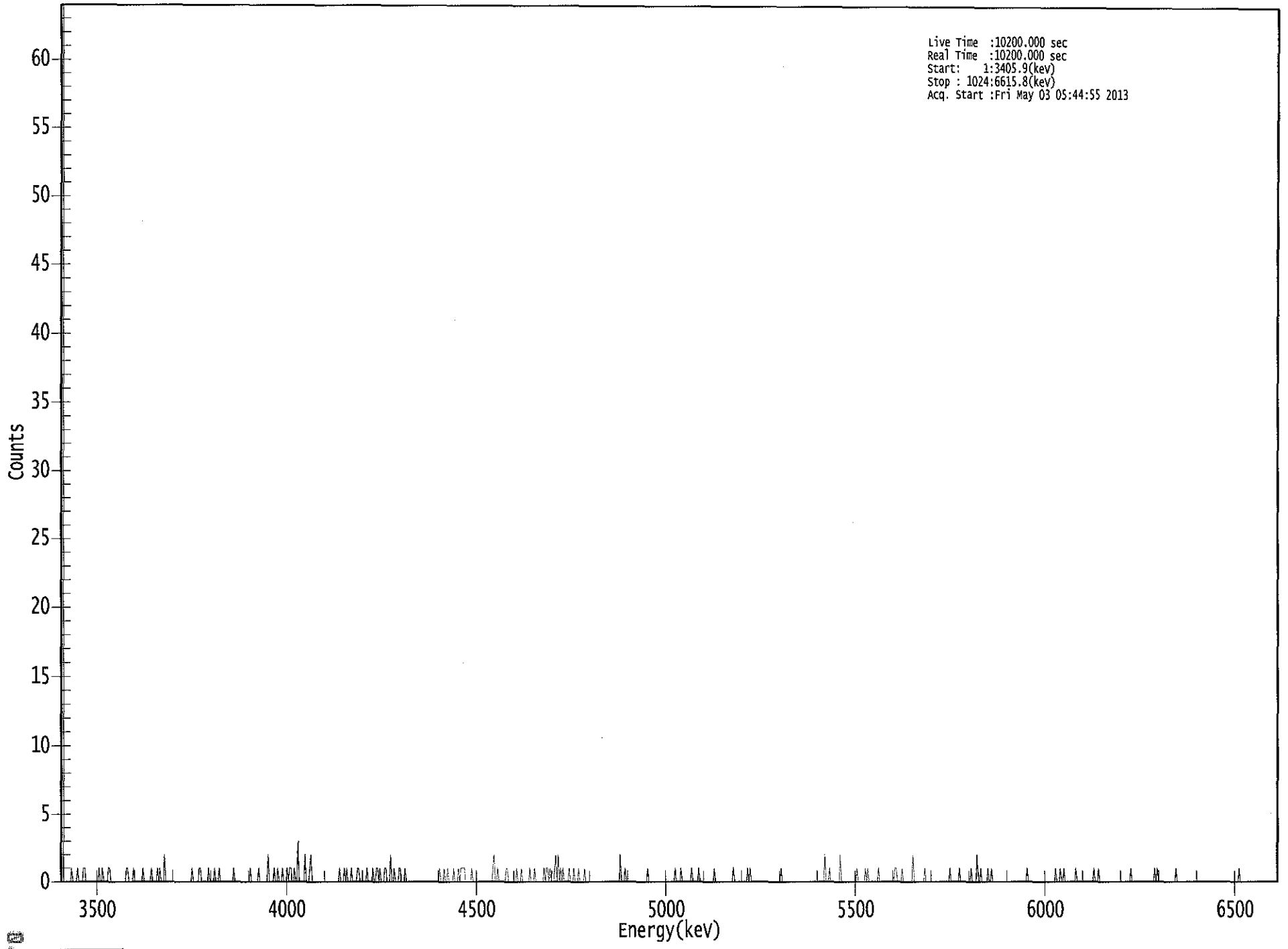
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.974	5685.50*	5.88E-001 +/- 1.02E+002	3.39E-001 +/- 5.91E+001
RA-226	0.959	4785.00*	1.27E+000 +/- 4.39E-001	2.36E-001 +/- 8.63E-003

US EPA ARCHIVE DOCUMENT

0000057013.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3405.9(kev)
Stop : 1024:6615.8(kev)
Acq. Start :Fri May 03 05:44:55 2013



US EPA ARCHIVE DOCUMENT

0420

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: 10200

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

369: 0 0 0 0 0 0 0 1 1

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 10

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

108
5/13/12

Apex-Alpha™

Sample Description: DUP 05 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_027
 Chamber Serial Number:
 Detector Serial Number: 27
 Env. Background: System Bkgd 55744
 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: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:56 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8708 +/- 0.0000
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Effective Efficiency: 0.1504 +/- 0.0028

Peak Match Tolerance: 0.350 MeV

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

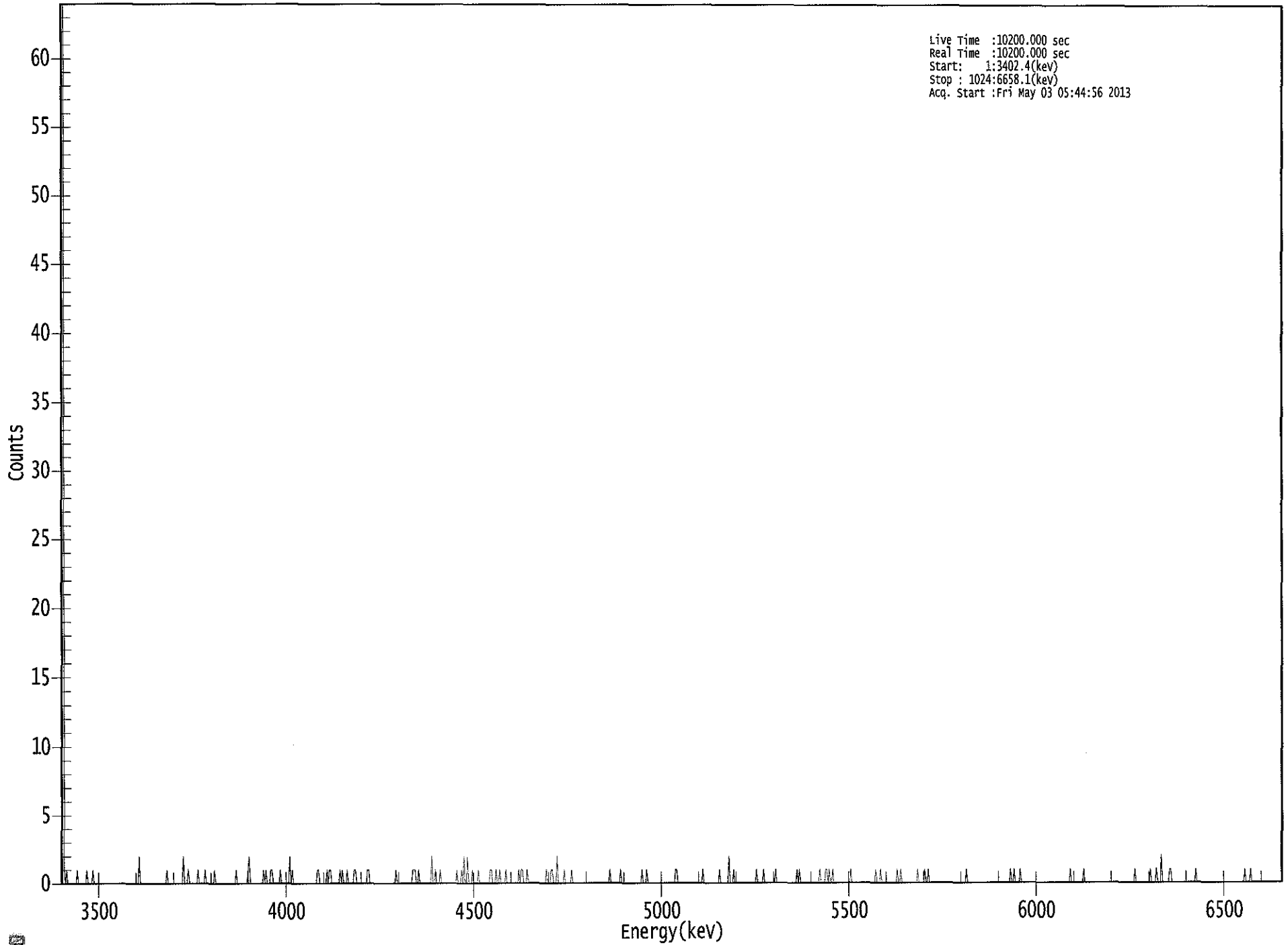
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.530	9.30	70.81	1.70	0.00E+000	3.2
RA-226	4.566	26.47	39.36	1.53	0.00E+000	3.2

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	3.57E-001 +/- 6.23E+001	2.82E-001 +/- 4.92E+001
RA-226	0.939	4785.00*	8.52E-001 +/- 3.37E-001	2.29E-001 +/- 8.40E-003

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3402.4(kev)
Stop : 1024:6658.1(kev)
Acq. Start :Fri May 03 05:44:56 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	1	0	1	0	0	0
9:	0	0	0	0	0	1	0	0
17:	0	0	0	0	0	1	0	0
25:	0	0	1	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	2	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	1	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	2	0
105:	0	0	1	0	0	0	0	0
113:	0	0	1	0	0	0	0	0
121:	1	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	1	0	0	0	0	0
153:	0	0	0	0	1	2	0	0
161:	0	0	0	0	0	0	0	0
169:	0	1	0	1	0	0	0	1
177:	1	0	0	0	0	0	0	1
185:	0	0	0	0	0	0	0	2
193:	0	1	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	1	1
217:	0	0	0	0	0	0	1	0
225:	1	1	0	0	0	0	0	0
233:	0	1	0	1	0	0	0	1
241:	0	0	0	0	0	1	1	0
249:	0	0	0	0	0	0	0	0
257:	1	1	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	1	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	1	1
297:	1	0	0	1	0	0	0	0
305:	0	0	0	0	0	0	2	0
313:	0	1	0	0	0	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	1	0	0	0	1
337:	0	2	0	0	2	0	0	0
345:	1	0	0	0	0	1	0	0
353:	0	0	0	0	0	0	0	1
361:	1	0	0	0	1	0	0	1

369: 0 0 0 0 1 0 0 0

Sample Title: 11

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

801: 0 0 0 1 0 0 0 0

Sample Title: 11

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	1	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	1	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	1	0	0	0	0	1	0	0
921:	0	2	0	0	0	0	0	0
929:	1	1	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	1	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	1
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

106
5/13/13

Apex-Alpha™

Sample Description: PZ-102-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_029
 Chamber Serial Number:
 Detector Serial Number: 29
 Env. Background: System Bkgd 55745
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 1.550E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 5:44:57 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.5312 +/- 0.0000
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Effective Efficiency: 0.1033 +/- 0.0019

Peak Match Tolerance: 0.350 MeV

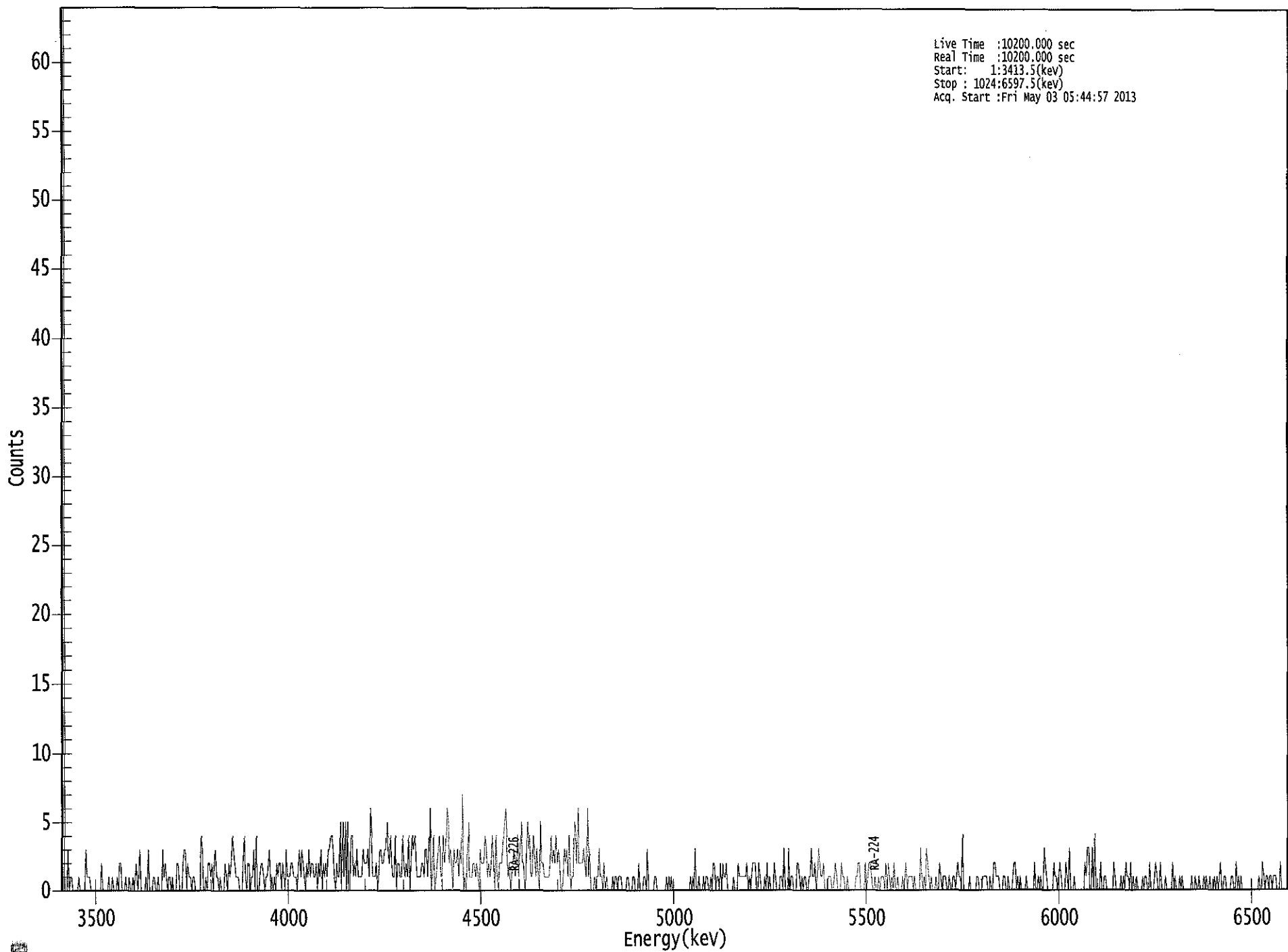
 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.523	70.13	23.77	1.87	0.00E+000	7.0
RA-226	4.589	303.64	11.28	1.36	0.00E+000	3.7

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.966	5685.50*	2.22E+000 +/- 3.87E+002	2.40E-001 +/- 4.17E+001
RA-226	0.951	4785.00*	8.05E+000 +/- 9.52E-001	1.82E-001 +/- 6.54E-003

US EPA ARCHIVE DOCUMENT



0430

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: 10200

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

369: 4 5 6 3 1 2 0 1

Sample Title: 12

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

801: 0 0 0 0 1 0 0 0

Sample Title: 12

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

100
5/3/13

Apex-Alpha™

Sample Description: PZ-102-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_033
 Chamber Serial Number: 04026479A
 Detector Serial Number: 91132
 Env. Background: System Bkgd 55746
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.040E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 8:20:23 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Chem. Recovery Factor: 0.8371 +/- 0.0000
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
 Effective Efficiency: 0.1527 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

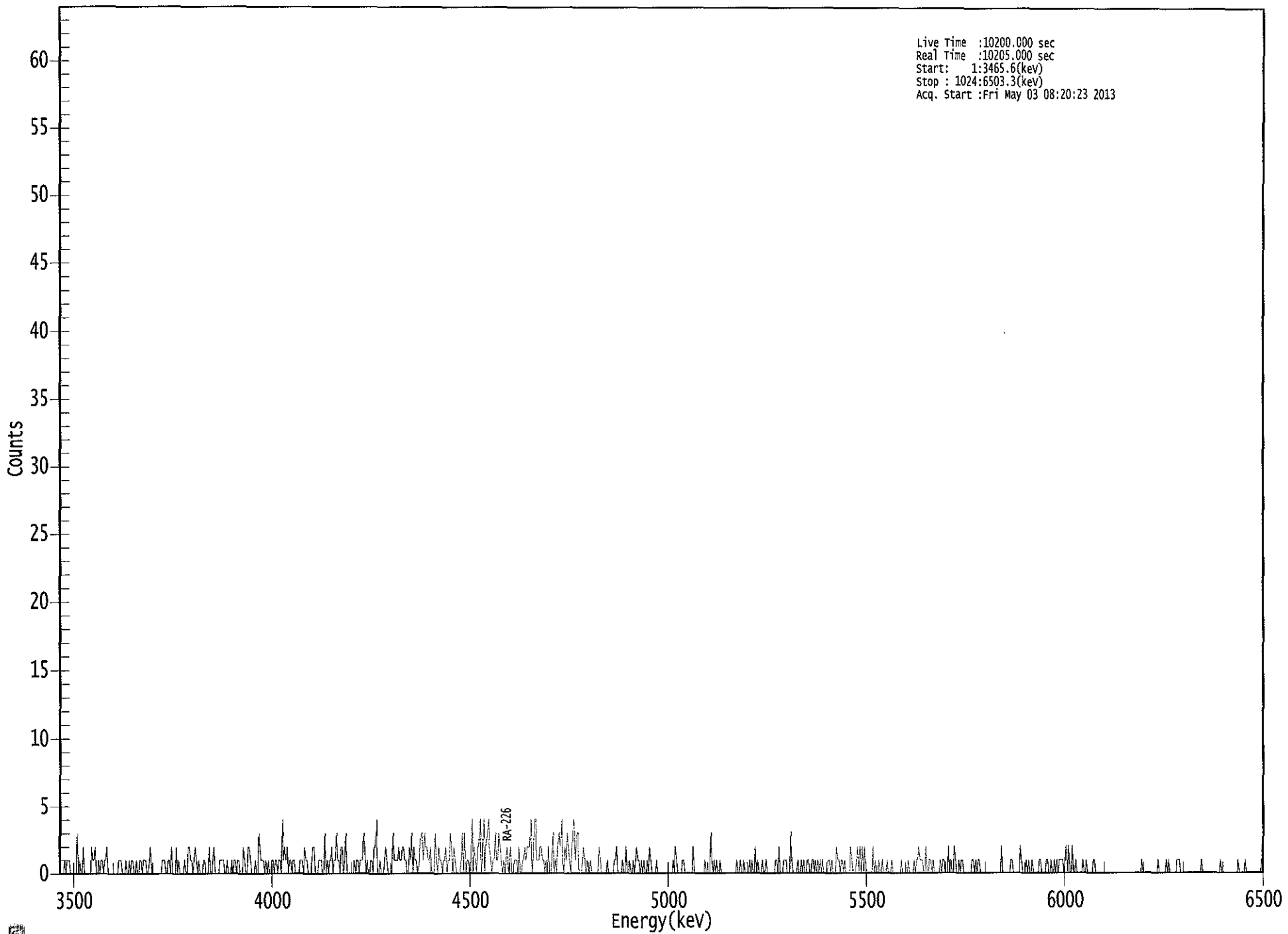
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.521	48.66	28.21	0.34	0.00E+000	4.5
RA-226	4.593	194.32	14.09	0.68	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.965	5685.50*	1.40E+000 +/- 2.83E+002	1.37E-001 +/- 2.78E+001
RA-226	0.953	4785.00*	4.58E+000 +/- 6.65E-001	1.33E-001 +/- 4.58E-003

US EPA ARCHIVE DOCUMENT

0000057025.CNF



0735

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: 10205

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

369: 1 1 3 1 1 3 2 1

Sample Title: 13

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

801: 2 0 0 0 0 0 0 0

Sample Title: 13

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

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5/3/13

Apex-Alpha™

Sample Description: PZ-102R-SS TOT
 Spectrum File: \\OR-ALPHA1\Camberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_034
 Chamber Serial Number: 04026479B
 Detector Serial Number: 91136
 Env. Background: System Bkgd 55747
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 4.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 8:20:24 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Chem. Recovery Factor: 0.3965 +/- 0.0000
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Effective Efficiency: 0.0736 +/- 0.0013

Peak Match Tolerance: 0.350 MeV

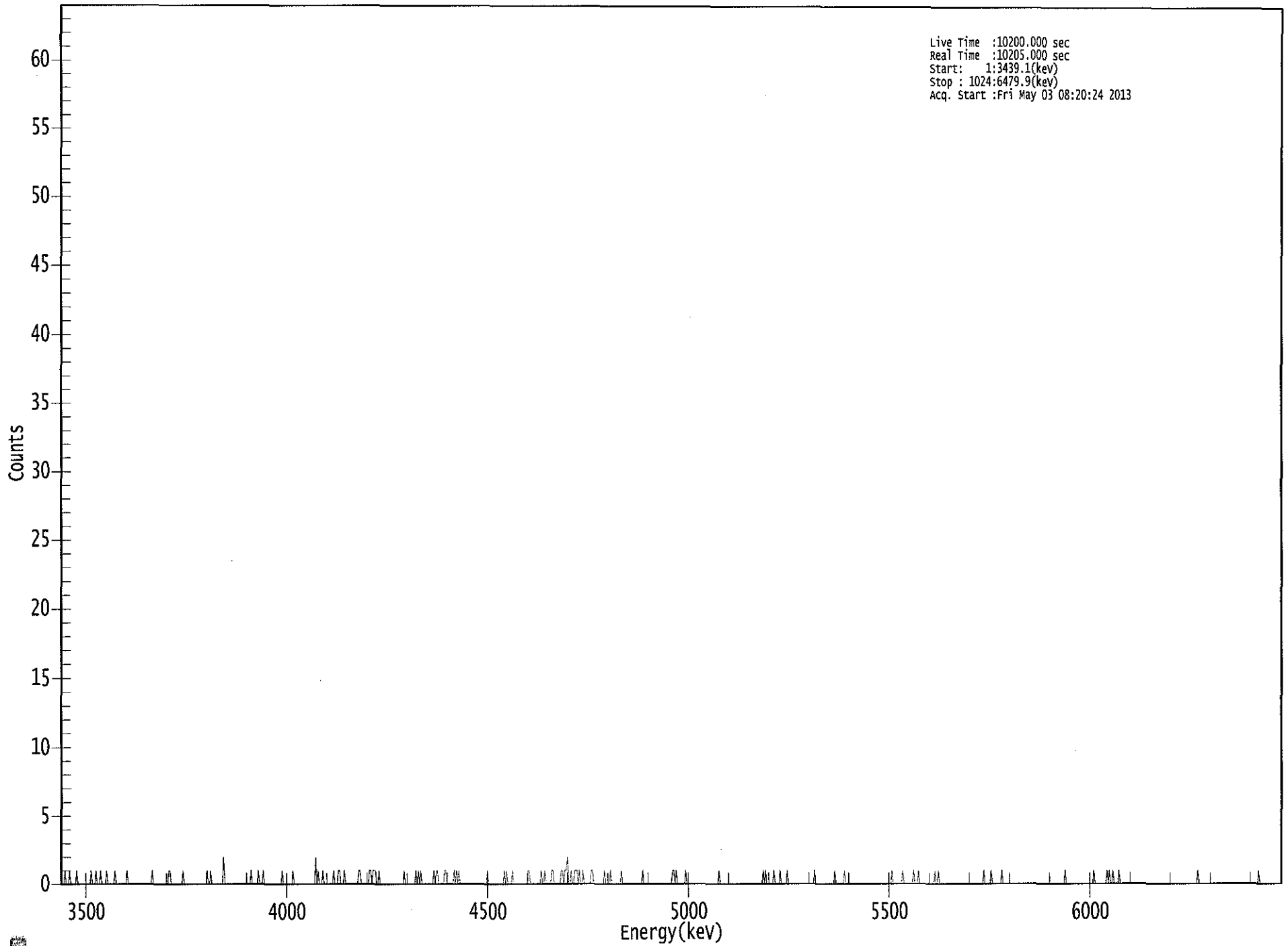
 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.544	6.83	76.08	0.17	0.00E+000	3.0
RA-226	4.624	33.15	34.55	0.85	0.00E+000	4.5

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.974	5685.50*	7.99E-001 +/- 1.62E+002	4.88E-001 +/- 9.88E+001
RA-226	0.967	4785.00*	3.18E+000 +/- 1.11E+000	5.75E-001 +/- 1.96E-002

US EPA ARCHIVE DOCUMENT



0770

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: 10205

Channel	1	2	3	4	5	6	7	8	9
1:	0	0	0	1	0	0	0	0	1
9:	0	0	0	0	0	0	1	0	0
17:	0	0	0	0	0	0	0	0	0
25:	0	1	0	0	0	0	1	0	0
33:	0	1	0	0	0	0	0	1	0
41:	0	0	0	0	0	0	1	0	0
49:	0	0	0	0	0	0	0	0	1
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	1	0	0	0
81:	0	0	0	0	0	0	0	0	0
89:	0	0	1	1	0	0	0	0	0
97:	0	0	0	0	0	0	0	1	0
105:	0	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0	0
121:	0	0	1	0	0	0	1	0	0
129:	0	0	0	0	0	0	0	0	0
137:	2	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	1
161:	0	0	0	0	0	0	1	0	0
169:	0	1	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0	0
185:	0	1	0	0	0	0	0	0	0
193:	0	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	2	0	1
217:	0	0	0	0	1	0	0	0	0
225:	0	0	0	0	0	1	0	0	0
233:	1	1	0	0	0	0	1	0	0
241:	0	0	0	0	0	0	0	0	0
249:	0	1	1	0	0	0	0	0	0
257:	0	0	1	1	0	0	1	1	1
265:	0	0	1	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	1
289:	0	0	0	0	0	0	0	0	0
297:	0	1	0	1	0	0	1	0	0
305:	0	0	0	0	0	0	0	0	0
313:	1	0	1	1	0	0	0	0	0
321:	0	1	1	0	0	0	0	0	0
329:	0	1	0	1	0	0	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	1	0	0
361:	0	0	0	0	0	0	0	0	0

369: 0 0 0 1 0 1 0 0

Sample Title: 14

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

801: 0 0 0 0 0 0 0 0 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	1	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	1	0	0	0	0	0	0
873:	0	0	0	0	1	0	1	0
881:	0	1	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:	1	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	1	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

WBS
5/3/13



Sample Description: PZ-102R-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_035
 Chamber Serial Number: 04026477A
 Detector Serial Number: 58771
 Env. Background: System Bkgd 55748
 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: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 8:20:19 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Chem. Recovery Factor: 0.7970 +/- 0.0000
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Effective Efficiency: 0.1455 +/- 0.0025

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

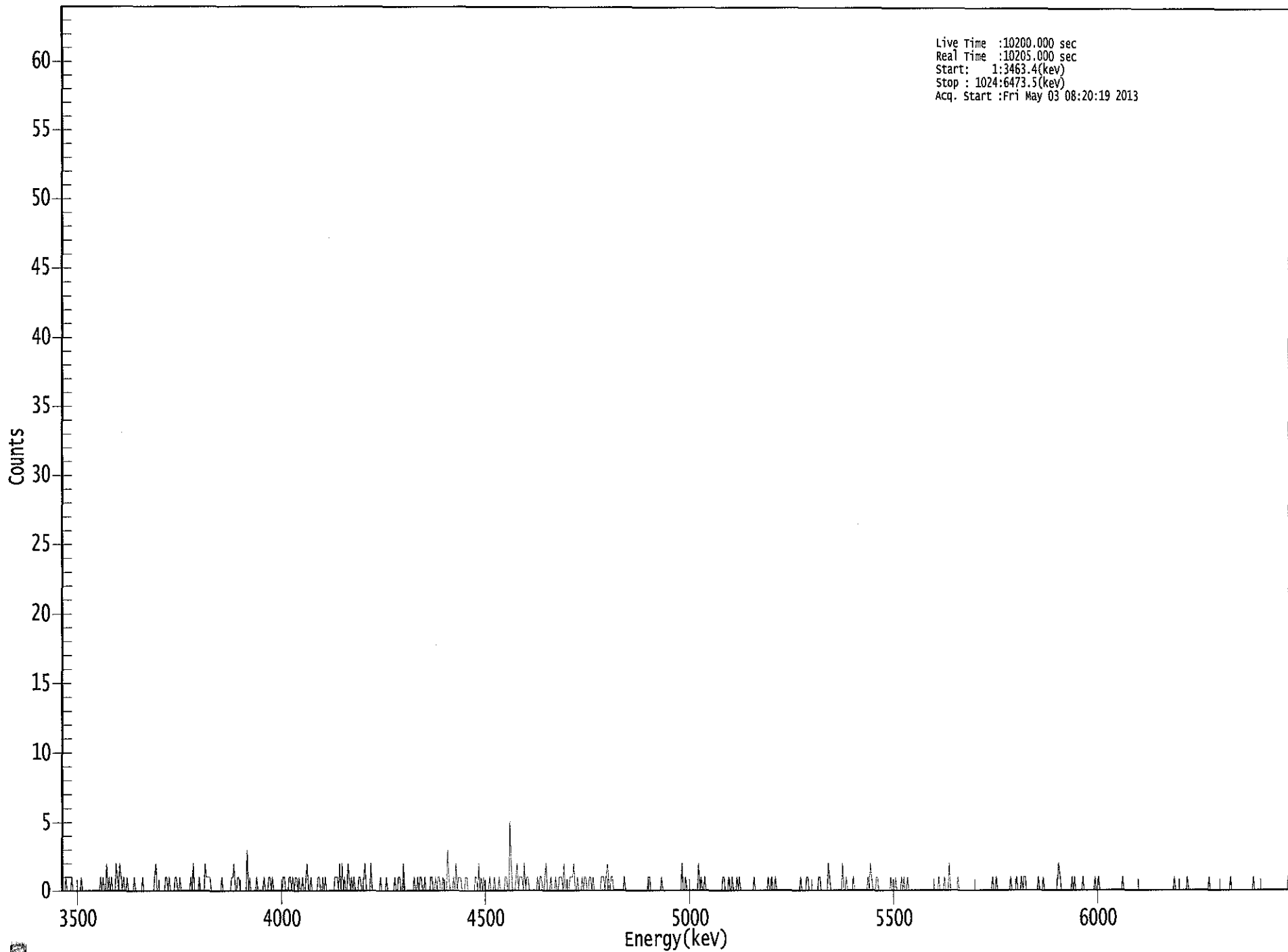
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.499	19.66	44.65	0.34	0.00E+000	2.9
RA-226	4.598	77.49	22.35	0.51	0.00E+000	3.9

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.955	5685.50*	5.82E-001 +/- 1.18E+002	1.41E-001 +/- 2.86E+001
RA-226	0.956	4785.00*	1.88E+000 +/- 4.25E-001	1.27E-001 +/- 4.36E-003

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10205.000 sec
Start: 1:3463.4(key)
Stop : 1024:6473.5(key)
Acq. Start :Fri May 03 08:20:19 2013



US EPA ARCHIVE DOCUMENT

5770

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: 10205

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

369: 0 1 1 0 0 5 2 0

Sample Title: 15

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

801: 0 1 1 0 0 0 0 0

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	1	0	0
817:	0	1	0	0	0	0	0	0
825:	0	0	0	0	0	1	2	1
833:	0	0	0	0	0	0	0	0
841:	0	1	0	1	0	0	0	0
849:	0	0	1	0	0	0	0	0
857:	0	0	0	0	1	0	0	1
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	1	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	1	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	1	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:	1	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	1	0	0

ICS
5/3/13

Apex-Alpha™

Sample Description: PZ-104-SD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_037
 Chamber Serial Number: 04026478A
 Detector Serial Number: 91133
 Env. Background: System Bkgd 55750
 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: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 8:20:21 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Chem. Recovery Factor: 0.7010 +/- 0.0000
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Effective Efficiency: 0.1250 +/- 0.0023

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	5.539	32.83	34.31	0.17	0.00E+000	2.9
RA-226	4.592	170.66	15.02	0.34	0.00E+000	3.7

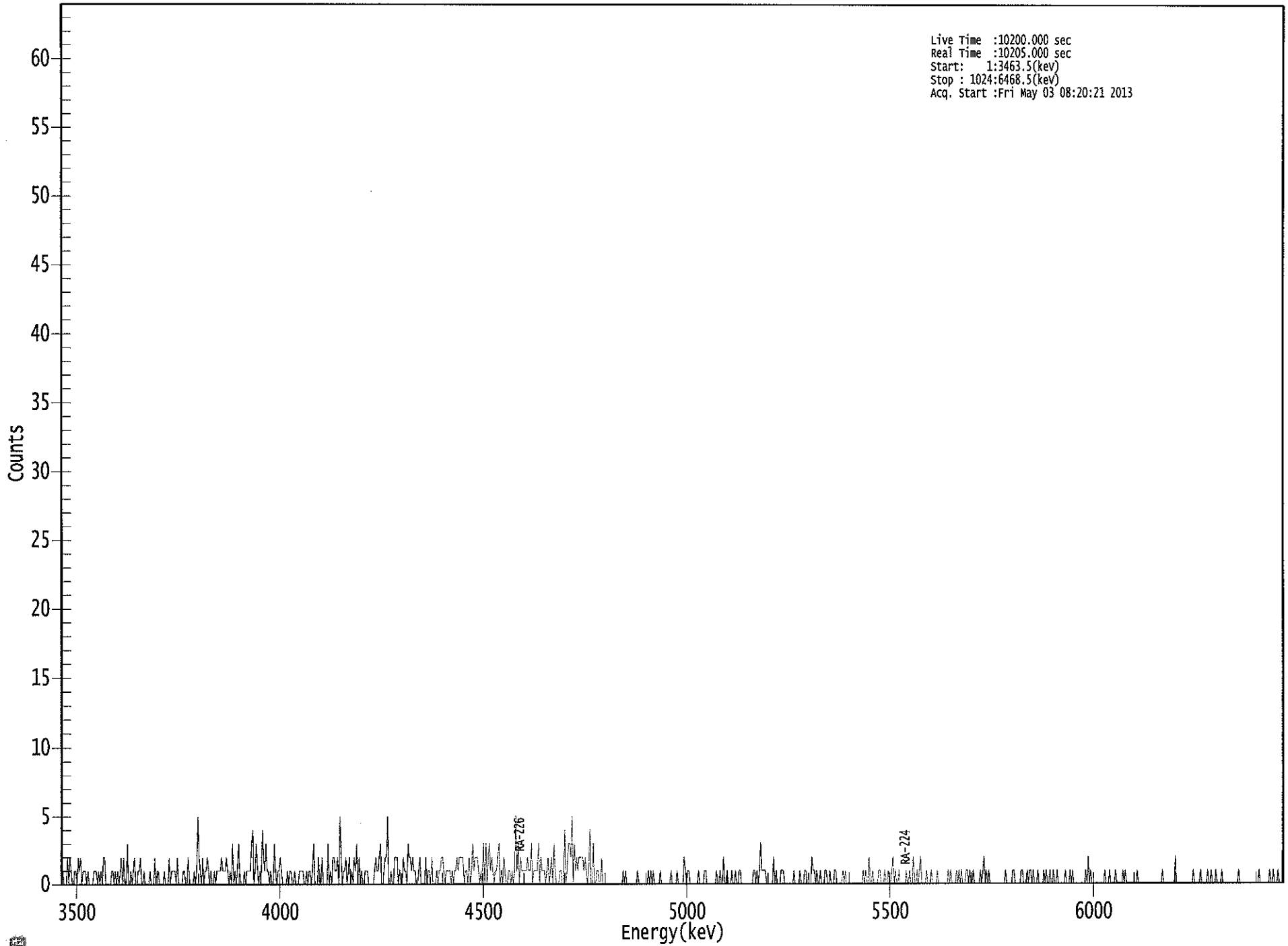
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.972	5685.50*	1.34E+000 +/- 2.71E+002	1.70E-001 +/- 3.45E+001
RA-226	0.952	4785.00*	5.72E+000 +/- 8.84E-001	1.60E-001 +/- 5.83E-003

US EPA ARCHIVE DOCUMENT

0000057028.CNF

Live Time :10200.000 sec
Real Time :10205.000 sec
Start: 1:3463.5(kev)
Stop : 1024:6468.5(kev)
Acq. Start :Fri May 03 08:20:21 2013



US EPA ARCHIVE DOCUMENT

0570

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: 10205

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

369: 1 0 2 1 0 0 1 1

Sample Title: 16

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

801: 0 0 0 1 1 0 0 0

Sample Title: 16

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

10/5
5/3/13

Apex-Alpha™

Sample Description: PZ-104-SD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 55752
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.500E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 8:20:30 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Chem. Recovery Factor: 0.8922 +/- 0.0000
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Effective Efficiency: 0.1695 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

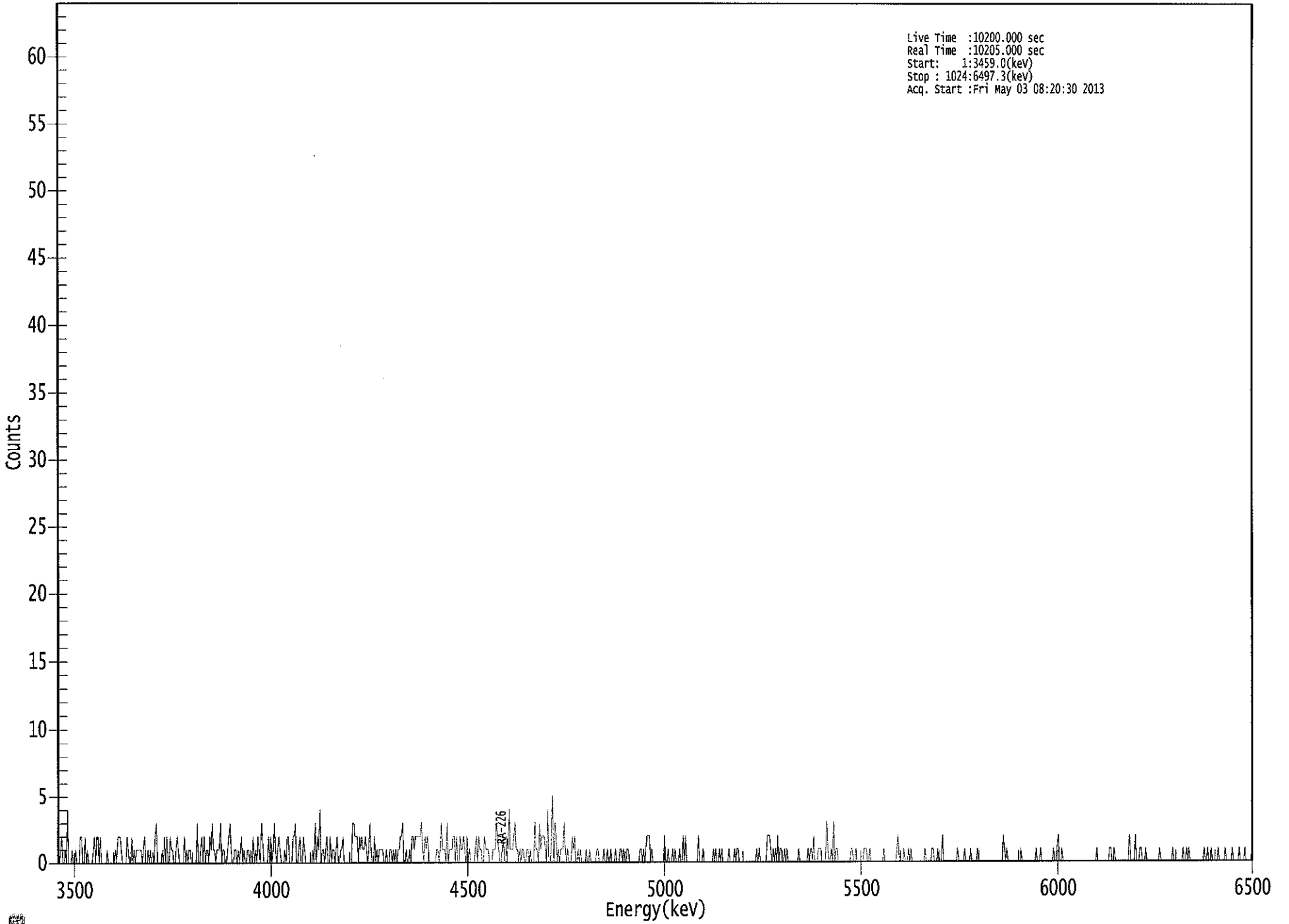
 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.490	33.32	34.36	0.68	0.00E+000	3.7
RA-226	4.587	144.49	16.34	0.51	0.00E+000	3.3

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.951	5685.50*	1.06E+000 +/- 2.14E+002	1.79E-001 +/- 3.62E+001
RA-226	0.950	4785.00*	3.76E+000 +/- 6.28E-001	1.37E-001 +/- 4.65E-003

US EPA ARCHIVE DOCUMENT



0455
5570

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: 10205

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

369: 1 0 0 0 1 1 1 3

Sample Title: 17

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

Sample Title: 17

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

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5/3/13

Apex-Alpha™

Sample Description: PZ-104-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_041
 Chamber Serial Number: 05026930A
 Detector Serial Number: 91087
 Env. Background: System Bkgd 55753
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.230E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 8:20:26 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Chem. Recovery Factor: 0.9342 +/- 0.0000
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Effective Efficiency: 0.1848 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

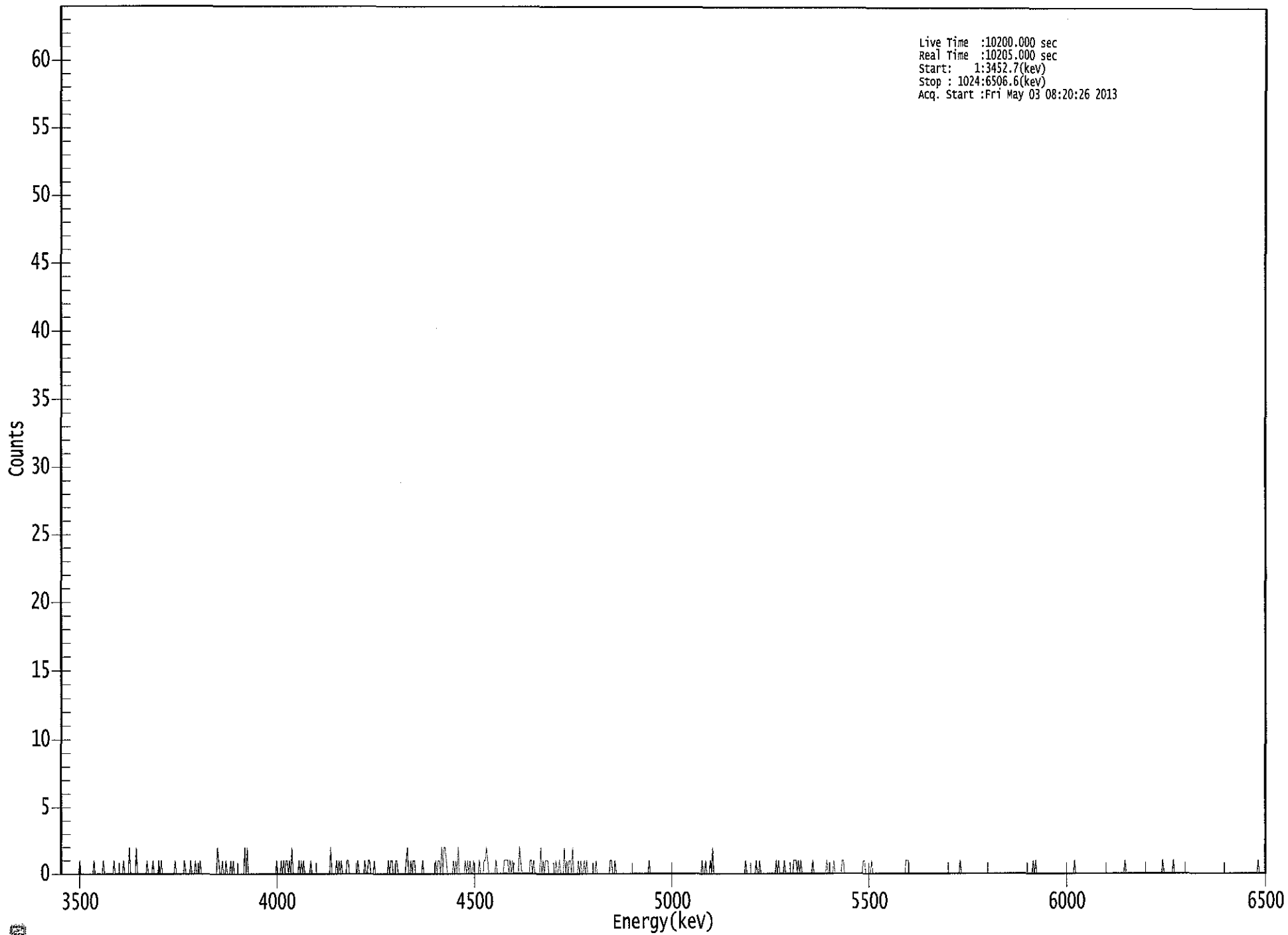
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.494	9.66	64.35	0.34	0.00E+000	3.0
RA-226	4.587	55.81	26.56	1.19	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.953	5685.50*	2.51E-001 +/- 5.07E+001	1.24E-001 +/- 2.51E+001
RA-226	0.950	4785.00*	1.19E+000 +/- 3.18E-001	1.40E-001 +/- 4.75E-003

US EPA ARCHIVE DOCUMENT

0000057023.CNF



9970

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: 10205

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

369: 0 1 0 0 0 0 0 0

Sample Title: 18

Channel	1	2	3	4	5	6	7	8
377:	1	1	1	1	0	1	0	1
385:	0	0	0	0	0	2	1	0
393:	0	0	0	0	0	0	1	1
401:	0	1	0	0	0	0	0	2
409:	0	1	0	1	1	1	0	0
417:	0	0	0	0	1	0	0	1
425:	0	0	0	2	0	1	0	1
433:	1	0	2	0	0	0	0	1
441:	0	1	0	0	1	0	1	0
449:	0	0	0	0	0	0	1	0
457:	0	0	0	0	0	0	0	0
465:	0	0	1	1	0	0	1	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	1	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:	1	0	0	1	0	0	0	1
553:	0	2	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	1	0
593:	0	1	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	1
609:	0	1	0	0	0	0	1	0
617:	0	0	0	0	0	0	1	1
625:	1	0	1	0	1	0	0	0
633:	0	0	0	0	0	0	1	0
641:	0	0	0	0	0	0	0	0
649:	0	0	1	0	0	0	0	0
657:	1	0	0	0	0	0	0	1
665:	1	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	1	1	0	0	0	0	0
689:	1	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	1	1	1
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	1	0	0	0	0
769:	0	0	0	0	0	0	0	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	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	1	0	1	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	1	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	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	1
937:	0	0	0	0	0	0	0	0
945:	1	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	1	0	0	0	0	0	0	0

10/3
5/3/13

Apex-Alpha™

Sample Description: PZ-104-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000570
 Batch Identification: 1304106A-RA
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_042
 Chamber Serial Number: 05026930B
 Detector Serial Number: 84185
 Env. Background: System Bkgd 55754
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.340E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 5/2/2013 1:37:25 PM
 Acquisition Date/Time: 5/3/2013 8:20:28 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Effective Efficiency: 0.1846 +/- 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	5.519	11.15	61.26	0.85	0.00E+000	6.0
RA-226	4.558	35.98	33.21	1.02	0.00E+000	3.0

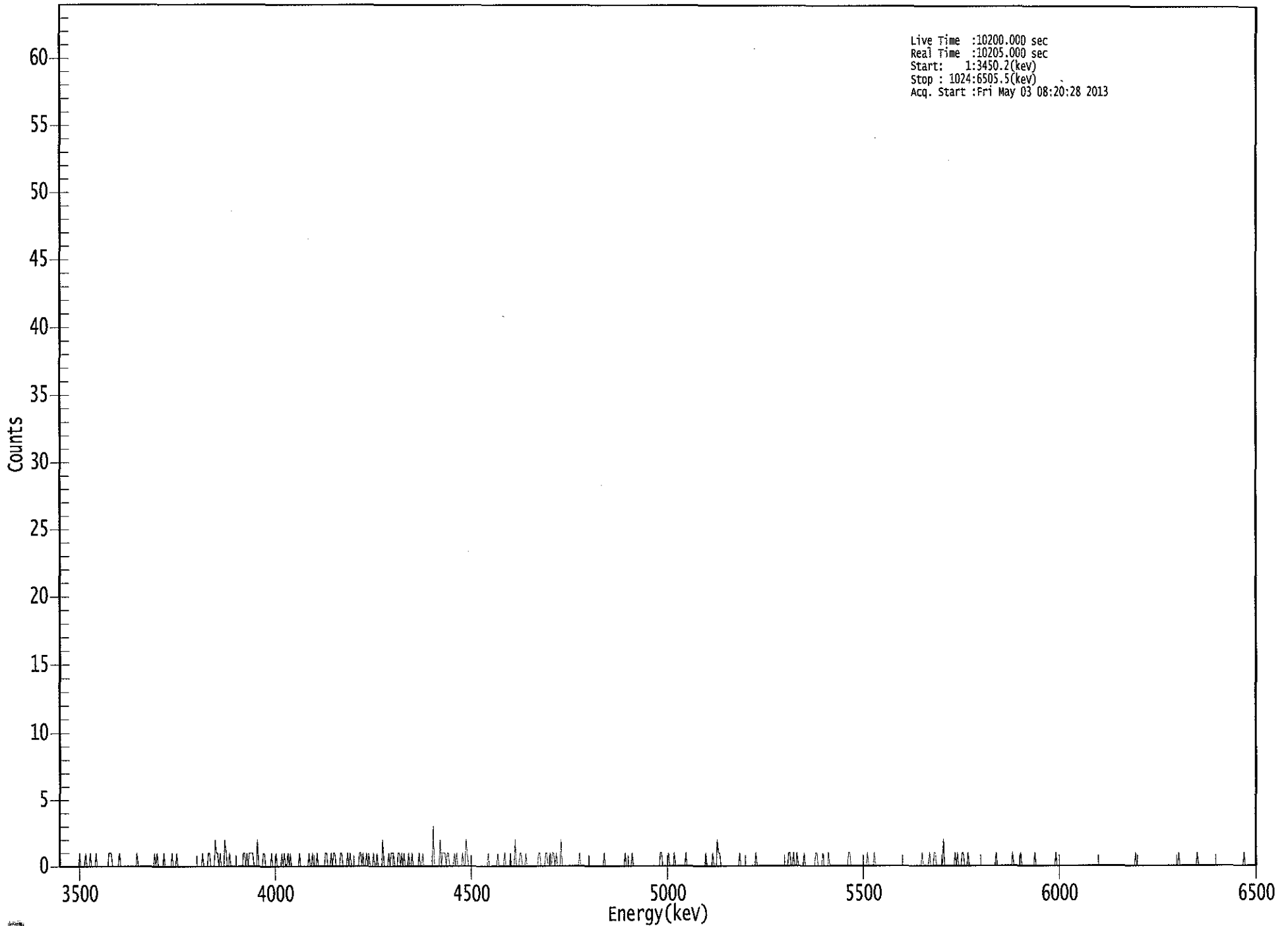
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.964	5685.50*	3.04E-001 +/- 6.15E+001	1.63E-001 +/- 3.30E+001
RA-226	0.935	4785.00*	8.06E-001 +/- 2.69E-001	1.41E-001 +/- 4.81E-003

US EPA ARCHIVE DOCUMENT

0000057024.CNF

Live Time :10200.000 sec
Real Time :10205.000 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Fri May 03 08:20:28 2013



US EPA ARCHIVE DOCUMENT

0465
5970

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: 10205

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

369: 0 0 0 0 0 0 1 0

Sample Title: 19

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

801: 1 0 0 0 0 0 0 0

Sample Title: 19

Channel	1	2	3	4	5	6	7	8	9
809:	0	0	0	0	0	0	0	1	0
817:	0	0	0	0	0	0	1	0	0
825:	0	0	0	0	0	0	0	0	0
833:	0	1	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0	0
849:	0	0	0	1	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	0	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	1
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	1	0	0	0
961:	0	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	1	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	1	0	0	0
1017:	0	0	0	0	0	0	0	0	0



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 5/3/2013
Time : 5:43:48 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	5/3/2013 5:20:28 AM
Alpha 004	21f	ALL	Passed	5/3/2013 5:20:29 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	5/3/2013 5:20:30 AM
Alpha 011	21f	ALL	Passed	5/3/2013 5:20:31 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	5/3/2013 5:20:32 AM
Alpha 014	21f	ALL	Passed	5/3/2013 5:20:33 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	5/3/2013 5:20:33 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	5/3/2013 5:20:34 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	5/3/2013 5:20:35 AM
Alpha 025	AIM730	ALL	Passed	5/3/2013 5:20:36 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	5/3/2013 5:20:37 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	5/3/2013 5:20:38 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	5/3/2013 5:20:39 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:40 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:42 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:29:59 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:43 AM
Alpha 038	Alpha Analyst100DC	ALL	Not Done	
Alpha 039	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:03 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:45 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:46 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:48 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:09 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:50 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:51 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:53 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	5/3/2013 5:20:55 AM

APPROVED BY: _____

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

SECTION XI
ANALYTICAL DATA (RADIUM-228)

US EPA ARCHIVE DOCUMENT

Work Order	13-04106
Analysis Code	Ra228
Run	1
Date Received	4/16/2013
Lab Deadline	5/7/2013
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)	1009.047
Carrier	Yttrium
Carrier Conc (mg/ml)	35

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/16/13 00:00	1.0000E+00
02	MBL	BLANK		04/16/13 00:00	1.5000E+00
03	DUP	PZ-111-KS TOT	43	04/09/13 15:35	1.5000E+00
04	DO	PZ-111-KS TOT	43	04/09/13 15:35	1.5000E+00
05	TRG	PZ-111-KS DIS	43	04/09/13 15:35	1.5000E+00
06	TRG	D-6 TOT	45	04/09/13 15:45	1.5000E+00
07	TRG	D-6 DIS	45	04/09/13 15:45	1.5000E+00
08	TRG	D-83 TOT	40	04/09/13 16:16	1.5000E+00
09	TRG	D-83 DIS	40	04/09/13 16:16	1.5000E+00
10	TRG	DUP 05 TOT	47	04/09/13 00:00	1.5000E+00
11	TRG	DUP 05 DIS	47	04/09/13 00:00	1.5000E+00
12	TRG	PZ-102-SS TOT	39	04/11/13 09:10	1.5000E+00
13	TRG	PZ-102-SS DIS	39	04/11/13 09:10	1.5000E+00
14	TRG	PZ-102R-SS TOT	45	04/11/13 11:30	1.5000E+00
15	TRG	PZ-102R-SS DIS	45	04/11/13 11:30	1.5000E+00
16	TRG	PZ-104-SD TOT	44	04/11/13 11:38	1.5000E+00
17	TRG	PZ-104-SD DIS	44	04/11/13 11:38	1.5000E+00
18	TRG	PZ-104-SS TOT	42	04/11/13 12:59	1.5000E+00
19	TRG	PZ-104-SS DIS	42	04/11/13 12:59	1.5000E+00

0473

* 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	0.9115	919.7	404.3	97.59	2.000	0.0924	0.1520	0.0596	85.14	83.09	1.00	1.00
02	MBL	0.9097	917.9	399.5	96.62	2.000	0.0910	0.1514	0.0604	86.29	83.37	1.00	1.00
03	DUP	0.9069	915.1	370.1	89.78	2.000	0.0925	0.1489	0.0564	80.57	72.34	1.00	1.00
04	DO	0.9027	910.9	376.3	91.71	2.000	0.0922	0.1545	0.0623	89.00	81.62	1.00	1.00
05	TRG	0.8995	907.6	362.5	88.66	2.000	0.0910	0.1524	0.0614	87.71	77.77	1.00	1.00
06	TRG	0.9010	909.2	337.4	82.39	2.000	0.0926	0.1282	0.0356	50.86	41.90	1.00	1.00
07	TRG	0.8735	881.4	339.2	85.43	2.000	0.0923	0.1515	0.0592	84.57	72.25	1.00	1.00
08	TRG	0.9031	911.3	359.6	87.60	2.000	0.0911	0.1502	0.0591	84.43	73.96	1.00	1.00
09	TRG	0.8786	886.5	365.2	91.45	2.000	0.0930	0.1385	0.0455	65.00	59.44	1.00	1.00
10	TRG	0.9011	909.3	315.6	77.06	2.000	0.0920	0.1513	0.0593	84.71	65.28	1.00	1.00
11	TRG	0.8694	877.3	344.1	87.08	2.000	0.0901	0.1316	0.0415	59.29	51.62	1.00	1.00
12	TRG	0.9020	910.2	217.8	53.12	2.000	0.0922	0.1286	0.0364	52.00	27.62	1.00	1.00
13	TRG	0.9038	912.0	343.9	83.71	2.000	0.0921	0.1430	0.0509	72.71	60.87	1.00	1.00
14	TRG	0.9034	911.6	162.8	39.65	2.000	0.0907	0.1200	0.0293	41.86	16.60	1.00	1.00
15	TRG	0.9002	908.3	326.1	79.70	2.000	0.0921	0.1245	0.0324	46.29	36.89	1.00	1.00
16	TRG	0.8050	812.3	256.5	70.10	2.000	0.0923	0.1289	0.0366	52.29	36.65	1.00	1.00
17	TRG	0.9010	909.2	365.4	89.22	2.000	0.0902	0.1501	0.0599	85.57	76.35	1.00	1.00
18	TRG	0.9107	918.9	386.7	93.42	2.000	0.0921	0.1530	0.0609	87.00	81.28	1.00	1.00
19	TRG	0.9016	909.8	424.9	103.68	2.000	0.0915	0.1356	0.0441	63.00	65.32	1.00	1.00

US EPA ARCHIVE DOCUMENT

0474

* 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			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
02	MBL			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
03	DUP			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
04	DO			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
05	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
06	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
07	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
08	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
09	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
10	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
11	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
12	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
13	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
14	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
15	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
16	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
17	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
18	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ
19	TRG			04/25/13 09:07	JBARNARD	05/02/13 13:37	LWALKER	05/14/13 05:59	RMARTZ

US EPA ARCHIVE DOCUMENT

0475

* 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	RA-228	LCS	LCS	pCi/l	7.23E+00	8.59E-01	1.14E+00	8.96E+00	80.70	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	6.99E-01	3.74E-01	7.14E-01					OK	OK
03	RA-228	DUP	PZ-111-KS TOT	pCi/l	2.62E-01	4.71E-01	9.77E-01				NA	OK	
04	RA-228	DO	PZ-111-KS TOT	pCi/l	1.08E+00	4.12E-01	7.54E-01					OK	
05	RA-228	TRG	PZ-111-KS DIS	pCi/l	7.29E-01	4.79E-01	9.45E-01					OK	
06	RA-228	TRG	D-6 TOT	pCi/l	5.89E+00	1.05E+00	1.66E+00					OK	
07	RA-228	TRG	D-6 DIS	pCi/l	2.70E+00	6.00E-01	1.01E+00					OK	
08	RA-228	TRG	D-83 TOT	pCi/l	5.53E+00	6.66E-01	8.89E-01					OK	
09	RA-228	TRG	D-83 DIS	pCi/l	3.78E+00	7.39E-01	1.20E+00					OK	
10	RA-228	TRG	DUP 05 TOT	pCi/l	2.45E+00	6.40E-01	1.12E+00					OK	
11	RA-228	TRG	DUP 05 DIS	pCi/l	1.79E+00	7.07E-01	1.31E+00					OK	
12	RA-228	TRG	PZ-102-SS TOT	pCi/l	7.98E+00	1.61E+00	2.67E+00					INV	
13	RA-228	TRG	PZ-102-SS DIS	pCi/l	2.35E+00	6.11E-01	1.04E+00					OK	
14	RA-228	TRG	PZ-102R-SS TOT	pCi/l	4.01E-01	2.08E+00	4.41E+00					INV	
15	RA-228	TRG	PZ-102R-SS DIS	pCi/l	1.50E+00	9.53E-01	1.87E+00					OK	
16	RA-228	TRG	PZ-104-SD TOT	pCi/l	2.72E+00	1.02E+00	1.88E+00					OK	
17	RA-228	TRG	PZ-104-SD DIS	pCi/l	1.90E+00	4.97E-01	8.50E-01					OK	
18	RA-228	TRG	PZ-104-SS TOT	pCi/l	8.04E-01	4.61E-01	8.99E-01					OK	
19	RA-228	TRG	PZ-104-SS DIS	pCi/l	1.58E+00	6.25E-01	1.17E+00					OK	

Run

1

Analysis Code

Ra228

Eberline Services Work Order

13-04106

Client

Engineering Management Support, Inc.

0470

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	RA-228	LCS	04/16/13 00:00	1.00E+00	97.59	85.14	83.09	1.00	5/2/2013 13:37	5/14/2013 5:59
02	RA-228	MBL	04/16/13 00:00	1.50E+00	96.62	86.29	83.37	1.00	5/2/2013 13:37	5/14/2013 5:59
03	RA-228	DUP	04/09/13 15:35	1.50E+00	89.78	80.57	72.34	1.00	5/2/2013 13:37	5/14/2013 5:59
04	RA-228	DO	04/09/13 15:35	1.50E+00	91.71	89.00	81.62	1.00	5/2/2013 13:37	5/14/2013 5:59
05	RA-228	TRG	04/09/13 15:35	1.50E+00	88.66	87.71	77.77	1.00	5/2/2013 13:37	5/14/2013 5:59
06	RA-228	TRG	04/09/13 15:45	1.50E+00	82.39	50.86	41.90	1.00	5/2/2013 13:37	5/14/2013 5:59
07	RA-228	TRG	04/09/13 15:45	1.50E+00	85.43	84.57	72.25	1.00	5/2/2013 13:37	5/14/2013 5:59
08	RA-228	TRG	04/09/13 16:16	1.50E+00	87.60	84.43	73.96	1.00	5/2/2013 13:37	5/14/2013 5:59
09	RA-228	TRG	04/09/13 16:16	1.50E+00	91.45	65.00	59.44	1.00	5/2/2013 13:37	5/14/2013 5:59
10	RA-228	TRG	04/09/13 00:00	1.50E+00	77.06	84.71	65.28	1.00	5/2/2013 13:37	5/14/2013 5:59
11	RA-228	TRG	04/09/13 00:00	1.50E+00	87.08	59.29	51.62	1.00	5/2/2013 13:37	5/14/2013 5:59
12	RA-228	TRG	04/11/13 09:10	1.50E+00	53.12	52.00	27.62	1.00	5/2/2013 13:37	5/14/2013 5:59
13	RA-228	TRG	04/11/13 09:10	1.50E+00	83.71	72.71	60.87	1.00	5/2/2013 13:37	5/14/2013 5:59
14	RA-228	TRG	04/11/13 11:30	1.50E+00	39.65	41.86	16.60	1.00	5/2/2013 13:37	5/14/2013 5:59
15	RA-228	TRG	04/11/13 11:30	1.50E+00	79.70	46.29	36.89	1.00	5/2/2013 13:37	5/14/2013 5:59
16	RA-228	TRG	04/11/13 11:38	1.50E+00	70.10	52.29	36.65	1.00	5/2/2013 13:37	5/14/2013 5:59
17	RA-228	TRG	04/11/13 11:38	1.50E+00	89.22	85.57	76.35	1.00	5/2/2013 13:37	5/14/2013 5:59
18	RA-228	TRG	04/11/13 12:59	1.50E+00	93.42	87.00	81.28	1.00	5/2/2013 13:37	5/14/2013 5:59
19	RA-228	TRG	04/11/13 12:59	1.50E+00	103.68	63.00	65.32	1.00	5/2/2013 13:37	5/14/2013 5:59

Run 1
Analysis Code Ra228
Eberline Services Work Order 13-04106
Client Engineering Management Support, Inc.

2278

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	05/14/13 09:50		LB4110R	A1	120	576	1.133333333	0.4776
02	RA-228	MBL	05/14/13 09:50		LB4110R	A2	120	179	0.966666667	0.4699
03	RA-228	DUP	05/14/13 09:50		LB4110R	A3	120	195	1.45	0.4809
04	RA-228	DO	05/14/13 09:50		LB4110R	A4	120	222	1.05	0.4732
05	RA-228	TRG	05/14/13 09:53		LB4110A	B1	120	232	1.433333333	0.4626
06	RA-228	TRG	05/14/13 09:53		LB4110A	B2	120	423	1.316666667	0.4691
07	RA-228	TRG	05/14/13 09:53		LB4110A	B3	120	358	1.316666667	0.449
08	RA-228	TRG	05/14/13 09:53		LB4110A	B4	120	568	1.133333333	0.4619
09	RA-228	TRG	05/14/13 09:53		LB4110A	C2	120	393	1.316666667	0.4578
10	RA-228	TRG	05/14/13 09:53		LB4110A	C3	120	348	1.466666667	0.4699
11	RA-228	TRG	05/14/13 09:53		LB4110A	C4	120	249	1.25	0.4692
12	RA-228	TRG	05/14/13 09:53		LB4110A	D2	120	414	1.483333333	0.4682
13	RA-228	TRG	05/14/13 09:53		LB4110A	D4	120	289	1.116666667	0.4741
14	RA-228	TRG	05/14/13 10:11		LB4110R	B1	120	175	1.4	0.4754
15	RA-228	TRG	05/14/13 10:11		LB4110R	B2	120	199	1.183333333	0.4658
16	RA-228	TRG	05/14/13 10:11		LB4110R	B3	120	250	1.216666667	0.4713
17	RA-228	TRG	05/14/13 10:11		LB4110R	B4	120	285	1.1	0.4773
18	RA-228	TRG	05/14/13 10:11		LB4110R	C1	120	232	1.366666667	0.4705
19	RA-228	TRG	05/14/13 10:11		LB4110R	C2	120	285	1.483333333	0.4676

US EPA ARCHIVE DOCUMENT

Client: Engineering Management Support, Inc.
 Eberline Services Work Order: 13-04106
 Analysis Code: Ra228
 Run: 1

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/16/13 00:00	1.0000	0.9115	919.7463	404.3000	97.59	1.00	1.00
02	MBL	BLANK	04/16/13 00:00	1.5000	0.9097	917.9301	399.5000	96.62	1.00	1.00
03	DUP	PZ-111-KS TOT	04/09/13 15:35	1.5000	0.9069	915.1047	370.1000	89.78	1.00	1.00
04	DO	PZ-111-KS TOT	04/09/13 15:35	1.5000	0.9027	910.8667	376.3000	91.71	1.00	1.00
05	TRG	PZ-111-KS DIS	04/09/13 15:35	1.5000	0.8995	907.6378	362.5000	88.66	1.00	1.00
06	TRG	D-6 TOT	04/09/13 15:45	1.5000	0.9010	909.1513	337.4000	82.39	1.00	1.00
07	TRG	D-6 DIS	04/09/13 15:45	1.5000	0.8735	881.4026	339.2000	85.43	1.00	1.00
08	TRG	D-83 TOT	04/09/13 16:16	1.5000	0.9031	911.2703	359.6000	87.60	1.00	1.00
09	TRG	D-83 DIS	04/09/13 16:16	1.5000	0.8786	886.5487	365.2000	91.45	1.00	1.00
10	TRG	DUP 05 TOT	04/09/13 00:00	1.5000	0.9011	909.2523	315.6000	77.06	1.00	1.00
11	TRG	DUP 05 DIS	04/09/13 00:00	1.5000	0.8694	877.2655	344.1000	87.08	1.00	1.00
12	TRG	PZ-102-SS TOT	04/11/13 09:10	1.5000	0.9020	910.1604	217.8000	53.12	1.00	1.00
13	TRG	PZ-102-SS DIS	04/11/13 09:10	1.5000	0.9038	911.9767	343.9000	83.71	1.00	1.00
14	TRG	PZ-102R-SS TOT	04/11/13 11:30	1.5000	0.9034	911.5731	162.8000	39.65	1.00	1.00
15	TRG	PZ-102R-SS DIS	04/11/13 11:30	1.5000	0.9002	908.3441	326.1000	79.70	1.00	1.00
16	TRG	PZ-104-SD TOT	04/11/13 11:38	1.5000	0.8050	812.2828	256.5000	70.10	1.00	1.00
17	TRG	PZ-104-SD DIS	04/11/13 11:38	1.5000	0.9010	909.1513	365.4000	89.22	1.00	1.00
18	TRG	PZ-104-SS TOT	04/11/13 12:59	1.5000	0.9107	918.9391	386.7000	93.42	1.00	1.00
19	TRG	PZ-104-SS DIS	04/11/13 12:59	1.5000	0.9016	909.7568	424.9000	103.68	1.00	1.00

US EPA ARCHIVE DOCUMENT

Spike and Tracer Worksheet

Internal Work Order					Run	Analysis Code			Date	Technician				Technician Initials		Witness Initials	
13-04106					1	Ra228			4/25/2013 9:06	JBARNARD							
LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD		
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate	
Ra-228	Ra-11	38.942	4/25/2013	0.510	0.5108				8.96	0.457	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	1009.047	4/25/2013	0.9115	1.0000										
02	Ba-133	Ba-6a	1009.047	4/25/2013	0.9097	1.0000										
03	Ba-133	Ba-6a	1009.047	4/25/2013	0.9069	1.0000										
04	Ba-133	Ba-6a	1009.047	4/25/2013	0.9027	1.0000										
05	Ba-133	Ba-6a	1009.047	4/25/2013	0.8995	1.0000										
06	Ba-133	Ba-6a	1009.047	4/25/2013	0.9010	1.0000										
07	Ba-133	Ba-6a	1009.047	4/25/2013	0.8735	1.0000										
08	Ba-133	Ba-6a	1009.047	4/25/2013	0.9031	1.0000										
09	Ba-133	Ba-6a	1009.047	4/25/2013	0.8786	1.0000										
10	Ba-133	Ba-6a	1009.047	4/25/2013	0.9011	1.0000										
11	Ba-133	Ba-6a	1009.047	4/25/2013	0.8694	1.0000										
12	Ba-133	Ba-6a	1009.047	4/25/2013	0.9020	1.0000										
13	Ba-133	Ba-6a	1009.047	4/25/2013	0.9038	1.0000										
14	Ba-133	Ba-6a	1009.047	4/25/2013	0.9034	1.0000										
15	Ba-133	Ba-6a	1009.047	4/25/2013	0.9002	1.0000										
16	Ba-133	Ba-6a	1009.047	4/25/2013	0.8050	1.0000										
17	Ba-133	Ba-6a	1009.047	4/25/2013	0.9010	1.0000										
18	Ba-133	Ba-6a	1009.047	4/25/2013	0.9107	1.0000										
19	Ba-133	Ba-6a	1009.047	4/25/2013	0.9016	1.0000										
							Matrix Spike									

US EPA ARCHIVE DOCUMENT

0480

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04106	1	Ra228	liters	5/7/2013	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 Dis	Dil Factor	Ratio	Aliquot	Net Equip	Aliquot	Net Equip	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-111-KS TOT	DUP					1.5000E+00	1.5000E+00				
04	PZ-111-KS TOT	DO					1.5000E+00	1.5000E+00				
05	PZ-111-KS DIS	TRG					1.5000E+00	1.5000E+00				
06	D-6 TOT	TRG					1.5000E+00	1.5000E+00				
07	D-6 DIS	TRG					1.5000E+00	1.5000E+00				
08	D-83 TOT	TRG					1.5000E+00	1.5000E+00				
09	D-83 DIS	TRG					1.5000E+00	1.5000E+00				
10	DUP 05 TOT	TRG					1.5000E+00	1.5000E+00				
11	DUP 05 DIS	TRG					1.5000E+00	1.5000E+00				
12	PZ-102-SS TOT	TRG					1.5000E+00	1.5000E+00				
13	PZ-102-SS DIS	TRG					1.5000E+00	1.5000E+00				
14	PZ-102R-SS TOT	TRG					1.5000E+00	1.5000E+00				
15	PZ-102R-SS DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-104-SD TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-104-SD DIS	TRG					1.5000E+00	1.5000E+00				
18	PZ-104-SS TOT	TRG					1.5000E+00	1.5000E+00				
19	PZ-104-SS DIS	TRG					1.5000E+00	1.5000E+00				

Comments

0481

Technician: JB Date: 4/25/13

US EPA ARCHIVE DOCUMENT

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-04106	1	Ra228	Yttirum	35.0000	MMCDOUGALL

TRetek 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	2.0000	0.0924	0.1520	0.0596	85.14
02	BLANK	MBL	2.0000	0.0910	0.1514	0.0604	86.29
03	DUP	DUP	2.0000	0.0925	0.1489	0.0564	80.57
04	PZ-111-KS TOT	DO	2.0000	0.0922	0.1545	0.0623	89.00
05	PZ-111-KS DIS	TRG	2.0000	0.0910	0.1524	0.0614	87.71
06	D-6 TOT	TRG	2.0000	0.0926	0.1282	0.0356	50.86
07	D-6 DIS	TRG	2.0000	0.0923	0.1515	0.0592	84.57
08	D-83 TOT	TRG	2.0000	0.0911	0.1502	0.0591	84.43
09	D-83 DIS	TRG	2.0000	0.0930	0.1385	0.0455	65.00
10	DUP 05 TOT	TRG	2.0000	0.0920	0.1513	0.0593	84.71
11	DUP 05 DIS	TRG	2.0000	0.0901	0.1316	0.0415	59.29
12	PZ-102-SS TOT	TRG	2.0000	0.0922	0.1286	0.0364	52.00
13	PZ-102-SS DIS	TRG	2.0000	0.0921	0.1430	0.0509	72.71
14	PZ-102R-SS TOT	TRG	2.0000	0.0907	0.1200	0.0293	41.86
15	PZ-102R-SS DIS	TRG	2.0000	0.0921	0.1245	0.0324	46.29
16	PZ-104-SD TOT	TRG	2.0000	0.0923	0.1289	0.0366	52.29
17	PZ-104-SD DIS	TRG	2.0000	0.0902	0.1501	0.0599	85.57
18	PZ-104-SS TOT	TRG	2.0000	0.0921	0.1530	0.0609	87.00
19	PZ-104-SS DIS	TRG	2.0000	0.0915	0.1356	0.0441	63.00

US EPA ARCHIVE DOCUMENT

0482

Technician:  Date: 5, 14, 13

(R)
5/14/13
EO

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
A1	1304106-01	19	576	120	1400	5/14/13 11:50
A2	1304106-02	18	179	120	1400	5/14/13 11:50
A3	1304106-03	19	195	120	1400	5/14/13 11:50
A4	1304106-04	13	222	120	1400	5/14/13 11:50

①
5/14/13
105

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
B1	1304106-05	23	232	120	1400	5/14/13 11:53
B2	1304106-06	20	423	120	1400	5/14/13 11:53
B3	1304106-07	16	358	120	1400	5/14/13 11:53
B4	1304106-08	21	568	120	1400	5/14/13 11:53
C2	1304106-09	16	393	120	1400	5/14/13 11:53
C3	1304106-10	17	348	120	1400	5/14/13 11:53
C4	1304106-11	9	249	120	1400	5/14/13 11:53
D2	1304106-12	30	414	120	1400	5/14/13 11:53
D4	1304106-13	17	289	120	1400	5/14/13 11:53

②
5/14/13
KB

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1304106-18	18	232	120	1400	5/14/13 12:11
C2	1304106-19	21	285	120	1400	5/14/13 12:11
B1	1304106-14	12	175	120	1400	5/14/13 12:11
B2	1304106-15	13	199	120	1400	5/14/13 12:11
B3	1304106-16	12	250	120	1400	5/14/13 12:11
B4	1304106-17	21	285	120	1400	5/14/13 12:11

GPC Detector Report
(ALL Backgrounds)

C
5/14/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	5/14/2013	6.67E-02	P	-2.18E+01	2.93E-01	2.24E+01
LB4110A - A2	Alpha	11/18/2007	5/14/2013	1.67E-02	P	-1.85E+01	2.62E-01	1.90E+01
LB4110A - A3	Alpha	11/18/2007	5/14/2013	5.00E-02	P	-1.80E+01	2.23E-01	1.84E+01
LB4110A - A4	Alpha	11/18/2007	5/14/2013	8.33E-02	P	-1.91E+01	2.44E-01	1.96E+01
LB4110A - B1	Alpha	11/18/2007	5/14/2013	5.00E-02	P	-9.87E-02	7.50E-02	2.49E-01
LB4110A - B2	Alpha	11/18/2007	5/14/2013	6.67E-02	P	-7.93E-02	7.28E-02	2.25E-01
LB4110A - B3	Alpha	11/18/2007	5/14/2013	1.33E-01	P	-6.40E-02	5.32E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	5/14/2013	8.33E-02	P	-1.43E-01	7.92E-02	3.02E-01
LB4110A - C1	Alpha	11/18/2007	5/14/2013	2.17E-01	P	-1.52E-01	8.93E-02	3.31E-01
LB4110A - C2	Alpha	11/18/2007	5/14/2013	8.33E-02	P	-1.80E-01	8.81E-02	3.56E-01
LB4110A - C3	Alpha	11/18/2007	5/14/2013	6.67E-02	P	-1.76E-01	1.01E-01	3.78E-01
LB4110A - C4	Alpha	11/18/2007	5/14/2013	6.67E-02	P	-6.26E-02	6.88E-02	2.00E-01
LB4110A - D1	Alpha	11/18/2007	5/14/2013	1.67E-02	P	-5.36E-02	8.40E-02	2.22E-01
LB4110A - D2	Alpha	11/18/2007	5/14/2013	1.50E-01	P	-7.02E-02	6.05E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	5/14/2013	3.33E-02	P	-4.76E-02	7.18E-02	1.91E-01
LB4110A - D4	Alpha	11/18/2007	5/14/2013	5.00E-02	P	-5.74E-02	7.09E-02	1.99E-01
LB4110R - A1	Alpha	11/24/2006	5/14/2013	1.17E-01	P	-1.01E-01	1.01E-01	3.03E-01
LB4110R - A2	Alpha	11/24/2006	5/14/2013	1.17E-01	P	-9.00E-02	7.75E-02	2.45E-01
LB4110R - A3	Alpha	11/24/2006	5/14/2013	1.33E-01	P	-7.34E-02	7.68E-02	2.27E-01
LB4110R - A4	Alpha	11/24/2006	5/14/2013	3.33E-02	P	-5.29E-02	7.17E-02	1.96E-01
LB4110R - B1	Alpha	11/24/2006	5/14/2013	1.00E-01	P	-9.57E-02	6.20E-02	2.20E-01
LB4110R - B2	Alpha	11/24/2006	5/14/2013	8.33E-02	P	-6.95E-02	6.43E-02	1.98E-01
LB4110R - B3	Alpha	11/24/2006	5/14/2013	1.17E-01	P	-6.52E-02	7.01E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	5/14/2013	5.00E-02	P	-6.47E-02	7.08E-02	2.06E-01
LB4110R - C1	Alpha	11/24/2006	5/14/2013	1.17E-01	P	-7.79E-02	7.43E-02	2.27E-01
LB4110R - C2	Alpha	11/24/2006	5/14/2013	1.67E-02	P	-7.54E-02	7.21E-02	2.20E-01
LB4110R - C3	Alpha	11/24/2006	5/14/2013	6.67E-02	P	-8.90E-02	8.47E-02	2.58E-01
LB4110R - C4	Alpha	11/24/2006	5/14/2013	8.33E-02	P	-6.23E-02	8.20E-02	2.26E-01
LB4110R - D1	Alpha	11/24/2006	5/14/2013	0.00E+00	P	-9.95E-02	7.29E-02	2.45E-01
LB4110R - D2	Alpha	11/24/2006	5/14/2013	0.00E+00	P	-7.36E-02	7.23E-02	2.18E-01
LB4110R - D3	Alpha	11/24/2006	5/14/2013	0.00E+00	P	-7.89E-02	7.20E-02	2.23E-01
LB4110R - D4	Alpha	11/24/2006	5/14/2013	0.00E+00	P	-7.04E-02	7.70E-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

US EPA ARCHIVE DOCUMENT

C
5/14/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	5/14/2013	8.10E+00	P	-2.96E+02	7.63E+00	3.11E+02
LB4110A - A2	Beta	11/18/2007	5/14/2013	3.25E+00	P	-3.11E+01	2.55E+00	3.62E+01
LB4110A - A3	Beta	11/18/2007	5/14/2013	1.25E+00	P	-5.13E+01	2.67E+00	5.66E+01
LB4110A - A4	Beta	11/18/2007	5/14/2013	7.17E+00	P	-3.33E+01	3.04E+00	3.94E+01
LB4110A - B1	Beta	11/18/2007	5/14/2013	1.43E+00	P	-1.04E+01	3.25E+00	1.69E+01
LB4110A - B2	Beta	11/18/2007	5/14/2013	1.32E+00	P	-7.54E+00	1.99E+00	1.15E+01
LB4110A - B3	Beta	11/18/2007	5/14/2013	1.32E+00	P	1.06E-01	1.36E+00	2.62E+00
LB4110A - B4	Beta	11/18/2007	5/14/2013	1.13E+00	P	-7.60E+00	1.97E+00	1.15E+01
LB4110A - C1	Beta	11/18/2007	5/14/2013	1.47E+00	P	-5.50E+00	2.15E+00	9.80E+00
LB4110A - C2	Beta	11/18/2007	5/14/2013	1.32E+00	P	3.79E-01	1.27E+00	2.16E+00
LB4110A - C3	Beta	11/18/2007	5/14/2013	1.47E+00	P	4.69E-01	1.47E+00	2.46E+00
LB4110A - C4	Beta	11/18/2007	5/14/2013	1.25E+00	P	-1.77E+00	2.14E+00	6.05E+00
LB4110A - D1	Beta	11/18/2007	5/14/2013	1.97E+00	P	-2.38E+00	2.58E+00	7.55E+00
LB4110A - D2	Beta	11/18/2007	5/14/2013	1.48E+00	P	-6.79E-01	1.57E+00	3.81E+00
LB4110A - D3	Beta	11/18/2007	5/14/2013	4.27E+00	P	1.23E+00	4.47E+00	7.72E+00
LB4110A - D4	Beta	11/18/2007	5/14/2013	1.12E+00	P	-4.49E-01	1.37E+00	3.20E+00
LB4110R - A1	Beta	11/24/2006	5/14/2013	1.13E+00	P	-6.19E+01	3.77E+00	6.95E+01
LB4110R - A2	Beta	11/24/2006	5/14/2013	9.67E-01	P	-4.92E+01	2.05E+00	5.33E+01
LB4110R - A3	Beta	11/24/2006	5/14/2013	1.45E+00	P	-4.55E+01	2.79E+00	5.11E+01
LB4110R - A4	Beta	11/24/2006	5/14/2013	1.05E+00	P	-4.54E+01	2.02E+00	4.95E+01
LB4110R - B1	Beta	11/24/2006	5/14/2013	1.40E+00	P	-4.78E+01	2.05E+00	5.19E+01
LB4110R - B2	Beta	11/24/2006	5/14/2013	1.18E+00	P	-4.78E+01	2.08E+00	5.20E+01
LB4110R - B3	Beta	11/24/2006	5/14/2013	1.22E+00	P	-4.76E+01	2.71E+00	5.30E+01
LB4110R - B4	Beta	11/24/2006	5/14/2013	1.10E+00	P	-4.79E+01	1.95E+00	5.18E+01
LB4110R - C1	Beta	11/24/2006	5/14/2013	1.37E+00	P	-4.77E+01	3.03E+00	5.38E+01
LB4110R - C2	Beta	11/24/2006	5/14/2013	1.48E+00	P	-4.77E+01	2.75E+00	5.32E+01
LB4110R - C3	Beta	11/24/2006	5/14/2013	1.40E+00	P	-4.82E+01	2.56E+00	5.33E+01
LB4110R - C4	Beta	11/24/2006	5/14/2013	1.33E+00	P	-5.43E+01	2.98E+00	6.03E+01
LB4110R - D1	Beta	11/24/2006	5/14/2013	0.00E+00	P	-4.51E+01	5.77E+00	5.66E+01
LB4110R - D2	Beta	11/24/2006	5/14/2013	0.00E+00	P	-4.86E+01	1.95E+00	5.25E+01
LB4110R - D3	Beta	11/24/2006	5/14/2013	0.00E+00	P	-5.19E+01	5.74E+00	6.34E+01
LB4110R - D4	Beta	11/24/2006	5/14/2013	0.00E+00	P	-4.83E+01	2.32E+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

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Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	5/14/2013	0.2446	P	-0.0186	0.2147	0.4480
LB4110A - A2	Alpha	11/18/2007	5/14/2013	0.2101	P	-0.0560	0.1726	0.4012
LB4110A - A3	Alpha	11/18/2007	5/14/2013	0.2022	P	-0.0796	0.1615	0.4026
LB4110A - A4	Alpha	11/18/2007	5/14/2013	0.2155	P	-0.0580	0.1804	0.4188
LB4110A - B1	Alpha	11/18/2007	5/14/2013	0.2203	P	0.1943	0.2246	0.2549
LB4110A - B2	Alpha	11/18/2007	5/14/2013	0.2063	P	0.1929	0.2218	0.2506
LB4110A - B3	Alpha	11/18/2007	5/14/2013	0.2432	P	0.1294	0.2326	0.3358
LB4110A - B4	Alpha	11/18/2007	5/14/2013	0.2260	P	0.2090	0.2367	0.2644
LB4110A - C1	Alpha	11/18/2007	5/14/2013	0.2192	P	0.1973	0.2208	0.2443
LB4110A - C2	Alpha	11/18/2007	5/14/2013	0.2266	P	0.1966	0.2252	0.2538
LB4110A - C3	Alpha	11/18/2007	5/14/2013	0.2552	P	0.2228	0.2494	0.2759
LB4110A - C4	Alpha	11/18/2007	5/14/2013	0.2215	P	0.1965	0.2258	0.2550
LB4110A - D1	Alpha	11/18/2007	5/14/2013	0.2224	P	0.2036	0.2334	0.2632
LB4110A - D2	Alpha	11/18/2007	5/14/2013	0.2478	P	0.2278	0.2584	0.2890
LB4110A - D3	Alpha	11/18/2007	5/14/2013	0.2565	P	0.2314	0.2639	0.2963
LB4110A - D4	Alpha	11/18/2007	5/14/2013	0.1819	P	0.1650	0.1999	0.2347
LB4110R - A1	Alpha	11/24/2006	5/14/2013	0.2415	P	0.2031	0.2389	0.2747
LB4110R - A2	Alpha	11/24/2006	5/14/2013	0.2170	P	0.1899	0.2206	0.2514
LB4110R - A3	Alpha	11/24/2006	5/14/2013	0.2193	P	0.1964	0.2249	0.2534
LB4110R - A4	Alpha	11/24/2006	5/14/2013	0.2483	P	0.2160	0.2457	0.2755
LB4110R - B1	Alpha	11/24/2006	5/14/2013	0.2194	P	0.1878	0.2261	0.2644
LB4110R - B2	Alpha	11/24/2006	5/14/2013	0.2075	P	0.1801	0.2176	0.2550
LB4110R - B3	Alpha	11/24/2006	5/14/2013	0.2490	P	0.2068	0.2440	0.2813
LB4110R - B4	Alpha	11/24/2006	5/14/2013	0.2226	P	0.1938	0.2320	0.2702
LB4110R - C1	Alpha	11/24/2006	5/14/2013	0.2119	P	0.1861	0.2153	0.2445
LB4110R - C2	Alpha	11/24/2006	5/14/2013	0.2202	P	0.1963	0.2248	0.2533
LB4110R - C3	Alpha	11/24/2006	5/14/2013	0.2340	P	0.2064	0.2397	0.2731
LB4110R - C4	Alpha	11/24/2006	5/14/2013	0.2057	P	0.1858	0.2229	0.2600
LB4110R - D1	Alpha	11/24/2006	5/14/2013	0.0000	F	0.0366	0.2070	0.3774
LB4110R - D2	Alpha	11/24/2006	5/14/2013	0.0000	F	0.0424	0.2354	0.4284
LB4110R - D3	Alpha	11/24/2006	5/14/2013	0.0000	F	0.0417	0.2312	0.4207
LB4110R - D4	Alpha	11/24/2006	5/14/2013	0.0000	F	0.0319	0.1864	0.3408
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

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Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	5/14/2013	0.5495	P	0.2037	0.5628	0.9218
LB4110A - A2	Beta	11/18/2007	5/14/2013	0.4894	P	0.1545	0.4633	0.7722
LB4110A - A3	Beta	11/18/2007	5/14/2013	0.4622	P	0.0819	0.4571	0.8322
LB4110A - A4	Beta	11/18/2007	5/14/2013	0.5197	P	0.1343	0.4878	0.8413
LB4110A - B1	Beta	11/18/2007	5/14/2013	0.5144	P	0.4637	0.5306	0.5974
LB4110A - B2	Beta	11/18/2007	5/14/2013	0.5036	P	0.4639	0.5276	0.5913
LB4110A - B3	Beta	11/18/2007	5/14/2013	0.5525	P	0.3192	0.5321	0.7449
LB4110A - B4	Beta	11/18/2007	5/14/2013	0.5376	P	0.4922	0.5546	0.6170
LB4110A - C1	Beta	11/18/2007	5/14/2013	0.5048	P	0.4502	0.5027	0.5552
LB4110A - C2	Beta	11/18/2007	5/14/2013	0.4992	P	0.4280	0.5011	0.5743
LB4110A - C3	Beta	11/18/2007	5/14/2013	0.6020	P	0.5277	0.5902	0.6526
LB4110A - C4	Beta	11/18/2007	5/14/2013	0.5229	P	0.4568	0.5251	0.5933
LB4110A - D1	Beta	11/18/2007	5/14/2013	0.5365	P	0.4798	0.5542	0.6287
LB4110A - D2	Beta	11/18/2007	5/14/2013	0.5443	P	0.4904	0.5887	0.6871
LB4110A - D3	Beta	11/18/2007	5/14/2013	0.5964	P	0.5368	0.6155	0.6942
LB4110A - D4	Beta	11/18/2007	5/14/2013	0.4313	P	0.3863	0.4734	0.5605
LB4110R - A1	Beta	11/24/2006	5/14/2013	0.5648	P	0.4814	0.5680	0.6545
LB4110R - A2	Beta	11/24/2006	5/14/2013	0.5153	P	0.4209	0.5089	0.5968
LB4110R - A3	Beta	11/24/2006	5/14/2013	0.5301	P	0.4580	0.5398	0.6215
LB4110R - A4	Beta	11/24/2006	5/14/2013	0.6001	P	0.5101	0.5918	0.6734
LB4110R - B1	Beta	11/24/2006	5/14/2013	0.5255	P	0.4535	0.5428	0.6320
LB4110R - B2	Beta	11/24/2006	5/14/2013	0.5088	P	0.4313	0.5202	0.6092
LB4110R - B3	Beta	11/24/2006	5/14/2013	0.6004	P	0.5016	0.5913	0.6810
LB4110R - B4	Beta	11/24/2006	5/14/2013	0.5275	P	0.4623	0.5500	0.6376
LB4110R - C1	Beta	11/24/2006	5/14/2013	0.4595	P	0.4241	0.5032	0.5824
LB4110R - C2	Beta	11/24/2006	5/14/2013	0.5133	P	0.4503	0.5292	0.6081
LB4110R - C3	Beta	11/24/2006	5/14/2013	0.5580	P	0.4814	0.5713	0.6612
LB4110R - C4	Beta	11/24/2006	5/14/2013	0.4923	P	0.4324	0.5265	0.6206
LB4110R - D1	Beta	11/24/2006	5/14/2013	0.0000	F	0.0866	0.4950	0.9033
LB4110R - D2	Beta	11/24/2006	5/14/2013	0.0000	F	0.0981	0.5562	1.0143
LB4110R - D3	Beta	11/24/2006	5/14/2013	0.0000	F	0.0952	0.5402	0.9852
LB4110R - D4	Beta	11/24/2006	5/14/2013	0.0000	F	0.0749	0.4447	0.8144
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

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SECTION XII
BARIUM-133 ANALYTICAL TRACER DATA

100
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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:00:33.64

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410601_GE1_BAFIL_191239.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : SPIKE
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 16:45:15.
Sample ID : 1304106-01 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE1 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	27.90	33	70	1.51	28.14	27	13	3.65E-02	38.7	6.84E+01
2	4	30.97	1885	80	1.39	31.20	27	13	2.09E+00	2.4	
3	4	34.87	536	91	2.03	35.10	27	13	5.95E-01	6.6	
4	0	52.63	58	83	2.66	52.86	50	7	6.44E-02	29.1	
5	2	61.86	257	81	1.73	62.10	57	13	2.85E-01	8.3	8.82E+00
6	2	65.73	81	106	1.74	65.96	57	13	8.99E-02	23.3	
7	0	81.33	872	151	1.90	81.56	76	12	9.69E-01	4.4	
8	0	92.75	31	108	1.16	92.97	89	8	3.41E-02	61.5	
9	4	112.23	221	84	2.02	112.45	108	16	2.46E-01	9.2	2.21E+00
10	4	116.27	50	69	2.07	116.50	108	16	5.61E-02	36.9	
11	0	160.54	19	79	1.22	160.76	159	7	2.13E-02	79.6	
12	1	273.94	17	8	1.80	274.16	272	9	1.89E-02	31.6	1.09E+01
13	1	276.69	69	20	1.80	276.91	272	9	7.62E-02	15.5	
14	2	303.01	171	29	1.58	303.22	299	14	1.89E-01	8.6	6.06E+00
15	2	307.81	34	27	2.01	308.02	299	14	3.77E-02	30.4	
16	2	334.07	58	18	1.70	334.28	330	15	6.39E-02	18.5	3.96E+00
17	2	337.90	24	20	2.03	338.11	330	15	2.67E-02	44.2	
18	0	356.42	564	25	1.74	356.63	352	10	6.27E-01	4.5	
19	0	377.50	23	12	4.35	377.71	375	7	2.57E-02	32.4	
20	4	383.75	86	16	1.83	383.96	381	14	9.51E-02	13.5	1.94E+01
21	4	387.04	247	12	2.08	387.24	381	14	2.75E-01	7.6	
22	4	391.60	58	4	2.05	391.81	381	14	6.48E-02	16.2	
23	3	415.06	29	13	2.13	415.26	409	24	3.26E-02	26.0	2.03E+00
24	3	418.93	23	16	2.30	419.14	409	24	2.53E-02	39.2	
25	3	422.22	8	17	2.30	422.43	409	24	9.03E-03	99.6	
26	0	437.41	125	9	2.00	437.62	434	7	1.39E-01	9.8	
27	1	467.93	23	12	1.93	468.13	465	12	2.50E-02	30.0	1.63E+00
28	1	472.62	9	3	1.93	472.82	465	12	9.72E-03	63.1	
29	0	511.31	29	7	1.40	511.51	508	9	3.21E-02	24.8	
30	0	678.15	9	0	1.92	678.33	675	7	1.00E-02	33.3	

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	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	4.042E+02	4.043E+02	0.771E+02	19.06		
Total Activity :			4.042E+02	4.043E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	3.462E+02	3.462E+02	0.601E+02	17.35		
Total Activity :			3.462E+02	3.462E+02				

Grand Total Activity : 7.504E+02 7.504E+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*	1.963E+01	4.042E+02	4.043E+02	19.06	OK
	302.84	17.80	4.915E+00	5.854E+02	5.855E+02	33.89	OK
	356.01	60.00	6.963E+00	4.054E+02	4.054E+02	17.65	OK

Final Mean for 3 Valid Peaks = 4.043E+02+/- 7.707E+01 (19.06%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.462E+02	3.462E+02	17.35	OK

Final Mean for 1 Valid Peaks = 3.462E+02+/- 6.007E+01 (17.35%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.043E+02	7.707E+01	1.833E+01	3.009E+00	22.052
TH-234	3.462E+02	6.007E+01	6.368E+01	2.040E+00	5.436

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.665E+00	1.418E+01	2.093E+01	6.533E+00	-0.319
CD-109	-9.447E+01	1.681E+02	2.140E+02	2.769E+01	-0.441
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.359E+00	1.766E+00	3.677E+00	6.910E-02	2.545
NP-237	-1.475E+01	4.718E+01	6.263E+01	7.625E+00	-0.235
AM-241	1.004E+01	3.755E+00	6.933E+00	1.627E-01	1.448

KP
5/2/13

VAX/VMS Peak Search Report Generated 2-MAY-2013 17:00:54.20

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410602_GE2_BAFIL_191240.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : BLANK
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 16:45:37.
Sample ID : 1304106-02 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.98	2036	139	1.32	31.10	27	13	2.26E+00	2.4	4.27E+00
2	3	35.23	486	126	1.68	35.34	27	13	5.40E-01	5.9	
3	0	52.82	74	144	2.03	52.94	50	8	8.24E-02	30.6	
4	1	61.85	219	68	1.46	61.96	58	12	2.43E-01	8.8	1.15E+00
5	1	65.88	93	72	1.47	66.00	58	12	1.03E-01	16.5	
6	0	81.09	789	130	1.45	81.20	76	8	8.77E-01	4.3	
7	0	93.28	42	106	1.57	93.39	89	9	4.67E-02	46.7	
8	0	111.85	176	123	1.26	111.96	108	7	1.95E-01	12.9	
9	0	161.01	27	76	1.60	161.12	157	8	3.02E-02	58.8	
10	0	211.25	15	43	2.46	211.36	208	6	1.64E-02	75.1	
11	0	223.70	23	36	3.41	223.81	221	7	2.61E-02	46.8	
12	0	276.60	60	19	1.82	276.71	275	6	6.65E-02	17.2	
13	3	302.98	159	10	1.52	303.08	299	15	1.76E-01	8.4	2.48E+00
14	3	307.19	32	10	2.16	307.30	299	15	3.59E-02	31.6	
15	6	333.95	72	17	1.87	334.05	329	17	8.05E-02	15.7	2.58E+00
16	6	338.78	36	24	2.93	338.89	329	17	3.99E-02	37.9	
17	0	356.07	552	15	1.47	356.18	351	10	6.13E-01	4.5	
18	0	365.21	10	15	1.59	365.31	362	8	1.16E-02	69.9	
19	8	384.11	71	18	2.32	384.21	381	17	7.89E-02	23.2	7.67E+00
20	8	387.05	192	12	1.89	387.16	381	17	2.14E-01	9.1	
21	8	391.11	49	7	2.08	391.21	381	17	5.49E-02	23.1	
22	8	394.73	10	7	3.64	394.84	381	17	1.10E-02	93.7	
23	2	414.53	32	13	2.07	414.64	410	11	3.50E-02	27.2	1.88E+00
24	2	417.87	21	14	2.08	417.98	410	11	2.28E-02	41.1	
25	0	428.52	12	5	2.83	428.62	426	7	1.37E-02	41.6	
26	0	436.98	85	9	1.60	437.09	433	9	9.40E-02	12.6	
27	0	468.72	28	5	1.75	468.82	464	10	3.11E-02	24.1	
28	0	484.07	7	1	1.06	484.17	481	7	7.36E-03	50.2	
29	0	495.99	9	3	2.28	496.10	493	7	1.04E-02	45.6	
30	1	507.90	9	1	1.78	508.00	507	10	9.62E-03	2.9	3.82E+00
31	1	512.90	7	1	1.78	513.00	507	10	8.29E-03	65.0	
32	0	531.18	7	4	1.89	531.29	529	7	7.78E-03	59.1	
33	0	539.23	7	1	2.71	539.33	537	5	7.71E-03	44.6	
34	0	609.24	9	1	1.65	609.35	605	7	9.50E-03	42.3	
35	0	676.35	9	0	1.66	676.44	673	7	1.00E-02	33.3	
36	0	731.26	6	5	2.72	731.36	727	9	6.97E-03	73.3	

Total number of lines in spectrum 36
 Number of unidentified lines 32
 Number of lines tentatively identified by NID 4 11.11%

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	3.995E+02	3.995E+02	0.780E+02	19.51	
Total Activity :			3.995E+02	3.995E+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	7.511E+02	7.511E+02	1.487E+02	19.80	
Total Activity :			7.511E+02	7.511E+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*	1.799E+01	3.995E+02	3.995E+02	19.51	OK
	302.84	17.80	7.560E+00	3.540E+02	3.541E+02	34.34	OK
	356.01	60.00	7.170E+00	3.853E+02	3.854E+02	17.57	OK

Final Mean for 3 Valid Peaks = 3.995E+02+/- 7.796E+01 (19.51%)

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	7.511E+02	7.511E+02	19.80	OK

Final Mean for 1 Valid Peaks = 7.511E+02+/- 1.487E+02 (19.80%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.995E+02	7.796E+01	2.181E+01	3.714E+00	18.316
TH-234	7.511E+02	1.487E+02	1.562E+02	1.291E+01	4.807

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-7.557E-01	5.472E+00	9.464E+00	1.453E+00	-0.080
CD-109	-6.500E+01	1.215E+02	1.850E+02	2.124E+01	-0.351
PA-231	3.710E+01	4.937E+00	9.634E+00	1.835E-01	3.851
PA-234	3.384E+00	1.764E+00	3.369E+00	6.949E-02	1.005
NP-237	-1.570E+00	3.920E+01	5.564E+01	6.283E+00	-0.028
AM-241	1.518E+01	1.063E+01	1.888E+01	1.461E+00	0.804

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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:01:37.98

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410603_GE3_BAFIL_191241.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-111-KS TOT
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 16:45:57.
Sample ID : 1304106-03 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:03.70 0.4%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.90	1880	98	1.41	31.22	27	14	2.09E+00	2.4	2.39E+00
2	3	35.11	435	73	1.75	35.43	27	14	4.84E-01	5.9	
3	0	52.33	91	122	3.04	52.65	49	9	1.01E-01	24.1	
4	3	61.84	262	90	1.82	62.15	58	12	2.91E-01	8.1	3.11E+00
5	3	65.75	93	123	1.83	66.06	58	12	1.04E-01	23.0	
6	0	81.13	772	175	1.93	81.45	77	10	8.58E-01	4.8	
7	0	93.40	31	49	1.35	93.72	92	5	3.41E-02	39.7	
8	4	108.75	18	50	2.11	109.07	107	19	1.98E-02	55.8	1.98E+00
9	4	112.03	225	48	1.81	112.34	107	19	2.51E-01	8.0	
10	4	116.25	88	41	2.06	116.56	107	19	9.81E-02	19.5	
11	4	122.67	14	29	2.14	122.98	107	19	1.60E-02	79.0	
12	0	142.69	29	33	2.66	143.01	140	8	3.26E-02	38.3	
13	1	182.84	12	19	1.68	183.15	182	8	1.37E-02	52.4	3.75E+00
14	1	185.84	29	26	1.69	186.15	182	8	3.21E-02	32.8	
15	0	277.38	42	34	1.24	277.69	274	8	4.70E-02	28.4	
16	5	302.98	143	8	1.72	303.29	298	18	1.59E-01	8.8	1.63E+00
17	5	307.38	40	7	2.65	307.68	298	18	4.49E-02	28.2	
18	5	311.67	16	5	2.65	311.97	298	18	1.74E-02	54.6	
19	2	334.04	77	17	1.95	334.35	331	18	8.60E-02	14.0	2.67E+00
20	2	338.66	22	16	2.02	338.96	331	18	2.47E-02	36.2	
21	0	356.30	418	28	1.80	356.60	352	10	4.64E-01	5.4	
22	1	383.65	103	12	1.87	383.95	381	16	1.15E-01	11.8	1.98E+01
23	1	386.79	177	12	1.87	387.10	381	16	1.97E-01	9.9	
24	1	391.53	46	12	1.88	391.83	381	16	5.07E-02	20.7	
25	1	411.64	8	3	1.89	411.94	409	16	9.01E-03	55.8	2.59E+00
26	1	414.87	42	3	1.89	415.17	409	16	4.72E-02	17.9	
27	1	417.87	17	3	1.90	418.17	409	16	1.91E-02	46.8	
28	0	437.47	84	13	1.90	437.78	434	10	9.33E-02	13.5	
29	0	467.92	21	10	1.19	468.22	464	8	2.28E-02	34.8	
30	0	510.56	14	7	3.14	510.86	507	9	1.52E-02	44.1	
31	0	609.49	5	5	2.01	609.78	606	6	6.06E-03	75.1	

Summary of Nuclide Activity

Sample ID : 1304106-03

Acquisition date : 2-MAY-2013 16:45:57

Total number of lines in spectrum 31
 Number of unidentified lines 26
 Number of lines tentatively identified by NID 5 16.13%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
CO-57	270.90D	1.00	4.255E+00	4.262E+00	6.750E+00	158.37	
BA-133	10.50Y	1.00	3.701E+02	3.701E+02	0.686E+02	18.53	
Total Activity :			3.743E+02	3.744E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	7.810E+02	7.810E+02	1.368E+02	17.52	
Total Activity :			7.810E+02	7.810E+02			

Grand Total Activity : 1.155E+03 1.155E+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
CO-57	122.06	85.51*	1.191E+01	4.255E+00	4.262E+00	158.37	OK
	136.48	10.60	1.069E+01	-----	Line Not Found	-----	Absent

Final Mean for 1 Valid Peaks = 4.262E+00+/- 6.750E+00 (158.37%)

BA-133	81.00	33.00*	1.899E+01	3.701E+02	3.701E+02	18.53	OK
	302.84	17.80	6.222E+00	3.868E+02	3.869E+02	27.16	OK
	356.01	60.00	5.860E+00	3.569E+02	3.570E+02	17.44	OK

Final Mean for 3 Valid Peaks = 3.701E+02+/- 6.857E+01 (18.53%)

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	7.810E+02	7.810E+02	17.52	OK

Final Mean for 1 Valid Peaks = 7.810E+02+/- 1.368E+02 (17.52%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.262E+00	6.750E+00	9.891E+00	1.130E+00	0.431
BA-133	3.701E+02	6.857E+01	2.029E+01	3.102E+00	18.246
TH-234	7.810E+02	1.368E+02	1.372E+02	7.367E+00	5.695

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CD-109	-3.763E+01	1.473E+02	1.998E+02	1.647E+01	-0.188
PA-231	2.873E+00	1.719E+00	3.416E+00	4.858E-02	0.841
PA-234	2.585E+00	1.376E+00	2.666E+00	3.791E-02	0.970
NP-237	-9.252E+00	3.695E+01	5.753E+01	4.651E+00	-0.161
AM-241	2.415E+01	9.922E+00	1.829E+01	8.995E-01	1.320

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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:16:57.44

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410604_GE3_BAFIL_191242.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-111-KS TOT
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:01:35.
Sample ID : 1304106-04 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:03.42 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	1894	81	1.46	31.20	27	15	2.10E+00	2.4	8.23E+00
2	4	35.13	512	66	1.62	35.45	27	15	5.69E-01	5.2	
3	0	53.05	44	96	1.48	53.37	50	6	4.92E-02	38.1	
4	3	61.93	253	92	1.82	62.25	58	12	2.81E-01	8.4	6.11E+00
5	3	66.23	112	108	1.84	66.54	58	12	1.24E-01	17.9	
6	7	81.15	785	77	1.60	81.47	76	11	8.72E-01	3.9	7.74E+00
7	7	84.14	24	58	1.47	84.46	76	11	2.62E-02	94.9	
8	2	111.74	200	63	1.75	112.05	107	13	2.22E-01	9.7	3.59E+00
9	2	115.74	50	68	1.76	116.06	107	13	5.51E-02	33.5	
10	0	233.63	24	42	3.14	233.94	230	8	2.66E-02	51.1	
11	0	276.71	31	38	1.09	277.02	275	6	3.45E-02	36.0	
12	0	298.67	11	24	2.96	298.98	294	7	1.18E-02	83.0	
13	2	303.03	138	17	1.71	303.34	300	11	1.53E-01	9.2	4.83E+00
14	2	307.57	30	16	1.99	307.88	300	11	3.31E-02	29.1	
15	3	333.81	72	18	1.80	334.11	330	13	8.01E-02	14.8	1.87E+00
16	3	338.09	16	27	2.22	338.39	330	13	1.73E-02	65.9	
17	0	356.18	451	19	1.97	356.49	351	11	5.01E-01	5.1	
18	0	365.00	15	16	1.37	365.30	362	7	1.66E-02	51.2	
19	7	383.77	58	17	1.90	384.08	381	15	6.48E-02	21.1	1.64E+01
20	7	387.09	200	12	1.75	387.39	381	15	2.22E-01	8.1	
21	7	391.55	41	10	1.82	391.86	381	15	4.57E-02	21.3	
22	0	417.57	65	20	4.20	417.88	412	13	7.25E-02	19.3	
23	0	437.30	95	5	1.96	437.61	433	10	1.06E-01	11.2	
24	0	467.67	17	16	1.95	467.97	463	9	1.86E-02	51.2	
25	0	472.29	12	3	1.89	472.59	471	5	1.30E-02	40.9	
26	0	510.98	25	0	3.66	511.28	507	10	2.78E-02	20.0	

Summary of Nuclide Activity

Sample ID : 1304106-04

Acquisition date : 2-MAY-2013 17:01:35

Total number of lines in spectrum 26
 Number of unidentified lines 22
 Number of lines tentatively identified by NID 4 15.38%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
BA-133	10.50Y	1.00	3.762E+02	3.763E+02	0.663E+02		17.63	
Total Activity :			3.762E+02	3.763E+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	
TH-234	4.47E+09Y	1.00	7.557E+02	7.557E+02	1.365E+02		18.06	
Total Activity :			7.557E+02	7.557E+02				

Grand Total Activity : 1.132E+03 1.132E+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	3.762E+02	3.763E+02	17.63	OK
	302.84	17.80	6.222E+00	3.731E+02	3.731E+02	27.66	OK
	356.01	60.00	5.860E+00	3.850E+02	3.850E+02	17.00	OK

Final Mean for 3 Valid Peaks = 3.763E+02+/- 6.633E+01 (17.63%)

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	7.557E+02	7.557E+02	18.06	OK

Final Mean for 1 Valid Peaks = 7.557E+02+/- 1.365E+02 (18.06%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.763E+02	6.633E+01	2.109E+01	3.226E+00	17.837
TH-234	7.557E+02	1.365E+02	1.424E+02	7.650E+00	5.306

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.944E-01	7.026E+00	1.108E+01	1.266E+00	-0.063
CD-109	3.323E+01	1.282E+02	2.097E+02	1.729E+01	0.158
PA-231	1.752E+00	1.597E+00	3.099E+00	4.408E-02	0.565
PA-234	3.420E+00	1.417E+00	2.800E+00	3.983E-02	1.221
NP-237	1.319E+01	3.586E+01	5.943E+01	4.804E+00	0.222
AM-241	1.720E+01	9.180E+00	1.740E+01	8.556E-01	0.988

KS
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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:17:21.43

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410605_GE1_BAFIL_191243.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-111-KS DIS
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:02:02.
Sample ID : 1304106-05 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE1 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.25 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	27.90	23	62	1.51	28.14	27	14	2.60E-02	49.0	7.23E+01
2	3	30.95	1880	69	1.37	31.18	27	14	2.09E+00	2.4	
3	3	34.88	467	74	1.85	35.11	27	14	5.18E-01	7.2	
4	0	52.63	49	85	1.51	52.87	50	8	5.41E-02	35.7	
5	2	61.94	252	61	1.73	62.17	58	12	2.80E-01	7.9	4.43E+00
6	2	65.72	112	63	1.74	65.95	58	12	1.25E-01	16.1	
7	3	81.37	782	46	1.63	81.60	77	11	8.69E-01	3.7	2.33E+01
8	3	84.63	23	49	1.95	84.86	77	11	2.50E-02	105.8	
9	0	93.67	52	77	1.11	93.90	90	8	5.75E-02	32.8	
10	0	111.87	192	95	1.72	112.10	107	8	2.13E-01	11.4	
11	0	161.49	18	55	2.16	161.72	158	6	1.97E-02	70.7	
12	0	184.91	24	77	3.72	185.13	182	8	2.62E-02	67.6	
13	0	276.79	65	28	1.28	277.01	273	8	7.22E-02	18.8	
14	0	303.55	125	49	1.71	303.77	300	7	1.39E-01	12.9	
15	0	334.34	57	40	1.31	334.55	331	7	6.28E-02	22.5	
16	0	338.69	31	18	2.59	338.90	338	5	3.46E-02	28.7	
17	4	356.39	488	15	1.44	356.60	352	16	5.42E-01	4.5	6.83E+00
18	4	360.57	8	15	2.47	360.78	352	16	9.24E-03	219.7	
19	4	365.12	24	10	2.48	365.33	352	16	2.68E-02	27.9	
20	1	384.79	106	1	1.71	385.00	381	16	1.18E-01	11.3	2.40E+01
21	1	391.78	59	6	1.88	391.99	381	16	6.59E-02	14.7	
22	2	415.16	37	13	2.08	415.36	411	14	4.15E-02	21.9	4.85E+00
23	2	418.54	26	9	2.09	418.74	411	14	2.83E-02	34.3	
24	2	421.43	12	7	2.09	421.64	411	14	1.39E-02	58.1	
25	0	437.39	117	3	1.82	437.60	432	12	1.30E-01	9.7	
26	0	468.06	30	3	1.97	468.27	465	6	3.33E-02	20.4	
27	0	579.31	6	0	1.16	579.50	576	6	6.67E-03	40.8	

Summary of Nuclide Activity

Sample ID : 1304106-05

Acquisition date : 2-MAY-2013 17:02:02

Total number of lines in spectrum 27
 Number of unidentified lines 22
 Number of lines tentatively identified by NID 5 18.52%

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	3.625E+02	3.625E+02	0.670E+02	18.47	
NP-237	2.14E+06Y	1.00	3.502E+01	3.502E+01	7.422E+01	211.95	
Total Activity :			3.975E+02	3.975E+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	3.390E+02	3.390E+02	0.564E+02	16.64	
Total Activity :			3.390E+02	3.390E+02			

Grand Total Activity : 7.365E+02 7.365E+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*	1.963E+01	3.625E+02	3.625E+02	18.47	OK
	302.84	17.80	4.915E+00	4.281E+02	4.282E+02	39.02	OK
	356.01	60.00	6.963E+00	3.504E+02	3.505E+02	17.65	OK

Final Mean for 3 Valid Peaks = 3.625E+02 +/- 6.696E+01 (18.47%)

NP-237	86.50	12.60*	1.532E+01	3.502E+01	3.502E+01	211.95	OK
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Final Mean for 1 Valid Peaks = 3.502E+01 +/- 7.422E+01 (211.95%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.390E+02	3.390E+02	16.64	OK

Final Mean for 1 Valid Peaks = 3.390E+02 +/- 5.641E+01 (16.64%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.625E+02	6.696E+01	1.655E+01	2.717E+00	21.901
TH-234	3.390E+02	5.641E+01	5.170E+01	1.656E+00	6.558
NP-237	3.502E+01	7.422E+01	4.842E+01	5.895E+00	0.723

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	5.197E+00	1.260E+01	2.248E+01	7.017E+00	0.231
CD-109	-2.478E+01	1.346E+02	1.840E+02	2.380E+01	-0.135
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.358E+00	1.743E+00	3.588E+00	6.743E-02	2.329
AM-241	1.051E+01	3.292E+00	6.410E+00	1.504E-01	1.640

KB
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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:17:48.74

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410606_GE2_BAFIL_191244.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : D-6 TOT
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:02:29.
Sample ID : 1304106-06 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 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	30.95	1857	119	1.34	31.06	27	14	2.06E+00	2.5	2.77E+00
2	3	35.25	449	126	1.63	35.36	27	14	4.99E-01	6.1	
3	0	52.66	54	91	1.66	52.78	50	6	6.00E-02	31.3	
4	2	61.82	191	74	1.60	61.94	57	13	2.13E-01	9.9	2.61E+00
5	2	65.89	84	80	1.61	66.00	57	13	9.29E-02	18.7	
6	1	80.99	667	51	1.50	81.10	77	15	7.41E-01	4.2	1.09E+01
7	1	83.75	19	67	1.50	83.86	77	15	2.16E-02	94.2	
8	0	93.40	22	68	1.63	93.52	91	6	2.47E-02	62.1	
9	0	111.39	125	116	1.40	111.50	108	8	1.39E-01	17.3	
10	0	186.95	34	81	1.71	187.06	183	9	3.78E-02	50.7	
11	0	276.11	69	20	1.69	276.21	272	8	7.67E-02	16.5	
12	0	302.82	142	24	1.27	302.93	299	7	1.58E-01	10.2	
13	0	307.51	27	29	1.80	307.62	306	6	3.00E-02	36.8	
14	0	333.90	57	32	1.35	334.01	330	7	6.28E-02	21.2	
15	0	338.40	29	18	1.57	338.51	337	6	3.20E-02	30.8	
16	0	356.09	488	12	1.51	356.20	354	7	5.43E-01	4.7	
17	6	383.77	103	13	2.26	383.88	380	15	1.14E-01	13.2	2.46E+00
18	6	387.09	169	9	2.02	387.19	380	15	1.88E-01	9.9	
19	6	391.23	43	8	2.36	391.33	380	15	4.75E-02	26.4	
20	1	414.74	30	13	1.88	414.85	410	16	3.35E-02	27.6	7.76E-01
21	1	418.07	12	14	1.89	418.17	410	16	1.33E-02	71.3	
22	0	437.25	83	16	1.74	437.35	433	9	9.23E-02	14.0	
23	0	511.95	27	9	1.96	512.06	508	8	2.98E-02	27.9	
24	0	518.29	11	1	1.83	518.39	516	6	1.21E-02	34.7	
25	0	584.40	5	3	1.28	584.50	581	6	5.56E-03	70.7	
26	0	1237.47	6	2	2.55	1237.55	1233	7	6.81E-03	54.3	

Summary of Nuclide Activity

Sample ID : 1304106-06

Acquisition date : 2-MAY-2013 17:02:29

Total number of lines in spectrum 26
 Number of unidentified lines 22
 Number of lines tentatively identified by NID 4 15.38%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.374E+02	3.374E+02	0.654E+02	19.38	
Total Activity :			3.374E+02	3.374E+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	6.560E+02	6.560E+02	1.433E+02	21.85	
Total Activity :			6.560E+02	6.560E+02			

Grand Total Activity : 9.934E+02 9.935E+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	3.374E+02	3.374E+02	19.38	OK
	302.84	17.80	7.560E+00	3.171E+02	3.172E+02	36.16	OK
	356.01	60.00	7.170E+00	3.409E+02	3.410E+02	17.80	OK

Final Mean for 3 Valid Peaks = 3.374E+02+/- 6.541E+01 (19.38%)

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	6.560E+02	6.560E+02	21.85	OK

Final Mean for 1 Valid Peaks = 6.560E+02+/- 1.433E+02 (21.85%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.374E+02	6.541E+01	2.058E+01	3.504E+00	16.399
TH-234	6.560E+02	1.433E+02	1.468E+02	1.213E+01	4.470

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	9.552E-01	5.070E+00	9.125E+00	1.401E+00	0.105
CD-109	-1.133E+02	1.141E+02	1.627E+02	1.868E+01	-0.696
PA-231	3.841E+01	5.071E+00	9.857E+00	1.877E-01	3.897
PA-234	3.029E+00	1.654E+00	3.172E+00	6.543E-02	0.955
NP-237	-2.985E+01	3.328E+01	4.822E+01	5.444E+00	-0.619
AM-241	1.759E+01	1.027E+01	1.864E+01	1.443E+00	0.944

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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:18:11.11

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410607_GE5_BAFIL_191245.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : D-6 DIS
 Deposition Date :
 Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:02:50.
 Sample ID : 1304106-07 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	21.25	77	31	0.49	209.26	201	18	8.55E-02	21.3	
2	0	28.38	23	39	0.14	277.70	269	16	2.50E-02	66.2	
3	0	31.06	1856	117	0.79	303.42	293	30	2.06E+00	3.0	
4	2	35.17	372	17	0.68	342.91	332	29	4.13E-01	6.2	1.73E+00
5	2	36.23	57	2	0.57	353.00	332	29	6.37E-02	27.3	
6	0	53.37	25	20	0.54	517.55	509	14	2.77E-02	43.7	
7	0	61.96	269	19	0.96	599.96	586	29	2.99E-01	7.3	
8	2	65.72	45	13	0.66	636.00	628	26	4.94E-02	26.6	1.48E+00
9	2	66.25	90	14	0.76	641.06	628	26	9.95E-02	15.0	
10	3	79.54	32	35	0.92	768.59	758	41	3.53E-02	44.5	1.74E+00
11	3	80.07	23	36	0.76	773.67	758	41	2.59E-02	102.3	
12	3	81.17	672	28	0.65	784.27	758	41	7.46E-01	4.3	
13	0	112.06	168	39	0.87	1080.66	1070	20	1.86E-01	11.0	
14	0	116.69	35	27	0.52	1125.14	1111	22	3.84E-02	37.7	
15	1	276.23	29	5	1.03	2656.00	2644	24	3.21E-02	28.4	6.15E-01
16	1	276.75	24	5	1.03	2661.00	2644	24	2.62E-02	29.7	
17	1	302.70	29	3	1.06	2910.00	2896	26	3.20E-02	37.9	4.92E+00
18	1	303.32	118	0	1.06	2916.00	2896	26	1.32E-01	7.5	
19	0	333.60	49	6	0.32	3206.54	3190	28	5.49E-02	17.0	
20	7	356.00	314	14	0.82	3421.48	3406	28	3.49E-01	6.4	1.15E+00
21	7	356.59	21	13	0.94	3427.08	3406	28	2.30E-02	79.7	
22	4	383.46	30	6	1.16	3685.00	3673	28	3.36E-02	32.5	1.08E+00
23	4	384.11	51	9	1.04	3691.23	3673	28	5.63E-02	18.9	
24	0	387.04	114	18	0.67	3719.31	3705	25	1.27E-01	11.6	

Total number of lines in spectrum 24
 Number of unidentified lines 18
 Number of lines tentatively identified by NID 6 25.00%

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	3.391E+02	3.392E+02	0.592E+02	17.47	
Total Activity :			3.391E+02	3.392E+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	2.431E+02	2.431E+02	0.367E+02	15.11	
Total Activity :			2.431E+02	2.431E+02			

Grand Total Activity : 5.823E+02 5.823E+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	3.391E+02	3.392E+02	17.47	OK
	302.84	17.80	2.575E+00	1.889E+02	1.889E+02	80.21	OK
	356.01	60.00	4.312E+00	3.642E+02	3.642E+02	19.34	OK

Final Mean for 3 Valid Peaks = 3.392E+02+/- 5.925E+01 (17.47%)

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	2.431E+02	2.431E+02	15.11	OK

Final Mean for 1 Valid Peaks = 2.431E+02+/- 3.673E+01 (15.11%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.392E+02	5.925E+01	1.264E+01	1.862E+00	26.825
TH-234	2.431E+02	3.673E+01	2.472E+01	3.181E-01	9.834

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	5.447E+00		1.184E+01	2.394E+01	8.114E+00	0.228
CD-109	7.585E+00		8.468E+01	1.593E+02	1.533E+01	0.048
PA-231	8.101E-01		8.983E-01	1.856E+00	2.089E-02	0.436
PA-234	3.562E+00	+	1.528E+00	1.979E+00	2.228E-02	1.800
NP-237	-3.330E+00		2.498E+01	4.509E+01	3.977E+00	-0.074
AM-241	6.850E-01		1.513E+00	2.496E+00	2.809E-02	0.274

KD
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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:33:36.36

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410608_GE1_BAFIL_191246.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : D-83 TOT
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:18:19.
Sample ID : 1304106-08 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE1 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.90	1988	76	1.52	31.13	27	13	2.21E+00	2.3	2.82E+01
2	3	35.15	493	55	1.65	35.39	27	13	5.48E-01	5.2	
3	0	52.39	57	93	2.71	52.62	49	8	6.36E-02	31.9	
4	3	61.93	250	71	1.91	62.16	58	12	2.78E-01	8.4	3.91E+00
5	3	65.84	113	82	1.91	66.07	58	12	1.26E-01	17.3	
6	0	81.27	776	116	1.89	81.50	76	11	8.62E-01	4.5	
7	1	92.69	43	46	1.62	92.92	88	12	4.83E-02	29.6	2.15E+00
8	1	96.62	14	42	1.63	96.85	88	12	1.52E-02	83.9	
9	2	111.97	214	46	1.81	112.19	106	14	2.38E-01	8.5	1.37E+00
10	2	116.46	32	51	1.82	116.68	106	14	3.57E-02	38.2	
11	0	161.71	27	43	1.08	161.94	159	6	2.98E-02	43.8	
12	0	186.19	47	69	4.12	186.41	183	9	5.17E-02	35.1	
13	0	252.45	22	29	2.50	252.66	249	8	2.45E-02	48.6	
14	0	276.84	59	20	1.34	277.05	273	8	6.54E-02	18.5	
15	0	303.10	157	24	1.71	303.31	300	6	1.75E-01	9.4	
16	0	307.70	24	32	1.18	307.91	307	5	2.69E-02	42.5	
17	3	333.87	77	19	1.70	334.08	329	17	8.51E-02	14.3	1.53E+00
18	3	338.34	24	21	2.23	338.55	329	17	2.72E-02	44.6	
19	0	356.48	533	24	1.81	356.69	352	10	5.92E-01	4.7	
20	1	384.96	152	3	1.88	385.17	381	16	1.69E-01	10.5	2.43E+01
21	1	391.62	43	3	1.88	391.83	381	16	4.74E-02	20.8	
22	4	415.25	37	14	2.52	415.45	411	19	4.12E-02	28.0	1.28E+00
23	4	418.50	31	7	2.02	418.70	411	19	3.48E-02	26.4	
24	4	422.37	14	6	2.30	422.57	411	19	1.57E-02	54.1	
25	0	437.17	111	6	1.92	437.37	431	10	1.23E-01	10.3	
26	0	445.87	8	9	2.66	446.07	442	7	8.92E-03	70.8	
27	0	468.67	25	11	2.05	468.88	465	10	2.80E-02	31.0	
28	4	507.62	5	8	1.95	507.82	505	11	5.65E-03	92.2	1.10E+00
29	4	511.22	14	7	2.60	511.42	505	11	1.55E-02	47.1	
30	0	599.71	5	3	2.79	599.90	596	6	5.56E-03	70.7	
31	0	610.62	7	4	1.82	610.82	607	6	7.68E-03	61.0	

Summary of Nuclide Activity

Sample ID : 1304106-08

Acquisition date : 2-MAY-2013 17:18:19

Total number of lines in spectrum 31
 Number of unidentified lines 27
 Number of lines tentatively identified by NID 4 12.90%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.596E+02	3.596E+02	0.688E+02	19.13	
Total Activity :			3.596E+02	3.596E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	3.371E+02	3.371E+02	0.591E+02	17.54	
Total Activity :			3.371E+02	3.371E+02			

Grand Total Activity : 6.967E+02 6.967E+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*	1.963E+01	3.596E+02	3.596E+02	19.13	OK
	302.84	17.80	4.915E+00	5.403E+02	5.404E+02	34.72	OK
	356.01	60.00	6.963E+00	3.832E+02	3.833E+02	17.80	OK

Final Mean for 3 Valid Peaks = 3.596E+02+/- 6.879E+01 (19.13%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.371E+02	3.371E+02	17.54	OK

Final Mean for 1 Valid Peaks = 3.371E+02+/- 5.914E+01 (17.54%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.596E+02	6.879E+01	1.576E+01	2.586E+00	22.826
TH-234	3.371E+02	5.914E+01	5.724E+01	1.834E+00	5.889

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	6.019E+00	1.275E+01	2.145E+01	6.696E+00	0.281
CD-109	6.248E+01	1.387E+02	2.091E+02	2.705E+01	0.299
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.477E+00	1.743E+00	3.654E+00	6.866E-02	2.594
NP-237	1.259E+01	3.797E+01	5.639E+01	6.865E+00	0.223
AM-241	7.807E+00	3.334E+00	6.182E+00	1.450E-01	1.263

KB
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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:33:59.30

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410609_GE2_BAFIL_191247.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : D-83 DIS
 Deposition Date :
 Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:18:44.
 Sample ID : 1304106-09 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.01	31	65	1.37	28.12	27	15	3.39E-02	35.1	2.48E+01
2	3	30.99	1771	114	1.40	31.11	27	15	1.97E+00	2.5	
3	3	35.02	424	115	1.68	35.13	27	15	4.71E-01	6.3	
4	3	37.76	28	88	1.40	37.87	27	15	3.12E-02	67.6	
5	0	46.30	12	126	1.08	46.41	44	6	1.32E-02	152.3	
6	0	52.42	44	125	1.42	52.54	50	8	4.87E-02	47.5	
7	1	61.95	164	50	1.46	62.07	58	11	1.82E-01	10.7	5.30E+00
8	1	65.75	87	47	1.47	65.87	58	11	9.62E-02	16.0	
9	1	77.02	16	19	1.49	77.14	76	11	1.79E-02	37.7	5.50E+00
10	1	81.02	722	35	1.50	81.13	76	11	8.02E-01	3.9	
11	0	111.72	108	131	1.42	111.83	108	8	1.20E-01	20.6	
12	0	116.73	36	50	1.75	116.84	115	6	4.01E-02	35.1	
13	0	186.54	28	50	1.11	186.65	185	6	3.12E-02	44.3	
14	0	276.56	67	17	1.96	276.66	273	8	7.42E-02	16.4	
15	1	292.89	9	12	1.61	293.00	290	28	1.06E-02	61.8	4.49E+00
16	1	302.98	165	10	1.78	303.09	290	28	1.84E-01	7.8	
17	1	306.97	19	8	1.79	307.07	290	28	2.15E-02	39.5	
18	1	333.73	48	19	1.81	333.84	330	14	5.37E-02	19.0	2.24E+00
19	1	337.73	24	12	1.82	337.83	330	14	2.70E-02	31.4	
20	0	356.06	522	32	1.41	356.17	351	10	5.80E-01	4.8	
21	0	365.83	9	15	1.50	365.94	363	7	1.04E-02	74.6	
22	1	383.72	102	15	1.86	383.83	381	19	1.14E-01	12.2	2.10E+00
23	1	386.96	154	9	1.86	387.07	381	19	1.71E-01	10.3	
24	1	391.06	34	5	1.86	391.17	381	19	3.73E-02	28.7	
25	1	415.07	30	8	1.88	415.17	412	15	3.33E-02	25.7	4.32E+00
26	1	421.89	9	5	1.72	422.00	412	15	1.00E-02	60.4	
27	0	437.10	80	7	1.45	437.21	432	10	8.84E-02	12.9	
28	0	511.59	33	6	2.00	511.69	507	11	3.61E-02	22.4	
29	0	584.30	10	4	3.79	584.40	580	8	1.11E-02	46.9	

Total number of lines in spectrum 29
 Number of unidentified lines 24
 Number of lines tentatively identified by NID 5 17.24%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.652E+02	3.652E+02	0.700E+02	19.16	
Total Activity :			3.652E+02	3.652E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	5.607E+02	5.607E+02	1.304E+02	23.25	
Total Activity :			5.607E+02	5.607E+02			

Grand Total Activity : 9.259E+02 9.259E+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	3.652E+02	3.652E+02	19.16	OK
	302.84	17.80	7.560E+00	3.689E+02	3.690E+02	33.71	OK
	356.01	60.00	7.170E+00	3.641E+02	3.641E+02	17.97	OK

Final Mean for 3 Valid Peaks = 3.652E+02+/- 6.997E+01 (19.16%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	5.607E+02	5.607E+02	23.25	OK

Final Mean for 1 Valid Peaks = 5.607E+02+/- 1.304E+02 (23.25%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.652E+02	6.997E+01	1.766E+01	3.007E+00	20.681
TH-234	5.607E+02	1.304E+02	1.283E+02	1.061E+01	4.369

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-4.230E+00	5.171E+00	7.361E+00	1.130E+00	-0.575
CD-109	-6.228E+01	1.069E+02	1.619E+02	1.859E+01	-0.385
PA-231	3.392E+01	4.906E+00	9.533E+00	1.815E-01	3.558
PA-234	2.935E+00	1.669E+00	3.188E+00	6.576E-02	0.920
NP-237	-3.159E+00	2.931E+01	4.744E+01	5.356E+00	-0.067
AM-241	2.109E+01	9.566E+00	1.805E+01	1.397E+00	1.168

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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:34:27.22

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410610_GE3_BAFIL_191248.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : DUP 05 TOT
 Deposition Date :
 Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:19:09.
 Sample ID : 1304106-10 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:03.30 0.4%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	30.81	1455	55	1.44	31.13	26	13	1.62E+00	2.9	3.52E+01
2	1	34.81	324	59	1.45	35.13	26	13	3.60E-01	6.9	
3	0	52.22	44	101	2.55	52.54	50	7	4.87E-02	40.8	
4	1	61.82	224	85	1.51	62.14	57	16	2.48E-01	9.3	2.01E+00
5	1	66.54	63	92	1.52	66.86	57	16	7.04E-02	26.3	
6	0	81.03	658	159	1.92	81.35	77	10	7.31E-01	5.3	
7	0	93.37	16	102	1.13	93.69	91	7	1.73E-02	110.4	
8	0	111.74	192	140	1.84	112.06	108	8	2.13E-01	12.9	
9	0	276.68	43	19	1.38	276.99	274	7	4.78E-02	22.7	
10	2	302.95	133	16	1.69	303.25	300	11	1.48E-01	9.6	7.85E+00
11	2	307.53	44	26	1.99	307.84	300	11	4.85E-02	22.2	
12	4	333.94	63	17	2.12	334.24	329	18	6.97E-02	16.6	2.00E+00
13	4	338.01	25	13	2.44	338.31	329	18	2.73E-02	38.6	
14	6	352.25	11	5	2.23	352.55	351	10	1.24E-02	39.5	5.02E-01
15	6	356.22	431	10	1.59	356.52	351	10	4.79E-01	4.9	
16	0	366.41	8	22	1.76	366.71	362	7	9.33E-03	97.3	
17	0	369.75	12	11	1.84	370.06	368	6	1.34E-02	51.5	
18	5	384.26	131	22	2.66	384.56	381	9	1.45E-01	13.3	2.27E+01
19	5	386.99	148	10	1.59	387.29	381	9	1.64E-01	9.9	
20	0	391.42	30	17	2.51	391.72	391	5	3.30E-02	31.8	
21	1	414.87	21	19	1.89	415.17	412	10	2.38E-02	38.3	6.79E+00
22	1	418.53	19	20	1.90	418.83	412	10	2.12E-02	44.6	
23	0	422.72	13	7	1.79	423.02	421	6	1.45E-02	42.8	
24	0	437.12	97	3	1.92	437.42	432	9	1.08E-01	10.5	
25	0	468.18	18	3	1.61	468.48	465	6	1.98E-02	28.3	
26	0	511.48	20	5	2.33	511.78	509	7	2.24E-02	28.9	
27	0	599.79	5	7	2.44	600.08	595	7	5.65E-03	96.9	
28	0	924.56	6	0	2.74	924.83	921	7	6.67E-03	40.8	

Summary of Nuclide Activity

Sample ID : 1304106-10

Acquisition date : 2-MAY-2013 17:19:09

Total number of lines in spectrum 28
 Number of unidentified lines 24
 Number of lines tentatively identified by NID 4 14.29%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.155E+02	3.156E+02	0.600E+02	19.00	
Total Activity :			3.155E+02	3.156E+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	6.671E+02	6.671E+02	1.322E+02	19.82	
Total Activity :			6.671E+02	6.671E+02			

Grand Total Activity : 9.826E+02 9.826E+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	3.155E+02	3.156E+02	19.00	OK
	302.84	17.80	6.222E+00	3.618E+02	3.619E+02	28.11	OK
	356.01	60.00	5.860E+00	3.684E+02	3.684E+02	16.86	OK

Final Mean for 3 Valid Peaks = 3.156E+02 +/- 5.996E+01 (19.00%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	6.671E+02	6.671E+02	19.82	OK

Final Mean for 1 Valid Peaks = 6.671E+02 +/- 1.322E+02 (19.82%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.156E+02	5.996E+01	2.015E+01	3.081E+00	15.662
TH-234	6.671E+02	1.322E+02	1.219E+02	6.548E+00	5.472

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.208E+00		6.028E+00	1.084E+01	1.239E+00	0.204
CD-109	3.616E+01		1.399E+02	2.035E+02	1.678E+01	0.178
PA-231	4.438E+00		2.185E+00	4.267E+00	6.068E-02	1.040
PA-234	3.511E+00		1.378E+00	2.659E+00	3.781E-02	1.321
NP-237	-1.200E+01		4.410E+01	5.964E+01	4.821E+00	-0.201
AM-241	2.960E+01		9.528E+00	1.828E+01	8.987E-01	1.619

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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:35:24.32

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410611_GE5_BAFIL_191249.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : DUP 05 DIS
 Deposition Date :
 Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:19:39.
 Sample ID : 1304106-11 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 00:15:01.10 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	11.33	10	2	0.31	114.10	110	9	1.12E-02	40.8	
2	0	21.19	92	15	0.41	208.72	198	21	1.02E-01	15.0	
3	0	31.05	1699	107	0.78	303.36	291	28	1.89E+00	3.0	
4	2	35.18	348	17	0.68	342.95	333	28	3.87E-01	6.4	7.11E-01
5	2	36.02	62	3	0.57	351.00	333	28	6.88E-02	29.2	
6	0	37.74	9	6	0.73	367.53	360	11	9.44E-03	63.5	
7	0	53.52	46	13	0.29	518.92	509	21	5.09E-02	22.7	
8	0	61.92	209	38	0.70	599.54	586	25	2.33E-01	9.6	
9	0	66.20	158	25	0.78	640.57	629	29	1.76E-01	11.0	
10	2	79.71	65	16	0.84	770.30	758	36	7.17E-02	23.5	1.57E+00
11	2	81.21	681	12	0.68	784.61	758	36	7.57E-01	4.0	
12	0	112.06	138	53	0.77	1080.72	1070	21	1.54E-01	14.0	
13	0	116.18	41	21	0.72	1120.24	1111	18	4.57E-02	27.2	
14	0	168.40	6	11	0.43	1621.27	1605	18	6.54E-03	110.6	
15	0	276.53	43	3	0.39	2658.87	2645	25	4.80E-02	17.3	
16	0	302.98	109	5	0.70	2912.68	2896	27	1.21E-01	10.4	
17	0	307.50	21	6	0.75	2956.02	2943	21	2.28E-02	30.8	
18	0	333.87	59	11	1.20	3209.12	3192	27	6.58E-02	16.8	
19	1	338.03	11	6	1.10	3249.00	3241	19	1.25E-02	44.2	1.14E+00
20	1	338.55	41	2	1.11	3254.00	3241	19	4.55E-02	11.0	
21	6	355.84	174	14	1.08	3419.92	3404	30	1.93E-01	10.9	8.15E-01
22	6	356.41	106	14	0.71	3425.39	3404	30	1.18E-01	16.5	
23	6	383.55	51	15	1.12	3685.84	3672	29	5.63E-02	22.7	2.30E+00
24	6	384.30	68	11	1.16	3693.00	3672	29	7.51E-02	14.4	
25	1	386.38	22	11	1.16	3713.00	3705	27	2.48E-02	40.5	5.20E+00
26	1	387.22	166	13	1.16	3721.00	3705	27	1.84E-01	7.6	

Summary of Nuclide Activity

Sample ID : 1304106-11

Acquisition date : 2-MAY-2013 17:19:39

Total number of lines in spectrum 26
 Number of unidentified lines 19
 Number of lines tentatively identified by NID 7 26.92%

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	3.440E+02	3.441E+02	0.592E+02	17.19	
Total Activity :			3.440E+02	3.441E+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	4.259E+00	4.259E+00	1.287E+00	30.21	
TH-234	4.47E+09Y	1.00	1.891E+02	1.891E+02	0.371E+02	19.64	
Total Activity :			1.933E+02	1.933E+02			

Grand Total Activity : 5.374E+02 5.374E+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	3.440E+02	3.441E+02	17.19	OK
	302.84	17.80	2.575E+00	7.114E+02	7.115E+02	33.66	OK
	356.01	60.00	4.312E+00	2.017E+02	2.017E+02	26.18	OK

Final Mean for 3 Valid Peaks = 3.441E+02 +/- 5.916E+01 (17.19%)

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	3.416E-01	3.416E-01	81.70	OK
	21.72	64.90*	1.000E+02	4.259E+00	4.259E+00	30.21	OK
	37.93	23.75	1.000E+02	1.075E+00	1.075E+00	127.05	OK
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 3 Valid Peaks = 4.259E+00 +/- 1.287E+00 (30.21%)

TH-234	63.29	3.80*	8.750E+01	1.891E+02	1.891E+02	19.64	OK
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Final Mean for 1 Valid Peaks = 1.891E+02 +/- 3.713E+01 (19.64%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.441E+02	5.916E+01	1.188E+01	1.750E+00	28.956
PA-234	4.259E+00	1.287E+00	7.073E-01	7.962E-03	6.021
TH-234	1.891E+02	3.713E+01	2.189E+01	2.816E-01	8.637

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	6.925E-01	1.262E+01	2.394E+01	8.114E+00	0.029
CD-109	-1.308E+01	9.295E+01	1.674E+02	1.611E+01	-0.078
PA-231	-3.144E-01	9.850E-01	1.712E+00	1.927E-02	-0.184
NP-237	1.627E+00	2.513E+01	4.660E+01	4.111E+00	0.035
AM-241	1.558E+00	1.247E+00	2.411E+00	2.714E-02	0.646

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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:50:24.10

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410612_GE1_BAFIL_191250.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-102-SS TOT
 Deposition Date :
 Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:35:05.
 Sample ID : 1304106-12 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE1 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.20 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	30.94	1232	101	1.36	31.17	27	7	1.37E+00	3.1	
2	0	35.28	221	98	2.43	35.51	35	5	2.45E-01	11.3	
3	0	52.91	48	82	3.56	53.15	50	8	5.37E-02	35.5	
4	1	61.91	156	50	1.58	62.14	58	12	1.74E-01	11.0	4.42E+00
5	1	65.63	55	50	1.58	65.86	58	12	6.12E-02	27.7	
6	0	81.39	470	107	1.70	81.61	77	10	5.22E-01	6.2	
7	0	93.34	40	49	1.34	93.57	90	7	4.43E-02	33.5	
8	1	109.77	22	24	1.49	110.00	108	14	2.44E-02	41.2	1.61E+01
9	1	116.62	35	34	1.65	116.85	108	14	3.87E-02	32.3	
10	0	161.41	26	57	1.89	161.63	157	8	2.86E-02	54.2	
11	0	186.45	25	56	1.15	186.67	184	7	2.76E-02	53.4	
12	0	276.78	51	30	1.31	277.00	274	7	5.67E-02	22.6	
13	2	302.98	79	13	1.66	303.19	299	13	8.79E-02	13.6	5.94E+00
14	2	307.62	22	13	2.01	307.83	299	13	2.48E-02	31.5	
15	1	333.93	45	12	1.84	334.15	331	11	4.97E-02	19.2	1.63E+00
16	1	337.96	12	7	1.84	338.17	331	11	1.33E-02	61.1	
17	0	356.43	325	22	1.78	356.64	352	8	3.61E-01	6.1	
18	0	386.29	177	39	4.48	386.49	382	8	1.97E-01	9.7	
19	0	416.06	37	15	1.63	416.27	411	10	4.11E-02	25.6	
20	0	430.71	10	4	2.82	430.92	428	6	1.15E-02	44.0	
21	0	437.40	62	10	1.98	437.60	434	9	6.85E-02	15.6	
22	0	470.27	30	3	6.77	470.47	466	11	3.31E-02	21.4	
23	0	510.90	25	2	3.38	511.10	507	9	2.78E-02	22.6	
24	0	517.89	11	0	2.92	518.09	516	6	1.22E-02	30.2	

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	2.178E+02	2.178E+02	0.457E+02	20.98	
Total Activity :			2.178E+02	2.178E+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	2.106E+02	2.106E+02	0.476E+02	22.62	
Total Activity :			2.106E+02	2.106E+02			

Grand Total Activity : 4.284E+02 4.284E+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*	1.963E+01	2.178E+02	2.178E+02	20.98	OK
	302.84	17.80	4.915E+00	2.716E+02	2.717E+02	40.00	OK
	356.01	60.00	6.963E+00	2.338E+02	2.338E+02	19.43	OK

Final Mean for 3 Valid Peaks = 2.178E+02 +/- 4.568E+01 (20.98%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	2.106E+02	2.106E+02	22.62	OK

Final Mean for 1 Valid Peaks = 2.106E+02 +/- 4.764E+01 (22.62%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	2.178E+02	4.568E+01	1.570E+01	2.577E+00	13.875
TH-234	2.106E+02	4.764E+01	5.509E+01	1.765E+00	3.824

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.532E+00	1.134E+01	1.925E+01	6.010E+00	0.235
CD-109	-3.038E+01	1.342E+02	1.820E+02	2.354E+01	-0.167
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.202E+00	1.672E+00	3.482E+00	6.544E-02	2.355
NP-237	1.228E+01	3.515E+01	5.286E+01	6.436E+00	0.232
AM-241	4.095E+00	2.977E+00	5.291E+00	1.241E-01	0.774

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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:50:50.20

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410613_GE2_BAFIL_191251.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-102-SS DIS
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:35:35.
Sample ID : 1304106-13 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	31.01	1755	128	1.43	31.12	26	14	1.95E+00	2.5	5.16E+00
2	2	35.15	369	125	1.53	35.27	26	14	4.10E-01	7.2	
3	0	52.90	58	109	1.39	53.02	50	7	6.39E-02	33.2	
4	1	61.88	151	56	1.46	62.00	57	13	1.68E-01	11.0	3.60E+00
5	1	65.75	71	60	1.47	65.87	57	13	7.84E-02	20.0	
6	0	81.04	680	129	1.43	81.15	76	10	7.55E-01	5.0	
7	0	92.47	37	73	1.17	92.58	89	8	4.16E-02	42.5	
8	0	111.60	147	82	1.56	111.72	107	8	1.63E-01	13.5	
9	0	116.48	31	58	2.03	116.60	115	5	3.50E-02	38.3	
10	0	161.87	25	55	1.88	161.98	159	7	2.82E-02	51.7	
11	0	276.40	51	34	2.05	276.51	274	10	5.72E-02	25.0	
12	3	302.95	134	23	1.51	303.06	299	13	1.49E-01	10.1	8.59E+00
13	3	307.35	29	34	2.16	307.46	299	13	3.17E-02	39.1	
14	0	312.85	8	13	0.96	312.96	311	5	8.57E-03	78.5	
15	1	333.94	84	14	1.81	334.05	330	16	9.39E-02	12.0	2.02E+00
16	1	337.88	23	8	1.82	337.99	330	16	2.53E-02	35.7	
17	0	356.11	453	30	1.53	356.21	351	9	5.03E-01	5.2	
18	1	383.72	115	5	1.86	383.83	380	16	1.28E-01	10.4	6.42E+00
19	1	387.00	157	4	1.86	387.10	380	16	1.74E-01	10.1	
20	1	391.06	28	3	1.86	391.17	380	16	3.16E-02	32.5	
21	0	399.04	12	1	1.66	399.15	396	7	1.28E-02	34.7	
22	9	415.85	39	12	4.04	415.96	411	14	4.31E-02	24.3	2.12E+00
23	9	419.89	10	2	1.72	420.00	411	14	1.15E-02	56.6	
24	0	436.73	95	2	1.93	436.83	431	10	1.05E-01	10.7	
25	0	510.94	29	7	4.27	511.05	506	10	3.25E-02	25.3	
26	0	593.09	6	2	1.19	593.19	590	6	6.11E-03	55.3	
27	0	912.16	8	3	2.05	912.25	909	6	8.89E-03	49.2	

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	3.439E+02	3.439E+02	0.691E+02	20.10	
Total Activity :			3.439E+02	3.439E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	5.180E+02	5.180E+02	1.238E+02	23.91	
Total Activity :			5.180E+02	5.180E+02			

Grand Total Activity : 8.619E+02 8.619E+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	3.439E+02	3.439E+02	20.10	OK
	302.84	17.80	7.560E+00	2.988E+02	2.989E+02	36.14	OK
	356.01	60.00	7.170E+00	3.161E+02	3.162E+02	18.34	OK

Final Mean for 3 Valid Peaks = 3.439E+02+/- 6.913E+01 (20.10%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	5.180E+02	5.180E+02	23.91	OK

Final Mean for 1 Valid Peaks = 5.180E+02+/- 1.238E+02 (23.91%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.439E+02	6.913E+01	1.677E+01	2.855E+00	20.507
TH-234	5.180E+02	1.238E+02	1.443E+02	1.192E+01	3.590

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.627E+00	5.348E+00	9.082E+00	1.395E+00	0.179
CD-109	-6.135E+01	1.171E+02	1.538E+02	1.766E+01	-0.399
PA-231	3.728E+01	5.218E+00	1.006E+01	1.916E-01	3.705
PA-234	1.259E+00	1.868E+00	3.171E+00	6.541E-02	0.397
NP-237	4.625E+00	3.351E+01	4.943E+01	5.582E+00	0.094
AM-241	1.585E+01	9.996E+00	1.808E+01	1.399E+00	0.876

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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:51:28.73

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410614_GE3_BAFIL_191252.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-102R-SS TOT
 Deposition Date :
 Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:36:09.
 Sample ID : 1304106-14 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 00:15:03.96 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	30.96	930	53	1.59	31.28	26	17	1.03E+00	3.5	5.02E+00
2	4	35.32	217	47	1.93	35.64	26	17	2.42E-01	9.1	
3	0	46.60	34	65	2.99	46.92	43	8	3.82E-02	43.8	
4	0	53.34	36	75	1.99	53.66	51	7	4.00E-02	43.0	
5	2	58.97	15	35	1.65	59.29	58	15	1.64E-02	55.6	3.31E+00
6	2	61.97	96	52	1.66	62.29	58	15	1.06E-01	15.5	
7	2	66.39	30	45	1.67	66.71	58	15	3.39E-02	41.0	
8	2	69.75	14	41	1.68	70.07	58	15	1.56E-02	78.2	
9	0	81.31	340	112	1.90	81.63	77	11	3.77E-01	8.1	
10	0	93.58	28	72	1.47	93.89	89	8	3.11E-02	55.8	
11	5	111.97	89	51	1.90	112.28	108	14	9.88E-02	16.6	1.59E+00
12	5	115.66	29	52	2.34	115.97	108	14	3.24E-02	55.4	
13	0	187.89	20	36	3.37	188.20	183	9	2.22E-02	58.5	
14	0	198.59	25	30	1.92	198.90	195	8	2.82E-02	43.8	
15	0	267.11	13	4	2.94	267.42	264	8	1.44E-02	38.5	
16	0	276.63	23	11	1.36	276.94	274	7	2.56E-02	31.4	
17	0	302.94	64	14	1.65	303.25	299	8	7.11E-02	16.1	
18	0	308.38	10	11	1.26	308.69	307	6	1.11E-02	60.6	
19	0	324.27	14	7	2.89	324.57	321	7	1.56E-02	41.2	
20	1	333.80	29	7	1.83	334.11	330	14	3.24E-02	20.5	1.70E+00
21	1	337.86	10	6	1.83	338.17	330	14	1.14E-02	52.3	
22	0	356.32	209	16	1.66	356.62	352	9	2.32E-01	7.7	
23	2	383.82	23	20	2.06	384.12	381	10	2.55E-02	38.9	3.21E+00
24	2	386.66	39	24	2.06	386.96	381	10	4.30E-02	28.2	
25	1	414.58	16	7	1.89	414.88	412	10	1.82E-02	32.9	1.19E+00
26	1	418.72	10	4	1.90	419.02	412	10	1.09E-02	47.7	
27	0	437.29	39	3	1.58	437.59	434	6	4.29E-02	17.7	
28	0	470.50	17	7	6.03	470.80	465	10	1.87E-02	38.7	
29	0	511.41	17	0	2.48	511.71	509	8	1.89E-02	24.3	
30	0	582.82	7	2	1.38	583.12	579	7	8.02E-03	48.1	
31	0	663.23	8	2	3.50	663.52	660	7	9.11E-03	44.1	

Total number of lines in spectrum 31
 Number of unidentified lines 26
 Number of lines tentatively identified by NID 5 16.13%

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	1.628E+02	1.628E+02	0.369E+02	22.67	
Total Activity :			1.628E+02	1.628E+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	2.851E+02	2.851E+02	0.907E+02	31.80	
AM-241	432.20Y	1.00	4.271E+00	4.271E+00	4.759E+00	111.42	
Total Activity :			2.894E+02	2.894E+02			

Grand Total Activity : 4.522E+02 4.522E+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	1.628E+02	1.628E+02	22.67	OK
	302.84	17.80	6.222E+00	1.736E+02	1.736E+02	38.19	OK
	356.01	60.00	5.860E+00	1.787E+02	1.787E+02	20.60	OK

Final Mean for 3 Valid Peaks = 1.628E+02+/- 3.692E+01 (22.67%)

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	2.851E+02	2.851E+02	31.80	OK

Final Mean for 1 Valid Peaks = 2.851E+02+/- 9.067E+01 (31.80%)

AM-241	59.54	35.90*	2.893E+01	4.271E+00	4.271E+00	111.42	OK
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Final Mean for 1 Valid Peaks = 4.271E+00+/- 4.759E+00 (111.42%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	1.628E+02	3.692E+01	1.757E+01	2.687E+00	9.268
TH-234	2.851E+02	9.067E+01	1.070E+02	5.747E+00	2.665
AM-241	4.271E+00	4.759E+00	1.034E+01	5.086E-01	0.413

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-8.025E-01	5.401E+00	8.611E+00	9.837E-01	-0.093
CD-109	-9.667E+01	1.215E+02	1.496E+02	1.234E+01	-0.646
PA-231	6.018E-01	1.452E+00	2.715E+00	3.862E-02	0.222
PA-234	1.556E+00	1.069E+00	2.015E+00	2.866E-02	0.772
NP-237	-1.632E+01	3.585E+01	4.725E+01	3.820E+00	-0.345

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VAX/VMS Peak Search Report Generated 2-MAY-2013 17:51:56.65

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410615_GE5_BAFIL_191253.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-102R-DIS
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:36:37.
Sample ID : 1304106-15 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 00:15:01.14 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	3.93	13	16	0.31	43.07	40	7	1.45E-02	62.2	
2	0	10.94	8	5	0.18	110.37	105	10	8.89E-03	63.1	
3	0	21.24	97	21	1.02	209.23	200	17	1.08E-01	14.9	
4	0	31.05	1788	87	0.74	303.35	291	23	1.99E+00	2.7	
5	2	35.15	391	10	0.65	342.69	332	29	4.35E-01	5.6	2.12E+00
6	2	36.17	73	9	0.62	352.46	332	29	8.15E-02	25.3	
7	0	53.39	43	17	0.43	517.72	510	15	4.79E-02	23.7	
8	0	61.90	207	39	0.85	599.34	588	21	2.30E-01	9.4	
9	1	65.82	78	22	0.66	637.00	627	25	8.65E-02	17.2	3.17E+00
10	1	66.55	29	9	0.66	644.00	627	25	3.22E-02	44.1	
11	0	81.23	646	74	0.60	784.88	773	26	7.18E-01	5.1	
12	0	112.13	185	35	0.83	1081.36	1071	22	2.06E-01	10.4	
13	0	118.29	8	13	1.27	1140.43	1129	15	8.52E-03	105.0	
14	0	276.57	52	3	0.55	2659.24	2646	22	5.76E-02	15.3	
15	2	302.90	91	0	1.29	2911.90	2896	28	1.01E-01	9.6	1.13E+00
16	2	303.32	11	0	1.06	2916.00	2896	28	1.20E-02	69.9	
17	1	333.44	30	3	1.10	3205.00	3195	22	3.33E-02	23.3	1.76E+00
18	1	333.96	26	3	1.10	3210.00	3195	22	2.84E-02	26.3	
19	3	356.27	388	11	1.25	3424.03	3406	31	4.31E-01	4.9	8.09E+00
20	3	356.68	22	9	1.13	3428.00	3406	31	2.43E-02	79.0	
21	2	383.45	26	4	1.15	3684.89	3671	30	2.91E-02	33.4	8.54E-01
22	2	384.22	36	5	1.27	3692.23	3671	30	3.99E-02	22.1	
23	4	386.70	77	17	1.16	3716.00	3703	25	8.52E-02	16.8	7.90E-01
24	4	387.32	32	9	0.76	3722.02	3703	25	3.57E-02	30.5	

Total number of lines in spectrum 24
 Number of unidentified lines 17
 Number of lines tentatively identified by NID 7 29.17%

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	3.260E+02	3.261E+02	0.598E+02	18.33		
Total Activity :			3.260E+02	3.261E+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				
PA-231	3.28E+04Y	1.00	5.720E-01	5.720E-01	7.225E-01	126.31		
PA-234	4.47E+09Y	1.00	4.493E+00	4.493E+00	1.349E+00	30.01		
TH-234	4.47E+09Y	1.00	1.873E+02	1.873E+02	0.361E+02	19.28		
Total Activity :			1.924E+02	1.924E+02				

Grand Total Activity : 5.184E+02 5.184E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.260E+02	3.261E+02	18.33	OK
	302.84	17.80	2.575E+00	5.969E+02	5.970E+02	32.61	OK
	356.01	60.00	4.312E+00	4.504E+02	4.504E+02	17.49	OK

Final Mean for 3 Valid Peaks = 3.261E+02 +/- 5.977E+01 (18.33%)

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	5.720E-01	5.720E-01	126.31	OK
	10.11	20.20	1.000E+02	1.189E+00	1.189E+00	126.31	OK
	283.67	1.60	2.191E+00	-----	Line Not Found	-----	Absent
	302.67	2.30	2.572E+00	4.626E+03	4.626E+03	31.04	OK

Final Mean for 3 Valid Peaks = 5.720E-01 +/- 7.225E-01 (126.31%)

PA-234	9.89	89.00	1.000E+02	2.699E-01	2.699E-01	126.31	OK
	21.72	64.90*	1.000E+02	4.493E+00	4.493E+00	30.01	OK
	37.93	23.75	1.000E+02	9.275E+00	9.275E+00	50.86	OK
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 3 Valid Peaks = 4.493E+00 +/- 1.349E+00 (30.01%)

TH-234	63.29	3.80*	8.750E+01	1.873E+02	1.873E+02	19.28	OK
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Final Mean for 1 Valid Peaks = 1.873E+02 +/- 3.612E+01 (19.28%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.261E+02	5.977E+01	1.783E+01	2.625E+00	18.289
PA-231	5.720E-01	7.225E-01	1.558E+00	1.753E-02	0.367
PA-234	4.493E+00	1.349E+00	9.485E-01	1.068E-02	4.737
TH-234	1.873E+02	3.612E+01	2.685E+01	3.454E-01	6.975

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.557E+01	1.769E+01	2.682E+01	9.091E+00	-0.581
CD-109	3.673E+01	8.714E+01	1.707E+02	1.643E+01	0.215
NP-237	-1.347E+01	2.582E+01	4.383E+01	3.866E+00	-0.307
AM-241	9.979E-01	1.548E+00	2.617E+00	2.946E-02	0.381

KB
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VAX/VMS Peak Search Report Generated 2-MAY-2013 18:05:48.54

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410616_GE1_BAFIL_191254.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-104-SD TOT
 Deposition Date :
 Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:50:31.
 Sample ID : 1304106-16 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE1 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.22 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	27.90	17	55	1.51	28.14	27	13	1.89E-02	61.3	1.94E+01
2	3	30.97	1436	57	1.38	31.21	27	13	1.60E+00	2.7	
3	3	34.95	344	53	1.85	35.18	27	13	3.82E-01	8.7	
4	0	46.45	23	51	1.16	46.68	43	7	2.52E-02	56.4	
5	0	53.11	61	71	1.99	53.34	50	8	6.79E-02	27.0	
6	5	62.10	202	60	1.95	62.33	58	17	2.25E-01	9.4	2.65E+00
7	5	66.25	103	74	2.17	66.48	58	17	1.14E-01	18.6	
8	0	81.36	553	119	1.83	81.59	77	10	6.14E-01	5.7	
9	0	93.29	50	84	1.79	93.52	89	8	5.60E-02	34.5	
10	4	112.15	184	45	2.19	112.37	107	18	2.04E-01	9.6	2.58E+00
11	4	116.57	51	33	2.20	116.80	107	18	5.68E-02	26.5	
12	1	160.93	29	40	1.70	161.15	157	20	3.27E-02	35.2	1.48E+00
13	1	166.93	18	35	1.70	167.15	157	20	1.98E-02	57.9	
14	0	186.68	26	66	2.30	186.90	182	8	2.91E-02	57.2	
15	0	215.06	14	38	2.08	215.28	210	8	1.53E-02	81.9	
16	0	276.60	58	23	1.47	276.81	272	10	6.45E-02	20.2	
17	0	303.94	139	17	1.95	304.15	300	10	1.55E-01	10.0	
18	3	331.79	12	3	1.67	332.00	330	15	1.32E-02	35.3	6.13E+00
19	3	338.14	27	22	2.23	338.35	330	15	3.03E-02	34.5	
20	0	356.40	411	15	1.90	356.61	351	12	4.57E-01	5.3	
21	4	376.87	13	10	2.49	377.08	373	23	1.49E-02	46.1	7.40E+00
22	4	384.55	113	9	2.50	384.76	373	23	1.26E-01	12.8	
23	4	387.19	177	4	1.68	387.40	373	23	1.96E-01	8.5	
24	4	391.39	36	4	2.50	391.59	373	23	3.95E-02	33.6	
25	5	414.62	22	4	1.89	414.83	411	15	2.47E-02	30.0	1.68E+00
26	5	418.84	22	7	2.75	419.05	411	15	2.47E-02	36.5	
27	0	437.29	95	9	1.96	437.50	433	9	1.06E-01	11.7	
28	0	448.15	4	7	1.83	448.35	443	7	4.29E-03	124.8	
29	5	468.30	22	1	2.51	468.50	466	11	2.44E-02	24.2	5.23E-01
30	5	473.68	9	3	2.83	473.88	466	11	1.02E-02	42.7	
31	0	511.00	13	11	1.14	511.20	508	7	1.39E-02	51.5	

Total number of lines in spectrum 31
 Number of unidentified lines 27
 Number of lines tentatively identified by NID 4 12.90%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	2.564E+02	2.565E+02	0.521E+02	20.33		
Total Activity :			2.564E+02	2.565E+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	2.725E+02	2.725E+02	0.529E+02	19.41		
Total Activity :			2.725E+02	2.725E+02				

Grand Total Activity : 5.289E+02 5.290E+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*	1.963E+01	2.564E+02	2.565E+02	20.33	OK
	302.84	17.80	4.915E+00	4.780E+02	4.781E+02	35.41	OK
	356.01	60.00	6.963E+00	2.956E+02	2.956E+02	18.47	OK

Final Mean for 3 Valid Peaks = 2.565E+02 +/- 5.214E+01 (20.33%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	2.725E+02	2.725E+02	19.41	OK

Final Mean for 1 Valid Peaks = 2.725E+02 +/- 5.288E+01 (19.41%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	2.565E+02	5.214E+01	1.767E+01	2.901E+00	14.510
TH-234	2.725E+02	5.288E+01	5.111E+01	1.638E+00	5.332

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.007E+00	1.141E+01	1.818E+01	5.674E+00	-0.055
CD-109	-2.295E+01	1.412E+02	1.933E+02	2.501E+01	-0.119
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.199E+00	1.633E+00	3.366E+00	6.326E-02	2.139
NP-237	-3.309E+00	3.930E+01	5.454E+01	6.640E+00	-0.061
AM-241	5.818E+00	2.926E+00	5.441E+00	1.277E-01	1.069

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VAX/VMS Peak Search Report Generated 2-MAY-2013 18:06:30.51

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410617_GE2_BAFIL_191255.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-104-SD DIS
 Deposition Date :
 Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:51:11.
 Sample ID : 1304106-17 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	31.03	1862	127	1.32	31.14	26	18	2.07E+00	2.5	2.60E+00
2	3	35.25	478	96	1.68	35.36	26	18	5.31E-01	5.8	
3	0	46.00	54	98	3.21	46.11	44	6	5.95E-02	32.2	
4	0	52.67	67	95	2.05	52.78	50	6	7.43E-02	26.2	
5	0	60.74	137	244	1.51	60.85	58	8	1.52E-01	21.4	
6	0	66.27	71	86	1.32	66.38	65	5	7.86E-02	23.6	
7	1	81.02	722	54	1.50	81.14	77	10	8.02E-01	4.0	1.22E+01
8	1	83.75	27	49	1.50	83.86	77	10	2.97E-02	72.4	
9	0	93.88	28	75	1.91	94.00	91	7	3.09E-02	55.8	
10	0	111.54	140	128	1.32	111.65	108	8	1.56E-01	16.2	
11	0	116.40	37	70	1.55	116.52	115	6	4.13E-02	39.9	
12	0	160.63	16	74	1.13	160.74	158	7	1.72E-02	95.2	
13	0	185.71	26	44	2.92	185.83	183	6	2.84E-02	45.9	
14	0	276.84	80	29	1.84	276.95	271	12	8.89E-02	17.6	
15	3	302.91	126	9	1.56	303.02	299	15	1.40E-01	9.5	4.45E+00
16	3	307.35	42	8	2.16	307.46	299	15	4.62E-02	22.9	
17	4	333.93	71	10	1.83	334.04	330	13	7.94E-02	14.1	1.58E+00
18	4	338.34	21	19	2.42	338.45	330	13	2.30E-02	44.2	
19	0	356.10	519	18	1.49	356.21	352	8	5.76E-01	4.6	
20	0	364.17	15	11	1.46	364.28	361	7	1.61E-02	45.4	
21	0	376.73	14	7	1.82	376.84	373	8	1.53E-02	44.2	
22	1	383.81	112	16	1.86	383.92	380	11	1.25E-01	12.7	1.11E+01
23	1	387.03	174	34	1.83	387.13	380	11	1.93E-01	10.1	
24	0	391.53	28	16	1.88	391.63	390	6	3.09E-02	30.7	
25	2	414.94	41	7	2.07	415.04	412	20	4.51E-02	18.1	1.84E+00
26	2	418.25	24	8	2.08	418.36	412	20	2.71E-02	35.1	
27	2	421.91	8	8	2.08	422.02	412	20	9.07E-03	73.7	
28	0	437.33	85	8	1.79	437.44	433	8	9.40E-02	12.3	
29	0	468.20	12	9	1.20	468.30	465	7	1.34E-02	49.9	
30	0	511.39	25	7	2.05	511.50	506	10	2.73E-02	29.0	
31	0	525.52	6	4	1.74	525.62	522	6	6.28E-03	72.4	

Summary of Nuclide Activity

Sample ID : 1304106-17

Acquisition date : 2-MAY-2013 17:51:11

Total number of lines in spectrum 31
 Number of unidentified lines 27
 Number of lines tentatively identified by NID 4 12.90%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	3.654E+02	3.654E+02	0.704E+02	19.27		
Total Activity :			3.654E+02	3.654E+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				
AM-241	432.20Y	1.00	4.657E+01	4.657E+01	2.031E+01	43.62		
Total Activity :			4.657E+01	4.657E+01				

Grand Total Activity : 4.119E+02 4.120E+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	3.654E+02	3.654E+02	19.27	OK
	302.84	17.80	7.560E+00	2.814E+02	2.814E+02	35.44	OK
	356.01	60.00	7.170E+00	3.620E+02	3.620E+02	17.74	OK

Final Mean for 3 Valid Peaks = 3.654E+02+/- 7.041E+01 (19.27%)

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	4.657E+01	4.657E+01	43.62	OK

Final Mean for 1 Valid Peaks = 4.657E+01+/- 2.031E+01 (43.62%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.654E+02	7.041E+01	2.023E+01	3.445E+00	18.062
AM-241	4.657E+01	2.031E+01	1.871E+01	1.448E+00	2.488

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	8.119E-01	5.743E+00	9.493E+00	1.458E+00	0.086
CD-109	7.157E+01	1.180E+02	1.850E+02	2.124E+01	0.387
PA-231	3.775E+01	5.302E+00	1.020E+01	1.942E-01	3.702
PA-234	3.587E+00	1.874E+00	3.392E+00	6.997E-02	1.057
TH-234	4.065E+02	1.446E+02	2.594E+02	2.143E+01	1.567
NP-237	5.895E+00	3.646E+01	5.354E+01	6.045E+00	0.110

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VAX/VMS Peak Search Report Generated 2-MAY-2013 18:07:11.45

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410618_GE3_BAFIL_191256.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-104-SS TOT
 Deposition Date :
 Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:51:49.
 Sample ID : 1304106-18 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 00:15:04.29 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	2	30.92	2004	104	1.58	31.24	27	14	2.23E+00	2.3	1.88E+01
2	2	35.40	459	81	1.59	35.72	27	14	5.10E-01	5.8	
3	3	53.23	46	89	1.80	53.55	50	25	5.13E-02	34.2	3.97E+00
4	3	61.80	243	87	1.82	62.12	50	25	2.70E-01	8.6	
5	3	65.64	131	101	1.83	65.96	50	25	1.46E-01	16.4	
6	3	71.14	25	99	1.85	71.46	50	25	2.76E-02	66.0	
7	3	81.13	807	75	1.58	81.45	76	13	8.96E-01	3.8	4.83E+00
8	3	84.54	25	90	1.87	84.85	76	13	2.74E-02	100.7	
9	0	93.07	53	110	1.54	93.39	89	9	5.94E-02	38.1	
10	0	101.50	14	81	1.57	101.82	100	6	1.56E-02	105.1	
11	3	111.93	224	68	1.72	112.25	108	12	2.49E-01	8.6	1.23E+00
12	3	116.40	63	67	1.93	116.72	108	12	7.05E-02	25.3	
13	0	136.50	27	75	2.54	136.81	133	8	3.01E-02	58.9	
14	0	153.85	40	50	2.74	154.17	151	8	4.40E-02	35.6	
15	0	162.30	50	52	5.26	162.61	158	9	5.60E-02	29.3	
16	0	249.04	13	27	1.25	249.35	246	6	1.44E-02	69.0	
17	0	276.79	50	20	1.13	277.09	276	5	5.53E-02	20.7	
18	5	303.08	141	10	1.67	303.39	300	18	1.56E-01	8.8	3.06E+00
19	5	308.18	30	16	2.65	308.49	300	18	3.35E-02	31.6	
20	5	333.58	63	16	1.87	333.89	330	12	7.03E-02	16.2	6.32E+00
21	5	338.39	34	6	2.68	338.69	330	12	3.81E-02	22.6	
22	0	356.34	463	32	1.82	356.64	352	11	5.14E-01	5.3	
23	0	366.22	30	18	5.07	366.53	362	11	3.32E-02	32.3	
24	1	383.87	106	26	1.87	384.17	381	10	1.18E-01	13.9	1.73E+01
25	1	386.87	199	40	1.79	387.17	381	10	2.21E-01	9.6	
26	2	414.72	34	20	2.08	415.02	410	12	3.77E-02	28.8	2.52E+00
27	2	418.06	14	35	2.09	418.36	410	12	1.52E-02	78.1	
28	0	437.40	119	11	1.92	437.70	432	10	1.33E-01	10.4	
29	0	468.16	22	7	1.93	468.45	464	7	2.44E-02	29.2	
30	0	512.38	19	6	2.27	512.68	506	13	2.14E-02	35.2	
31	0	615.22	6	1	2.81	615.51	612	6	6.19E-03	54.6	

Total number of lines in spectrum 31
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 6 19.35%

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	3.866E+02	3.867E+02	0.680E+02	17.57	
NP-237	2.14E+06Y	1.00	3.356E+01	3.356E+01	6.765E+01	201.61	
Total Activity :			4.202E+02	4.202E+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	7.245E+02	7.245E+02	1.342E+02	18.53	
Total Activity :			7.245E+02	7.245E+02			

Grand Total Activity : 1.145E+03 1.145E+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	3.866E+02	3.867E+02	17.57	OK
	302.84	17.80	6.222E+00	3.817E+02	3.818E+02	27.09	OK
	356.01	60.00	5.860E+00	3.952E+02	3.952E+02	17.24	OK

Final Mean for 3 Valid Peaks = 3.867E+02+/- 6.795E+01 (17.57%)

NP-237	86.50	12.60*	1.749E+01	3.356E+01	3.356E+01	201.61	OK
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Final Mean for 1 Valid Peaks = 3.356E+01+/- 6.765E+01 (201.61%)

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	7.245E+02	7.245E+02	18.53	OK

Final Mean for 1 Valid Peaks = 7.245E+02+/- 1.342E+02 (18.53%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.867E+02	6.795E+01	2.015E+01	3.081E+00	19.192
TH-234	7.245E+02	1.342E+02	1.319E+02	7.086E+00	5.491
NP-237	3.356E+01	6.765E+01	5.417E+01	4.379E+00	0.619

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	6.505E+00	6.397E+00	1.144E+01	1.307E+00	0.569
CD-109	-4.023E+00	1.327E+02	1.866E+02	1.539E+01	-0.022
PA-231	2.229E+00	1.640E+00	3.224E+00	4.585E-02	0.692
PA-234	2.740E+00	1.422E+00	2.748E+00	3.908E-02	0.997
AM-241	2.635E+01	9.799E+00	1.833E+01	9.014E-01	1.437

KB
5/21/13

VAX/VMS Peak Search Report Generated 2-MAY-2013 18:08:00.27

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410619_GE5_BAFIL_191257.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-104-SS DIS
Deposition Date :
Sample Date : 2-MAY-2013 00:00:00. Acquisition date : 2-MAY-2013 17:52:24.
Sample ID : 1304106-19 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 00:15:01.17 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	0	12.30	5	7	0.10	123.36	118	9	5.09E-03	123.9	
2	0	20.96	100	32	0.84	206.50	191	26	1.12E-01	18.5	
3	0	27.49	20	15	1.01	269.15	261	16	2.18E-02	50.7	
4	0	31.04	2014	114	0.72	303.26	290	25	2.24E+00	2.6	
5	6	35.15	383	31	0.61	342.63	333	30	4.26E-01	6.5	1.00E+00
6	6	35.95	141	23	0.91	350.39	333	30	1.56E-01	20.3	
7	1	53.32	35	17	0.62	517.00	506	23	3.84E-02	32.5	9.75E-01
8	1	53.73	13	9	0.62	521.00	506	23	1.49E-02	78.5	
9	0	61.90	263	12	0.88	599.34	587	25	2.92E-01	6.9	
10	5	65.82	37	25	0.66	637.00	627	29	4.16E-02	36.7	9.05E-01
11	5	66.70	58	20	1.07	645.39	627	29	6.43E-02	25.3	
12	0	70.43	17	9	0.28	681.17	673	14	1.89E-02	40.5	
13	1	79.69	40	45	0.76	770.10	760	37	4.44E-02	34.7	8.52E-01
14	1	81.19	842	28	0.68	784.48	760	37	9.35E-01	3.7	
15	0	112.10	177	51	0.75	1081.10	1070	25	1.97E-01	12.3	
16	0	116.47	53	20	0.52	1122.96	1112	24	5.85E-02	23.5	
17	0	276.61	38	13	0.62	2659.62	2644	24	4.20E-02	25.9	
18	0	303.01	97	10	0.76	2913.02	2899	24	1.08E-01	11.8	
19	1	333.34	14	7	1.10	3204.00	3191	30	1.56E-02	63.2	3.62E+00
20	1	333.96	94	4	1.10	3210.00	3191	30	1.04E-01	9.3	
21	0	356.10	392	13	0.71	3422.42	3405	33	4.36E-01	5.4	
22	1	383.46	19	3	1.16	3685.00	3676	24	2.16E-02	44.1	1.63E+00
23	1	384.09	83	4	1.16	3691.00	3676	24	9.24E-02	11.6	
24	3	386.06	15	5	1.28	3709.89	3702	29	1.61E-02	65.8	8.93E-01
25	3	386.93	130	15	1.16	3718.27	3702	29	1.44E-01	10.4	
26	1	390.45	12	5	1.16	3752.00	3745	27	1.32E-02	37.7	9.86E-01
27	1	391.19	53	5	1.28	3759.12	3745	27	5.84E-02	13.5	
28	0	414.77	26	7	0.62	3985.41	3970	24	2.83E-02	27.8	

Total number of lines in spectrum 28
 Number of unidentified lines 22
 Number of lines tentatively identified by NID 6 21.43%

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	4.249E+02	4.249E+02	0.720E+02	16.95	
Total Activity :			4.249E+02	4.249E+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	2.375E+02	2.375E+02	0.342E+02	14.38	
Total Activity :			2.375E+02	2.375E+02			

Grand Total Activity : 6.623E+02 6.624E+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	4.249E+02	4.249E+02	16.95	OK
	302.84	17.80	2.575E+00	6.342E+02	6.343E+02	35.38	OK
	356.01	60.00	4.312E+00	4.552E+02	4.553E+02	18.05	OK

Final Mean for 3 Valid Peaks = 4.249E+02+/- 7.201E+01 (16.95%)

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	2.375E+02	2.375E+02	14.38	OK

Final Mean for 1 Valid Peaks = 2.375E+02+/- 3.416E+01 (14.38%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.249E+02	7.201E+01	1.264E+01	1.862E+00	33.604
TH-234	2.375E+02	3.416E+01	2.397E+01	3.083E-01	9.908

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.061E+00		1.450E+01	2.775E+01	9.408E+00	0.146
CD-109	1.010E+02		8.387E+01	1.809E+02	1.740E+01	0.558
PA-231	-9.119E-01		8.948E-01	1.369E+00	1.541E-02	-0.666
PA-234	4.644E+00	+	1.725E+00	2.012E+00	2.265E-02	2.308
NP-237	-2.534E+01		2.411E+01	3.697E+01	3.261E+00	-0.685
AM-241	2.367E+00		1.458E+00	2.833E+00	3.189E-02	0.835